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Customary and Traditional Use Worksheet: Shellfish in Districts 6A, 8, and 10, Southeast Alaska

Prepared by

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and

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for the January 2009 Petersburg Board of Fisheries meeting

January 2009

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

cubic feet per second	ft^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

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

Measures (fisheries)

fork length	FL
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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CUSTOMARY AND TRADITIONAL USE WORKSHEET: SHELLFISH IN DISTRICTS 6A, 8, AND 10, SOUTHEAST ALASKA

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Special Publications are available through the Alaska State Library and on the Internet: http://www.subsistence.adfg.state.ak.us. This publication has undergone editorial and professional review.

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INTRODUCTION

This worksheet provides background information on the subsistence uses of shellfish in those waters of fishing District 6A that are east of a line from McNamara Point to Mitchell Point and in those waters of District 10 that are east of a line from Pinta Point to Point Pybus, in Southeast Alaska. These waters are not currently addressed by the prior Board of Fisheries customary and traditional use (C&T) findings for District 6A (5 AAC 02.108 (a) (3)(G)) and District 10 (5 AAC 02.108 (a) (3)(C)). (Figure 1) Under the Alaska subsistence law (AS 16.05.258(a)), the Board of Fisheries is required to identify the fish stocks or portions of stocks that are customarily and traditionally taken or used for subsistence (a "C&T finding").

This worksheet also provides evidence of the customary and traditional uses of king crabs *Paralithodes* and *Lithodes* spp, Tanner crabs *Chionoecetes* spp, and Dungeness crabs *Cancer magister* in the areas. The information is organized according to the 8 criteria for identifying customary and traditional uses as defined in the Joint Board of Fisheries and Game Subsistence Procedures (5 AAC 99.010).

King crab is defined in regulation as any or all of the following species: *P. camtschaticus* (red king crab), *P. platypus* (blue king crab), *L. couesi* (scarlet king crab), and *L. aequispinus* (golden king crab) (5 ACC 39.975 (17)). Tanner crab is defined as any or all of the following species: *C. bairdi*, (Tanner crab), *C. opilio* (snow crab), *C. tanneri* (grooved Tanner crab), *and C. angulates* (triangle Tanner crab) (5 ACC 39.975 (18)). These species are currently excluded from the shellfish C&T finding for districts 6A, 10 and 8 (5 AAC 02.108 (a)(5)). In this worksheet, "Tanner crab" refers to all species of Tanner crab combined, unless otherwise noted, and "king crab" refers to all species of king crab combined, unless otherwise noted.

A shellfish C&T finding for districts 6A, 8, and 10, including for king crabs, would be necessary in order to adopt Proposal 166, submitted to the Alaska Board of Fisheries for their consideration during their January 2009 meeting in Petersburg, Alaska. The Board of Fisheries requires this information in order to determine whether there are customary and traditional uses of shellfish in this area. It is intended that the information in this worksheet be supplemented by written and oral public testimony, if any, delivered during Board of Fisheries January 2009 meeting.

The quantitative harvest data presented in this report are estimations based on the results of Alaska Department of Fish and Game (ADF&G) Division of Subsistence (Division) surveys administered to randomly-sampled households Wrangell and Petersburg in 2000 and in Kake in 1996. The harvest data presented here have been expanded from the sampled households to generate per capita estimates for all individuals in each community. Survey instruments included questions about shellfish in general and for some resources did not differentiate at the species level. See Cohen (1989), Smythe (1988), and Firman and Bosworth (1990) for explanation of survey methods and means.

