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The Subsistence Harvest of Herring Spawn on Kelp in the Togiak District, Alaska, 2011 and 2012

by

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and

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November 2012

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.)	$, ¢
mnths (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

SPECIAL PUBLICATION

THE SUBSISTENCE HARVEST OF HERRING SPAWN ON KELP IN THE TOGIAK DISTRICT, ALASKA, 2011 AND 2012

by

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

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ERRATA

The original publication of BOF 2012-06, *The Subsistence Harvest of Herring Spawn on Kelp in the Togiak District, Alaska, 2011 and 2012*, contained an error in describing the ANS for other finfish in the Bristol Bay Area that has been corrected in this version.

Text on page 2 was edited to correctly reflect the ANS.

...herring spawn on kelp is included in the 25,000 lb of other finfish in the Bristol Bay Area (5 AAC 01.336).

now reads:

...herring spawn on kelp is included in the 250,000 lb of other finfish in the Bristol Bay Area (5 AAC 01.336).

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ABSTRACT

The subsistence fishery for the spawn of Pacific herring *Clupea pallasi* in the Togiak District has been, and remains, important to residents of the Bristol Bay area of Alaska, especially the community of Togiak. Alaska Department of Fish and Game (ADF&G) Division of Subsistence research of the herring spawn-on-kelp fishery in the Togiak District reveals that harvesting is a specialized activity in which a relatively small number of community members harvest and distribute herring spawn to many others. This report presents the results of a study to document herring spawn on kelp, including harvest amounts, harvest locations, local availability, and distribution for 2011 and 2012.

Key words: Pacific herring, *Clupea pallasi*, herring spawn, subsistence fishing, harvest estimate, subsistence, Togiak, Togiak Traditional Council.

INTRODUCTION

The spawn (fertilized eggs) of Pacific herring *Clupea pallasi*, generally known as "herring eggs," is a traditional food for Native Americans and Alaska Natives throughout the coastal regions of the Pacific Northwest and Alaska. Although herring spawn is consumed throughout this region, only a limited number of people have the equipment to travel long distances to harvesting sites and the local knowledge of where those sites are located. Togiak Bay was, and continues to be, an important location for the harvest of herring spawn on kelp, which is shared throughout the Bristol Bay Region (Wright and Chythlook 1985). Herring spawn on kelp (*melucuaq*) has been used as long as Togiak residents can recall in oral traditions:

> Elderly residents of the Togiak area recall harvesting and eating herring spawn-on-kelp all their lives. According to their reports, in the early 20th century kelp covered with layers of herring eggs was picked by hand at low tide along rocky shorelines. It was eaten fresh or preserved for later consumption by drying. Compared to staples such as seal, Dolly Varden, or salmon which were eaten many times each week for several months or more of the year, spawn-on-kelp was a special treat which was eaten occasionally and provided variety in the diet. (Wright and Chythlook 1985:31)

Prior to the 1930s, residents of the Togiak area would move from their homes, situated inland on rivers, to spring camps along the coast in Togiak Bay, where a variety of resources could be procured within easy walking distance or by kayak. *Tuyuryarmiut* (VanStone 1984) Yup'ik resource gathering and harvest strategies have traditionally utilized a wide diversity of resources from the marine and land environments—a tradition that continues in present times. At spring camps, men hunted from kayaks for harbor seals *Phoca vitulina* while women and children gathered clams, bird eggs, Arctic ground squirrels *Spermophilus parryii*, and other resources that were easy to gather close to camp, such as herring spawn on kelp. Following establishment of more permanent settlements, residents have continued to return to those locations each spring to harvest resources, such as herring spawn on kelp.

Then, as now, the primary method of harvest was to pick the kelp by hand from the beach when it became exposed at low tide. Harvesters either grabbed the kelp at the base and snapped it off the rocks or cut it with a knife (Wright and Chythlook 1985:34). Some residents began using rakes in the 1970s; however, the dominant method continues to be picking kelp by hand because residents are able to carefully select kelp that has thick spawn. Historically, herring spawn was air dried at the beach, then bundled into open-weave grass baskets and stored in a cool, dry location. Later, when salt became available, wooden casks were used to hold salted herring spawn on kelp. Eventually, salting became a primary method of preservation, along with freezing.

At its 1983 meeting, the Alaska Board of Fisheries (board) made a positive customary and traditional (C&T) use finding for the harvest of herring spawn on kelp in the Togiak District. There is no finding

specific to herring spawn on kelp for the amount reasonably necessary for subsistence (ANS); however, herring spawn on kelp is included in the 250,000 lb of other finfish in the Bristol Bay Area (5 AAC 01.336). The Alaska Department of Fish and Game (department) divisions of Commercial Fisheries and Subsistence worked together from 1982 to 1985 to document the harvest of herring spawn on kelp by Bristol Bay residents (Wright and Chythlook 1985:3). Spawn-on-kelp harvests were documented during Division of Subsistence comprehensive baseline surveys for the 1999 (Coiley-Kenner et al. 2003) and 2008 (Fall et al. *In prep*) study years. This report is the result of a recent research undertaken in 2011 and 2012 focusing on the community of Togiak, where a majority of the harvesters of the resource reside (Wright and Chythlook 1985; Coiley-Kenner et al. 2003; Fall et al. *In prep*). The community of Togiak (population 817; U.S. Census 2010) is located in Togiak Bay, approximately 68 miles west of Dillingham, the region's largest community (Figure 1).

This project was initiated by a request for information from resource managers within the department to collect harvest and use data, including harvest locations, for herring spawn on kelp in the Togiak District of Bristol Bay. This information is useful in determining areas that are important for the harvest of herring spawn on kelp by residents of Togiak. Togiak residents have related to department staff that they do not participate in the Togiak herring commercial fishery as they once did due to a concern about abundance of herring for subsistence uses. "Abundance," or what harvesters call "good" spawn on kelp, refers to the density of the spawn on kelp. Also, "abundance" refers to the kelp that is locally available on which the herring spawn. What was not well understood was the amount of herring spawn on kelp that is harvested by local residents, the areas where the harvest takes place, and the factors that influence decisions residents make regarding participation in both the commercial herring fishery and the subsistence spawn-on-kelp fishery.

Project partners included the Bristol Bay Native Association (BBNA) and the Togiak Traditional Council (TTC). This project was modeled on a project documenting the harvest and uses of herring spawn on branches in Sitka Sound. The Sitka Herring Project, as it is commonly referred to, is a cooperative project between the divisions of Commercial Fisheries and Subsistence, and the Sitka Tribe of Alaska. The project includes determining conversion factors for weighing herring spawn on branches, conducting a household survey with herring harvesters in Sitka, and documenting community comments and concerns. The Togiak herring spawn-on-kelp project has employed similar methodology for collecting harvest data.

