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Customary and Traditional Use Worksheet: Cormorants, Game Management Units 6, 8, 10, 17, 18, 22, and 23

Prepared by

Alaska Department of Fish and Game, Division of Subsistence

for the March 2016 Board of Game meeting

March 2016

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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The Division of Subsistence Technical Paper series was established in 1979 and represents the most complete collection of information about customary and traditional uses of fish and wildlife resources in Alaska. The papers cover all regions of the state. Some papers were written in response to specific fish and game management issues. Others provide detailed, basic information on the subsistence uses of particular communities which pertain to a large number of scientific and policy questions.

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INTRODUCTION

Proposal 133, submitted by the Alaska Department of Fish and Game (ADF&G) for the Alaska Board of Game (BOG) March 2016 Statewide meeting, would modify the state hunting season for cormorants. The BOG has not made a customary and traditional use determination for cormorant populations under the provisions of AS 16.05.258. This worksheet provides background information for a determination, organized by the Joint Board of Fisheries and Game's eight criteria as listed in 5 AAC 99.010(b).

Cormorants are among the 91 species of migratory birds, including about 36 species of sea birds, eligible for subsistence hunting in Alaska under the terms of the Amended Migratory Bird Treaty Act of 1997. Federal regulations governing spring and summer subsistence hunting of migratory birds came into effect in 2003 (U.S. National Archives and Records Administration 2015).

Three species of cormorants regularly occur in Alaska:

Pelagic cormorant *Phalacrocorax pelagicus*

Double-crested cormorant *P. auritus*

Red-faced cormorant *P. urile*

A fourth species, Brandt's cormorant *P. penicillatus*, is uncommon in the state but may be found seasonally in eastern Southcentral Alaska [a portion of Game Management Unit (GMU) 6] and Southeast Alaska. Federal subsistence regulations do not include Brandt's cormorant.

Currently, there are state and federal open hunting seasons for pelagic and double-crested cormorants. Due to conservation concerns, there are no open hunting seasons for red-faced cormorants.

Some Alaska Native names for cormorants include:

Alutiiq: *agayuuq* (Stanek 1985:112), *uyalek* (Smelcer 2010);

Dena'ina Athabascan: *yeq, tsaltsiggi* (Kari 2007);

Aleut: *agayuux, anulgix, ingatux, kanuliisigi, qilitaqa* (Bergsland 1994);

Central Yup'ik: *agasuuq, agayuuq, uyalek*; *uyalegpak* (Jacobsen 1984:706);

Siberian Yupik: *ngelqaq* (Jacobson 1987);

Inupiaq: *pautjuk* (Nelson et al. 2010); and

Tlingit: *yook, x'adaax'aan* (Hunn and Thornton 2010).

THE EIGHT CRITERIA

CRITERION 1: LENGTH AND CONSISTENCY OF USE

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

Cormorants are one of a variety of seabirds that Alaska Native peoples have used for food and raw materials for thousands of years (Causey et al. 2005; Moss 2007). Seabirds and their eggs were taken in relatively large numbers throughout their range in Alaska into the mid-20th century. In addition to the meat, bird parts such as skin, organs, and fat were and continue to be eaten because they are good sources of calories, vitamins, and other nutrients (Unger 2014:218).

Archaeological sites in the Aleutian Islands and lower Alaska Peninsula reveal that cormorants were one of the most important birds used in the past (Unger 2014:233). Ethnographic evidence documents uses of cormorants in the 20th century by Alutiiq (in present GMUs 6 and 8; Stanek 1985:112), Aleut (GMU 10; Veltre and Veltre 1981), Central Yup'ik (GMUs 17 and 18; Lantis 1984:214), Siberian Yupik (GMU 22; Little and Robbins 1984), and Inupiat (GMUs 22 and 23).

Contemporary harvest surveys have often used seabird categories rather than species to collect harvest data because of difficulties in species identification. In the following discussion, based on species' distribution ranges, all cormorants harvested in the St. Lawrence—Diomede Islands and Bering Strait Mainland regions are assumed to be pelagic cormorant (Stephensen et al. 1998). Table 1 provides estimates of statewide harvests of cormorants as well as the larger categories of "seabirds" and "total birds." Estimates of annual harvests of cormorants were 992 birds/year in the 1980s–1990s; 2,574 birds/year in 1996; 1,753 birds/year in 1995–2000; 3,948 birds/year in 2001–2005; and 3,296 birds/year in 2004–2013. The most recent estimate (2004–2013) is largely based on surveys conducted by ADF&G on behalf of the Alaska Migratory Bird Co-Management Council (AMBCC), and is composed of 98% pelagic cormorants and 2% unidentified cormorants. Of the total AMBCC estimated cormorant harvest, 86% were harvested in the St. Lawrence—Diomede Islands subregion, 12% in the Bering Strait Mainland subregion, and 2% in other subregions, primarily the Aleutian-Pribilof Islands (Table 2). It is the policy of the AMBCC to not release harvest estimates at the community level.