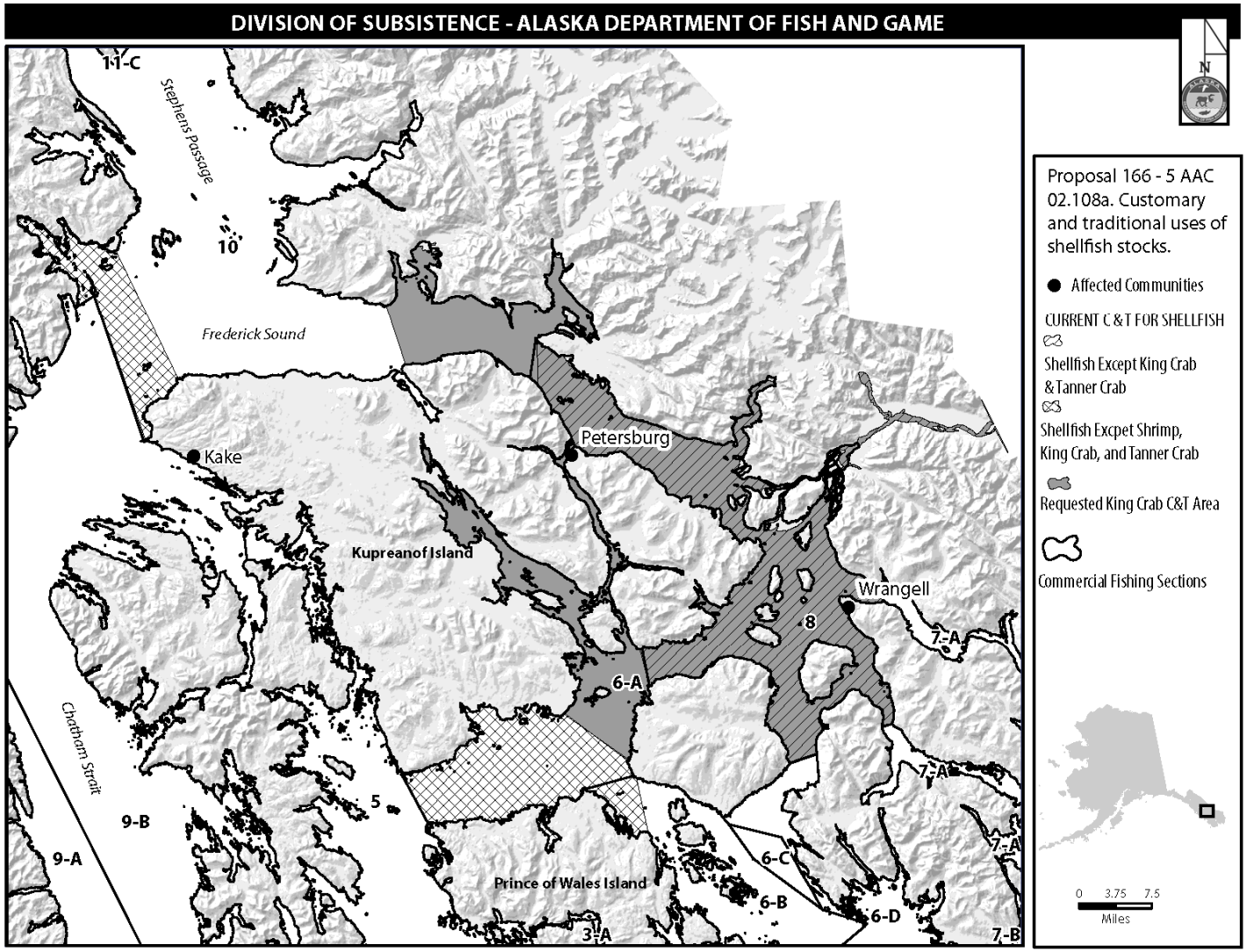

Figure 1.–Map of Petersburg area current and requested C&T findings for shellfish, 2008.

The communities of Wrangell, Petersburg, and Kake show a history of using shellfish in this area, including king and Tanner crabs.

PROPOSAL NUMBER: 166

FISHING DISTRICTS: Portions of districts 6A, 8, & 10

SPECIES/STOCK: Shellfish, all species

MAIN COMMUNITIES USING THE SPECIES Kake, Petersburg, and Wrangell

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.

Archeological evidence suggests that the inhabitants of Southeast Alaska have had a marine-based diet for at least 9,000 years, the entire known period of human occupancy (Dixon 2000). Fragments of intertidal mollusk shells were found in one archeological site that was dated to 6,500 BCE. Shellfish harvests appear to have increased with the stabilization of sea levels, as evidenced by the appearance of numerous shell middens throughout the region between 4,200 and 3,200 BCE (Ames and Maschner 1999).

Reports by numerous anthropologists and travelers in the past century have remarked on residents' uses of shellfish, including various species of crabs, clams, cockles, whelks, limpets, oysters, mussels, scallops, geoducks, abalone, sea urchins, chitons, sea cucumbers, and octopuses. A traveler visiting a Tlingit village in the late 1800s was fed a crab (likely a species of king crab) with a 6 ft span and 18 in body (Wood 1882).

In addition to food uses, large clam shells were used as dishes and spoons. Spoons were also made by attaching smaller clam shells and mussel shells to wooden handles. Pieces of shell were used as surgical tools to puncture and drain inflammations. Large mussel shells were made into knives for dressing game and fish, and medium-sized mussel shells were used as tools by basket makers and mat weavers. Shell fragments were inlaid into carvings and scallop shells were used to make rattles. Various species of starfish and jellyfish were used for medicine (Emmons 1991).

By 1916, canneries in Wrangell and Petersburg were processing shrimp *Pandalus* spp for commercial sale. Wrangell and Petersburg residents have harvested Dungeness crabs *Cancer magister* for home use since at least the early 1900s. King and Tanner crabs have been commercially harvested since the late 1940s. Shellfish were removed from commercial catches for home use in varying amounts, a practice which continues to the present. Clams and cockles were heavily utilized throughout the history of these communities (Betts et al. 1994; Smythe 1988: 35, 36)

Harvest of marine invertebrates for home use continues throughout the region in all communities, depending on species availability, food preferences, and other factors (Firman and

Bosworth 1990; Smythe 1988; Cohen 1989). Analysis of the Division of Subsistence data from surveys conducted in Petersburg, Wrangell, and Kake suggests clams were harvested in large quantities in all 3 communities (Tables 1, 2, and 3). The estimated mean harvest per household ranged from 7 gallons per household in Kake to 4 gallons per household in Petersburg (Tables 2 and 3).

Table 1.–Estimated harvest and use of shellfish resources, species with reported harvest, Wrangell, 2000.

	Percentage of households					Pounds harvested			Amount harvested			95% confidence limit (+/-)	
Resource name	Use	Att	Harv	Receive	Give	Total	Mean HH	Per capita	Total	Unit	Mean HH	Harvest	Per capita
Shrimp	68	19	19	57	24	54,424	72.86	27.78	6,803	gal	9.11	0.89	0.88
Crab													
Dungeness crab	63	32	30	44	22	30,426	40.73	15.53	23,050	ea.	30.86	1.03	1.01
Tanner crab	23	9	9	15	7	5,987	8.01	3.06	3,628	ea.	4.86	0.86	0.85
King crab:													
Red king crab	13	4	4	10	4	5,577	7.47	2.85	1,037	ea.	1.39	1.42	1.41
Golden king crab	5	1	1	4	3	1,230	1.65	0.63	229	ea.	0.31	1.55	1.54
Subtotal, all king crab species	15	5	5	12	5	6,807	9.11	3.48	1,265	ea.	1.69	1.20	1.18
Subtotal, all crab species	64	34	32	52	23	43,221	57.86	22.06	27,982	ea.	37.46	1.00	1.01
Clam	35	30	30	14	16	12,289	16.45	6.27	3,373	gal	4.52	0.39	0.41
Cockle	22	17	17	8	10	4,486	6.01	2.29	1,443	gal	1.93	0.41	0.42
Sea cucumber	6	4	4	3	4	1,616	2.16	0.82	202	gal	0.27	1.05	1.05
Scallop	5	2	2	3	0	377	0.50	0.19	229	gal	0.31	1.31	1.31
Octopus	3	2	2	1	1	146	0.20	0.07	23	ea.	0.03	1.15	1.15
Geoduck	3	0	0	3	1	0	0.00	0.00	0	gal	0.00	0.00	0.00
Gumboot chiton	2	1	1	1	0	114	0.15	0.06	38	gal	0.05	1.55	1.55
Mussel	1	1	1	0	1	11	0.02	0.01	8	gal	0.01	1.55	1.55
Total, all marine invertebrates	**83**	**47**	**46**	**72**	**43**	**116,685**	**156.20**	**59.56**	**116,685**	**lbs**	**156.20**	**0.81**	**0.80**
All resources	94	83	81	89	65	328,141	439.28	167.51	328,141	lbs	439.28	0.44	0.43

Source ADF&G Division of Subsistence household surveys 2001.

