

Alaska Subsistence Harvest of Birds and Eggs, 2012, Alaska Migratory Bird Co-Management Council

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Photo by Lili Naves, ADF&G Subsistence

August 2014

Alaska Department of Fish and Game
Division of Subsistence



Alaska Migratory Bird
Co-Management Council



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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly-accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H _A
gram	g			base of natural logarithm	e
hectare	ha			catch per unit effort	CPUE
kilogram	kg	all commonly-accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	coefficient of variation	CV
kilometer	km			confidence interval	CI
liter	L	at	@	correlation coefficient (multiple)	R
meter	m	compass directions:		correlation coefficient (simple)	r
milliliter	mL	east	E	covariance	cov
millimeter	mm	north	N	degree (angular)	�
		south	S	degrees of freedom	df
Weights and measures (English)		west	W	expected value	E
cubic feet per second	ft ³ /s	copyright	�	greater than	>
foot	ft	corporate suffixes:		greater than or equal to	≥
gallon	gal	Company	Co.	harvest per unit effort	HPUE
inch	in	Corporation	Corp.	less than	<
mile	mi	Incorporated	Inc.	less than or equal to	≤
nautical mile	nmi	Limited	Ltd.	logarithm (natural)	ln
ounce	oz	District of Columbia	D.C.	logarithm (base 10)	log
pound	lb	et alii (and others)	et al.	logarithm (specify base)	log ₂ , etc.
quart	qt	et cetera (and so forth)	etc.	minute (angular)	'
yard	yd	exempli gratia (for example)	e.g.	not significant	NS
		Federal Information Code	FIC	null hypothesis	H ₀
Time and temperature		id est (that is)	i.e.	percent	%
day	d	latitude or longitude	lat. or long.	probability	P
degrees Celsius	�C	monetary symbols (U.S.)	\$, �	probability of a type I error (rejection of the null hypothesis when true)	α
degrees Fahrenheit	�F	months (tables and figures)	first three letters (Jan.,...,Dec)	probability of a type II error (acceptance of the null hypothesis when false)	β
degrees kelvin	K	registered trademark	�	second (angular)	"
hour	h	trademark	TM	standard deviation	SD
minute	min	United States (adjective)	U.S.	standard error	SE
second	s	United States of America (noun)	USA	variance	
		U.S.C.	United States Code	population	Var
Physics and chemistry		U.S. state	two-letter abbreviations (e.g., AK, WA)	sample	var
<i>all atomic symbols</i>					
alternating current	AC	Measures (fisheries)			
ampere	A	fork length	FL		
calorie	cal	mideye-to-fork	MEF		
direct current	DC	mideye-to-tail-fork	METF		
hertz	Hz	standard length	SL		
horsepower	hp	total length	TL		
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

TECHNICAL PAPER NO. 397

**ALASKA SUBSISTENCE HARVEST OF BIRDS AND EGGS, 2012,
ALASKA MIGRATORY BIRD CO-MANAGEMENT COUNCIL**

by

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Front cover photo: Four short-tailed shearwaters (bottom right), or *kaputaghaq* in St. Lawrence Island Siberian Yupik, wait to be plucked at Larry Kava's household. Kaputaghaq is the most abundant bird in fall offshore St. Lawrence Island, and it is sometimes harvested for food. Savoonga, November 2012. Photo by Lili Naves, ADF&G Division of Subsistence.

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ABSTRACT

This report presents subsistence harvest estimates of birds and their eggs in Alaska for the data year 2012. Data were collected 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 communities 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 communities and households. The sampling 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 community level are considered sensitive. Communities with similar harvest patterns are grouped in subregions. Harvests reported by surveyed communities are expanded to nonsurveyed communities in the same subregion. Subregions are grouped into regions, which approximately correspond to the designated migratory bird management regions. Within communities, households are stratified by harvest level. Communities and regions are surveyed on a rotating schedule, which is adjusted annually according to monitoring priorities and funding availability. In 2012, the harvest survey was conducted in 2 regions: Bering Strait-Norton Sound (St. Lawrence-Diomedes Islands subregion) and Northwest Arctic (Kotzebue subregion).

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, ptarmigans, grouses, seabirds, shorebirds, grebes, loons.

ACKNOWLEDGMENTS

This subsistence harvest survey would not have been possible without the local support of the Alaska communities. The Alaska Migratory Bird Co-Management Council (AMBCC) and the Alaska Department of Fish and Game (ADF&G) Division of Subsistence are most grateful to all households that agreed to report their subsistence harvests. We thank the tribal councils of the communities of Gambell, Savoonga, and Kotzebue for their support to the survey and assistance in logistical and communication matters. We thank Alex Whiting (Native Village of Kotzebue) for facilitating the Kotzebue survey and its data review. Local surveyors helped with data collection: Susan Apassingok, Dawnelle Apangalook, and Joshua Slwooko (Gambell); Morgan Annogiyuk and Tristan Seppilu (Savoonga); and Chelsea Hadley, Denali Whiting, Mahlon Ferreira, and Eryn Schaeffer-Newlin (Kotzebue). Social scientists and biologists also helped in harvest data collection: James Van Lanen, Elizabeth Mikow, Anna Godduhn, Brittany Retherford, Loraine Navarro (ADF&G) and Tamara Zeller (USFWS). Dave Koster and staff of the Information Management Unit provided data entry and management support. Terri Lemons prepared maps, and Adam Knight edited this report.

INTRODUCTION

In 1918, Canada and the United States ratified the Migratory Bird Treaty Act (the treaty) to protect migratory bird populations. Among other provisions, the treaty set an annual hunting closure between 10 March and 1 September. However, this provision failed to provide for the spring and summer harvest of migratory birds by northern peoples; these harvests have been historically necessary to their subsistence way of life. Despite the closure, customary and traditional bird hunting in spring and summer continued.

In 1997, the U.S. Congress ratified a treaty amendment recognizing traditional spring and summer subsistence bird harvests by northern peoples. The goal of the amendment was to promote conservation of migratory birds by including subsistence hunting in the regulatory process. The amendment authorized the U.S. Fish and Wildlife Service (USFWS) to open regulated spring and summer subsistence hunts of migratory birds in Alaska. The amendment also mandated that Alaska's Native people play a meaningful role 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 Native entities (65 FR 16405–16409¹). The AMBCC identified the need for harvest assessment to document traditional uses of migratory birds and levels of harvest. Harvest assessment 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 first legal spring–summer subsistence hunting season was in 2003.

Annual monitoring of bird and egg harvests was first implemented in 1985–2002 in the Yukon-Kuskokwim Delta region (Y-K Delta) (Copp 1985; Copp and Roy 1986; Wentworth 2007a) in the context of the Goose Management Plan (Zavaleta 1999). Similar surveys were conducted in the Bristol Bay region about every other year in 1995–2002 (Wentworth 2007b). These earlier surveys played an important role in refining survey methods, developing acceptance of harvest surveys in rural communities, engaging users in the management process, and together with the AMBCC harvest data (below) constitute a long dataset necessary for the understanding of highly variable harvests.

The AMBCC harvest monitoring program was developed to meet the intentions of the treaty amendment. This program was based on goose management plan surveys conducted in the Y-K Delta and Bristol Bay and expanded the geographic coverage of birds and eggs harvest monitoring to other Alaska regions (Reynolds 2007)². The AMBCC survey has been conducted annually since 2004 relying on collaboration among USFWS, ADF&G, and Alaska Native partners. The USFWS has funded the survey program and currently contracts with the ADF&G Division of Subsistence for program coordination. Data collection is usually implemented by Native partners at the regional and local levels. Data collection in 2004–2009 followed methods described in Naves (2010a). In 2008–2009, the survey program was collaboratively revised to streamline program structure and data collection, analysis, and reporting (Naves et al. 2008). The revised survey has been implemented since 2010. The AMBCC also conducts outreach, education, and research to address specific management issues (e.g., (Naves and Zeller 2013; Naves 2014a). This report is the sixth in a series presenting annual regional and subregional harvest estimates for birds and bird eggs based on data collected by the AMBCC harvest assessment program (Naves 2010a; Naves 2010b; Naves 2011; Naves 2012; Naves 2014b).

Harvest estimates from the AMBCC survey are available to Alaska rural communities (or villages), Native organizations, state and federal resource management and conservation agencies, the Pacific Flyway Council, and the general public. Some uses of the survey data are:

- Document the importance of customary and traditional uses of migratory birds by Alaska rural communities so that subsistence uses will be protected and conducted in a sustainable manner;
- Document subsistence harvest trends and track changes in harvests;

1. Federal Register Vol. 65, No. 60 (March 28, 2000) available online: <http://www.gpo.gov/fdsys/pkg/FR-2000-03-28/pdf/00-7550.pdf>.

2. See also AMBCC (Alaska Migratory Bird Co-Management Council). 2003. Recommendations for a statewide Alaska migratory bird subsistence harvest survey. Unpublished report by the Subsistence Harvest Survey Committee. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Anchorage.

- 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

GENERAL SURVEY DESIGN

Current survey methods were described in detail in Naves (2012). The subsistence harvest survey area includes 193 remote communities in 10 survey and management regions (68 FR 43010–43030³). The Southeast Alaska region has not been surveyed (4 communities are eligible only for egg harvests). The survey regions were divided in 29 subregions to better account for geographical variation in harvest patterns (Figure 1). In 2010, the regions had a total population of 89,481 people (U.S. Census Bureau 2011). Regions have been surveyed depending on annual management priorities, funding availability, and factors affecting fieldwork logistics in remote Alaska (e.g., weather, communication, costs, local partnerships in place) (tables 1 and 2).

In 2012, the survey was conducted in Kotzebue (Figure 2), and the communities of St. Lawrence Island (Figure 3) were surveyed in the context of a dedicated survey (Naves and Zeller 2013). These data were used in this report to generate subregion harvest estimates. The following organizations participated in the 2012 data collection: Native Villages of Kotzebue, Gambell, and Savoonga and ADF&G Division of Subsistence (Fairbanks).

From a subsistence harvester’s perspective, harvest surveys collect information that commonly is private and sensitive. Subsistence bird harvests are sensitive because spring and summer hunting was illegal until recently. Subsistence users fear that information provided in harvest surveys may be used to direct law enforcement efforts and to limit harvest practices that are essential for their diet and culture. To meet survey objectives, it is necessary to develop and maintain trust and collaboration between subsistence users and resource management agencies. Community and household participation in the survey were voluntary. Community consent to conduct surveys was granted as tribal council resolutions and ethical principles for social science research were closely observed (Arctic Research Consortium of the United States (ARCUS) 1999:55–59; Naves 2012:7)⁴. Data at the household level are considered confidential and data at the community level are sensitive. Archived materials did not include household names or other personal information for anonymity of household harvest reports. Household names were not used in harvest report forms and were not entered in the database (a numeric household identifier was used). Names on household lists were covered; lists not showing names were then photocopied and scanned for digital archiving together with other survey materials. Preliminary harvest estimates based on survey data are submitted to Alaska Native regional partners for review before being adopted by the AMBCC in its annual spring meeting. Information from the survey is not to be used for punitive enforcement purposes, nor has this been reported to have happened.

The household was the basic sampling unit. The sampling frame encompassed all occupied households in surveyed regions or subregions. At the community level, data collection relied on household lists including all resident households (appendices A and B). A household is considered resident if its members have lived in the community for at least the 12 months prior to the survey. Household lists did not include unoccupied dwellings, commercial buildings, and public buildings.

Local surveyors were trained by a regional partner or survey coordination staff. Harvest surveys were completed during face-to-face interviews conducted by a local surveyor. In 2012, social scientists and biologists from the ADF&G and the USFWS also worked in data collection. Survey respondents were instructed to report (1) all bird and egg harvests by all hunters in the household, including those given to other household(s); (2) to report the household’s share of harvests done by a multi-individual harvesting party; and (3) not to report birds or eggs received from other household(s). A tracking sheet was used to document household contacts and participation (Appendix B). Alternate households were selected to replace households that declined to participate and households that could not be contacted after 3 reasonable attempts.

3. Federal Register Vol. 68, No. 139 (July 21, 2003) available online: <http://www.gpo.gov/fdsys/pkg/FR-2003-07-21/pdf/03-18097.pdf>.

4. See also Alaska Federation of Natives. 2013. “Alaska Federation of Natives Guidelines for Research.” Alaska Native Knowledge Network. Accessed February 25, 2014. <http://www.ankn.uaf.edu/IKS/afnguide.html>.

The harvest report form for Western Alaska was used to record the harvest of birds and eggs (Appendix C). The survey form included species important for subsistence uses or of management interest. Harvests of species not represented in the form can be reported in the field “other bird.” Some species that are difficult to tell apart were combined in categories [teal, goldeneye, scaup, merganser, Canada goose, swan, grouse, ptarmigan, cormorant, tern, Bonaparte’s/Sabine’s gull, large gull, auklet, murre, guillemot, puffin, whimbrel/curlew, godwit, golden/black-bellied plover, turnstone, phalarope, small shorebird, Pacific loon, and grebe (Appendix D)]. The form had a sheet for each survey season (spring: 2 April–30 June, summer: 1 July–31 August, and fall: 1 September–31 October). The bird identification guide had color drawings of birds (Appendix E). A poster with color photographs of all species included in the survey assisted in species identification and outreach. On the poster, close to each photograph, appeared the species’ English name and a blank field for writing Native and local names (Appendix F). Data collection staff used lists of local and Alaska Native species names to help in communicating with respondents and in species identification (Naves 2012; Naves and Zeller 2013).