Estimated harvests of cormorants for selected Alaska communities are available from harvest surveys conducted by ADF&G and reported in the Community Subsistence Information System database (CSIS[1]). As with the AMBCC surveys, the results show that most harvests occur on St. Lawrence Island, with smaller harvests in several other regions (Table 3).

Although cormorants are no longer hunted in the Aleutian and Pribilof islands to the extent they were in the past (Veltre and Veltre 1981:144; Veltre and Veltre 1983:139; Young et al. 2014), harvests have been documented in occasional household surveys (Table 3). Veltre and Veltre (1981:144) estimated that in 1980/1981, about 50 cormorants were harvested by about 10–15 households at St. George, where the birds are also called "shags."

Little and Robbins (1984:232) reported a harvest of 700 cormorants by 10 hunters in Gambell, St. Lawrence Island, in 1981. They added that "Even though not taken in large numbers, this bird is the favorite of some hunters because of the dark, delicious meat it provides."

CRITERION 2: SEASONALITY

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

[1] http://www.adfg.alaska.gov/sb/CSIS/ . Hereinafter cited as CSIS.

Harvest estimates available for 2004–2013 report that 83% of the cormorant harvest occurred in fall and winter, 12% in summer, and 5% in spring (Table 2).

As summarized by Veltre and Veltre (1981:143), historical sources for the Pribilof Islands indicate that cormorants were traditionally especially important in winter as a source of fresh meat, when other resources were unavailable. Unger (2014:233) also notes that "Since this bird is a year-round resident on the Pribilofs, it provided fresh meat in the middle of winter when other foods were scarce." A depiction of the seasonal round of Pribilof Island harvest activities shows "sea ducks and cormorants" harvested primarily in December and also in November and January (Unger 2014:51). For the Aleutian Islands area more generally, "*Anulgilax* " is the Aleut language name for February, and means "young cormorant:" cormorant were a primary source of fresh meat in this month (Unger 2014:52-53).

On St. Lawrence and Diomede islands, fall—winter harvests of pelagic cormorant, black-legged kittiwake, large gulls, guillemots, and loons are related to a local harvest preference for young birds, because they are tender and fatter than adults (Naves and Zeller 2013). Some summer and fall harvests may be chicks harvested just before they leave the nest [especially cliff-nesting species (e.g., Little and Robbins 1984:248)], but harvest of nestlings has not been differentiated in harvest surveys. Little and Robbins (1984:221) report cormorant hunting on St. Lawrence Island from August to November.

CRITERION 3: EFFICIENT MEANS AND METHODS OF HARVEST AND ECONOMY OF COST

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

Unger (2014:233) notes for Aleut communities that "In the past, cormorants were hunted by hand at night while on their nests. The hunter would twist the neck to kill the bird." For the Pribilof and Aleutian islands, Veltre and Veltre (1981:17), describe "bird hunting at nesting sites" as follows:

> Bird cliffs approached by boat from below or by rope from above; birds caught with snares, bolas, hand nets, leisters, clubs, or by hand at nests as well as away from nesting areas.

Hoffman (1990) describes traditional methods of harvesting cormorants and other sea birds from nests on cliffs by the Central Yup'ik on Nunivak Island.

In recent decades, subsistence seabird hunting in Alaska has been done primarily with shotguns, although other harvest methods are still used at a small scale (e.g., auklet nets; e.g., Little and Robbins 1984:195 for St. Lawrence Island). Harvesting gear is owned and operated by family groups. Although some bird hunts are specialized, bird hunting is usually done opportunistically together with other pursuits, such as marine mammal hunting and berry picking.

CRITERION 4: GEOGRAPHIC AREAS

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

Published maps that specifically depict areas used to hunt cormorants are rare because these areas are often combined in general maps that show where birds are hunted or eggs gathered, and because cormorants are taken when hunters are engaged in other subsistence activities.

For St. Paul Island, Veltre and Veltre (1981:144) note that "cormorants may be found around most of the coast of St. Paul and, consequently, are hunted in no special locations." Veltre and Veltre (1981:144–145) include a map of cormorant hunting locations around St. George Island and note that

> Many stretches of coastline on St. George island [are] used for cormorant hunting, with hunters shooting with 12-gauge shotguns from below the cliffs at the birds overhead.

Little and Robbins (1984:222) provide a map of cormorant hunting locations on St. Lawrence Island.

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

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

Based on traditions recorded in several Aleut communities, Unger (2014:233) notes that

> Cormorant can be fried, roasted, or made into a soup or stew. The cormorant is sometimes skinned before using and boiled for a long time if used in soup.