PROJECT OBJECTIVES

The primary goal of the project was to document the subsistence harvest of herring spawn on kelp for the years 2011 and 2012. The objectives of the harvest monitoring were to:

1. Document methods for harvesting spawn on kelp by local users in the Togiak District.
2. Determine conversion factors for weights of spawn on kelp for commonly used containers.
3. Document the total harvest of herring spawn on kelp by Togiak residents.
4. Map historical and contemporary locations for harvesting herring spawn on kelp.
5. Establish the factors that determine participation in both the subsistence herring spawn on kelp fishery and the commercial herring fishery.[1]

1. Objective number 5 was included at the request of the Togiak Traditional Council. This objective to establish the factors that determine participation in both the subsistence herring spawn-on-kelp fishery and the commercial fishery was to document perceptions of local residents about the intersection of the 2 fisheries, both of which are important for the local economy. There is a perception that local residents do not participate in the commercial fishery due to their concerns about the local abundance of herring spawn on kelp. However, as will be shown in the findings section, this turned out to not be the case.

METHODS

This report documents the 2011 and 2012 harvest of herring spawn on kelp by known harvesters as part of an effort by the department to estimate harvest and harvesting locations. In addition, researchers participated with harvesters and interviewed key respondents. A summer intern from BBNA working with the division also participated in the project. Households and local herring spawn-on-kelp users were identified by knowledgeable TTC and Division of Subsistence staff.

This project was guided by the research principles detailed in the *Alaska Federation of Natives Guidelines for Research* as described by the Alaska Native Knowledge Network of the University of Alaska, Fairbanks (ANKN 2009). These principles stress community approval for research designs, informed consent, anonymity of project participants, community review of draft findings, and a requirement to provide project findings to each study community upon completion of the research.

SURVEY PLAN AND IMPLEMENTATION

TTC and research staff from the division met prior to the start of the 2011 subsistence herring spawn-on-kelp harvest to review the survey instrument, methods for compiling the household list, and methods for creating and validating conversion factors. The methods outlined in this section are a collaborative effort between the division and TTC. Division staff participated in the harvest at the beginning of the herring spawn-on-kelp season in Togiak in May 2011. Due to inclement weather and repeated cancelled trips to Togiak in May 2012, researchers were not able to participate in 2012.

Ethnography

The ethnographic component of this project was met through 1) participant observation, and 2) key respondent interviews. The first method involved researchers from the Division of Subsistence participating in the fishery to harvest herring spawn on kelp alongside Togiak residents.

The second component included key respondent interviews with harvesters in Togiak. This involved in-depth qualitative interviews with 5 harvesters in Togiak who were identified by the community as harvesters with a diversity of involvement and history in the fishery. These were semi-structured interviews that included topics such as methods and means, changes in the fishery over time, environmental and other habitat changes in the Togiak District, and potential impacts of other fisheries in the Togiak District on subsistence harvests and uses. Key respondent interviews also included in-depth mapping of historical harvest sites.

Harvest Estimate

The first goal in measuring the harvest of herring spawn on kelp included determining accurate weights for commonly used containers. The methodology outlined here has been used for two consecutive years for the Sitka Herring Project mentioned above. The weighing of herring spawn on kelp to create a conversion factor summary occurred once in 2011 and is included in Appendix C.

- Division of Subsistence staff and the BBNA intern worked with harvesters to determine the most commonly used containers. These included plastic zip-top gallon- and quart-sized bags.
- Division of Subsistence researchers processed and weighed herring spawn on kelp harvested by local users to obtain conversion factors in pounds usable weight. Both the kelp and the eggs are eaten.
- Researchers weighed two containers and found the average, then three containers and found the average, then four containers, and so on, until a consistent average was reached. Based on the experience with the Sitka Herring Project, researchers weighed at least 12 containers from each of the container types.

The second step in determining the total harvest of spawn on kelp by Togiak residents was a household harvest survey (see Appendix A). This occurred in May 2011 and fall 2012 to provide two study years of harvest data. The following methods were based on the lessons learned during the Sitka Herring Project:

- Division researchers worked with TTC to make a list of all Togiak residents who were actively involved with harvesting herring spawn on kelp.
- The list was expanded based on the chain referral method, in which people who are already on the list provide names of other harvesters to be included on the list. The list was renewed in 2012 to only include harvesting households.
- In addition to using the chain referral method, division researchers conducted outreach to alert harvesters about the survey and to collect additional names for the list.
- The list included only Togiak residents.
- The list included households whose members were actively involved in harvesting herring spawn on kelp for the specific year of the survey.
- Harvest location data were aggregated to show where harvests took place and amounts of herring eggs obtained.

DATA ANALYSIS

Division Information Management staff analyzed the data from the 2011 and 2012 surveys to produce estimates of the total harvest of herring spawn on kelp. The surveys were coded for data entry by division staff in Anchorage using the conversion factors that were determined as described above (also see Appendix D for codes for qualitative questions). Division staff also created codes for responses given to assessment questions. Responses were coded following standardized conventions used by the division. Division Information Management staff in Anchorage set up database structures within a Microsoft SQL Server[2] database. The database structures included rules, constraints, and referential integrity to ensure that data were entered completely and accurately. Data entry screens were developed in Microsoft Access and made available on a secure network. Daily incremental backups of the database occurred, and transaction logs were backed up hourly. Full backups of the database occurred twice weekly. This ensured that no more than one hour of data entry would be lost in the unlikely event of a catastrophic failure. All survey data were entered twice and reviewed so as to minimize data entry errors.

Once data were entered and quality-control checked using standardized procedures employed by division Information Management staff, the information was processed using the Statistical Package for the Social Sciences (SPSS), Version 18. Initial processing included performing standardized logic checks of the data, which are often needed in complex datasets where rules, constraints, and referential integrity do not capture all the possible inconsistencies that may appear.

Data analysis also included review of raw data frequencies, cross tabulations, table generation, estimation of population parameters, and calculation of confidence intervals for the estimates. Missing information was dealt with in a manner appropriate to each situation, following such standardized practices as minimal value substitution or the use of an average response for similarly-characterized households (mean replacement). Typically, missing data are an uncommon, randomly-occurring phenomenon in division household surveys. In unusual cases, where a substantial amount of survey information was missing, the household survey is treated as a “nonresponse” and was not included in community estimates. All adjustments were documented.