Table 2.–Estimated harvest and use of shellfish resources, species with reported harvest, Petersburg, 2000.

	Percentage of households					Pounds harvested			Amount harvested			95% confidence limit (+/-)	
Resource name	Use	Att	Harv	Receive	Give	Total	Mean HH	Per capita	Total	Unit	Mean HH	Harvest	Per capita
Shrimp	34	14	14	23	15	40,814	38.14	13.86	5,102	gal	4.77	0.59	0.58
Crab													
Dungeness crab	67	30	30	50	18	18,689	17.47	6.35	14,158	ea.	13.23	0.36	0.36
Tanner crab	29	14	12	20	9	10,480	9.79	3.56	6,352	ea.	5.94	0.65	0.64
King crab:													
Red king crab	29	8	6	26	7	13,586	12.70	4.61	2,525	ea.	2.36	1.09	1.08
Golden king Crab	10	4	4	6	2	5,849	5.47	1.99	1,087	ea.	1.02	0.87	0.88
Blue king crab	1	1	1	0	0	87	0.08	0.03	17	ea.	0.02	1.56	1.56
Subtotal, all king crab species	36	10	9	30	9	19,521	18.24	6.63	3,629	ea.	3.39	0.80	0.80
Subtotal, all crab species	76	34	34	62	22	48,690	45.50	16.54	24,139	ea.	22.56	0.44	0.53
Clam	33	26	26	12	11	15,781	14.75	5.36	4,404	gal	4.12	0.63	0.57
Octopus	10	7	7	6	4	2,191	2.05	0.74	342	ea.	0.32	0.85	0.85
Cockle	7	7	7	1	2	1,151	1.08	0.39	370	gal	0.35	0.79	0.79
Gumboot chiton	6	3	3	2	1	597	0.56	0.20	81	gal	0.08	0.92	0.92
Scallop	2	1	1	2	2	42	0.04	0.01	26	gal	0.02	1.56	1.55
Limpet	1	1	1	0	0	6	0.01	0.00	4	gal	0.00	1.56	1.56
Mussel	1	1	1	0	1	13	0.01	0.00	9	gal	0.01	1.56	1.57
Abalone	1	0	0	1	0	0	0.00	0.00	0	ea.	0.00	0.00	0.00
Geoduck	1	0	0	1	0	0	0.00	0.00	0	gal	0.00	0.00	0.00
Total, all marine invertebrates	**82**	**45**	**45**	**70**	**32**	**109,287**	**102.14**	**37.11**	**109,287**	**lbs**	**102.14**	**0.48**	**0.48**
All resources	94	81	78	81	43	475,321	444.23	161.42	475,321	lbs	444.23	0.34	0.34

Source ADF&G Division of Subsistence household surveys 2001.

Table 3.–Estimated harvest and use of marine invertebrate resources, species with reported harvest, Kake, 1996.

	Percentage of households					Pounds harvested			Amount harvested			95% confidence limit (+/-)
Resource name	Use	Att	Harv	Receive	Give	Total	Mean HH	Per capita	Total	Unit	Mean HH	Harvest
Shrimp	52	5	5	47	4	1,555	6.25	2.08	194	gal	0.78	94.39%
Crab												
Dungeness crab	71	22	22	55	14	1,986	7.97	2.66	1,504	ea.	6.04	49.57%
Tanner crab	16	4	4	12	1	107	0.43	0.14	65	ea.	0.26	120.50%
King crab:												
Red king crab	10	3	3	8	3	587	2.36	0.79	109	ea.	0.44	121.41%
Golden king Crab	5	0	0	5	0	0	0.00	0.00	0	ea.	0.00	0.00%
Unknown king crab	5	0	0	5	0	0	0.00	0.00	0	ea.	0.00	0.00%
Subtotal, all king crab species	19	3	3	18	3	587	2.36	0.79	109	ea.	0.44	121.41%
Subtotal, all crab species	74	22	22	59	15	2,680	10.76	3.59	1,678	ea.	6.74	51.72%
Gumboot chiton	56	30	29	30	19	3,658	14.69	4.90	488	gal	1.96	61.92%
Clam	55	26	25	32	14	7,536	30.27	10.09	1,849	gal	7.42	98.08%
Cockle	26	11	11	15	4	785	3.15	1.05	252	gal	1.01	116.40%
Octopus	15	4	4	11	1	109	0.44	0.15	17	ea.	0.07	110.19%
Sea cucumber	8	1	1	7	1	27	0.11	0.04	3	gal	0.01	167.60%
Sea urchin	5	0	0	5	0	0	0.00	0.00	0	gal	0.00	0.00%
Starfish	4	4	4	0	1	0	0.00	0.00	41	gal	0.16	140.65%
Geoduck	3	0	0	3	0	0	0.00	0.00	0	gal	0.00	0.00%
Mussel	3	1	1	1	0	3	0.01	0.00	2	gal	0.01	167.60%
Squid	1	1	1	0	0	27	0.11	0.04	3	gal	0.01	167.60%
Total, all marine Invertebrates	**86**	**49**	**48**	**78**	**38**	**16,381**	**65.79**	**21.93**	**16,381**	**lbs**	**65.79**	**63.46%**
All resources	99	89	85	96	75	133,794	537.32	179.10	133,794	lbs	537.32	25.02%

Source ADF&G Division of Subsistence household surveys 1996.