In 2012, differently from previous years, loon species names were not displayed the bird identification guide and harvest report form because of confusion generated by the English name “common loon,” which is frequently understood as the locally most common species of loon, and because of differences between local ethnotaxonomy and western taxonomy (Naves and Zeller 2013). To facilitate loon identification and document harvests of loons in nonbreeding plumages (juveniles and nonbreeding adults), a drawing of a loon in nonbreeding plumage (juvenile Pacific loon) was added to the bird identification guide and harvest report form. The common loon was presented next to the yellow-billed loon to highlight similarities between these species. The sizing of the loon drawings attempted to depict size differences among species. Loon identification was based primarily on drawings related to numbers: loon 1 (Pacific/Arctic loon), loon 2 (nonbreeding loon), loon 3 (yellow-billed loon), loon 4 (common loon), and loon 5 (red-throated loon).

In 2012, communities of St. Lawrence Island were surveyed in the context of a dedicated survey (Naves and Zeller 2013) and these data were used to generate harvest estimates for the St. Lawrence-Diomedes Islands subregion presented in this report. Harvest data collection followed standard AMBCC survey methods, except that the sampling goal was increased to a census survey (100% of all households in Gambell and Savoonga). Because some households decline to participate or cannot be contacted, households were stratified a priori as harvester or nonharvester to properly account for nonsurveyed households when calculating harvest estimates. Harvester was defined as households that have harvested birds or eggs in any 1 of the 3 years prior to the study year.

The 2012 AMBCC harvest survey in Kotzebue was possible because of the opportunity to conduct this survey in conjunction with a harvest survey for other subsistence resources (Godduhn and Braem 2014). The value of this opportunity resided on the fact that no recent bird harvest information was available for this area and that some previous surveys did not include detailed information on species harvested and seasonality of harvests. To combine these surveys, modifications were necessary to the timing of data collection and sampling design of the standard AMBCC harvest survey protocol (Naves 2012). Harvest data was collected during in-person interviews conducted in May 2013 while the standard AMBCC protocol calls for 2 seasonal household visits to collect spring and summer–fall harvest data. The sample included 216 households randomly selected out of a total of 815 households in the community (sampling rate=27%) while the standard AMBCC protocol calls for harvest-other stratification. Considering the timing of data collection and reduced survey burden associated to a single household visit, this survey also included winter harvests to completely portray Kotzebue bird harvests. The harvest period covered was April 2012–March 2013.

AMBC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, REGIONS AND SUBREGIONS

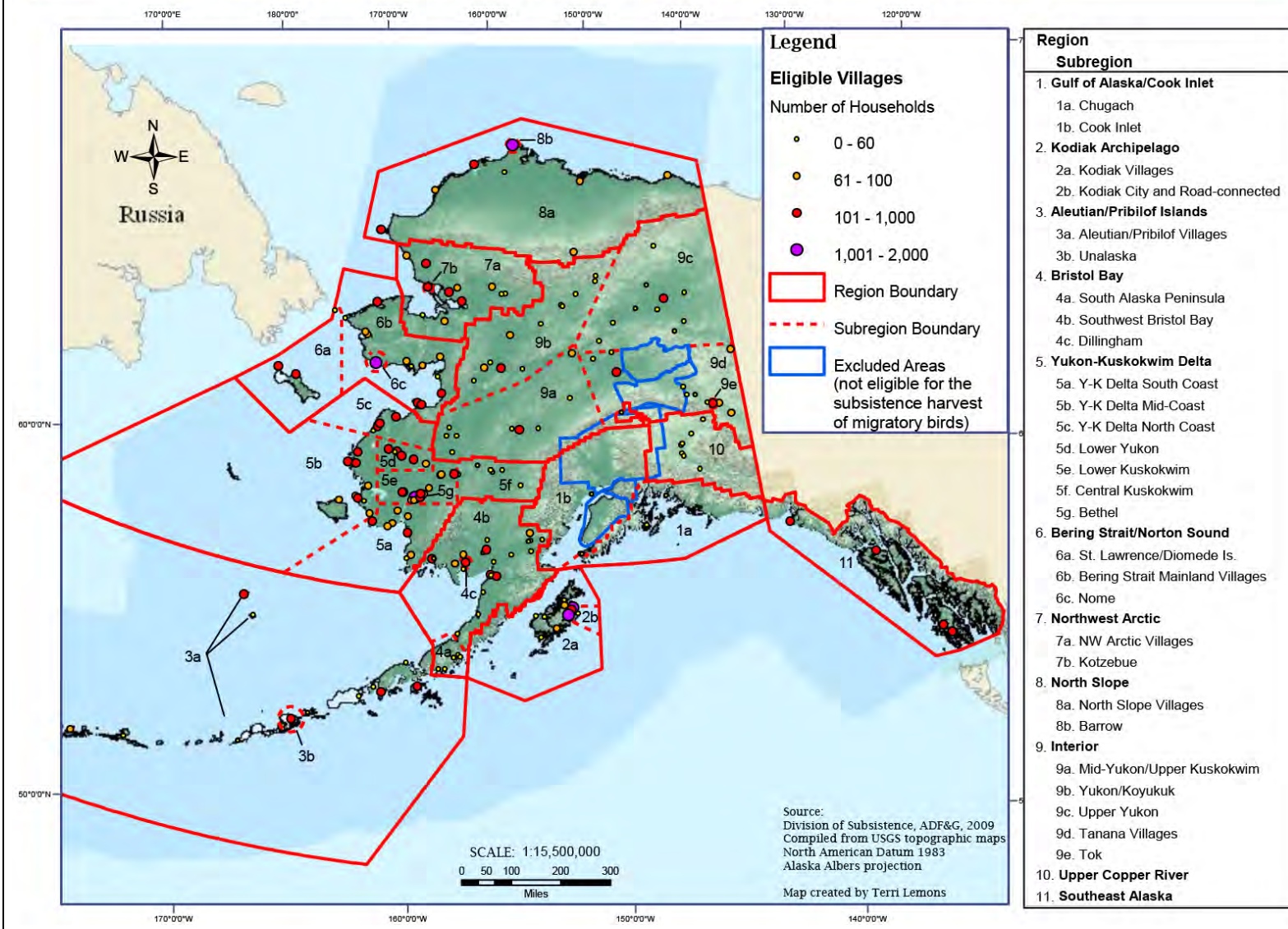
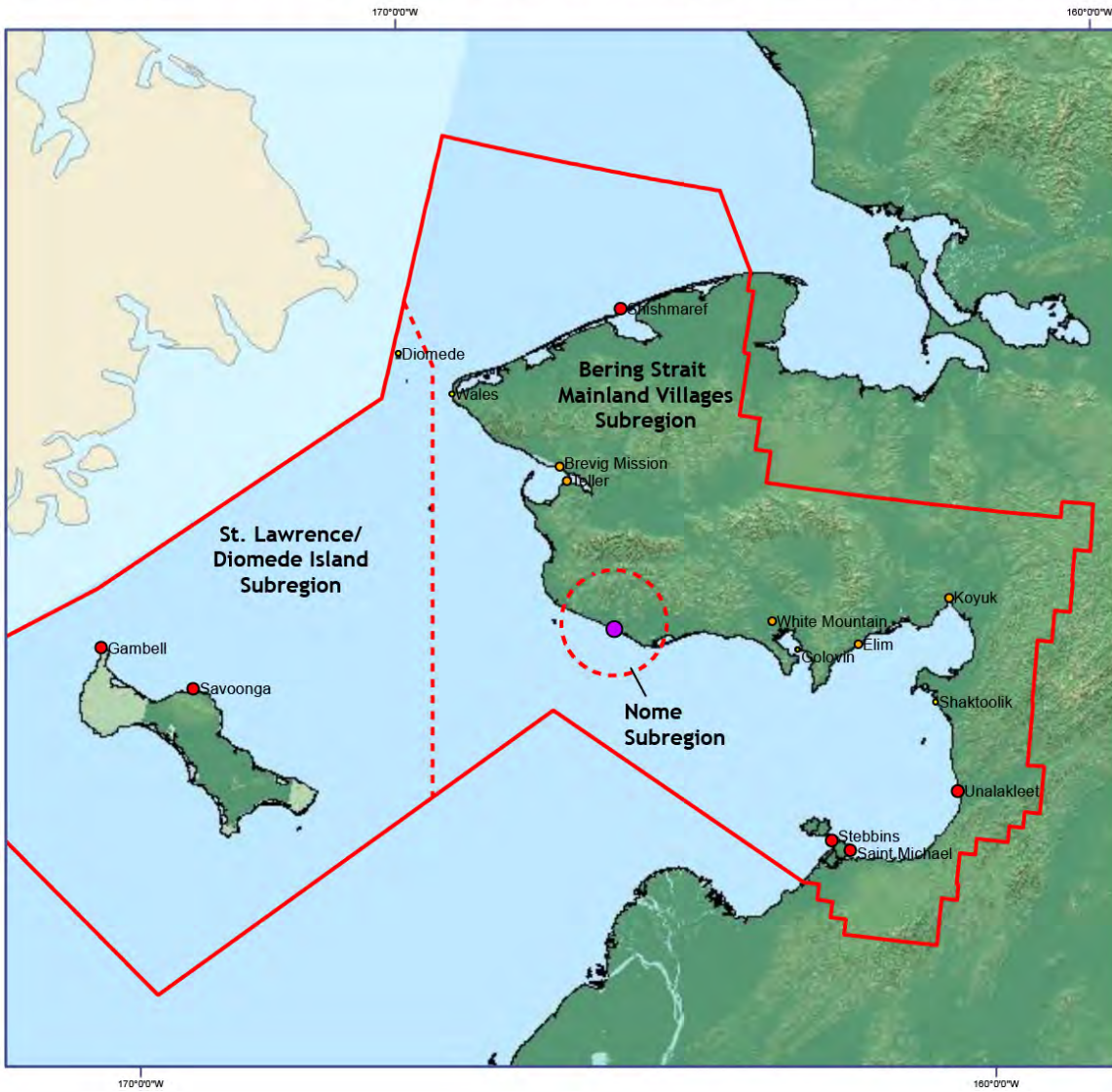


Figure 1.—Regions and subregions of the AMBC migratory bird subsistence harvest survey.

AMBCC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, BERING STRAIT/NORTON SOUND



Legend

Eligible Villages

Number of Households

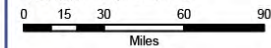
- 0 - 60
- 61 - 100
- 101 - 1,000
- 1,001 - 2,000

Region Boundary

Subregion Boundary



SCALE: 1:3,500,000



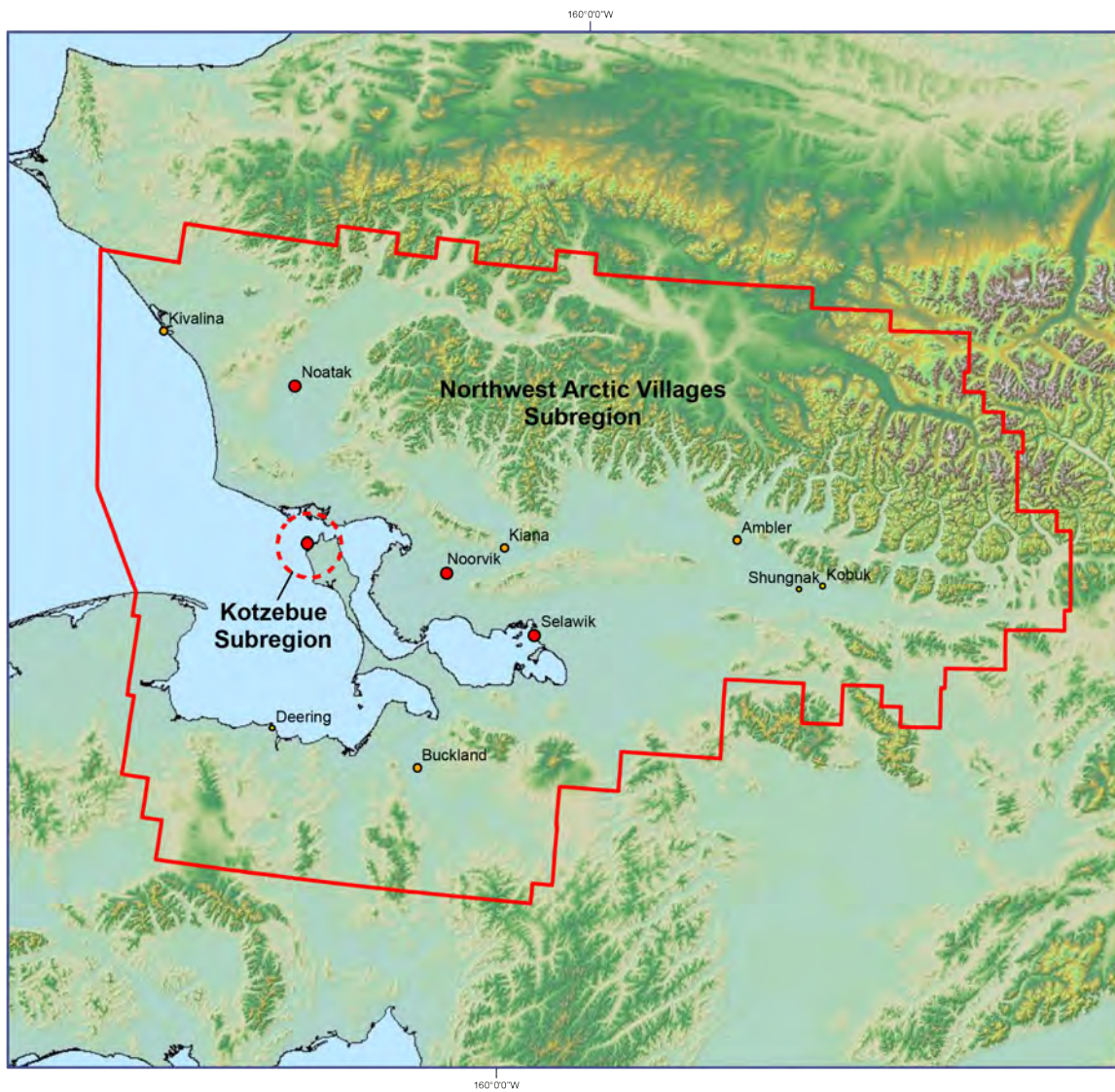
Source:
 Division of Subsistence, ADF&G, 2009
 Compiled from USGS topographic maps
 North American Datum 1983
 Alaska Albers projection

Map created by Terri Lemons

7

Figure 2.-Bering Strait-Norton Sound region.