The division applied the weighted means method (Cochran 1977) to generate harvest estimates for herring spawn on kelp from an interviewed sample of households drawn from a list of households known to harvest herring spawn in Togiak during the study years. In cases where a household was known to be an

2. Product names are given because they are established standards for the State of Alaska, and for scientific completeness; they do not constitute an endorsement.

active harvester during one year, but the harvest was unknown that year, the mean household harvest of that year was used as an estimate of that household's actual harvest. Information Management staff used the following formula to generate these estimates:

$$H = N\left(\frac{\sum x}{n}\right) \tag{1}$$

Where

H= Total estimated harvest,

N = Total number of households identified,

n = Number of sampled households, and

x = household's reported harvest.

In this approach, the mean of the estimate remains the same as the sampled mean so percentages derived from sampled households can be applied to the entire household list. The principal assumption was that the group of unsurveyed households from the household list of likely harvesters in 2011 had (on average) the same harvest and use patterns as the households that were successfully contacted. Since the mean is the primary statistic used to develop the estimates, Information Management staff produced a 95% confidence interval (CI), represented as a percentage, to measure the relative precision of the mean. The CI can also be applied to the total estimated harvest to obtain a likely upper and lower range for the estimate. The following formula was applied to create the CI percentage:

$$CI\% = \frac{t_{\propto/2} \times \frac{s}{\sqrt{n}} \times \sqrt{1 - \frac{n}{N}}}{\bar{x}} \tag{2}$$

Where

s = sample standard deviation,

n = sampled households,

N = total households identified,

$t_{\alpha/2}$ = student's t statistic for alpha level ($\alpha = 0.05$) with n–1 degrees of freedom, and

$\bar{x}$ = mean harvest.

A small CI percentage indicates low variance in household harvest amounts and that the actual mean is very close to the sampled mean. A larger CI percentage would indicate that there is a larger variance between household harvest amounts and an increased likelihood that the actual mean differs, possibly substantially, from the sampled harvest mean.

2011 AND 2012 RESULTS

As provided in Table 1, 38 households were interviewed out of 51 (75%) households identified as potential harvesters in Togiak in 2011. In 2012, using the 2011 list, this list was further revised to include only those known to have potentially harvested. Due to several factors, which are discussed below, fewer residents attempted to harvest and the list was revised to 25 potential harvesting households in 2012. In 2011, all of the 38 households attempted to harvest herring spawn on kelp, and all (100%) were successful; and in 2012, 57% of the 25 households attempted to harvest herring spawn on kelp, and 52% were successful (Table 2).

Of households interviewed in 2011, 16% noted that they used less herring spawn on kelp than in recent years, whereas 75% said they used more. However, in 2012, 50% said they used less and only 6% said

they used more (Table 3, Figure 1). Table 2 reports a significant difference in the estimated amount harvested between the two study years. In 2011, the estimated harvest in terms of pounds usable weight was 5,742 lb of herring spawn on kelp, whereas this declined to 1,125 lb in 2012, mainly due to lower participation in the harvest. The harvest amounts reported here are expanded only to the harvester list; anyone not on the list is deemed a nonharvester and therefore estimates are for entire community of Togiak.

Researchers documented and coded assessment responses from the survey for both years. In 2011, 64% of respondents said that 2011 was a good year, better than it had been in the previous 3–4 years. Respondents also reported more eggs on the kelp, meaning a good quality harvest (18% of responses) and some respondents said that it was a good harvest, meaning an abundant harvest (18%). In 2012, 78% of respondents said that it was a poor harvest (Table 4, Figure 2). As noted above, the harvest in 2012 was substantially lower than the harvest in 2011.

Table 1.–Sampling characteristics for herring spawn-on-kelp harvest, Togiak, 2011 and 2012.

	Sampling characteristics	
Togiak	2011	2012
Herring spawn-on-kelp harvesting households	51	25
Surveyed	38	25
Total	38	23
Sampling fraction	74.5%	92.0%
Actively harvesting households		
Total households surveyed	38	23
Total households harvesting	38	12
Sampling fraction	100.0%	52.2%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

Table 2.–Estimated subsistence harvest and uses of herring spawn on kelp, Togiak, 2011 and 2012.

	Percentage of households										Estimated pounds harvested		Confidence interval					
	Used		Attempted		Harvested		Gave		Received		Total		2011			2012		
Resource	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	CI %	Low	High	CI %	Low	High
Herring spawn–all types	100.0%	82.6%	100.0%	56.5%	100.0%	52.2%	78.9%	47.8%	28.9%	73.9%	5,741.6	1,124.7	10.0%	5,162.5	6,320.7	13.0%	982.6	1,266.8
Herring spawn on kelp	100.0%	82.6%	100.0%	56.5%	100.0%	52.2%	78.9%	47.8%	28.9%	73.9%	5,741.6	1,124.7	10.0%	5,162.5	6,320.7	13.0%	982.6	1,266.8
Herring roe–unspecified	0.0%	13.0%	0.0%	4.3%	0.0%	0.0%	0.0%	4.3%	0.0%	4.3%	0.0	0.0	n/a	0.0	0.0	n/a	0.0	0.0

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

Note n/a = not applicable.

Table 3.–Herring spawn harvest in 2011 and 2012 compared to recent years, Togiak.

		Herring spawn harvest							
	Surveyed	Valid responses		Less use		Same use		More use	
Year	households	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
2011	38	32	84.2%	5	15.6%	3	9.4%	24	75.0%
2012	23	18	78.3%	9	50.0%	8	44.4%	1	5.6%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