Three genera of crab were harvested (king, Tanner and Dungeness) and 5 species of shrimp (northern, sidestriped, coonstriped, spot, and humpy) (Cohen 1989). The harvest data combined all shrimp species. As for crabs, Wrangell and Kake harvested more pounds of Dungeness crab (30,426 and 1,986) (Table 1 and Table 3) than king or Tanner crab; however, in Petersburg, more pounds of king crab were harvested (19,521 lbs), followed by Dungeness crab (18,689 lbs) (Table 2). In all 3 communities, the red king crab harvest exceeded either the golden king crab harvest or the blue king crab harvest in terms of pounds harvested and household utilization (Tables 1, 2, and 3).

In 2000, based on Division household surveys, an estimated 83% of Wrangell households reported using marine invertebrates, 46% harvested marine invertebrates, and 43% of these households shared some of their catch with other households (Table 1). The mean household harvest of all marine invertebrates for Wrangell in 2000 was 156 lbs. The marine invertebrate resource with the highest percentage of reported use was shrimp (68%), followed by the crab (64%), clam (35%), cockle (22%), sea cucumber (6%), and then scallop (5%) resources. Fewer than 5% of the households were estimated to have utilized octopuses, geoducks, chitons, or mussels. None of the sampled Wrangell households reported using abalone, limpets, oysters, sea urchins, or squids in 2000. Dungeness crabs were the most utilized of the crab species (63% of Wrangell households), followed by Tanner crabs (23%) and king crabs (15%) (Table 1).

Nearly the same percentage of households in Petersburg reported using marine invertebrates (82%) and harvesting marine invertebrates (45%) as in Wrangell, based on household surveys in 2000 (Table 2). Thirty-two percent of the harvesting Petersburg households shared some of their catch with other households. The mean household harvest of all marine invertebrates for Petersburg in 2000 was 102 lbs. The resource with the highest percentage of use reported by Petersburg households was crab (76%), followed by the shrimp (34%), clam (33%), octopus (10%), cockle (7%), and chiton (6%) resources. Fewer than 5% of the households were estimated to have utilized scallops, limpets, mussels, abalone, or geoducks. None of the sampled Petersburg households reported using oysters, sea cucumbers, sea urchins, or squids in 2000; however, sea urchins were reported as harvested in the 1986-1987 survey (Smythe 1988). Dungeness crabs were the most utilized of the crab species (67% of Petersburg households), followed by king crabs (36%) and Tanner crabs (29%). In terms of pounds per household, however, more king crabs were harvested, at an average 18 lbs per household, than Dungeness crabs, at an average harvest of 17 lbs per household (Table 2).

Similar marine invertebrate use was reported in Kake, based on 1996 household surveys (Table 3). Eighty-six percent of Kake households were estimated to have used marine invertebrates, 48% of the households harvested them, and 38% shared them with other households. The mean household harvest of all marine invertebrates for Kake in 1996 was 66 lbs per household. The resource with the highest percentage that Kake households reported using was crab (74%), followed by the chiton (56%), clam (55%), cockle (26%), octopus (15%), sea cucumber (8%), and sea urchin (5%) resources. Fewer than 5% of the households utilized starfish, geoducks, mussels, or squids. None of the sampled Kake households reported using abalone, limpets, or scallops in 1996. Dungeness crabs were the most utilized crab species (71% of Kake households), followed by king crabs (19%), and Tanner crabs (16%) (Table 3).

CRITERION 2: SEASONALITY

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

Historically, shellfish consumption occurred year-round but was more frequent when salmon *Oncorhynchus* spp and Pacific halibut *Hippoglossus stenolepis* were less available (Emmons 1991). Oberg (1973:67) reported that shellfish gathering usually occurred in spring, especially in March, when large quantities of clams and mussels were taken and preserved. Intertidal species, including clams, cockles, scallops, abalone, chitons, and mussels, were taken during low tides, but were generally avoided during the “season of growing plants” (Emmons 1991:149).

In the days before pot fishing for crabs, the Tlingits used to harvest crabs in spring and summer, often by picking them out of shallow waters near the beaches during low tide (transcripts, Kake

key respondent, interviewed by Anne Firman, 4/16/1986). King crabs were also harvested when they could be found in shallow waters from late winter through spring, according to a key respondent from Hoonah. King crabs are listed as an intertidal resource for the Tlingit people in Goldschmidt and Haas (1998).

Contemporary seasonal use of shellfish in this report came from Division of Subsistence key respondent interviews conducted in Kake and Wrangell in the 1980s (Cohen 1989; Firman and Bosworth 1990). Seasonal use was affected by various factors, including species' annual migrations, the weather, tidal fluctuations, other harvesting activities, regulations, and paralytic shellfish-poisoning concerns. Crab and shrimp harvests often occurred as a supplemental activity to other recreational boating pursuits or commercial fishing trips.

Current personal use shellfish regulations restrict red and blue king crab harvests to July 1 through March 31; closures may occur by ADF&G emergency order. There are no regulatory seasonal restrictions on other shellfish.

Clam harvests were generally avoided during summer months, the season of maximum concern for paralytic shellfish-poisoning; although cockles were harvested year-round in Kake. Cockles are the only clam that is edible year-round, according to a Tlingit key respondent although the key respondent considered spring to be the best time to harvest them (Transcripts, Kake key respondent, interviewed by Anne Firman, 4/16/1986).

Chitons were also harvested year-round in Kake, but only occasionally in June and July. Shrimps were harvested in February and March, sea urchins in late February through May, and sea cucumbers in April and May, with occasional harvest efforts in June. Kake residents said they harvested Dungeness crabs year-round and king crabs in winter, especially January and February. Tanner crabs were mostly caught incidentally to king crab fishing (Kake key respondent, interviewed by Anne Firman, 4/16/1986).

Octopuses were harvested August through April, but only occasionally between January and April (Firman and Bosworth 1990). Incidental harvest of octopus in shrimp or crab pots also occurs.

In Wrangell, clam, gumboot chiton, sea urchin, and sea cucumber harvests were generally spring activities. Sea urchin harvest occurred in late February through May; sea cucumbers were harvested in April and May and occasionally in June. As in Kake, Dungeness crabs were harvested year-round; king crabs and Tanner crabs were mostly harvested during winter, especially in January. Shrimp harvests were a year-round activity in Wrangell (Cohen 1989).