AMBCC SUBSISTENCE HOUSEHOLD HARVEST SURVEY, NORTHWEST ARCTIC



Legend

Eligible Villages

Number of Households

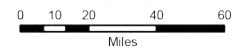
- 0 - 60
- 61 - 100
- 101 - 1,000
- 1,001 - 2,000

Region Boundary

Subregion Boundary



SCALE: 1:2,750,000



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

Map created by Terri Lemons

Figure 3.–Northwest Arctic region.

Table 1.–Regions surveyed in 2004–2012.

Regions	2004	2005	2006	2007	2008	2009	2010	2011	2012
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 2004–2011 were reported in Naves (2010a; 2010b; 2011; 2012; 2014b).

Table 2.–Number of communities and households included in data analysis, 2004–2012.

Survey year	Communities included in harvest estimates	Households surveyed			
		Spring	Summer	Fall (or Fall-Winter)	Winter
2004	77	1,770	1,707	1,673	a
2005	75	2,226	2,251	1,742	a
2006	62	1,793	1,773	1,687	a
2007	74	2,076	2,051	1,491	a
2008	44	1,630	1,568	1,189	a
2009	27	923	909	762	a
2010	50	1,875	1,845	1,675	215
2011	25	1,335	1,176	1,197	36
2012	3	473	473	445	216

Sources Survey results for 2004–2011 were reported in Naves (2010a; 2010b; 2011; 2012; 2014b).

a. In 2004–2009, for regions and subregions with a winter survey, data were recorded as fall–winter.

DATA ANALYSIS

Data were entered in Microsoft Office Access 2010⁵ forms designed to mimic survey forms. The raw data were stored in a Microsoft SQL Server Management Studio 2008 relational database. Double data entry and logical checks promote accuracy of the data stored in the database (reported harvests, sampling method used, sample size, strata size). Logical checks and data analysis were done with IBM SPSS Statistics 19, 2010. Original survey forms were scanned and archived as digital files. To ensure anonymity of household harvest reports, household names or other personal information provided were covered prior to scanning and the original forms were not archived.

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

Community participation rate was calculated as the number of communities that agreed to participate divided by the total number of communities where contact was attempted. The total number of communities where contact was attempted included (a) communities that agreed to participate, (b) communities that did not agree to participate, and (c) communities where multiple contact attempts were made without a response (which may suggest lack of interest or willingness to participate in the survey). Household participation rate was calculated as the number of households that agreed to participate divided by the total number of households contacted. The total number of households contacted included (a) households that agreed to participate and (b) households that did not agree to participate.

Reported harvests from surveyed communities were expanded to nonsurveyed communities in the same subregion. Harvest estimates and confidence intervals were based on Cochran (1977) and Bernard, Bingham, and Alexandersdottir (1998) (Appendix G). Harvest estimates were calculated for each season and annual estimates were calculated as the sum of seasonal harvests. For nonsurveyed communities, the number of occupied households was calculated by dividing 2012 population estimates (Alaska Department of Labor and Workforce Development 2013) by the number of people per household reported in the 2010 census (U.S. Census Bureau 2011). If the low end of the confidence intervals was less than the reported harvest, the calculated low end was replaced by the reported harvest.

Surveyors are instructed to assist households to report egg harvests in number of eggs. But occasionally, egg harvests are reported by volume and need to be converted to number of eggs. Five-gallon or 1-gallon buckets are containers commonly used in egg harvesting. Eggs of different sizes and shapes arrange differently in a given volume. The amount of empty space among eggs depends on egg size and shape and also on the shape of the container. Besides, people may use grass or moss between layers of eggs to prevent breaking them during transport. Therefore, the household can provide the best information on the number of eggs harvested. In the lack of this information, conversion of egg volume to numbers of eggs (Table 3) was done by relating the size of wild bird eggs to the size of large eggs of domestic chicken (J. Magdanz, Subsistence Resource Specialist, ADF&G, Kotzebue, Alaska, personal communication) considering that a 1-gallon bucket holds 48 large chicken eggs (24 oz per dozen, U.S. Department of Agriculture standard).

Table 3.–Estimated conversion factors, egg volume to number of eggs.

Species	Number of eggs in 5-gallon bucket	Number of eggs in 1-gallon bucket	References for egg volumes
Mallard	261	52	Drilling, Titman, and Mckinney (2002)
Northern pintail	327	65	Austin and Miller (1995)
Murre	126	25	Ainley et al. (2002)
Mew gull	261	52	Moskoff and Bevier (2002)
Black-legged kittiwake	263	53	Hatch, Robertson, and Baird (1994)
Herring gull	147	29	Pierotti and Good (1994)
Glaucous-winged gull	147	29	Hayward and Verbeek (2008)
Glaucous gull	121	24	Weiser and Gilchrist (2012)
Arctic tern	716	143	Hatch (2002)
Large gull ^a	147	29	Weiser and Gilchrist (2012)
Greater white-fronted goose	105	21	Ely and Dzubin (1994)
Brant	136	27	Lewis et al. (2013)

a. Based on glaucous gull egg size.

The subsistence harvest survey covers a large geographic area and a large number of species. Some species are abundant and harvested in relatively large numbers. Other species are harvested only occasionally because they have small populations, restricted distribution, or are not widely used for subsistence purposes. Wide-coverage sampling designs such as the AMBCC survey 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. Dedicated harvest surveys and specific analytical procedures would be required to accurately estimate harvests of species that have small populations, low densities, or limited distributions, and that are less likely to be precisely documented in the regular statewide subsistence harvest survey.

RESULTS

In 2012, 3 communities were invited to participate in the survey. All communities responded to the invitation and agreed to participate in the survey (Table 4). Household participation rates were 82% in Kotzebue and 96% in the St. Lawrence-Diomed Islands subregion (Table 5).

Annual region and subregion harvest estimates (all species combined) were summarized in Table 6 (birds) and Table 7 (eggs), which indicate that estimates detailed by species and seasons are available in the following subregion tables (tables 8–11). Harvest estimate tables included all species represented in the harvest report form. The categories duck (unidentified), goose (unidentified), gull (unidentified), and other and unknown bird were included only if harvest in these categories was reported.

Information on sampling effort was presented as footnotes to harvest estimate tables. For subregional tables, “sampling effort” referred to the number of communities included in the analysis (Table 2, Appendix H) and the proportion of subregion households represented in the sample (number of households in surveyed communities in relation to the total number of households in the subregion). Deviations from standard survey methods were also presented as table footnotes (e.g., incomplete geographic coverage or nonstandard community sampling approaches).

Kotzebue birds and eggs harvest estimates available in the literature (1986–2004; Georgette and Loon 1993; Fall and Utermohle 1995; Whiting 2006) and the results obtained in the 2012 AMBCC survey were summarized for data review, and a handout was produced to facilitate communication and outreach with the community (Appendix I). St. Lawrence Island birds and eggs harvest estimates available in the literature (1993–2010) were summarized and discussed in Naves (2014a), and results obtained in the 2011 and 2012 AMBCC surveys were discussed in Naves and Zeller (2013).

Table 4.—Community participation rate, AMBCC harvest survey 2012.

	Communities in subregion	Selected communities	Communities that agreed to participate in the survey	Community participation rate
Kotzebue	1	1	1	100%
St. Lawrence-Diomed Islands subregion	3	2	2	100%
Total	4	3	3	100%

Note Community participation rate equals (=) number of communities that agreed to participate divided by (÷) number of communities contacted.

Table 5.—Household participation rate, AMBCC harvest survey 2012.

	Total households	Households contacted	Household participation rate
Kotzebue	815	266	82%
St. Lawrence-Diomed Islands subregion	326	272	96%

Note Household participation rate equals (=) number of households that agreed to participate divided by (÷) number of households contacted.

Table 6.—Annual estimated bird harvest at subregions and regions (total birds), AMBCC survey, 2004–2012.

Regions, subregions	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gulf of Alaska-Cook Inlet	2,995	*	*	-	-	-	*	-	-
Gulf of Alaska	2,756	-	596	-	-	-	1,049	-	-
Cook Inlet	239	13	-	-	-	-	-	-	-
Kodiak Archipelago	-	-	*	-	-	-	6,926	-	-
Kodiak Villages	-	-	5,552	-	-	-	1,947	-	-
Kodiak City & Road-connected	-	-	a	-	-	-	4,979	-	-
Aleutian-Pribilof Islands	-	*	-	*	8,401	-	-	-	-
Aleutian-Pribilof Villages	-	16,876	-	(7,371)	7,642	-	-	-	-
Unalaska	-	-	-	-	760	-	-	-	-
Bristol Bay	*	47,336	*	28,285	32,995	-	-	30,081	-
South Alaska Peninsula	801	-	-	968	(115)	-	-	833	-
Southwest Bristol Bay	14,955	32,769	(26,715)	20,169	(29,352)	-	-	26,601	-
Dillingham	-	11,769	-	7,148	3,527	-	-	2,650	-
Yukon-Kuskokwim Delta	130,343	114,514	171,856	148,715^b	79,088	195,082	142,834	110,611	-
Y-K Delta South Coast	25,764	35,508	31,918	33,927	19,999	35,203	17,537	37,834	-
Y-K Delta Mid Coast	34,480	17,546	(61,998)	43,737	17,160	82,654	37,363	13,899	-
Y-K Delta North Coast	8,806	11,206	4,493	1,206	4,867	13,637	4,920	-	-
Lower Yukon	(6,201)	6,815	10,269	3,988	4,727	6,904	(7,748)	-	-
Lower Kuskokwim	46,033	16,557	48,849	58,983	22,813	44,934	(7,1317)	32,826	-
Central Kuskokwim	440	-	1,167	219	-	-	(659)	-	-
Bethel ^c	8,618	23,954	13,163	6,654 ^b	7,789	7,478	3,290	2,539	-
Bering Strait-Norton Sound	53,576	74,115	-	123,257	-	*	*	*	*
St. Lawrence-Diomedes Is.	33,600	30,481	-	88,362	-	41,176	14,054	12,077	8,848
Bering Strait Mainland Villages	17,195	37,482	-	31,169	-	-	20,719	-	-
Nome	2,782	6,152	-	3,726	-	-	-	-	-
Northwest Arctic	-	-	*	-	-	-	-	-	*
Northwest Arctic Villages	-	-	9,676	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	4,437
North Slope	-	15,615	-	44,270	45,123	19,075	-	-	-
North Slope Villages	-	4,672	-	6,118	9,873	10,411	-	-	-
Barrow	-	10,943	-	38,152 ^d	35,250	8,664	-	-	-
Interior Alaska	50,995	*	37,068	*	*	-	32,611	-	-
Mid Yukon-Upper Kuskokwim	(3,086)	2,744	697	-	-	-	(786)	-	-
Yukon-Koyukuk	3,108	(930)	(1,764)	(3,031)	(6,908)	-	4,532	-	-
Upper Yukon	(14,418)	-	10,927	18,402	-	-	(12,692)	-	-
Tanana Villages	20,388	-	17,358	-	-	-	(14,086)	-	-
Tok	-	-	6,321 ^d	-	-	-	515 ^d	-	-
Upper Copper River^e	1,120	-	-	247	-	-	-	-	-

Source: Survey results for 2004–2011 were reported in Naves (2010a; 2010b; 2011; 2012; 2014b).

-: Region/subregion not surveyed. *: 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.

a: Fall bird harvest data not available for Kodiak City & Road-connected subregion; annual harvest estimates not available.

b: Does not include fall bird harvest for Bethel subregion.

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

d: Subregional harvest estimates assumed simple random sampling.

e: Sampling and harvest expansions represent Alaska Native households only.

Table 7.—Annual estimated egg harvest at subregions and regions (total eggs), AMBCC survey, 2004–2012.