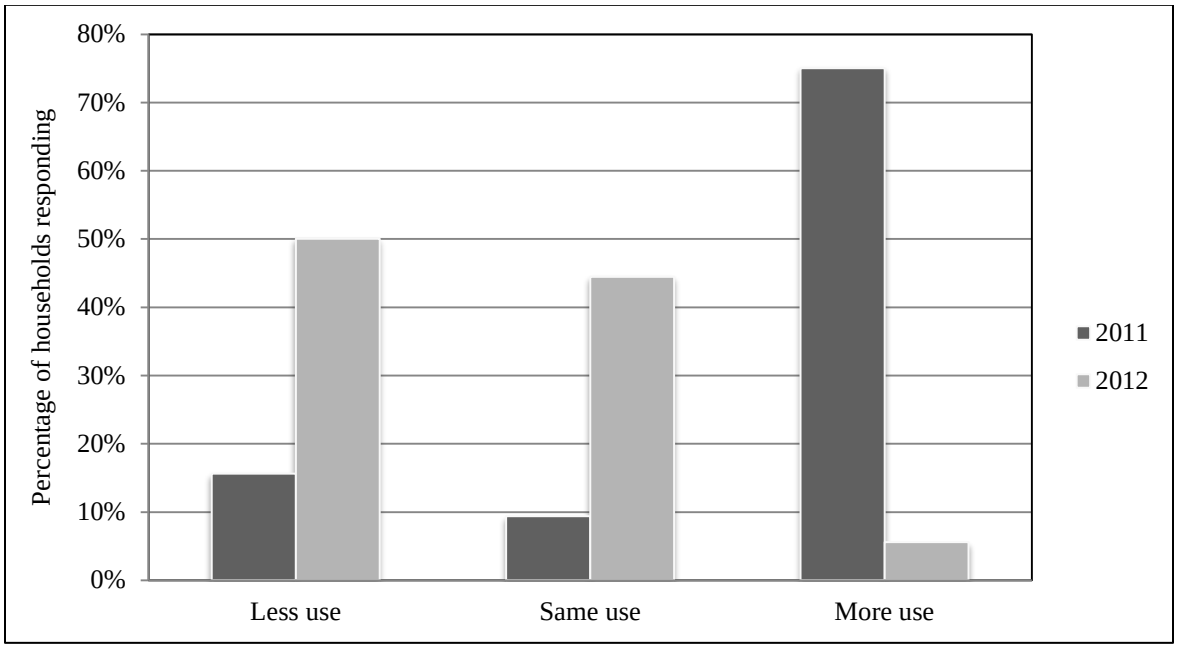

Figure 1.–Herring spawn use, Togiak, 2011 and 2012.

Table 4.–Assessment of herring spawn-on-kelp harvest compared to recent years, Togiak, 2011 and 2012.

	Herring spawn			
	2011		2012	
Reason	Number	Percentage	Number	Percentage
Good, not present in previous 3–4 years	14	63.6%	1	11.1%
More eggs on kelp	4	18.2%	1	11.1%
Good harvest	4	18.2%	0	0.0%
Same as recent years	0	0.0%	0	0.0%
Poor harvest	0	0.0%	7	77.8%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

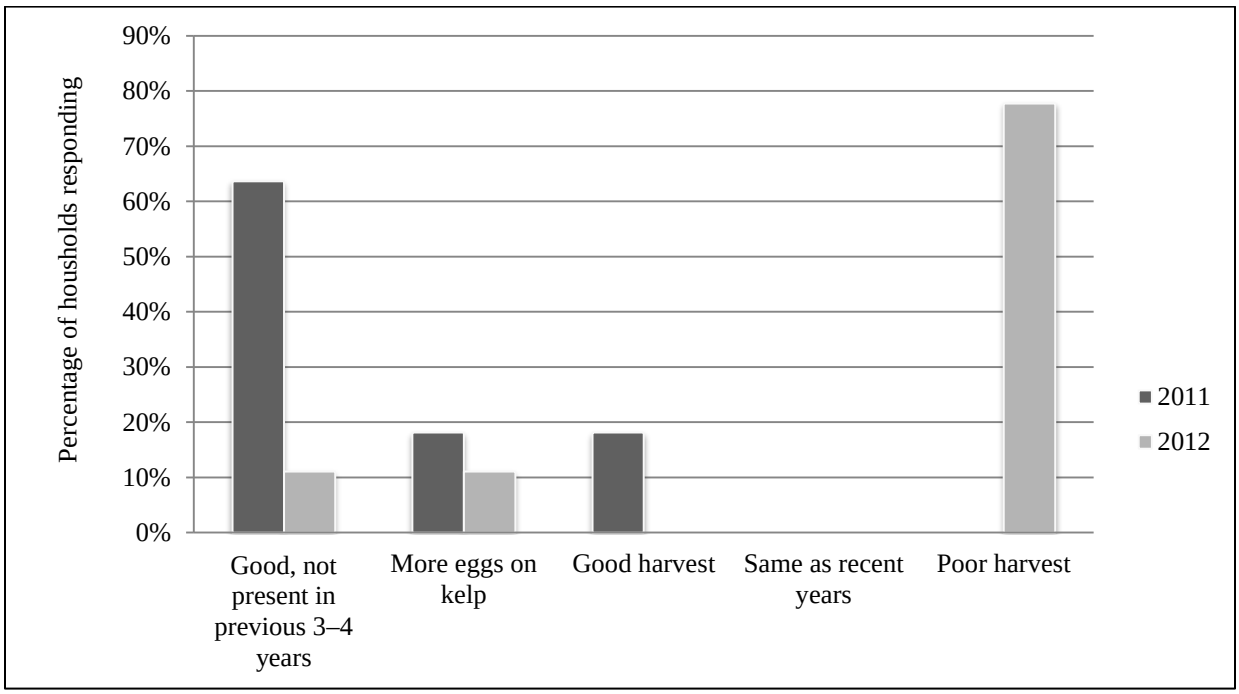

Figure 2.–Reasons offered on herring spawn harvest, Togiak, 2011 and 2012.

To understand the effort and complexity of the harvesting activity, researchers asked respondents questions about their participation with other families and if they combined resources by sharing expenses and equipment in harvesting activities. Figure 3 shows that some harvesting locations were a considerable distance from the community: in some cases, a 90-mile round trip was required to harvest herring spawn on kelp. Due to the price of fuel, and for safety in inclement weather, residents traveled to harvesting locations as a group. Table 5 and Figure 4 show that, in 2011, 71% of households participated in harvesting activities with other households, and in 2012, 67% of households traveled to harvesting locations with other households. All households are included separately in the sample. Although households traveled together to harvesting locations, fewer households related that they actually combined resources, such as expenses and equipment to harvest. As shown in Table 6, 42% of households in 2011 combined resources to harvest herring spawn on kelp, and 67% combined resources in 2012.

As noted in the introduction, much of the harvest occurred by hand picking the kelp from the rocks. Table 7 and Figure 6 show the methods for harvesting herring spawn on kelp during the two study years. During the more abundant year of 2011, most of the herring spawn on kelp (97%) was harvested by hand-picking the kelp from beaches at low tide. However, in 2012, residents used rakes (35%) from a skiff during times of higher water to gather the less abundant harvest. During both study years, harvesters brought the herring spawn on kelp back to the community for processing. The harvest was then frozen for storage.