CRITERION 3: MEANS AND METHODS OF HARVEST

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

Historically, Dungeness crabs were speared or kicked out of the sand or mud at low tide (Jacobs M. Jr. and Jacobs M. Sr. 1982). In some cases, special digging sticks were used for crabs and other shellfish (De Laguna 1972). According to a key respondent from Hoonah, Tlingits traditionally harvested king crabs at low tide using barbed spears, long poles with a loop of twine at the end, or baited lines with or without treble hooks that hung below the bait. Wood (1882) reported that "boy archers" brought him giant crabs (probably king crabs). King and Tanner crabs were also caught in deeper waters while harvesting other species; the crabs would either be

tangled in the net or fishing line or they would grab a baited hook and be taken to the surface. Many other species were gathered at low tide. Occasionally, king crabs were also incidentally caught on halibut gear (transcripts, Kake key respondent, interviewed by Anne Firman, 4/16/1986).

More recently, subsistence harvesters targeting Dungeness crabs and shrimps use pots or webbed rings. Shrimps are also harvested with trawls. In the 1980s, several Wrangell households reported using an otter trawl to harvest smaller species of shrimp for home use (Cohen 1989). King crabs and Tanner crabs are taken with heavier pots than Dungeness crab, webbed rings, or baited hand lines. Additionally, crabs and shrimps are removed from commercial catches for home use. Rakes or shovels are sometimes used in shallow intertidal areas for crabs or clams.

Currently king and Tanner crabs are harvested with pots in the deeper waters of bays and inlets or when they move to shallow water. At these times, pots are set from local docks or in shallow bays to target king and Dungeness crabs. Crabs are also removed from commercial catches for home use; however, the majority of the marine resources used for home use are harvested under sport, personal use, or subsistence regulations. Table 4 shows the percentage of marine invertebrates taken from commercial catches compared to the percentage of total noncommercial harvests for home use, by species, in Petersburg, a major fishing community. Commercial catches provided 37% of the red king crab resource removed for home use, and 28% of the king crab resource in general. Only 15% of the Dungeness crab harvest was removed for home use from commercial pots. Overall, removals from commercial harvests contributed 21% of the total crab harvest for home use in 2000.

Table 4.–Estimated resources removed from commercial harvests, Petersburg, 2000.

	Removed from commercial catch		Percentage of total catch for home use	
Resource name	Amount	Pounds	Species harvest (lbs)	Community harvest (lbs)
Shrimp	86	685	1.68	0.14
Crab				
Dungeness crab	2,174	2,870	15.36	0.60
Tanner crab (*C. bairdi*)	984	1,624	15.50	0.34
King crab:				
Golden king crab	86	461	7.87	0.10
Red king crab	942	5,066	37.29	1.07
Subtotal, all king crab species	1,027	5,526	28.31	1.16
Subtotal, all crab species	4,186	10,021	20.58	2.11
Total, all marine invertebrates	**10,705**	**10,705**	**9.80**	**2.25**
All resources	116,143	116,143	27.49	24.45

Source ADF&G Division of Subsistence household surveys 2001.

Many intertidal invertebrates, including clams, cockles, gumboot chitons, sea urchins and sea cucumbers, continue to be gathered during low tide. Octopuses are found along the shorelines in small underwater caves or rock overhangs from which they can be extricated using a long-

handled hook (Kake key respondent, interviewed by Anne Firman, 4/16/1986). They are also retained from the bycatch of commercial or personal use shellfish fisheries (Cohen 1989). Abalone are generally picked off rocks at low tide. In some areas, harvesters are using diving gear to target shellfish; however, the cost of this gear and the skills required to use it considerably limits its use.

CRITERION 4: GEOGRAPHIC AREAS

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

The Wrangell Indians are descended from the Stikine *kwaan*. They occupied the mainland coast from Cape Fanshaw south to Cleveland Peninsula; the eastern half of Kupreanof Island; all of Mitkof, Zarembo, and Etolin islands; and the northeastern coast of Prince of Wales Island from Red Bay to Thorne Bay (Betts et al 1994; Cohen 1989:12-13) (Figure 2). In the mid-1940s, Wrangell residents testified that they traveled to Blind Slough in Wrangell Narrows for crabs, clams, and mussels (Goldschmidt and Haas 1998).

Prior to land ownership conflicts with European and American settlers, Kake Tlingit had exclusive use of the northern shore of Kupreanof Island, the southeastern shore of Admiralty Island from Point Brightman to Gambier Island, and the shores of Farragut Bay on the mainland of Alaska. With other Tlingit bands, they shared Seymour Canal as well as the mainland shore from Point Coke on the north side of Holkham Bay to Grant Point on the south side of Farragut Bay, including the adjacent islands, according to a petition filed with the U.S. Department of the Interior in 1944 (U. S. Department of the Interior 1944).

The community of Petersburg is located on the north end of Mitkof Island where Wrangell Narrows meets Frederick Sound. Prior to Petersburg's development by homesteaders and fishers at the turn of the 20th century, there were many small settlements of Tlingit, all of which used the area. Petersburg was developed by European and American settlers, especially settlers from Norway. In the early years, immigrants often came to Petersburg directly from Norway (Smythe 1988: 21).

Duncan Canal reportedly has been the most productive area for commercial and subsistence Dungeness crab fishing for Petersburg fishers since at least the 1930s (Smythe 1988). The red king crab fishery began in the 1950s in Seymour Canal. Historically, Dungeness crabs were also harvested non-commercially by Petersburg residents, who speared them from rowboats near the mouth of Petersburg Creek, and who otherwise gathered them from the flats north of Petersburg and in Wrangell Narrows. Clams and cockles were also dug from beaches at the north end of Mitkof Island, and the flats of Petersburg Creek (Smythe 1988:35, 36, 90-94). Commercial shrimp fishing has occurred in Thomas Bay since 1915, and in Duncan Canal and the Stikine flats since at least the 1920s (Smythe 1988). Shrimps continue to be retained from commercial catches for home use. The majority of clam, crab, and shrimp harvests continue to take place in areas close to Petersburg (Betts et al. 1994).