The following are two cormorant recipes from St. George Island, collected in 2012 (Unger 2014:247):

> Roast Cormorant (Aleut Turkey)
>
> Pluck bird, remove innards, and rinse bird well. Sprinkle with salt and pepper inside the cavity. Season bird with Worcestershire [sauce]. Place bird in roasting pan. Do not cover. Bake at 325 degrees for about 2 hours. Note: the meat of the cormorant can be tough and it is advisable to cook at lower temperature for a longer period of time (up to 3 hours).
>
> Cormorant Soup
>
> Pluck bird, remove innards, and rinse well. Cut bird into pieces. In a large pot, add bird pieces and water just to cover. Boil for about an hour or until meat is tender. Add one cup of rice and continue to boil for another half hour or until rice is done. Salt and pepper as desired.

In addition to food, the feathered skins of cormorants were also used to make parkas. Twenty-five cormorants were needed to make one parka (Unger 2014). In the Aleutian Islands, barbs for fishing were made from the wing bones of cormorants (Unger 2014:133, Black 1999).

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

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

A recent book on Aleut traditional uses of wild foods included oral traditions about cormorants, including hunting methods and recipes (see Criterion 5; Unger 2014).

Veltre and Veltre (1981:143–144) recorded the following oral tradition regarding cormorants in the Pribilof Islands that illustrates both the value of cormorants as food and their role as a symbol of aspects of Aleut history.

> Today, cormorants are often referred to as "Aleut turkeys." As explained to the authors, years ago turkeys were sent to the Pribilof Islands for the white administrators to eat for certain holidays. This food was not shared with the Aleuts, who provided their own "turkeys" by hunting cormorants. According to residents today, the cormorant is a bird with a good deal of meat and is good eating when it is fat.

Dena'ina Athabascan oral traditions from Lime Village describe a place on the upper Stony River (far inland in GMU 19) called *Yeqtnu Denyiq* or "cormorant stream canyon," that had a nesting colony of 300–400 cormorants until they were washed away by high water. Birds still were observed in the area after relocation downstream (Russell and West 2003:61–62).

CRITERION 7: DISTRIBUTION AND EXCHANGE

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

Wild resource harvests are commonly shared in the communities that have contemporary uses of cormorants. As shown in Table 3, most households that reported harvests of cormorants in household surveys also reported sharing the harvest. For example, in 2009, 30% of Savoonga (St. Lawrence Island) households harvested cormorants and 21% gave them away, thus 70% of all successful hunters shared their harvests with others. In Diomede in 2013, 16% of households harvested cormorants but 32% used them, indicating widespread sharing.

For St. Paul, Veltre and Veltre (1981:144) noted that while cormorant harvests had declined by the late 20th century, those that are harvested "are usually given to older persons who are fond of them."

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

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

Where most frequently used today, harvests and uses of cormorants and other seabirds occur within diverse and relatively large subsistence harvests. For example, total subsistence harvests in the St. Lawrence Island community of Savoonga were estimated at 890 pounds usable weight per person in 2009 (88% of this harvest was marine mammals; 4% was birds and eggs; Tahbone and Trigg 2011); harvests in Diomede in 2013 averaged 340 lb per person (6% of this harvest was birds and eggs; CSIS).

Alaska communities in these subregions have a mixed economy relying on cash as well as harvests of wild resources for food and to support their ways of life. The total subsistence harvest in Alaska outside the nonsubsistence areas is about 36.9 million edible pounds/year, and is composed of fish (55%), land mammals (22%), marine resources (13%), plants (4%), shellfish (3%), and birds and eggs (3%; Fall 2014). Although birds represent a small proportion of total statewide subsistence harvests, bird harvests are culturally and socially important because they occur when other resources are scarce and contribute to diet diversity. Seabirds, including cormorants, are harvested in low numbers compared to other birds, but seabird eggs represent a large proportion of the total egg harvest (Paige and Wolfe 1997; Paige and Wolfe 1998).

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Table 1.–Estimates of Alaska subsistence harvests of cormorants and other seabirds and population sizes (estimated average birds/year).

Species categories Species that may be represented in harvests	Alaska population (breeding birds)*	Harvest Estimate (number of birds/year)				
		1980s–1990s[a]	1996[b]	1995–2000[c]	2001–2005[c]	2004–2013[d]
Double-crested cormorant *Phalacrocorax auritus*	6,100					
Red-faced cormorant‡** *P. urile*	20,000					
Pelagic cormorant‡ *P. pelagicus*	44,000	–	–	–	–	3,229
Cormorant (unidentified)		992	2,574	1,753	3,948	67
Total seabirds		**7,222**	**36,418**	**21,700**	**30,381**	**23,209**
Total birds		**–**	**371,223**	**–**	**–**	**342,778[e]**

a. Wohl et al. (1995). Minimum harvest (not extrapolated to non-surveyed communities), loons and grebes not included.

b. Paige and Wolfe (1998). Red-legged kittiwake harvest data were expanded to communities outside of the species breeding range.

c. Wohl et al. (2008). Minimum harvest (not extrapolated to non-surveyed communities).

d. Naves *In prep*.

e. Naves unpublished data.