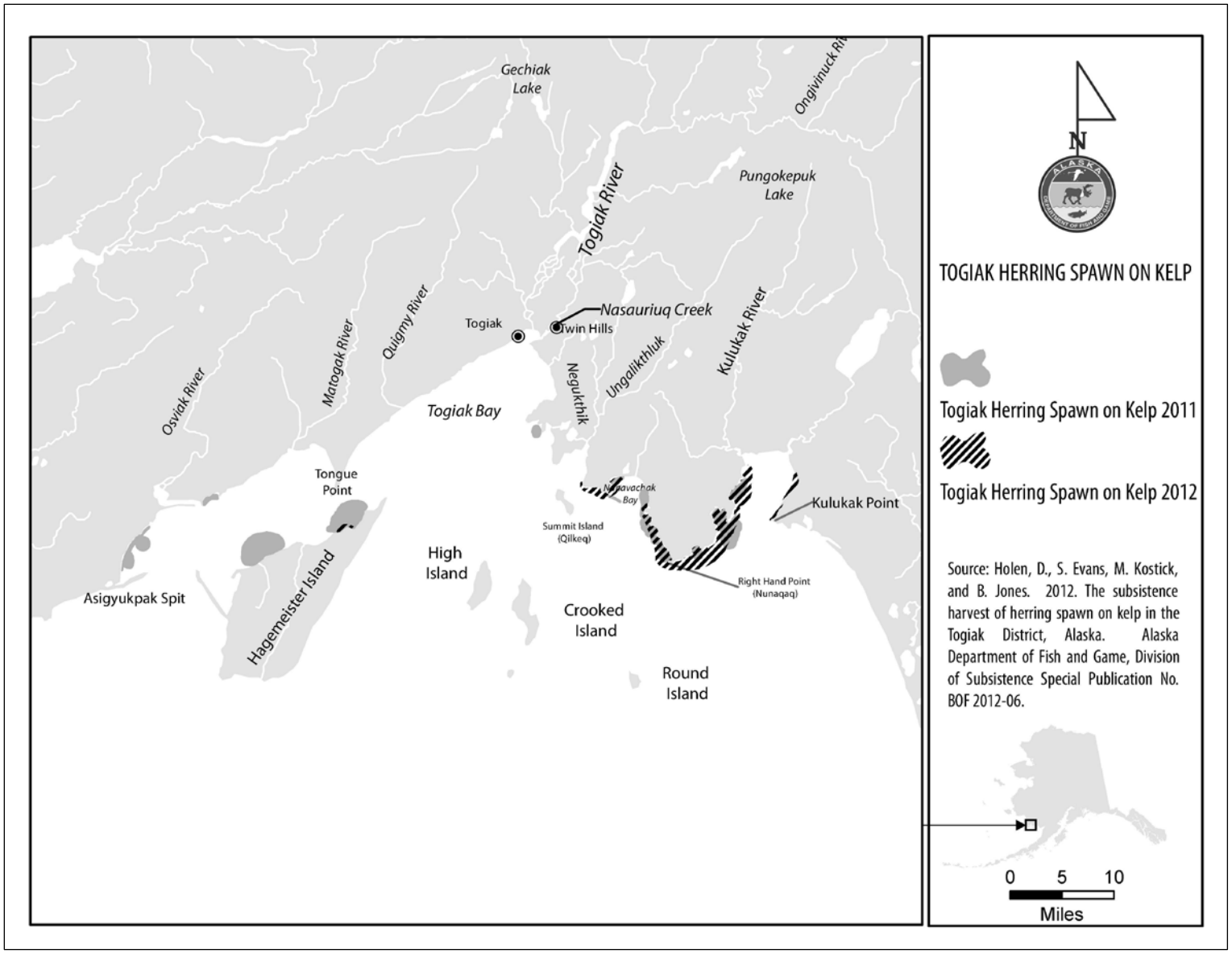

Figure 3.–Herring spawn-on-kelp harvesting locations, Togiak, 2011 and 2012.

Table 5.–Reported household participation in harvesting herring spawn on kelp with other families, Togiak, 2011 and 2012.

	Households harvesting			
	2011 (*N=38*)		2012 (*N=12*)	
Participation	Number	Percentage	Number	Percentage
Yes	27	71.1%	8	66.7%
No	11	28.9%	4	33.3%
Unknown	0	0.0%	0	0.0%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

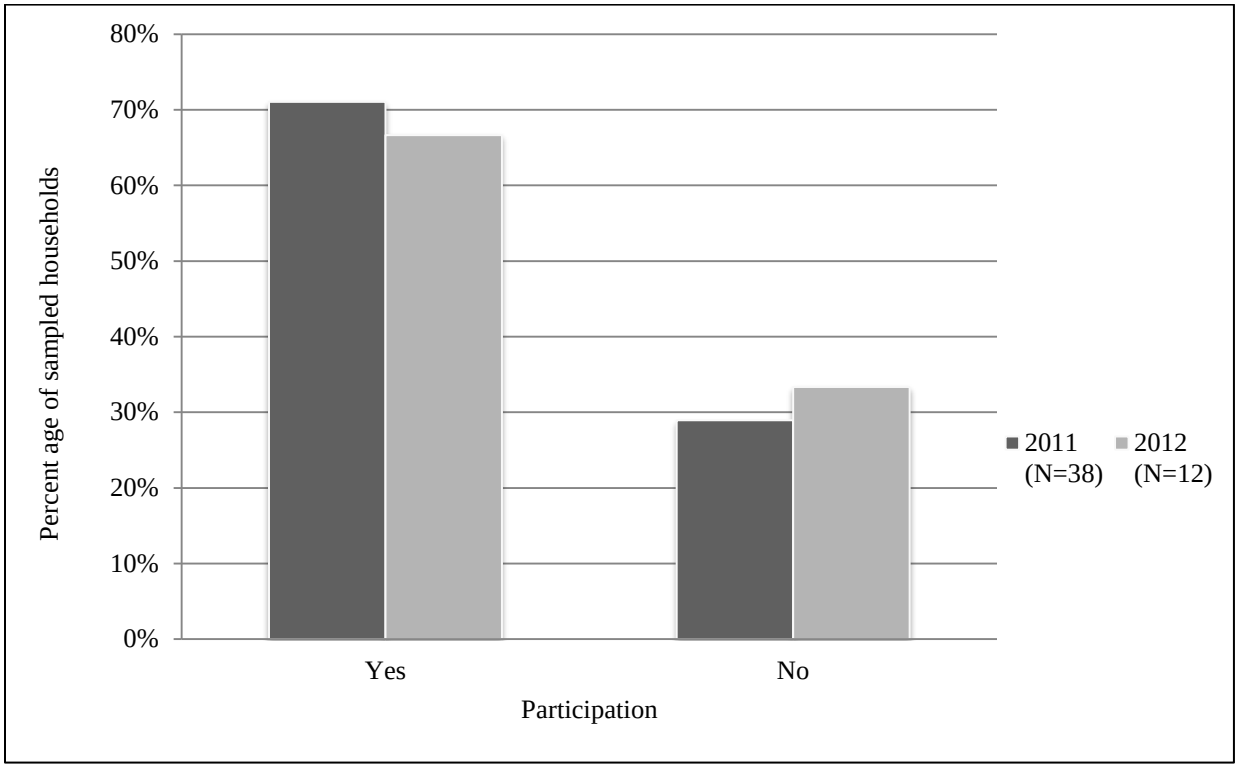

Figure 4.–Household participation in harvesting herring spawn on kelp with other families, Togiak, 2011 and 2012.