Shellfish harvest areas are generally the coastal flats, rocky headlands, and sheltered bays close to the communities. Marine invertebrates gathered in intertidal and subtidal areas include sea urchins, abalone, scallops, gumboot chitons, sea cucumbers, clams, and cockles. Other less-common species gathered include limpets, mussels, moon snails (Naticidae family), and oysters (Cohen 1989:79-85).

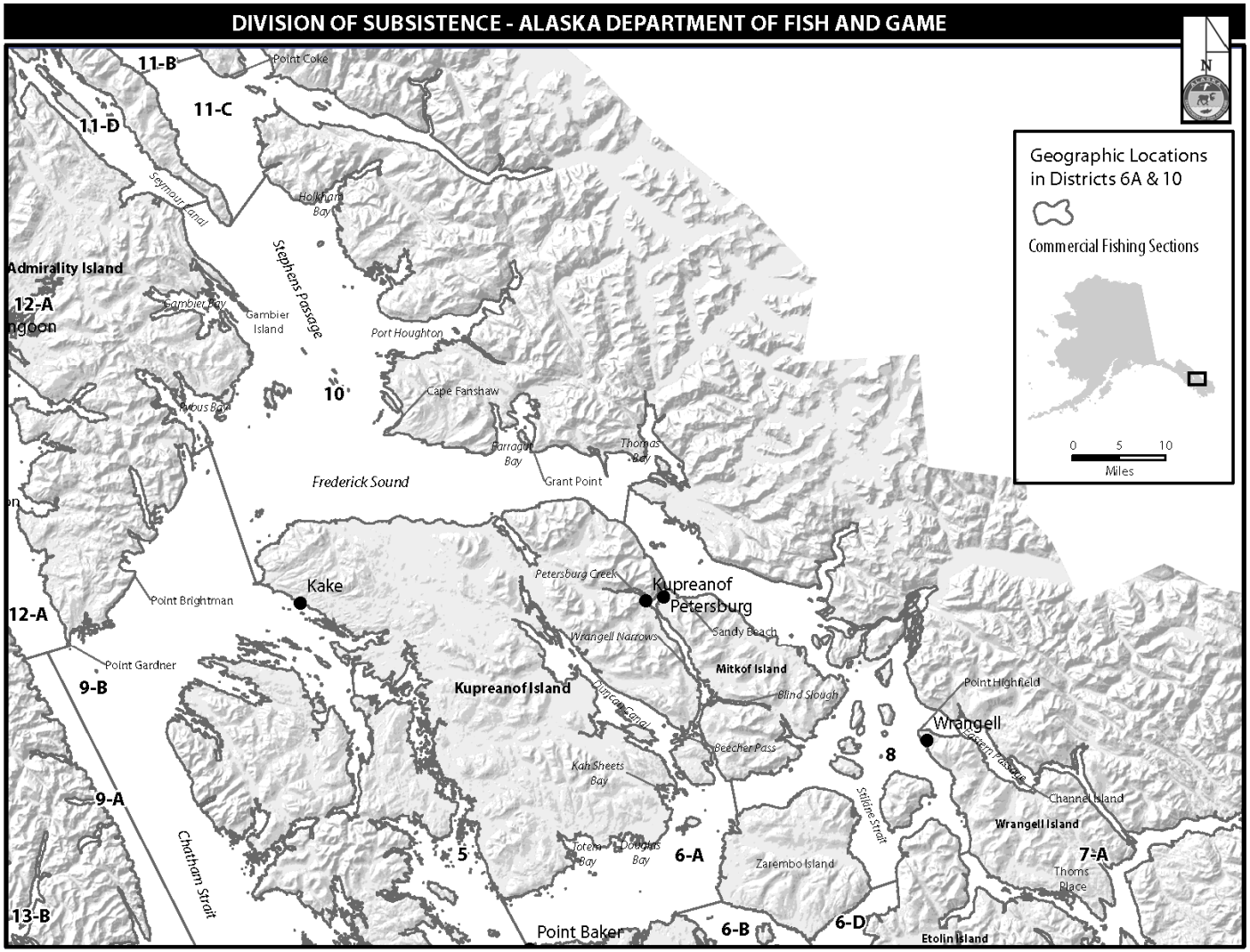

Figure 2–Map of Petersburg and Wrangell geographic areas.

Shellfish are recognized as an important resource by Petersburg households and are harvested over a large portion of District 6A and District 8A, especially those areas extending from Sandy Beach north of town, along Wrangell Narrows, and through Beecher Pass to Duncan Canal and Kah Sheets Bay, as well as in Douglas and Totem bays on southern Kupreanof Island (Betts et. al. 1994). Wrangell residents also reported marine invertebrate harvests in District 6A in Portage Bay, Duncan Canal, and Totem and Douglas bays (Betts et. al. 1994).

In District 8, Wrangell households harvested crabs off the western shore of Wrangell Island between Thoms Place and Point Highfield. Crabs and shrimps are also harvested in the waters of Eastern Passage, or "Back Channel," as far south as Channel Island.

In District 10, Petersburg residents harvested marine invertebrates in Seymour Canal as well as Gambier and Pybus bays on Admiralty Island; in Frederick Sound at the northern entrance to Wrangell Narrows; and in Thomas Bay, Farragut Bay, Cape Fanshaw, and Port Houghton on the mainland shore. The entirety of Thomas Bay and the shoreline between Thomas Bay and Farragut Bay are extensively used for crab harvests (Betts et. al. 1994). Kake households harvested marine invertebrates in the intertidal and nearshore areas along Admiralty Island from Pybus Bay to just north of Point Gardner. Some Wrangell residents travelled to Pybus Bay for invertebrates (Betts et al. 1994).

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.