Regions, subregions	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gulf of Alaska-Cook Inlet	2,178	*	*	-	-	-	*	-	-
Gulf of Alaska	2,173	-	102	-	-	-	1,366	-	-
Cook Inlet	5	0	-	-	-	-	-	-	-
Kodiak Archipelago	-	-	5,222	-	-	-	803	-	-
Kodiak Villages	-	-	4,545	-	-	-	771	-	-
Kodiak City & Road-connected	-	-	(677 ^a)	-	-	-	32	-	-
Aleutian-Pribilof Islands	-	*	-	*	4,778	-	-	-	-
Aleutian-Pribilof Villages	-	11,733	-	6,127	4,018	-	-	-	-
Unalaska	-	-	-	-	760	-	-	-	-
Bristol Bay	*	47,799	*	30,801	47,653	-	-	25,211	-
South Alaska Peninsula	409	-	-	651	(106)	-	-	392	-
Southwest Bristol Bay	54,437	39,206	(31,292)	25,118	(37,630)	-	-	21,105	-
Dillingham	-	5,768	-	5,032	9,917	-	-	3,716	-
Yukon-Kuskokwim Delta	27,288	22,268	30,723	19,153	31,195	58,995	26,965	54,075	-
Y-K Delta South Coast	7,768	13,424	7,406	1,746	8,442	29,065	6,208	26,492	-
Y-K Delta Mid Coast	14,598	2,140	(21,354)	11,930	16,195	24,640	19,137	15,213	-
Y-K Delta North Coast	2,466	3,921	188	22	554	345	1,619	-	-
Lower Yukon	(191)	652	232	565	0	386	(0)	-	-
Lower Kuskokwim	2,265	1,302	1,498	4,891	5,298	3,087	(0)	877	-
Central Kuskokwim	0	-	15	0	-	-	(0)	-	-
Bethel ^b	0	261	29	0	23	179	0	0	-
Bering Strait-Norton Sound	99,494	113,082	-	146,557	-	*	*	*	*
St. Lawrence-Diomedes Is.	81,675	75,373	-	129,656	-	117,174	55,682	20,999	29,701
Bering Strait Mainland Villages	16,467	29,321	-	12,240	-	-	13,910	-	-
Nome	1,351	8,387	-	4,661	-	-	-	-	-
Northwest Arctic	-	-	*	-	-	-	-	-	*
Northwest Arctic Villages	-	-	10,081	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	5,896
North Slope	-	4,705	-	2,388	858	2,430	-	-	-
North Slope Villages	-	4,672	-	606	654	2,341	-	-	-
Barrow	-	32	-	1,783 ^c	204	88	-	-	-
Interior Alaska	1,009	-	911	*	*	-	65	-	-
Mid Yukon-Upper Kuskokwim	(0)	2	0	-	-	-	(0)	-	-
Yukon-Koyukuk	11	(0)	(0)	(0)	(0)	-	22	-	-
Upper Yukon	(40)	-	0	0	-	-	(0)	-	-
Tanana Villages	760	-	875	-	-	-	(43)	-	-
Tok	-	-	36 ^c	-	-	-	0	-	-
Upper Copper River^d	82	-	-	0	-	-	-	-	-

Source: Survey results for 2004–2011 were reported in Naves (2010a; 2010b; 2011; 2012; 2014b).

-: Region/subregion not surveyed. *: 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.

a: Harvest estimates based on a sample of only known harvester households.

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

c: Subregional harvest estimates assumed simple random sampling.

d: Sampling and harvest expansions represent Alaska Native households only.

Table 8.—Estimated bird harvest, Bering Strait-Norton Sound region, St. Lawrence-Diomedes Is. subregion, 2012.

Species	Annual estimated bird harvest			Seasonal estimated bird harvest					
	Number	Confidence Interval		Spring		Summer		Fall	
		CIP	Low – High	Number	CIP	Number	CIP	Number	CIP
Ducks									
American wigeon	1	71%	1 – 2	1	81%	0		0	
Teal	4	70%	3 – 6	4	73%	0		0	
Mallard	4	70%	3 – 6	4	73%	0		0	
Northern pintail	74	23%	61 – 92	58	31%	8	64%	8	72%
Northern shoveler	0		-	0		0		0	
Black scoter	0		-	0		0		0	
Surf scoter	0		-	0		0		0	
White-winged scoter	31	56%	21 – 48	0		0		31	85%
Bufflehead	0		-	0		0		0	
Goldeneye	0		-	0		0		0	
Canvasback	0		-	0		0		0	
Scaup	0		-	0		0		0	
Common eider	476	12%	418 – 534	272	18%	60	33%	144	29%
King eider	93	31%	73 – 121	66	47%	8	71%	19	54%
Spectacled eider	53	30%	37 – 68	7	79%	3	96%	43	52%
Steller's eider	20	55%	14 – 31	0		14	96%	6	103%
Harlequin duck	6	53%	5 – 10	6	67%	0		0	
Long-tailed duck	0		-	0		0		0	
Merganser	0		-	0		0		0	
Total ducks	762	11%	673 – 848	418	18%	93	27%	251	24%
Geese									
Black brant	86	23%	67 – 106	37	41%	14	96%	35	46%
Cackling/Canada goose	7	59%	6 – 11	7	62%	0		0	
Greater white-fronted goose	8	35%	7 – 11	7	42%	0		1	96%
Emperor goose	216	17%	180 – 252	70	31%	56	35%	90	40%
Snow goose	32	31%	25 – 42	18	52%	0		14	49%
Total geese	349	15%	296 – 404	139	28%	70	42%	140	32%
Tundra swan	7	50%	5 – 10	1	73%	0		6	96%
Sandhill Crane	12	42%	8 – 16	3	62%	3	96%	6	103%
Seabirds									
Short-tailed shearwater	55	48%	37 – 81	0		0		55	72%
Cormorant	1,038	12%	909 – 1,167	96	36%	190	28%	752	22%
Tern	0		-	0		0		0	
Black-legged kittiwake	28	39%	20 – 40	0		0		28	64%
Bonaparte's/Sabine's gull	0		-	0		0		0	
Mew gull	0		-	0		0		0	
Large gull	258	18%	212 – 305	0		28	49%	230	29%
Auklet	3,162	14%	2,704 – 3,618	2,153	16%	138	38%	871	52%
Murre	2,948	14%	2,532 – 3,365	2,689	18%	49	56%	210	33%
Guillemot	15	68%	10 – 25	0		0		15	103%
Puffin	0		-	0		0		0	
Total seabirds	7,504	10%	6,754 – 8,254	4,938	14%	405	25%	2,161	25%
Shorebirds									
Whimbrel/Curlew	0		-	0		0		0	
Godwit	0		-	0		0		0	
Golden/Black-bellied plover	0		-	0		0		0	
Turnstone	0		-	0		0		0	
Phalarope	0		-	0		0		0	
Small shorebird	0		-	0		0		0	
Total shorebirds	0		-	0		0		0	
Loons and grebes									
Common loon (Loon "4")	7	46%	5 – 11	1	96%	0		6	81%
Pacific/Arctic loon (Loon "1")	53	40%	36 – 75	0		0		53	61%
Red-throated loon (Loon "5")	9	51%	6 – 13	0		0		9	77%
Yellow-billed loon (Loon "3")	3	68%	2 – 5	0		0		3	103%
Non-breeding loon (Loon "2")	132	22%	104 – 160	0		11	86%	121	33%
Grebe	10	45%	7 – 15	3	96%	0		7	85%
Total loons and grebes	214	18%	176 – 253	4	71%	11	86%	199	26%
Total migratory birds	8,848	9%	8,032 – 9,661	5,503	13%	582	20%	2,763	21%
Ptarmigans and grouses (non-migratory)									
Total ptarmigans and grouses	0		-	0		0		0	
Total birds	8,848	9%	8,032 – 9,661	5,503	13%	582	20%	2,763	21%

Sampling effort (St. Lawrence-Diomedes Is. subregion, 2012): 2 out of 3 villages in this subregion were included in analysis; 88% of subregion households were represented in the sample. -: No reported harvest.

Table 9.– Estimated egg harvest, Bering Strait-Norton Sound region, St. Lawrence-Diomedes Is. subregion, 2012.

Species	Annual estimated egg harvest			Seasonal estimated egg harvest			
	Number	Confidence Interval		Spring		Summer	
		CIP	Low	High	Number	CIP	Number
Ducks							
American wigeon	0	-	-	0		0	
Teal	0	-	-	0		0	
Mallard	0	-	-	0		0	
Northern pintail	0	-	-	0		0	
Northern shoveler	0	-	-	0		0	
Black scoter	0	-	-	0		0	
Surf scoter	0	-	-	0		0	
White-winged scoter	0	-	-	0		0	
Bufflehead	0	-	-	0		0	
Goldeneye	0	-	-	0		0	
Canvasback	0	-	-	0		0	
Scaup	0	-	-	0		0	
Common eider	36	67%	31 – 61	36	71%	0	
King eider	0	-	-	0		0	
Spectacled eider	0	-	-	0		0	
Steller's eider	0	-	-	0		0	
Harlequin duck	0	-	-	0		0	
Long-tailed duck	0	-	-	0		0	
Merganser	0	-	-	0		0	
Total ducks	36	67%	31 – 61	36	71%	0	
Geese							
Black brant	0	-	-	0		0	
Cackling/Canada goose	0	-	-	0		0	
Greater white-fronted goose	0	-	-	0		0	
Emperor goose	0	-	-	0		0	
Snow goose	0	-	-	0		0	
Total geese	0	-	-	0		0	
Tundra swan	11	73%	8 – 19	11	96%	0	
Sandhill Crane	0	-	-	0		0	
Seabirds							
Cormorant	0	-	-	0		0	
Tern	0	-	-	0		0	
Black-legged kittiwake	0	-	-	0		0	
Bonaparte's/Sabine's gull	0	-	-	0		0	
Mew gull	39	72%	30 – 67	0		39	89%
Large gull	36	59%	26 – 57	36	77%	0	
Auklet	14	73%	10 – 24	14	96%	0	
Murre	29,565	16%	24,742 – 34,388	23,567	23%	5,998	34%
Guillemot	0	-	-	0		0	
Puffin	0	-	-	0		0	
Total seabirds	29,654	16%	24,827 – 34,480	23,617	23%	6,037	34%
Shorebirds							
Whimbrel/Curlew	0	-	-	0		0	
Godwit	0	-	-	0		0	
Golden/Black-bellied plover	0	-	-	0		0	
Turnstone	0	-	-	0		0	
Phalarope	0	-	-	0		0	
Small shorebird	0	-	-	0		0	
Total shorebirds	0	-	-	0		0	
Loons and grebes							
Common loon (Loon "4")	0	-	-	0		0	
Pacific/Arctic loon (Loon "1")	0	-	-	0		0	
Red-throated loon (Loon "5")	0	-	-	0		0	
Yellow-billed loon (Loon "3")	0	-	-	0		0	
Grebe	0	-	-	0		0	
Total loons and grebes	0	-	-	0		0	
Total migratory birds	29,701	16%	24,872 – 34,530	23,664	23%	6,037	34%
Ptarmigans and grouses (non-migratory)							
Total ptarmigans and grouses	0	-	-	0		0	
Total eggs	29,701	16%	24,872 – 34,530	23,664	23%	6,037	34%

Sampling effort (St. Lawrence-Diomedes Is. subregion, 2012): 2 out of 3 villages in this subregion were included in analysis; 88% of subregion households were represented in the sample. -: No reported harvest.

Table 10.–Estimated bird harvest, Northwest Arctic region, Kotzebue subregion, 2012.

Species	Annual estimated bird harvest			Seasonal estimated bird harvest							
	Number	Confidence Interval		Spring		Summer		Fall		Winter	
		CIP	Low – High	Number	CIP	Number	CIP	Number	CIP	Number	CIP
Ducks											
American wigeon	178	39%	109 – 246	91	111%	0		87	108%	0	
Teal	95	39%	58 – 131	53	101%	0		42	120%	0	
Mallard	200	28%	143 – 256	102	75%	15	169%	83	95%	0	
Northern pintail	464	28%	335 – 593	257	78%	45	105%	162	97%	0	
Northern shoveler	0		-	0		0		0		0	
Black scoter	60	67%	20 – 101	45	169%	0		15	169%	0	
Surf scoter	0		-	0		0		0		0	
White-winged scoter	16	60%	6 – 24	8	169%	0		8	169%	0	
Bufflehead	0		-	0		0		0		0	
Goldeneye	0		-	0		0		0		0	
Canvasback	23	84%	6 – 42	0		23	169%	0		0	
Scaup	76	60%	30 – 121	38	169%	0		38	169%	0	
Common eider	0		-	0		0		0		0	
King eider	4	84%	1 – 7	4	169%	0		0		0	
Spectacled eider	0		-	0		0		0		0	
Steller's eider	0		-	0		0		0		0	
Harlequin duck	0		-	0		0		0		0	
Long-tailed duck	38	84%	10 – 70	38	169%	0		0		0	
Merganser	4	84%	1 – 7	0		4	169%	0		0	
Duck (unidentified)	154	29%	109 – 199	101	73%	0		53	98%	0	
Total ducks	1,312	20%	1,053 – 1,564	737	52%	87	92%	488	67%	0	
Geese											
Black brant	596	27%	435 – 757	494	62%	45	169%	57	98%	0	
Cackling/Canada goose	596	18%	491 – 701	411	45%	38	112%	147	59%	0	
Greater white-fronted goose	287	23%	220 – 353	226	52%	8	169%	53	109%	0	
Emperor goose	0		-	0		0		0		0	
Snow goose	132	45%	72 – 192	132	90%	0		0		0	
Goose (unidentified)	8	60%	3 – 12	8	119%	0		0		0	
Total geese	1,619	16%	1,354 – 1,884	1,271	39%	91	99%	257	49%	0	
Tundra swan	30	33%	20 – 40	11	97%	4	169%	15	103%	0	
Sandhill crane	38	38%	24 – 52	30	89%	4	169%	4	169%	0	
Seabirds											
Cormorant	0		-	0		0		0		0	
Tern	0		-	0		0		0		0	
Black-legged kittiwake	0		-	0		0		0		0	
Bonaparte's/Sabine's gull	0		-	0		0		0		0	
Mew gull	0		-	0		0		0		0	
Large gull	0		-	0		0		0		0	
Auklet	0		-	0		0		0		0	
Murre	0		-	0		0		0		0	
Guillemot	0		-	0		0		0		0	
Puffin	0		-	0		0		0		0	
Total seabirds	0		-	0		0		0		0	
Shorebirds											
Whimbrel/Curlew	0		-	0		0		0		0	
Godwit	0		-	0		0		0		0	
Golden/Black-bellied plover	0		-	0		0		0		0	
Turnstone	0		-	0		0		0		0	
Phalarope	0		-	0		0		0		0	
Small shorebird	0		-	0		0		0		0	
Total shorebirds	0		-	0		0		0		0	
Loons and grebes											
Common loon (Loon "4")	0		-	0		0		0		0	
Pacific/Arctic loon (Loon "1")	0		-	0		0		0		0	
Red-throated loon (Loon "5")	0		-	0		0		0		0	
Yellow-billed loon (Loon "3")	0		-	0		0		0		0	
Non-breeding loon (Loon "2")	0		-	0		0		0		0	
Grebe	0		-	0		0		0		0	
Total loons and grebes	0		-	0		0		0		0	
Total migratory birds	2,999	14%	2,581 – 3,409	2,049	34%	186	85%	764	52%	0	
Ptarmigans and grouses (non-migratory)											
Grouse	8	84%	2 – 14	0		0		0		8	169%
Ptarmigan	1,430	20%	1,145 – 1,715	57	148%	26	169%	64	113%	1,283	42%
Total ptarmigans and grouses	1,438	20%	1,152 – 1,723	57	148%	26	169%	64	113%	1,291	42%
Total birds	4,437	11%	3,936 – 4,929	2,106	33%	212	78%	828	48%	1,291	42%