Table 6.–Reported household participation in combining expenses and equipment to gather herring spawn on kelp, Togiak, 2011 and 2012.

	Households harvesting			
	2011 (*N=38*)		2012 (*N=12*)	
Participation	Number	Percentage	Number	Percentage
Yes	16	42.1%	8	66.7%
No	22	57.9%	4	33.3%
Unknown	0	0.0%	0	0.0%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

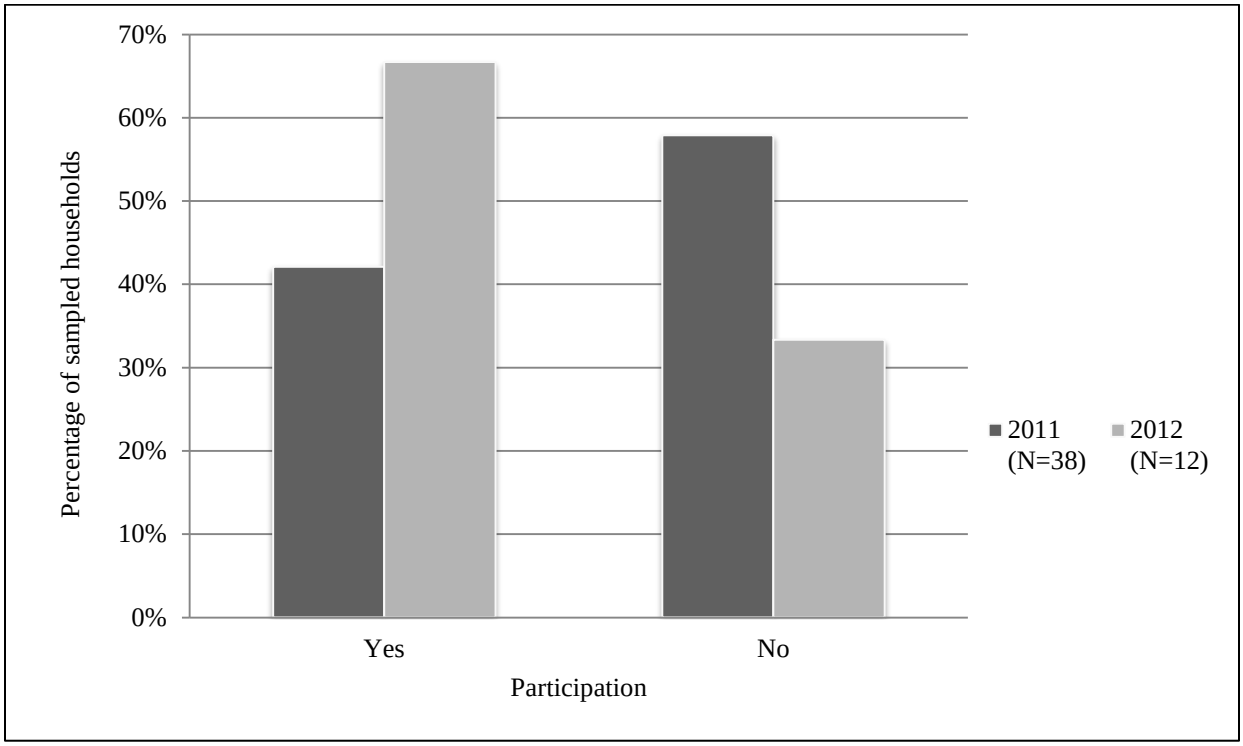

Figure 5.–Household participation in combining resources to gather herring spawn on kelp, Togiak, 2011 and 2012.

Table 7.–Methods of harvesting herring spawn on kelp, Togiak, 2011 and 2012.

Resource	Percentage of households			
	Hand pick		Rake	
	2011	2012	2011	2012
Herring spawn on kelp	97.1%	64.7%	2.9%	35.3%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

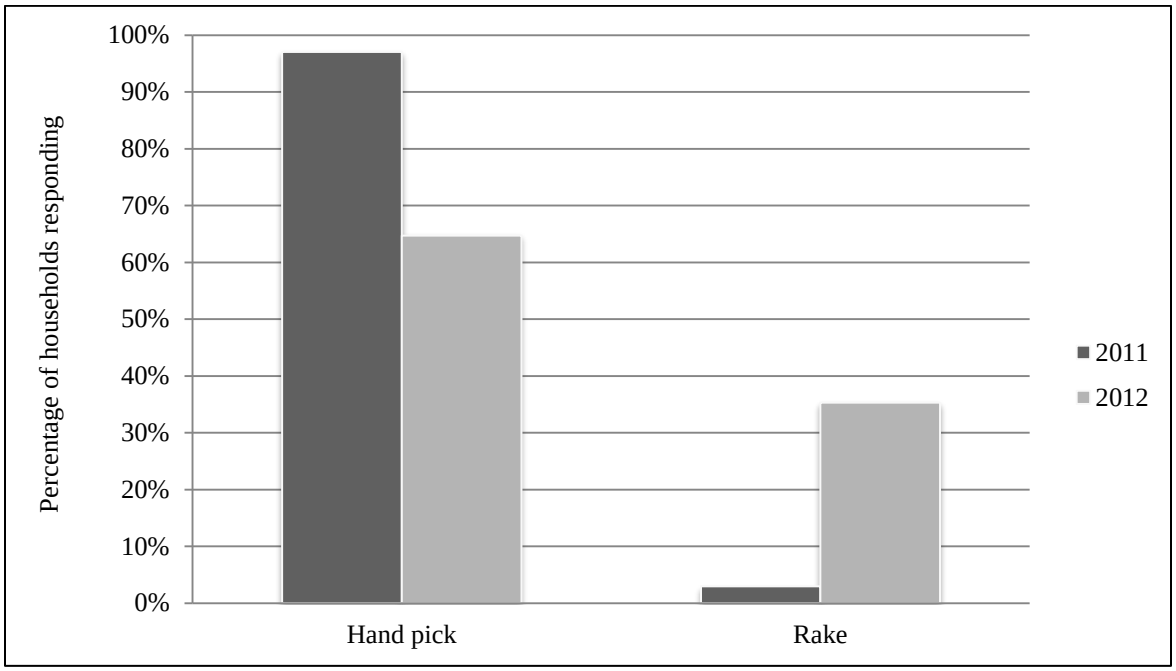

Figure 6.–Methods of harvesting herring spawn on kelp, Togiak, 2011 and 2012.