Historically, the Tlingits ate shellfish fresh or strung them up and dried them for winter use. Sea urchin roe were scooped out and eaten raw. Crabs were boiled and greatly enjoyed. (Emmons 1991:149). Oberg (1973:67) reported that "On the islands great quantities of clams and mussels are taken and dried, smoked, and packed in airtight boxes or hung in the roof where they keep dry." Oberg described the preparation of a traditional delicacy:

> One of the great delicacies of the old days was clams baked in an oven. A hole was dug in the ground and lined with stones. A fire was built in it and removed when the stones were hot. A layer of wet leaves was then put down. The clams were placed on the leaves and covered with another thick layer of leaves. Periodically water was poured over them. After 6 hours the clams would be baked, and the whole house-group would sit around to a feast. (Oberg (1973:67)

In more recent times, shellfish is eaten fresh or frozen for later consumption. Clams are occasionally canned. Octopuses are pickled, boiled, or fried for human consumption and are also used as bait for halibut.

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

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

In addition to generations of Tlingit residents, Wrangell has a sizeable non-Native population many of whom derive from Russian occupation in the early 1800s and then the American influx following the rise of the commercial fishing, logging, and mining industries throughout the 20th century (Cohen 1989).

Traditional Native and non-Native methods of harvest and harvest areas for shellfish have endured throughout the region. Because shellfish are a highly-valued food, residents of the region are aware of seasonal harvest opportunities and efficient harvest methods.

Divisions of Subistence survey data indicate that, in Southeast Alaska, ethnicity influences the decision to use certain species of shellfish. For example, more Alaska Native households used cockles and gumboot chitons more than did non-Native households, while both groups have traditionally used, and currently use, clams.[1] Values associated with food choices are generally passed from prior generations to current ones. In addition, attitudes towards harvesting often reflect traditional methods and long-standing values. For example, respondents who grew up using wild resources in their households attached a high value to "cultural background" (that is, knowledge and skills learned from elders) in their personal motivation for continued use of wild resources (Turek unpublished field notes).

Some marine invertebrate species in Southeast Alaska, such as king crabs and cockles, have spotty distributions and harvest can be "hit or miss" without the sharing of location information between generations and closely-associated friends and family. Traditional Tlingit octopus intertidal harvest methods have been passed down through generations, including how to recognize a den and how to use a dull hook to avoid tearing the meat. There are also taboos against ruining a den and the belief that if the viscera of harvested octopus are returned to the den, another octopus will move in (transcripts, Kake key respondent, interviewed by Anne Firman, 4/16/1986).

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.

Shellfish are highly valued foods in the region; those species that are not widely found are frequently shared among households and communities. Oberg (1973) reported that island tribes traded dried and smoked clams and mussels to mainland tribes for dried meat or hides.

Division of Subsistence research suggests that, in many communities, the "high harvesters" are responsible for supplying shellfish and other resources to many other households (Betts et al. 1994). This is especially true with shrimps and crabs, which need special equipment to harvest year-round. Clams are shared also, although, because of their ease of harvest, they are not shared as widely as other species. Household surveys in Wrangell, Petersburg, and Kake indicate higher numbers of households utilizing resources than harvesting them for most species (Tables 1, 2, and 3). This suggests that some households regularly depend on others for wild foods. In addition, harvesting households often shoulder social obligations to share resources, especially wild foods, with others in the community, especially in the Tlingit community. Shellfish, for example, were often used in community dinners and traditional feasts, as well as given as gifts to relatives and friends in other communities.

[1] Data from the ADF&G Division of Subsistence Community Subsistence Information System, http://www.subsistence.adfg.state.ak.us/CSIS

Table 1 shows the relationship between harvest, use, and sharing for Wrangell households, based on 2000 survey data estimates. Forty-three percent of Wrangell households shared their marine invertebrate harvests with other households. Resources harvested with special equipment, such as the crab and shrimp, were highly shared. Only 19% of the households harvested shrimps, a resource which gets used by 68% of Wrangell households. Fifty-seven percent of Wrangell households received shrimps from another household.

Crabs were also highly shared between households. Sixty-three percent of Wrangell households used Dungeness crabs, but only 30% harvested them. Fifteen percent of Wrangell households used king crabs. Most of these households (12% out of the 15%) received king crabs from other households. Five percent of the households harvested king crabs; the same percentage shared king crabs with other households (Table 1). Overall, 52% of Wrangell households received at least one species of crab from another household.

Survey data for 2000 indicate that 32% of Petersburg harvesting households shared their marine invertebrate harvests with other households (Table 2). King and Tanner crabs were highly shared within Petersburg. Nine percent of Petersburg households provided king crabs used by 36% of Petersburg households. The data suggests that all king crab harvesters shared some portion of their catch: 9% of Petersburg households harvested king crabs and 9% gave them away. Most of the households that utilized king crabs (36%) received king crab from another household (30%).

Although not as widely utilized as king crabs, Tanner crabs were also shared with 9% out of the 12% harvesting households giving Tanner crabs away and 20% of Petersburg households receiving Tanner crabs from another household. Although 30% of Petersburg households harvested Dungeness crabs, more than other crab species, sharing is still widespread. One-half of Petersburg households reported receiving Dungeness crabs from other households. Eighteen percent of the harvesting households shared their Dungeness crab harvest with others. Overall, 62% of Petersburg households received at least one species of crab from another household. Shrimps and clams were also shared by Petersburg households (Table 2).

The Kake data (Table 3) also shows widespread sharing of marine invertebrate species. Seventy-eight percent of Kake households utilized marine invertebrates that they received from other households. Crabs and shrimps were highly shared, with 59% of the Kake households receiving crabs and 47% of the households receiving shrimps. Over one-half of Kake households (55%) received Dungeness crabs from others. As in Wrangell and Petersburg, all households harvesting king crabs (3%) shared them with others. Eighteen percent of Kake households received king crabs from other households. The data suggest that most Kake households that utilize king crabs (19%) are receiving them from a few harvesting households. Tanner crabs were also shared, with 12% of Kake households receiving Tanner crabs and 16% utilizing them, but only 4% harvesting 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 variety of fish and game resources and that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.