**Sources* U.S. Fish and Wildlife Service (2009, 2014), Wetlands International (2015). Number of breeding birds, unless otherwise noted. Species with occasional occurrence and limited distribution in Alaska were not included because they are unlikely to be harvested (e.g., Brandt's cormorant).

** Species not opened for harvest in the Alaska subsistence hunt (U.S. National Archives and Records Administration 2015).

‡ Species of conservation concern (U.S. Fish and Wildlife Service 2009, 2014).

Table 2.–Alaska subsistence harvests of cormorants and other seabirds by region and season (estimated average birds/year), 2004–2013.

	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Archipelago	Cook Inlet	Southeast Alaska	**Total**
Pelagic cormorant	§	§	2,825	404	§	§	§	§	§	§	§	§	**3,229**
Spring	§	§	140	4	§	§	§	§	§	§	§	§	**144**
Summer	§	§	401	0	§	§	§	§	§	§	§	§	**401**
Fall—winter	‡		2,284	400	§	§	§	§	§	§	§	§	**2,684**
Cormorants (unidentified)	0	0	§	§	4	0	0	1	59	0	3	0	**67**
Spring	0	0	§	§	0	0	0	0	7	0	0	0	**7**
Summer	0	0	§	§	0	0	0	0	0	0	3	0	**3**
Fall—winter	‡	0	§	§	4	0	0	1	52	0	0	0	**57**
Total seabirds	158	76	18,132	1,301	638	8	0	950	1,794	42	110	0	**23,209**
Spring	36	35	9,181	634	481	2	0	873	951	24	85	0	**12,302**
Summer	122	3	4,108	261	53	6	0	10	254	0	13	0	**4,830**
Fall—winter	‡	38	4,843	406	104	0	0	67	589	18	12	0	**6,077**

Source Naves *In prep*

§: Cormorants harvested in the St. Lawrence—Diomede islands and Bering Strait Mainland regions were assumed to be pelagic cormorant based on species distribution.

‡: Alaska Migratory Bird Co-Management Council survey not conducted in North Slope in fall because birds migrate out of this region starting in late summer.

Table 3.–Estimated harvests and uses of cormorants in Alaska: data available from selected household surveys.

Community Name	Study Year	Percentage of Households					Estimated Harvest, number of Birds	Estimated Pounds Harvested	Average Lbs Harvested per Household	Per Capita Lbs Harvested	95% CIP +/-
		Using	Hunting	Harvesting	Giving Away	Receiving					
Tatitlek	1988	4.8	4.8	4.8	4.8	0.0	13	33	1.19	0.33	100
Akutan	1990	4.0	4.0	4.0	4.0	0.0	9	22	0.70	0.22	77
Nikolski	1990	7.1	0.0	0.0	0.0	7.1	0	0	0.00	0.00	
Tatitlek	1990	5.9	5.9	0.0	0.0	5.9	0	0	0.00	0.00	
Atka	1994	10.7	7.1	7.1	7.1	3.6	19	33	1.13	0.39	26
Saint George	1994	11.1	5.6	5.6	5.6	5.6	18	33	0.66	0.18	72
Saint Paul	1994	6.0	4.8	4.8	3.6	1.2	38	69	0.44	0.14	68
Unalaska	1994	0.3	0.3	0.3	0.0	0.0	7	14	0.02	0.01	142
Diomede	1995			2.6			6	16	0.39	0.11	50
Gambell	1995			68.1			1,432	3,581	24.53	5.72	20
Savoonga	1995			60.3			853	2,132	16.15	3.78	25
Shishmaref	1995	2.2	2.2	2.2	2.2	2.2	25	78	0.56	0.14	160
Akutan	1996	3.6	0.0	0.0	0.0	3.6	0	0	0.00	0.00	
Stebbins	2006			2.7			14	44			111
Gambell	2006			24.1			780	2,457			
Savoonga	2006			61.0			2,864	9,021			
Savoonga	2009	30.0	30.0	30.0	21.0	7.0	1,050	2,624	18.70	3.80	34
Diomede	2013	32.0	16.0	16.0	20.0	24.0	34	107	2.70	1.30	70

Blank cells means data not available

Sources: CSIS, Ahmasuk and Trigg 2007, Tahbone and Trigg 2011