DISCUSSION

The following discussion is based on the analysis of quantitative findings from the household survey and from qualitative analysis of the key respondent interviews. As noted above, local perceptions of abundance generally refer to the density of locally-available herring spawn on kelp. In some cases though, the kelp on which the herring spawn is not available at the same locations annually and harvesters adjust their harvest strategy yearly. These perceptions may differ from abundance estimates as measured by aerial and spawn deposition surveys conducted by the department. Local harvesters observe abundance from a skiff while searching for good harvesting areas by following seals and birds that are also following herring. In addition, this report documents only two years of harvest data. The data do suggest a general pattern: that harvest and local abundance varies annually, as will be discussed below.

The clearest difference between 2011 and 2012 is the total amount harvested. In 2011, 5,742 lb were harvested, and in 2012 the estimated harvest was 1,125 lb. Residents reported no single reason for the substantial drop in reported pounds harvested. Respondents reported that in 2011 more herring spawn on kelp was used because there was a greater abundance of herring eggs on the kelp (Table 8). However, in 2012 respondents reported fewer eggs present, meaning that the eggs were not as thick on the kelp as they were in 2011. Also, Table 4 shows that many respondents (78%) reported that the 2012 season was a poor harvest year, while in 2011 no respondent reported having a poor harvest year.

Table 8.–Reported reasons for less or more harvest of herring spawn, Togiak, 2011 and 2012.

	Herring spawn			
	2011		2012	
Reason	Number	Percentage	Number	Percentage
Greater abundance	15	78.9%	1	14.3%
Fewer eggs present	1	5.3%	5	71.4%
Travel farther to harvest	1	5.3%	0	0.0%
Sharing	1	5.3%	1	14.3%
First time harvesting	1	5.3%	0	0.0%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

Another possible reason for the large drop in harvests between 2011 and 2012 is the amount of participation by residents of Togiak. Table 2 shows that in 2011, 100% of respondents attempted to harvest herring spawn on kelp, while in 2012 only 57% of respondents attempted to harvest. Because fuel was so expensive, and Togiak residents had to travel far to find harvestable herring spawn on kelp, the community tended to work together to search for good kelp beds that also had a thick deposition of herring eggs on the kelp. Certain households would travel to areas that were known to be good harvesting locations to see what was available. Depending on how harvestable the area was, the household would report to other herring spawn-on-kelp harvesters within the community. This was continually done until a good harvesting spot was designated, and then more households would travel to this area to harvest what they needed until their harvest goals were met. If no area was deemed a good harvesting area that year, fewer households attempted to gather herring spawn on kelp, as was the case in 2012. One of the key respondents said that in the three years prior to 2011, he had attempted to harvest spawn on kelp every year, but was unable to find any worth gathering. Many households combined resources, such as boats, fuel, food, and harvesting gear, so they could help each other harvest spawn on kelp, since the trip was lengthy and, therefore, expensive.

Research respondents reported several factors influencing their harvest of herring spawn on kelp in the Togiak District from the perspective of local harvesters. These included their perceptions of potential impacts of the commercial herring fishery in the Togiak District. The commercial herring fishery in Togiak started in 1967, but did not really become viable until 1977. Commercial herring are caught by

seine and gillnet boats, and are primarily sold for sac roe (ADF&G 2012). Several respondents said that in the past, the herring fishery was very healthy when the only commercial gear type used was gillnets. Once the purse seine was introduced to the Togiak herring fishery, respondents said they noticed a reduction in the spawning events. In addition, longtime harvesters related that there are two spawning events, and historically they would never harvest for spawn on kelp from the first run, but would wait for the second run. This, they said, would ensure plenty of herring were able to spawn, and there would be more fish the following year. Respondents noted that they think the commercial herring sac roe fishery is harvesting both the first and second group of herring that are coming in to spawn near Togiak. Although this perception was related by local users of herring spawn on kelp, surveyed households continue to participate in the commercial herring fishery in the Togiak District. In 2011, 32% of respondents in the survey said that someone in their household participated in the commercial herring fishery, and in 2012, 39% said that someone participated (Table 9). The survey did not capture whether residents participated in the gillnet or seine fishery.

Table 9.–Reported participation in commercial herring fishing, Togiak, 2011 and 2012.

	Households			
	2011		2012	
Participation	Number	Percentage	Number	Percentage
Yes	12	31.6%	9	39.1%
No	26	68.4%	12	31.6%
Unknown	0	0.0%	4	10.5%

Source ADF&G Division of Subsistence household survey, 2011 and 2012.

The final aspect of the subsistence herring harvest that the project attempted to understand is location of harvest. Respondents related that the best places to harvest are mainly in places where the beach is rocky and the tide goes out far enough to leave most of the spawn on kelp exposed at low tide. Also, the kelp beds must be healthy and tall, and with sufficient density of herring eggs. Harvest areas must be free from sand, especially areas where the water is rough because the waves will churn up the sand and it will stick to the herring spawn on kelp—it is then impossible to sufficiently wash the sand off so it is fit for consumption. There are known “traditional” harvest locations along the coast from the village of Togiak to the east side of Kulukak Bay. Herring do not have as much site fidelity as salmon; therefore, where they spawn each year can change. As mentioned previously, due to high fuel prices, harvesters tried to stay close to Togiak to cut down on costs. Also, the Togiak Bay area is known to have high winds and rough waters, which can make accessing harvesting areas dangerous, so for safety, residents preferred not to travel too far.

CONCLUSION

The timing of the return of herring to Togiak Bay in the spring and the opportunity to harvest spawn on kelp continues to be an important customary and traditional activity for the residents of Togiak. It allows Togiak residents a chance to put the skiff in the water after a long winter and harvest some fresh wild foods. Herring spawn on kelp was once a food eaten occasionally year-round on special occasions or just to add variety to the diet. Today, the resource is usually saved only for special occasions because it has become harder to find in large harvestable amounts close to Togiak. Even so, it continues to be a customary and traditional food favored by Togiak residents. Although there have been some good harvesting years recently, it is important that this harvest survey continue, and include harvesters from neighboring communities in order to track changes in the subsistence harvest of herring spawn on kelp over time.