In 2000, Wrangell households harvested an average of just over 10 different resources. Some households used as many as 45 different animal or plant species (Paige 2002). Three shellfish

species were listed in the top 10 species used by households in Wrangell (Paige 2002). Shrimp was the second most-used resource, with 68.4% of the households reporting using it. Dungeness crab was the fourth most-used resource (63.3%); clams was the eighth most-used resource (34.7%) (Table 5).

Table 5.–Top 10 species used by the most households in Wrangell, Alaska, 2000.

Rank	Resource	Percentage of households using
1.	Halibut	68.4%
2.	Shrimp	68.4%
3.	Chinook salmon *O. tshawytscha*	67.3%
4.	Dungeness crab	63.3%
5.	Berry	56.1%
6.	Deer	48.0%
7.	Sockeye salmon *O. nerka*	38.8%
8.	Clam	34.7%
9.	Moose *Alces alces*	31.6%
10.	Cutthroat trout *O. clarki*	29.6%

Source Paige 2002.

In 2000, Petersburg households harvested an average of 9 different resources; some households used as many as 31 different animal or plant species (Paige 2002). Five shellfish species were listed in the top 10 species used by households in Petersburg (Paige 2002). Dungeness crab was the second most-used resource: 67.2% of the households reported using it. King crab was the seventh most-used resource: 36.0% of the households reporting using it. Shrimps were reported used by 33.6% of the households; clams by 32.8% of the households; and Tanner crabs by 28.8% of the households. These species were the eighth, ninth, and tenth most-used resources in Petersburg (Table 6).

Table 6.–Top 10 species used by the most households in Petersburg, Alaska, 2000.

Rank	Resource	Percentage of households using
1.	Halibut	72.0%
2.	Dungeness crab	67.2%
3.	Chinook salmon	64.8%
4.	Berry	55.2%
5.	Coho salmon *O. kisutch*	45.6%
6.	Deer	40.0%
7.	King crab	36.0%
8.	Shrimp	33.6%
9.	Clam	32.8%
10.	Tanner crab	28.8%

Source Paige 2002.

In 1996, Kake households harvested an average of 8 different wild resources and used as many as 33 different plant or animal species (Paige 2002). Three shellfish species were listed in the top

10 species used by households in Kake. Dungeness crab was the sixth most-used resource, with 71.2% of households reporting using it; gumboot chiton was the seventh most-used resource (56.2%); and shrimp was the eighth most-used resource (52.1%) (Table 7).

Table 7.–Top 10 resources used by the most households in Kake, Alaska, 1996.

Rank	Resource	% HH
1.	Sockeye salmon	95.9%
2.	Halibut	94.5%
3.	Chinook salmon	84.9%
4.	Deer	79.5%
5.	Black seaweed	75.3%
6.	Dungeness crab	71.2%
7.	Gumboot chiton	56.2%
8.	Shrimp	52.1%
9.	Harbor seal *Phoca vitulina*	47.9%
10.	Coho salmon	46.6%

Source Paige 2002.

REFERENCES CITED

Ames, K. M. and H. D. G. Maschner. 1999. Peoples of the Northwest Coast: Their archeology and prehistory. Thames and Hudson, New York.

Betts, M. F., R. F. Schroeder, T. Thornton, and A.-M. Victor. 1994. Subsistence resource use patterns in Southeast Alaska: Summaries of thirty communities. Alaska Department of Fish and Game Division of Subsistence, Juneau. Revised 1999.

Cohen, K. A. 1989. Wrangell harvest study: A comprehensive study of wild resource harvest and use by Wrangell residents. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 165 and Phoenix Associates, Juneau. http://www.subsistence.adfg.state.ak.us/TechPap/tp165.pdf

De Laguna, F., 1972. Under Mount St. Elias: The history and culture of the Yakutat Tlingit. Smithsonian Contributions to Anthropology Vol. 7 (in 3 parts). U.S. Government Printing Office, Washington D.C.

Dixon, E. J. 2000. Archaeological research gives clues about life in Southeast Alaska four hundred generations ago. Pages 55-58 *in* Fair, S. W. and R. Worl, editors. Celebration 2000: Restoring balance through culture. Sealaska Heritage Foundation, Juneau.

Emmons, G. T. 1991. The Tlingit Indians. Edited with additions by F. de Laguna. The University of Washington Press, Seattle, and the American Museum of Natural History, New York.

Firman, A. S. and R. G. Bosworth. 1990. Harvest and use of fish and wildlife by residents of Kake, Alaska. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 145, Juneau. http://www.subsistence.adfg.state.ak.us/TechPap/tp145.pdf

Goldschmidt, W. R. and T. H. Haas. 1998. *Haa Aani*, Our Land: Tlingit and Haida land rights and use. Editor, T. F. Thornton. University of Washington Press , Seattle; and Sealaska Heritage Foundation, Juneau.

Jacobs M. Jr. and Jacobs M. Sr. 1982. Southeast Alaska Native foods. *In* A. Hope III, editor. Raven's Bones. Sitka Community Association, Sitka, Alaska.

Oberg, K. 1973. The social economy of the Tlingit Indians. University of Washington Press, Seattle.

Paige, A. 2002. Customary and traditional use determinations for fish in the Southeast Alaska region: a report prepared for the U.S. Forest Service of the U.S. Department of Agriculture. Alaska Department of Fish and Game Division of Subsistence, Juneau.

Smythe, C. W. 1988. Harvest and use of fish and wildlife resources by residents of Petersburg, Alaska. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 164 and the Chilkat Institute., Juneau. http://www.subsistence.adfg.state.ak.us/TechPap/tp164.pdf

U. S. Department of the Interior. 1944. Hearings on aboriginal claims of the Indians of Hydaburg, Kake, and Klawock, Transcript of proceedings. Volumes V and VI, Proceedings of September 22 and September 23, 1944. Unpublished Government Hearings, available at the Alaska Historical Library, Juneau.

Wood, C. E. S. 1882. Among the Thlinkits in Alaska. The Century 24(3):323-340.