Sampling effort (Kotzebue subregion, 2012): 1 out of 1 village in this subregion were included in analysis. Survey done by simple random sampling. -: No reported harvest.

Table 11.–Estimated egg harvest, Northwest Arctic region, Kotzebue subregion, 2012.

Species	Annual estimated egg harvest			Seasonal estimated egg harvest			
	Number	Confidence Interval		Spring		Summer	
		CIP	Low	High	Number	CIP	Number
Ducks							
American wigeon	0	-	-	0		0	
Teal	0	-	-	0		0	
Mallard	0	-	-	0		0	
Northern pintail	0	-	-	0		0	
Northern shoveler	0	-	-	0		0	
Black scoter	0	-	-	0		0	
Surf scoter	0	-	-	0		0	
White-winged scoter	0	-	-	0		0	
Bufflehead	0	-	-	0		0	
Goldeneye	0	-	-	0		0	
Canvasback	0	-	-	0		0	
Scaup	0	-	-	0		0	
Common eider	0	-	-	0		0	
King eider	0	-	-	0		0	
Spectacled eider	0	-	-	0		0	
Steller's eider	0	-	-	0		0	
Harlequin duck	0	-	-	0		0	
Long-tailed duck	0	-	-	0		0	
Merganser	0	-	-	0		0	
Total ducks	0	-	-	0		0	
Geese							
Black brant	147	45%	80 – 214	147	90%	0	
Cackling/Canada goose	79	49%	40 – 118	79	98%	0	
Greater white-fronted goose	0		-	0		0	
Emperor goose	0		-	0		0	
Snow goose	0		-	0		0	
Goose (unidentified)	192	45%	106 – 279	192	89%	0	
Total geese	418	28%	303 – 534	418	54%	0	
Tundra swan	34	76%	9 – 60	34	151%	0	
Sandhill crane	30	60%	12 – 48	30	119%	0	
Seabirds							
Cormorant	0		-	0		0	
Tern	0		-	0		0	
Black-legged kittiwake	30	84%	8 – 56	0		30	169%
Bonaparte's/Sabine's gull	0		-	0		0	
Mew gull	113	84%	30 – 209	113	169%	0	
Large gull	4,444	30%	3,096 – 5,794	4,369	61%	75	169%
Gull (unidentified)	359	43%	203 – 514	321	95%	38	169%
Auklet	0		-	0		0	
Murre	91	84%	24 – 167	0		91	169%
Guillemot	0		-	0		0	
Puffin	0		-	0		0	
Total seabirds	5,037	27%	3,674 – 6,401	4,803	56%	234	106%
Shorebirds							
Whimbrel/Curlew	0		-	0		0	
Godwit	0		-	0		0	
Golden/Black-bellied plover	0		-	0		0	
Turnstone	0		-	0		0	
Phalarope	0		-	0		0	
Small shorebird	0		-	0		0	
Total shorebirds	0		-	0		0	
Loons and grebes							
Common loon (Loon "4")	0		-	0		0	
Pacific/Arctic loon (Loon "1")	0		-	0		0	
Red-throated loon (Loon "5")	0		-	0		0	
Yellow-billed loon (Loon "3")	0		-	0		0	
Grebe	0		-	0		0	
Total loons and grebes	0		-	0		0	
Other/unknown bird	377	60%	152 – 603	377	119%	0	
Total migratory birds	5,896	26%	4,357 – 7,438	5,662	53%	234	106%
Ptarmigans and grouses (non-migratory)							
Grouse	0		-	0		0	
Ptarmigan	0		-	0		0	
Total ptarmigans and grouses	0		-	0		0	
Total eggs	5,896	26%	4,357 – 7,438	5,662	53%	234	106%

Sampling effort (Kotzebue subregion, 2012): 1 out of 1 village in this subregion were included in analysis. Survey done by simple random sampling. -: No reported harvest.

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APPENDICES

Appendix C.–Harvest report form, Western Alaska (spring sheet, both sides, original size 8.5x11 in each side).

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OMB PWS Form 3-2381-1 Expires 06/30/2016



AMBC Subsistence Migratory Bird Household Harvest Survey
Western Alaska Harvest Report - SPRING
 Y-K Delta, Bering Strait-Norton Sound, NW Arctic, Bristol Bay (except South AK Peninsula)


Did the household harvest birds or eggs from **April 1 to June 30**? YES NO

Village: _____ Household ID: _____ Harvest Year: _____ Date: ____/____/____

American wigeon birds _____ eggs _____	Teal birds _____ eggs _____	Mallard birds _____ eggs _____	Northern pintail birds _____ eggs _____
Northern shoveler birds _____ eggs _____	Black scoter birds _____ eggs _____	Surf scoter birds _____ eggs _____	White-winged scoter birds _____ eggs _____
Bufflehead birds _____ eggs _____	Goldeneye birds _____ eggs _____	Canvasback birds _____ eggs _____	Scaup birds _____ eggs _____
Common eider birds _____ eggs _____	King eider birds _____ eggs _____	Spectacled eider birds _____ eggs _____	Steller's eider birds _____ eggs _____
Harlequin duck birds _____ eggs _____	Long-tailed duck birds _____ eggs _____	Merganser birds _____ eggs _____	Unknown duck birds _____ eggs _____
Black brant birds _____ eggs _____	Cackling/Canada goose birds _____ eggs _____	Greater white-fronted goose birds _____ eggs _____	Emperor goose birds _____ eggs _____
Snow goose birds _____ eggs _____			

PWS Form 3-2381-1 10/09. This form supersedes form 7-PW-103, which is obsolete.

OMB PWS Form 3-2381-1 Expires 06/30/2016



AMBC Subsistence Migratory Bird Household Harvest Survey
Western Alaska Harvest Report
SPRING - April 1 to June 30

Village: _____ Household ID: _____ Harvest Year: _____ Date: ____/____/____

Swan birds _____ eggs _____	Sandhill crane birds _____ eggs _____	Grouse birds _____ eggs _____	Ptarmigan birds _____ eggs _____
Loon "1" birds _____ eggs _____	Loon "2" birds _____ eggs _____	Loon "3" birds _____ eggs _____	Loon "4" birds _____ eggs _____
Loon "5" birds _____ eggs _____			
Grebe birds _____ eggs _____	Cormorant birds _____ eggs _____	Murre birds _____ eggs _____	Guillemot birds _____ eggs _____
Auklet birds _____ eggs _____	Puffin birds _____ eggs _____	Black-legged kittiwake birds _____ eggs _____	Gull with black head birds _____ eggs _____
Mew gull birds _____ eggs _____	Large gull birds _____ eggs _____	Tern birds _____ eggs _____	Whimbrel/Curlew birds _____ eggs _____
Godwit birds _____ eggs _____			
Golden/Black-bellied plover birds _____ eggs _____	Turnstone birds _____ eggs _____	Phalarope birds _____ eggs _____	Small shorebird birds _____ eggs _____
Other/unknown bird: birds _____ eggs _____			

Comments: _____

Appendix D.—Species represented in the Western Alaska harvest report form and their distribution range.

	Western Alaska harvest report form			
	Bristol Bay	Yukon-Kuskokwim Delta	Bering Strait-Norton Sound	Northwest Arctic
Ducks				
American wigeon <i>Anas americana</i>	x	x	x	x
Teal	x	x	x	x
Green-winged teal <i>A. crecca</i> (1)	(1)	(1)	(1)	(1)
Blue-winged teal <i>A. discors</i> (2)				
Mallard <i>A. platyrhynchos</i>	x	x	x	x
Northern pintail <i>A. acuta</i>	x	x	x	x
Northern shoveler <i>A. clypeata</i>	x	x	x	x
Black scoter <i>Melanitta nigra</i>	x	x	x	x
Surf scoter <i>M. perspicillata</i>	x	x	x	x
White-winged scoter <i>M. fusca</i>	x	x	x	x
Bufflehead <i>Bucephala albeola</i>	x	x	x	x
Goldeneye	x	x	x	x
Common goldeneye <i>Bucephala clangula</i> (1)	(1, 2)	(1, 2)	(1)	(1)
Barrow's goldeneye <i>B. islandica</i> (2)				
Canvasback <i>Aythya valisineria</i>	x	x	x	x
Scaup	x	x	x	x
Greater scaup <i>Aythya marila</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Lesser scaup <i>A. affinis</i> (2)				
Common eider <i>Somateria mollissima</i>	x	x	x	x
King eider <i>S. spectabilis</i>	x	x	x	x
Spectacled eider <i>S. fischeri</i> *	x	x	x	x
Steller's eider <i>Polysticta stelleri</i> *	x	x	x	x
Harlequin duck <i>Histrionicus histrionicus</i>	x	x	x	x
Long-tailed duck <i>Clangula hyemalis</i>	x	x	x	x
Merganser	x	x	x	x
Common merganser <i>Mergus merganser</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Red-breasted merganser <i>M. serrator</i> (2)				
Duck (unidentified)	x	x	x	x
Geese				
Black brant <i>Branta bernicla</i>	x	x	x	x
Canada/cackling goose	x	x	x	x
Taverner's Canada goose <i>Branta hutchinsii taverneri</i> (1)	(2, 4)	(1, 2, 4)	(1, 4)	(1, 4)
Cackling Canada goose <i>B. h. minima</i> (2)				
Aleutian Canada goose <i>B. h. leucopareia</i> (3)				
Lesser Canada goose <i>B. canadensis parvipes</i> (4)				
Dusky Canada goose <i>B. c. occidentalis</i> (5)				
Greater white-fronted goose <i>Anser albifrons</i>	x	x	x	x
Emperor goose <i>Chen canagica</i> *	x	x	x	x
Lesser snow goose <i>C. caerulescens</i>	x	x	x	x
Swans				
Swan	x	x	x	x
Tundra swan <i>Cygnus columbianus</i> (1)	(1)	(1)	(1)	(1)
Trumpeter swan <i>C. buccinator</i> * (2)				
Cranes				
Sandhill crane <i>Grus canadensis</i>	x	x	x	x

-continued-

	Western Alaska harvest report form			
	Bristol Bay	Yukon-Kuskokwim Delta	Bering Strait-Norton Sound	Northwest Arctic
Ptarmigans and grouses				
Grouse	x	x	x	x
Spruce grouse <i>Falcapennis canadensis</i> (1)	(1)	(1, 2)	(1)	(1)
Ruffed grouse <i>Bonasa umbellus</i> (2)				
Sharp-tailed grouse <i>Tympanuchus phasianellus</i> (3)				
Ptarmigan	x	x	x	x
Willow ptarmigan <i>Lagopus lagopus</i> (1)	(1, 2)	(1, 2, 3)	(1, 2)	(1, 2)
Rock ptarmigan <i>L. muta</i> (2)				
White-tailed ptarmigan <i>L. leucura</i> (3)				
Seabirds				
Cormorant	x	x	x	x
Pelagic cormorant <i>Phalacrocorax pelagicus</i> (1)	(1, 2, 3)	(1, 2, 3)	(1)	(1)
Double-crested cormorant <i>P. auritus</i> (2)				
Red-faced cormorant <i>P. urile</i> * (3)				
Tern	x	x	x	x
Arctic tern <i>Sterna paradisea</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Aleutian tern <i>Onychoprion aleutica</i> (2)				
Black-legged kittiwake <i>Rissa tridactyla</i>	x	x	x	x
Bonaparte's/Sabine's gull	x	x	x	x
Bonaparte's gull <i>Larus philadelphia</i> (1)	(1, 2)	(1, 2)	(2)	(2)
Sabine's gull <i>Xema sabini</i> (2)				
Mew gull <i>Larus canus</i>	x	x	x	x
Large gull	x	x	x	x
Glaucous-winged gull <i>L. glaucescens</i> (1)	(1, 2)	(2)	(2, 3)	(2)
Glaucous gull <i>L. hyperboreus</i> (2)				
Herring gull <i>L. argentatus</i> (3)				
Auklet	x	x	x	x
Cassin's auklet <i>Ptychoramphus aleuticus</i> (1)	(1, 2, 3,	(2, 3, 4, 6)	(2, 3, 4, 6)	(2, 3, 4, 6)
Crested auklet <i>Aethia cristatella</i> (2)	4, 6)			
Least auklet <i>A. pusilla</i> (3)				
Parakeet auklet <i>A. psittacula</i> (4)				
Whiskered auklet <i>A. pygmaea</i> (5)				
Rhinoceros auklet <i>Cerorhinca monocerata</i> (6)				
Murre	x	x	x	x
Common murre <i>Uria aalge</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Thick-billed murre <i>U. lomvia</i> (2)				
Guillemot	x	x	x	x
Pigeon guillemot <i>Cepphus columba</i> (1)	(1)	(1)	(1)	(1, 2)
Black guillemot <i>C. grylle</i> (2)				
Puffin	x	x	x	x
Tufted puffin <i>Fratercula cirrhata</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Horned puffin <i>F. corniculata</i> (2)				
Shorebirds				
Whimbrel/curlew	x	x	x	x
Whimbrel <i>Numenius phaeopus</i> * (1)	(1)	(1, 2)	(1, 2)	(1)
Bristle-thighed curlew <i>N. tahitiensis</i> * (2)				
Godwit	x	x	x	x
Bar-tailed godwit <i>Limosa lapponica</i> (1)	(1, 2, 3)	(1, 2)	(1, 2)	(1, 2)
Hudsonian godwit <i>L. haemastica</i> * (2)				
Marbled godwit <i>L. fedoa</i> * (3)				

-continued-

	Western Alaska harvest report form			
	Bristol Bay	Yukon-Kuskokwim Delta	Bering Strait-Norton Sound	Northwest Arctic
Shorebirds, continued				
Golden/black-bellied plover	x	x	x	x
American golden plover <i>Pluvialis dominica</i> * (1)	(1, 2, 3)	(1, 2, 3)	(1, 2, 3)	(1, 3)
Pacific golden plover <i>P. squatarola</i> * (2)				
Black-bellied plover <i>P. fulva</i> (3)				
Turnstone	x	x	x	x
Ruddy turnstone <i>Arenaria interpres</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Black turnstone <i>A. melanocephala</i> * (2)				
Phalarope	x	x	x	x
Red-necked phalarope <i>Phalaropus lobatus</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Red phalarope <i>P. fulicaria</i> (2)				
Small shorebird	x	x	x	x
Dunlin <i>Calidris alpina</i> (1)	(1, 2, 3)	(1, 2, 3, 4, 5, 6)	(1, 2, 3, 4, 5)	(1, 2, 3, 4)
Pectoral sandpiper <i>C. melanotos</i> * (2)	4, 5, 6, 7,	7, 11, 12, 13, 14,	6, 7, 11, 12,	5, 6, 7, 11,
Rock sandpiper <i>C. pilocnemis</i> * (3)	11, 13,	15, 16, 17, 18,	13, 14, 15,	12, 13, 14,
Western sandpiper <i>C. mauri</i> (4)	14, 15,	19, 22, 23, 24)	16, 17, 18,	15, 16, 17,
Semipalmated sandpiper <i>C. pusilla</i> (5)	16, 17,		19, 22, 23,	18, 19, 22,
Least sandpiper <i>C. minutilla</i> (6)	18, 19,		24)	23, 24)
Baird's sandpiper <i>C. bairdii</i> (7)	22, 23,			
White-rumped sandpiper <i>C. fuscicollis</i> * (8)	24)			
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)				
Surfbird <i>Aphirza virgata</i> * (18)				
Wandering tattler <i>Heteroscelus incanus</i> * (19)				
Upland sandpiper <i>Bartramia longicauda</i> * (20)				
Buff-breasted sandpiper <i>Tryngites subruficollis</i> *(21)				
Short-billed dowitcher <i>Limnodromus griseus</i> * (22)				
Long-billed dowitcher <i>L. scolopaceus</i> (23)				
Wilson's snipe <i>Gallinago delicata</i> (24)				
Loons and grebes				
Common loon <i>Gavia immer</i>	x	x	x	x
Pacific loon	x	x	x	x
Pacific loon <i>G. pacifica</i> (1)	(1)	(1, 2)	(1, 2)	(1, 2)
Arctic loon <i>G. arctica</i> (2)				
Red-throated loon <i>G. stellata</i>	x	x	x	x
Yellow-billed loon <i>G. adamsii</i> *	x	x	x	x
Grebe	x	x	x	x
Red-necked grebe <i>Podiceps griseana</i> (1)	(1, 2)	(1, 2)	(1, 2)	(1, 2)
Horned grebe <i>P. auritus</i> (2)				

-continued-

Sources For information on distribution range of species: Johnson and Herter (1989); Timm and Rothe (2008), MacIntosh (2000); Pearce et al. (2000); Banks et al. (2004); Sibley (2010); Sea Duck Joint Venture (2003–2005); Denlinger (2006); Warren (2006); Johnson et al. (2007); Alaska Shorebird Group (2008); Bowman and Alaska Sea Grant College Program (2008); Pacific Flyway Council (1986 [rev. 1999]); and also personal Lanctot (R. Lanctot, USFWS Migratory Bird Management, Anchorage, personal communication), Taylor (E. Taylor, USFWS Migratory Bird Management, Anchorage, personal communication), Dewhurst (D. Dewhurst, USFWS Migratory Bird Management, Anchorage, personal communication), Irons (D. Irons, USFWS Migratory Bird Management, Anchorage, personal communication), Dau (C. Dau, USFWS Migratory Bird Management, Anchorage, personal communication), Rosenberg (D. Rosenberg, ADF&G Division of Wildlife Conservation, Anchorage, personal communication).

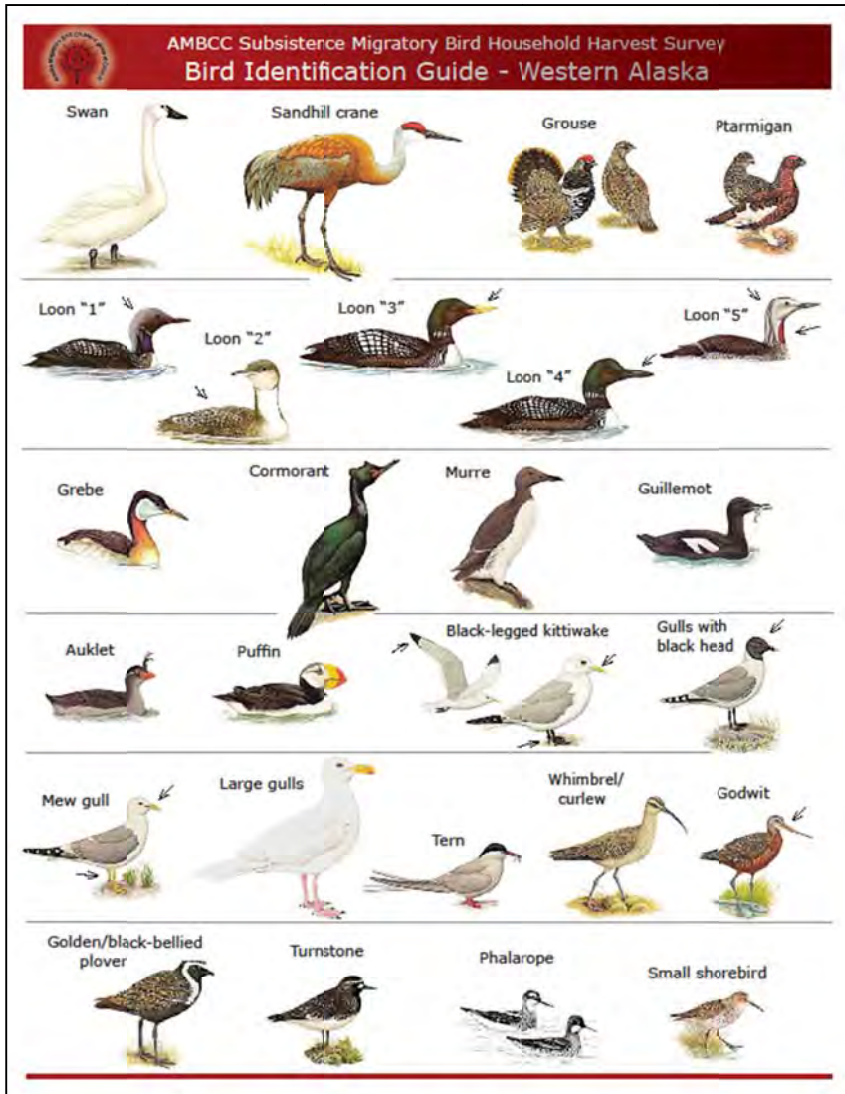
Note If more than one species is presented, the category name is used on the harvest survey form.

Note The South Alaska Peninsula is a subregion of the Bristol Bay region; most of the Bristol Bay region is surveyed with the Western Alaska Form, but the South Alaska Peninsula is surveyed with the Southern Coastal Alaska form.

Note “x” indicates the species is included in the harvest report form used in the region. Numbers in parenthesis indicate the species likely to occur in each region.

Note “*” indicates species closed to bird or egg harvests at least in some management units.

Appendix E.-Bird identification guide, Western Alaska (both sides, original size 8.5x11 in each side).



Appendix F.–Bird poster, Western Alaska (original size 23 x 36 in).









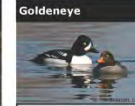
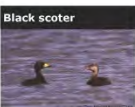




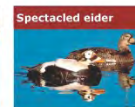










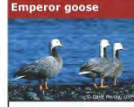
















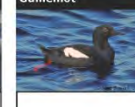







Alaska Migratory Bird Co-Management Council - AMBCC

Birds on the Subsistence Harvest Survey

Y-K Delta, Bering Strait-Norton Sound, NW Arctic, Bristol Bay (except South AK Peninsula)

Write your local bird names in the boxes below the pictures.

Birds/eggs that may be closed to harvest are shown with a red name tag; check the current regulation booklet.

Wigeon  <input type="text"/>	Teal  <input type="text"/>	Mallard  <input type="text"/>	Pintail  <input type="text"/>	Shoveler  <input type="text"/>	Bufflehead  <input type="text"/>	Goldeneye  <input type="text"/>
Black scoter  <input type="text"/>	Surf scoter  <input type="text"/>	White-winged scoter  <input type="text"/>	Common eider  <input type="text"/>	King eider  <input type="text"/>	Spectacled eider  <input type="text"/>	Steller's eider  <input type="text"/>
Canvasback  <input type="text"/>	Scaup  <input type="text"/>	Harlequin  <input type="text"/>	Long-tailed duck  <input type="text"/>	Merganser  <input type="text"/>	Swan  <input type="text"/>	Crane  <input type="text"/>
Brant  <input type="text"/>	Canada/cackling goose  <input type="text"/>	White-fronted goose  <input type="text"/>	Emperor goose  <input type="text"/>	Snow goose  <input type="text"/>	Grouse  <input type="text"/>	Ptarmigan  <input type="text"/>
Common loon  <input type="text"/>	Yellow-billed loon  <input type="text"/>	Pacific loon  <input type="text"/>	Red-throated loon  <input type="text"/>	Grebe  <input type="text"/>	Cormorant  <input type="text"/>	Tern  <input type="text"/>
Black-legged kittiwake  <input type="text"/>	Black-headed gulls  <input type="text"/>	Mew gull  <input type="text"/>	Large gulls  <input type="text"/>	Auklet  <input type="text"/>	Murre  <input type="text"/>	Guillemot  <input type="text"/>
Puffin  <input type="text"/>	Whimbrel/curlew  <input type="text"/>	Godwit  <input type="text"/>	Golden/black-bellied plover  <input type="text"/>	Turnstone  <input type="text"/>	Phalarope  <input type="text"/>	Small shorebird  <input type="text"/>

Please complete the survey so that:

- There is better understanding of the birds important to your culture;
- The subsistence harvest regulations are based on correct information;
- The subsistence harvest of birds will continue for you and your children.

Thank you!

AMBCC website
<http://alaska.fws.gov/ambcc/index.htm>

ADF&G Division of Subsistence
333 Raspberry Rd
Anchorage AK 99518
phone (907) 267-2353

AMBCC contact at USFWS Migratory Birds
1011 E. Tudor Rd, MS 201
Anchorage, AK 99503
phone (907) 786-3443

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

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

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

$$CI(X_s) = t_{\alpha/2} \times \sqrt{\text{var}(X_s)}$$

$$CIP(X_s) = \frac{CI(X_s)}{X_s}$$

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

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

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

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

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

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

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

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

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

$\text{CI}(X_s)$ = confidence interval around the harvest estimate (confidence level 95%).

$\text{CIP}(X_s)$ = confidence interval as a percentage of the harvest estimate.

s = first-stage units (subregion).

i = second-stage units (sampled harvest level strata).

j = third-stage unit (harvest level strata).

k = households.

h = number of communities sampled in a subregion.

hi = number of strata sampled in the community.

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

n_{1s} = total number of households in sampled communities in subregion s .

N_{2si} = total number of households in all strata of a community in subregion s .

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

N_{3sij} = total number of households in each stratum of a community in subregion s .

n_{3sij} = number of households sampled in each stratum of a community 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 (harvest level strata).

\bar{x} = weighted household harvest average.

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

\bar{x}_{si} = average community household harvest.

\bar{x}_{sij} = average household harvest for harvest level strata.

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

$t_{\alpha/2}$ = Student's t distribution value with significance level (tail area probability) $\alpha = 0.05$.

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

	Harvester	Other	
Total households	40	50	$N_{2si} = 90$
Sampled households	40	0	$n_{2si} = 40$

Appendix H.—Communities included in the 2004–2012 harvest estimates.

Region, subregion, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gulf of Alaska-Cook Inlet									
<i>Gulf of Alaska</i>									
Chenega Bay	-	-	x	-	-	-	x	-	-
Nanwalek	x	-	-	-	-	-	x	-	-
Port Graham	x	-	x	-	-	-	-	-	-
Tatitlek	x	-	-	-	-	-	-	-	-
<i>Cook Inlet</i>									
Tyonek	x	x	-	-	-	-	-	-	-
Kodiak Archipelago									
<i>Kodiak Villages</i>									
Akhiok	-	-	x	-	-	-	x	-	-
Karluk	-	-	x	-	-	-	x	-	-
Larsen Bay	-	-	x	-	-	-	x	-	-
Old Harbor	-	-	x	-	-	-	-	-	-
Ouzinkie	-	-	x	-	-	-	-	-	-
Port Lions	-	-	-	-	-	-	x	-	-
<i>Kodiak City and Road-connected</i>									
Aleneva	-	-	-	-	-	-	-	-	-
Chiniak	-	-	-	-	-	-	-	-	-
Kodiak City	-	-	x	-	-	-	-	-	-
Kodiak Station	-	-	-	-	-	-	-	-	-
Womens Bay	-	-	-	-	-	-	x	-	-
Balance of Kodiak Is. Borough	-	-	-	-	-	-	x	-	-
Aleutian-Pribilof Islands									
<i>Aleutian-Pribilof Villages</i>									
Adak	-	-	-	-	-	-	-	-	-
Akutan	-	x	-	x	x	-	-	-	-
Atka	-	x	-	-	-	-	-	-	-
Cold Bay	-	x	-	-	-	-	-	-	-
False Pass	-	-	-	-	x	-	-	-	-
King Cove	-	x	-	-	x	-	-	-	-
Nelson Lagoon	-	-	-	-	-	-	-	-	-
Nikolski	-	-	-	-	-	-	-	-	-
Sand Point	-	-	-	-	x	-	-	-	-
Saint George	-	-	-	-	-	-	-	-	-
Saint Paul	-	-	-	-	-	-	-	-	-
<i>Unalaska</i>	-	-	-	-	x	-	-	-	-
Bristol Bay									
<i>South Alaska Peninsula</i>									
Chignik Bay	x	-	-	x	-	-	-	x	-
Chignik Lagoon	x	-	-	-	-	-	-	-	-
Chignik Lake	x	-	-	-	x	-	-	-	-
Ivanof Bay	-	-	-	-	-	-	-	-	-

-continued-

Region, subregion, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
Perryville	x	-	-	x	-	-	-	x	-
<i>Southwest Bristol Bay</i>									
Aleknagik	x	-	-	x	x	-	-	x	-
Clark's Point	x	x	-	x	x	-	-	-	-
Egegik	-	x	-	x	-	-	-	-	-
Ekwok	x	-	-	x	x	-	-	x	-
Igiugig	-	-	-	-	-	-	-	-	-
Iliamna	-	x	-	x	-	-	-	-	-
King Salmon	-	x	-	-	-	-	-	-	-
Kokhanok	x	x	-	x	x	-	-	x	-
Koliganek	-	x	-	x	-	-	-	-	-
Levelock	x	x	-	-	x	-	-	x	-
Manokotak	-	x	-	x	-	-	-	x	-
Naknek	x	-	-	x	-	-	-	x	-
New Stuyahok	-	x	-	x	-	-	-	-	-
Newhalen	x	x	-	-	x	-	-	-	-
Nondalton	x	x	-	-	-	-	-	-	-
Pedro Bay	-	x	-	-	-	-	-	-	-
Pilot Point	-	x	-	-	-	-	-	-	-
Port Heiden	-	x	-	-	-	-	-	x	-
South Naknek	-	x	-	x	-	-	-	-	-
Togiak	x	-	x	x	-	-	-	x	-
Twin Hills	x	x	-	x	-	-	-	-	-
<i>Dillingham</i>	-	x	-	x	x	-	-	x	-
Yukon-Kuskokwim Delta									
<i>Y-K Delta South Coast</i>									
Eek	x	x	-	x	x	-	x	x	-
Goodnews Bay	-	-	x	-	-	-	x	-	-
Kipnuk	-	x	x	x	-	x	-	x	-
Kongiganak	-	x	x	x	x	-	-	-	-
Kwigillingok	-	-	-	-	-	-	-	-	-
Platinum	-	x	x	-	-	-	x	-	-
Quinhagak	x	x	x	x	-	-	-	x	-
Tuntutuliak	x	-	x	-	x	x	x	-	-
<i>Y-K Delta Mid Coast</i>									
Chefornak	x	-	x	x	-	x	x	-	-
Chevak	x	-	-	-	-	x	x	-	-
Hooper Bay	x	x	-	-	x	-	-	x	-
Mekoryuk	-	x	-	x	x	-	-	x	-
Newtok	-	x	x	-	x	x	-	-	-
Nightmute	x	-	x	x	-	x	-	x	-
Scammon Bay	-	-	x	-	x	x	x	-	-
Toksook Bay	x	x	-	x	-	-	-	-	-
Tununak	x	x	-	x	x	-	-	x	-

-continued-

Region, subregion, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
<i>Y-K Delta North Coast</i>									
Alakanuk	X	-	X	-	-	X	X	-	-
Emmonak	-	X	X	X	X	X	-	-	-
Kotlik	X	X	-	-	-	-	-	-	-
Nunam Iqua	-	X	X	-	X	X	X	-	-
<i>Lower Yukon</i>									
Marshall	X	X	-	X	X	-	X	-	-
Mountain Village	-	X	-	X	X	-	-	-	-
Pilot Station	-	X	X	-	X	X	-	-	-
Pitkas Point	X	-	X	X	-	X	X	-	-
Russian Mission	-	X	X	-	X	X	-	-	-
Saint Mary's	-	X	-	X	-	X	-	-	-
<i>Lower Kuskokwim</i>									
Akiachak	-	-	X	-	-	X	-	-	-
Akiak	-	X	X	X	-	-	X	-	-
Aniak	X	X	-	-	X	-	-	-	-
Atmautluak	X	-	-	X	X	-	-	-	-
Kasigluk	X	-	X	X	-	X	-	-	-
Kwethluk	X	X	X	X	-	X	X	-	-
Lower Kalskag	X	-	X	X	X	X	X	-	-
Napakiak	-	-	-	X	-	-	-	-	-
Napaskiak	-	X	X	X	X	X	-	X	-
Nunapitchuk	X	X	-	X	X	-	-	X	-
Oscarville	-	-	X	X	-	X	X	-	-
Tuluksak	-	X	X	-	X	-	-	X	-
Upper Kalskag	-	X	X	-	-	-	-	X	-
<i>Central Kuskokwim</i>									
Chuathbaluk	X	-	-	-	-	-	-	-	-
Crooked Creek	X	-	X	-	-	-	-	-	-
Lime Village	-	-	X	-	-	-	X	-	-
Red Devil	-	-	-	X	-	-	-	-	-
Sleetmute	-	-	X	X	-	-	-	-	-
Stony River	X	-	X	-	-	-	-	-	-
<i>Bethel</i>	X	X	X	X	X	X	X	X	-
Bering Strait-Norton Sound									
<i>St. Lawrence-Diomedes Islands</i>									
Diomedes	-	X	-	X	-	-	X	-	-
Gambell	X	X	-	X	-	X	X	X	X
Savoonga	X	X	-	X	-	X	X	X	X
<i>Bering Strait Mainland Villages</i>									
Brevig Mission	X	-	-	X	-	-	X	-	-
Elim	X	X	-	-	-	-	-	-	-
Golovin	-	X	-	X	-	-	X	-	-
Koyuk	-	X	-	X	-	-	X	-	-

-continued-

Region, subregion, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
Shaktoolik	-	-	-	X	-	-	X	-	-
Shishmaref	X	X	-	-	-	-	-	-	-
Saint Michael	X	-	-	X	-	-	-	-	-
Stebbins	-	X	-	X	-	-	X	-	-
Teller	X	X	-	-	-	-	-	-	-
Unalakleet	X	-	-	X	-	-	-	-	-
Wales	X	X	-	-	-	-	-	-	-
White Mountain	X	-	-	X	-	-	-	-	-
Nome	X	X	-	X	-	-	-	-	-
Northwest Arctic									
<i>Northwest Arctic Villages</i>									
Ambler	-	-	-	-	-	-	-	-	-
Buckland	-	-	X	-	-	-	-	-	-
Deering	-	-	-	-	-	-	-	-	-
Kiana	-	-	-	-	-	-	-	-	-
Kivalina	-	-	-	-	-	-	-	-	-
Kobuk	-	-	X	-	-	-	-	-	-
Noatak	-	-	-	-	-	-	-	-	-
Noorvik	-	-	-	-	-	-	-	-	-
Selawik	-	-	X	-	-	-	-	-	-
Shungnak	-	-	X	-	-	-	-	-	-
Kotzebue	-	-	-	-	-	-	-	-	X
North Slope									
<i>North Slope Villages</i>									
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	-	X	-	X	X	X	-	-	-
Interior Alaska									
<i>Mid Yukon-Upper Kuskokwim</i>									
Anvik	X	X	X	-	-	-	X	-	-
Grayling	-	X	X	-	-	-	-	-	-
Holy Cross	X	X	X	-	-	-	X	-	-
Lake Minchumina	X	-	X	-	-	-	-	-	-
McGrath	-	-	-	-	-	-	-	-	-
Nikolai	X	X	X	-	-	-	-	-	-
Shageluk	-	X	-	-	-	-	-	-	-
Takotna	-	X	-	-	-	-	X	-	-
Tanana	-	-	-	-	-	-	-	-	-

-continued-

Region, subregion, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
<i>Yukon-Koyukuk</i>									
Alatna	x	-	x	x	x	-	x	-	-
Allakaket	x	-	x	x	x	-	x	-	-
Bettles/Evansville	-	-	x	-	-	-	-	-	-
Coldfoot	-	-	-	-	-	-	x	-	-
Galena	x	-	-	-	-	-	-	-	-
Hughes	x	-	-	-	-	-	-	-	-
Huslia	x	-	-	-	-	-	x	-	-
Kaltag	x	-	-	-	-	-	-	-	-
Koyukuk	x	x	-	-	-	-	-	-	-
Nulato	x	x	-	-	-	-	-	-	-
Ruby	x	x	-	-	-	-	x	-	-
Wiseman	-	-	-	-	-	-	x	-	-
<i>Upper Yukon</i>									
Arctic Village	-	-	x	-	-	-	-	-	-
Beaver	-	-	x	x	-	-	x	-	-
Birch Creek	-	-	-	x	-	-	-	-	-
Central	-	-	x	-	-	-	x	-	-
Chalkyitsik	-	-	x	x	-	-	x	-	-
Circle	-	-	x	x	-	-	-	-	-
Fort Yukon	x	-	x	x	-	-	-	-	-
Rampart	-	-	-	-	-	-	x	-	-
Stevens Village	-	-	-	-	-	-	-	-	-
Venetie	-	-	x	x	-	-	x	-	-
<i>Tanana Villages</i>									
Dot Lake	x	-	-	-	-	-	-	-	-
Dry Creek	-	-	-	-	-	-	-	-	-
Eagle City	x	-	-	-	-	-	-	-	-
Eagle Village	x	-	-	-	-	-	-	-	-
Healy Lake	-	-	-	-	-	-	-	-	-
Manley Hot Springs	x	-	-	-	-	-	-	-	-
Minto	-	-	x	-	-	-	x	-	-
Nenana	x	-	x	-	-	-	-	-	-
Northway	x	-	-	-	-	-	-	-	-
Tanacross	-	-	x	-	-	-	-	-	-
Tetlin	-	-	-	-	-	-	x	-	-
<i>Tok</i>	-	-	x	-	-	-	x	-	-
<i>Upper Copper River</i>									
Cantwell	-	-	-	x	-	-	-	-	-
Cheesh'na (Chistochina)	x	-	-	x	-	-	-	-	-
Chitina	x	-	-	-	-	-	-	-	-
Copper Center	x	-	-	x	-	-	-	-	-
Gakona	x	-	-	x	-	-	-	-	-
Gulkana	x	-	-	x	-	-	-	-	-

-continued-

Region, <i>subregion</i>, community	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mentasta Lake	x	-	-	x	-	-	-	-	-
Tazlina	-	-	-	-	-	-	-	-	-
Southeast Alaska^a									
Craig	-	-	-	-	-	-	-	-	-
Hoonah	-	-	-	-	-	-	-	-	-
Hydaburg	-	-	-	-	-	-	-	-	-
Yakutat	-	-	-	-	-	-	-	-	-

2004–2011 Survey results reported in Naves (2010a, 2010b, 2011, 2012, 2014b).

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

**Appendix I.–Survey summary produced for data review and community communication, 2012
Kotzebue survey.**



Alaska Migratory Bird Co-Management Council (AMBCC)

Kotzebue Bird and Egg Harvest Estimates, 2012

Summary Results

The 2012 birds and eggs harvest survey was conducted in collaboration with the Native Village of Kotzebue and was funded by the U.S. Fish and Wildlife Service, AMBCC Program. Participation in the survey was voluntary at the community and household level. Data collection and analysis were conducted by the Division of Subsistence of the Alaska Department of Fish and Game (ADF&G), with the participation of local survey assistants. The birds and eggs harvest data collection occurred in conjunction with a survey for other subsistence resources (Goddhun and Braem 2014). This summary presents main results of the 2012 birds and eggs survey and also includes results of previous surveys conducted in 1986–2004 in Kotzebue. For a complete report of the 2012 survey, please consult Naves and Braem (2014).

The harvest period covered was April 2012–March 2013. Harvest data was collected in in-person interviews conducted in May 2013. The sample included 216 households randomly selected from a total of 815 households in the community (sampling rate=27%). Among the households contacted, 82% agreed to participate in the survey.

In 2012, 27% of the households surveyed harvested birds, 16% harvested eggs, and 33% harvested birds or eggs.

The birds harvested in the largest numbers were ptarmigan (32% of the total harvest), brant (14%), Canada/cackling geese (14%), pintail (11%), and mallard (5%) (Table 1). The 2012 annual bird harvest estimates (4,437 birds; Table 1) were relatively low compared to 1986–1998 (9,361–13,575 birds) (Figure 1).

In 2012, the eggs harvest was mostly composed of gulls (84% of the total harvest) and geese eggs (7%) (Table 2). The 2012 annual egg harvest estimates (5,896 eggs; Table 2) were similar in species composition and amounts compared to previous years (Figure 2).

In the Kotzebue area¹, the spring arrival of migratory birds usually happens with ESE winds. In 2012, the spring was very cold and with WNW winds; wintery conditions remained until very late. These spring conditions were unfavorable for birds to arrive in large numbers. Once winds shifted to ESE in late May, the spring breakup was very fast and travel conditions quickly deteriorated, allowing a very limited time window to harvest birds. On the other hand, these spring conditions were not bad for egg harvests. The egg laying season was compressed in time because of late arrival of birds. Once people began boating, they found lots of full nests and fresh eggs. In fall, lots of rain likely caused reduced participation in fall bird hunting. Because of (1) effects of weather on the timing of arrival of birds, (2) travel conditions for hunters in spring, (3) timing of egg laying, and (4) hunting conditions in fall, it is likely that bird harvests in 2012 were below the average while egg harvests were not below average.

1. Information on local weather, ecological, and hunting conditions was provided by Alex Whiting, Environmental Specialist for the Native Village of Kotzebue.

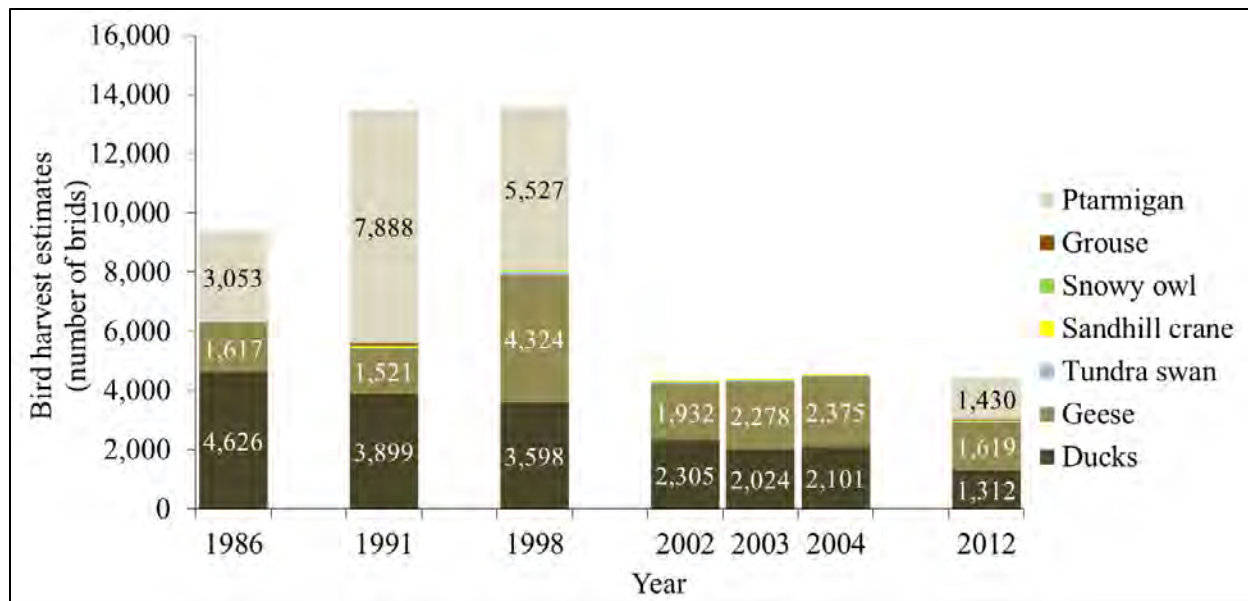


Figure 1. Kotzebue bird harvest estimates 1986–2012.

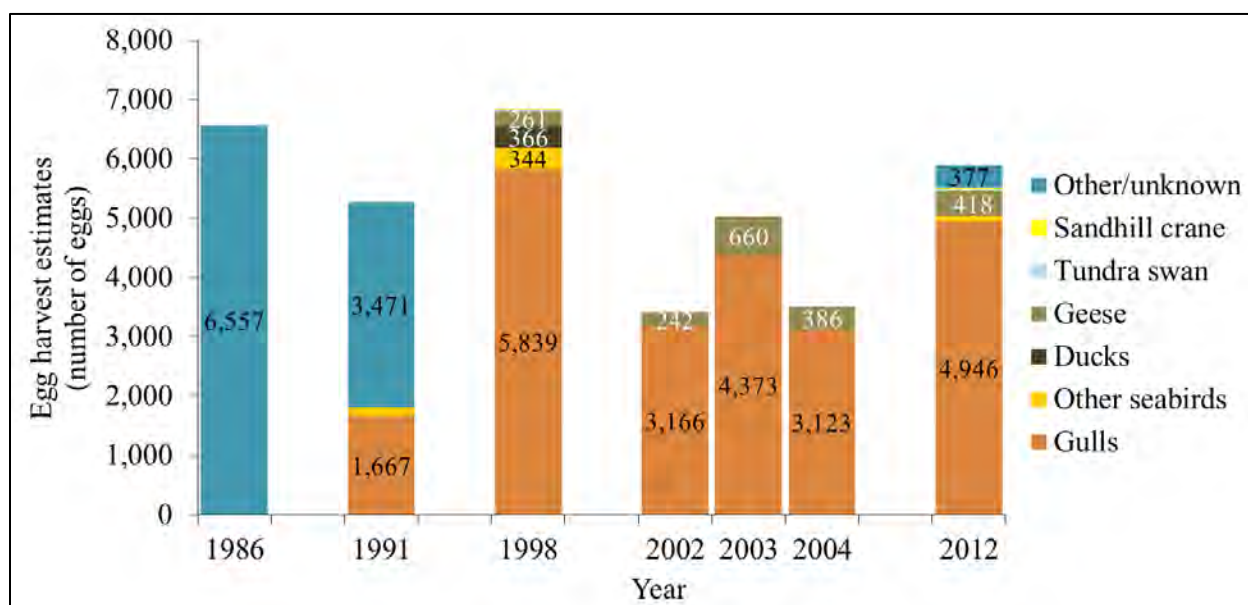


Figure 2. Kotzebue egg harvest estimates 1986–2012.

Data source for birds and eggs harvests presented in figures 1 and 2: 1986 (Georgette and Loon, 1993), 1991 (Fall and Utermohle, 1995), 1998 (Georgette, 2000), 2002–2004 (Whiting, 2006), and 2012 (present study). Harvest estimates for 1986, 1991, 1998, and 2012 represented the entire community. Harvest estimates for 2002–2004 represented households with tribal membership and did not include ptarmigan.

Prepared by Liliana Naves, Division of Subsistence, ADF&G, August 2014.

For a copy of the Alaska Department of Fish and Game OEO statement, see

<http://www.adfg.alaska.gov/index.cfm?adfg=home.oeostatement>

Table 1. Kotzebue bird harvest estimates (number of birds), April 2012–March 2013.

English, Iñupiaq	Estimated Bird Harvest (number of birds)					Total	CIP	Reported harvest
	Spring Apr-Jun	Summer Jul-Aug	Fall Sep-Oct	Winter Nov-Mar				
Wigeon, Ugihiq	91	0	87	0	178	38%	47	
Teal, Qaingngiq	53	0	42	0	95	38%	25	
Mallard, Kuruǵaisugruk	102	15	83	0	200	28%	49	
Pintail, Kuruǵaq	257	45	162	0	464	28%	119	
Black scoter, Tuungaaǵruk	45	0	15	0	60	66%	16	
White-winged scoter	8	0	8	0	16	59%	4	
Canvasback	0	23	0	0	23	84%	6	
Scaup, Qaqłuktuuq	38	0	38	0	76	59%	20	
Common eider, Mitik	0	0	0	0	0		0	
King eider, Qiqalik	4	0	0	0	4	84%	1	
Spectacled eider, Qavaasuk	0	0	0	0	0		0	
Steller's eider, Iñniqauqtuq	0	0	0	0	0		0	
Long-tailed duck (olsdquaw), Ahaaliq	38	0	0	0	38	84%	10	
Merganser, Paisugruk	0	4	0	0	4	84%	1	
Duck (unidentified)	101	0	53	0	154	29%	37	
Total ducks	737	87	488	0	1,312	19%	335	
Brant, Niǵliqnaq	494	45	57	0	596	27%	158	
Canada/cackling goose, Iqsraǵutilik	411	38	147	0	596	18%	158	
White-fronted goose, Qiqiyuk	226	8	53	0	287	23%	76	
Emperor goose, Liǵliqpak	0	0	0	0	0		0	
Snow goose, Kanguq	132	0	0	0	132	45%	35	
Goose (unidentified), Tiñmiaq	8	0	0	0	8	59%	1	
Total geese	1,271	91	257	0	1,619	16%	428	
Tundra swan, Qugruq	11	4	15	0	30	33%	8	
Sandhill crane, Tatirgaq	30	4	4	0	38	37%	10	
Seabirds	0	0	0	0	0		0	
Shorebirds	0	0	0	0	0		0	
Common loon, Tuutlik	0	0	0	0	0		0	
Pacific loon, Tunusulik-qaqsaup	0	0	0	0	0		0	
Red-throated loon, Qaqsauchauraq	0	0	0	0	0		0	
Yellow-billed loon, Tuutlik	0	0	0	0	0		0	
Grebe, Suǵliq, suǵlitçhauraq	0	0	0	0	0		0	
Grouse, Napaaqtuum aqargiq	0	0	0	8	8	84%	2	
Ptarmigan, Aqargiq, niqsaaqtungiq	57	26	64	1,283	1,430	20%	379	
Total birds	2,106	212	828	1,291	4,437	11%	1,162	

CIP: Confidence interval as a percentage of estimated harvests.

Sources for Iñupiaq names: Webster et al. (1970), Burch (1985), Georgette and Loon (1993).

Acknowledgments

We thank all households that participated in this survey and shared information about their subsistence harvests. The Native Village of Kotzebue, especially Alex Whiting, facilitated this survey and its data review. Local surveyors Chelsea Hadley, Denali Whiting, Mahlon Ferreira, and Eryn Schaeffer-Newlin and ADF&G staff Elizabeth Mikow, Anna Godduhn, Brittany Retherford, and Loraine Navarro helped in data collection.

Table 2. Kotzebue egg harvest estimates (number of eggs), April 2012–March 2013.

English, Iñupiaq	Estimated Egg Harvest (number of eggs)					CIP	Reported harvest
	Spring Apr-Jun	Summer Jul-Aug	Fall Sep-Oct	Winter Nov-Mar	Total		
Ducks	0	0			0		0
Brant, Niqliqnaq	147	0			147	45%	39
Canada/cackling goose, Iqsraqutilik	79	0			79	49%	21
Goose (unidentified), Tiñmiaq	192	0			192	45%	51
Total geese	418	0			418	27%	111
Tundra swan, Qugruq	34	0			34	75%	9
Sandhill crane, Tatirgaq	30	0			30	59%	8
Black-legged kittiwake	0	30			30	84%	8
Mew gull, Nauyatchaiq	113	0			113	84%	30
Large gull, Nauyaq	4,369	75			4,444	30%	1,178
Gull (unidentified)	321	38			359	43%	95
Murre, Atpa	0	91			91	84%	24
Total seabirds	4,803	234			5,037	27%	1,335
Shorebirds	0	0			0		0
Loons and grebes	0	0			0		0
Ptarmigans and grouses	0	0			0		0
Other/unknown bird	377	0			377	59%	100
Total eggs	5,662	234			5,896	26%	1,563

CIP: Confidence interval as a percentage of estimated harvests.



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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.



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