ACKNOWLEDGEMENTS

The ADF&G Division of Subsistence would like to thank the residents of Togiak who took the time to share their knowledge about harvesting herring spawn on kelp for subsistence. Also a big thank you to the Togiak Traditional Council for its support for this project and its help in ensuring all potential spawn-on-kelp harvesters in Togiak were surveyed. Thanks also to the Bristol Bay Native Association for its help on this project and for funding an intern to assist with the survey work. Finally, the Division of Commercial Fisheries in Dillingham provided assistance throughout this project, especially providing valuable information at the beginning.

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APPENDIX A: TOGIAK HERRING SPAWN-ON-KELP SURVEY FORM, 2012

HERRING SPAWN ON KELP SUBSISTENCE SURVEY

TOGIAK, ALASKA

2012

This survey is used to estimate subsistence harvests and to describe community subsistence economies. We will publish a summary report, and send it to all households in your community. We share this information with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service and the National Park Service. We work with the Federal Regional Advisory Councils and with local Fish and Game Advisory Committees to better manage subsistence, and to implement federal and state subsistence priorities.

We will NOT identify your household. We will NOT use this information for enforcement. Participation in this survey is voluntary. Even if you agree to be surveyed, you may stop at any time.

HOUSEHOLD ID:		
COMMUNITY ID:	TOGIAK	345
RESPONDENT ID:		
HOW MANY PEOPLE LIVING IN HOUSEHOLD:		
INTERVIEWER:		
INTERVIEW DATE:		
START TIME:		
STOP TIME:		
DATA CODED BY:		
DATA ENTERED BY:		
SUPERVISOR:		

COOPERATING ORGANIZATIONS

TOGIAK TRADITIONAL COUNCIL
P.O. BOX 310
TOGIAK, AK 99678

907-493-5004

DIVISION OF SUBSISTENCE
ALASKA DEPT OF FISH & GAME
333 RASPBERRY ROAD
ANCHORAGE, AK 99518

907-267-2353

HARVESTS: HERRING SPAWN ON KELP

HOUSEHOLD ID

Do members of your household USUALLY harvest HERRING SPAWN ON KELP ?.....Y N

In 2012
...Did members of your household USE or TRY TO HARVEST herring spawn on kelp?.....Y N

IF NO, go to the next harvest page.
If YES, continue on this page...

Please estimate how many herring spawn on kelp ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED this year. INCLUDE herring spawn on kelp you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If fishing with others, report ONLY YOUR SHARE of the catch.

	IN 2012 DID MEMBERS OF YOUR HH...				IN 2012, HOW MUCH (_____) DID YOUR HOUSEHOLD...			POUND CONVERSION
	USE?	TRY TO HARVEST?	RECEIVE?	GIVE AWAY?	...HARVEST IN BAGS (Gallons, Quarts)	...HARVEST IN BOXES (Size of weight of box)	...HARVEST OTHER	
	(circle)				(amount taken by each type)			(Lbs)
HERRING SPAWN ON KELP *120306000* 120306000	Y N	Y N	Y N	Y N				
HERRING ROE/UNSPECIFIED 120302000	Y N	Y N	Y N	Y N				
	Y N	Y N	Y N	Y N				
					These columns should include all the herring spawn on kelp HARVESTED by members of this household in 2012.			

HERRING SPAWN ON KELP

Did your household USE less, more, or about the same amount of herring spawn on kelp in 2012 than in recent years? *X L S M*

If LESS or MORE, why was there a change?

Did your household get enough spawn on kelp?..... *Y N*

How do you feel your 2012 HARVEST was compared to other years?..... *X L S M*

If LESS or MORE
Why was your harvest different?

If you HARVESTED LESS herring spawn on kelp in 2012, what was the last year you remember having a good harvest?

How do you preserve/store herring spawn on kelp?
How do you gather your herring spawn on kelp?...

Do you go with other families?..... *Y N*

Do you combine resources to gather herring spawn on kelp?..... *Y N*

continued.....

HARVESTS: HERRING SPAWN ON KELP

HOUSEHOLD ID

If you shared herring spawn on kelp with others, how many households did you share with?

NUMBER OF HOUSEHOLDS	COMMUNITY

Have you or any member of your household ever participated in the commercial herring fishery? Y N

If yes and you no longer participate why?

DO YOU HAVE ANY QUESTIONS, COMMENTS, OR CONCERNS ABOUT THE 2012 SUBSISTENCE HERRING SPAWN ON KELP HARVEST?

INTERVIEW SUMMARY:

OTHER FISH: 06 **TOGIAK: 345**

TOGIAK HERRING SPAWN-ON-KELP PROJECT

N
TOGIAK BAY
TOGIAK BAY
Walrus Islands
High Island
Crooked Island
Summit Island
Kulukak Bay
Kulukak
HAGEMEISTER STRAIT
HAGEMEISTER ISLAND
WALRUS ISLANDS STATE GAME SANCTUARY
TOGIAK NATIONAL WILDLIFE REFUGE
WILDLIFE REFUGE
Amanda Lake
Twin Hills
Fire Hill
Aedulik Mtns
Togiak Bay
Togiak Pass
Togiak Pt
Twin Pt
Cape Peirce
Cape Newenham
Nushagak Spit
Nushagak Bay
Nushagak Pt
Ugashik Bay
Ugashik Lake
Ugashik
Kulukak Pt
Kulukak Bay
Kulukak
Twin Hills
Fire Hill

APPENDIX B: 2011 CONVERSION FACTORS

Resource container type	Estimated average weight of herring spawn on kelp (pounds)
Ziploc[a] gallon bag	3.87 lb
Ziploc[a] quart bag	1.46 lb

a. Product names are given for scientific completeness; they do not constitute endorsement.

APPENDIX C: 2011 & 2012 CODE BOOK

Togiak District Herring Spawn on on-Kelp Harvest: Responses to Household Survey.

Did your household use less, more, or about the same amount of herring spawn on kelp in 2011 than in recent years? If YES or MORE, why was there a change?	Code
Harvest was the same - no response necessary	Blank
Refused.	-7
Missing (blank, but should not be & the reason is not clear)	-9
Unknown to respondent	-8
greater abundance (could be because they did not get any in 2010)	1
fewer eggs present	2
Travel further to harvest	3
Sharing	4
First time harvesting	5
How do you feel your 2011 Harvest was compared to other years?	Code
Harvest was the same - no response necessary	Blank
Refused	-7
Missing (blank, but should not be & the reason is not clear)	-9
Unknown to respondent	-8
Good as was not present in last 3-4 years.	1
More eggs present on the kelp.	2
Good harvest.	3
The same as in recent years.	4
Poor harvest.	5
How do you preserve/store herring spawn on kelp?	Code
Refused	-7
Missing (blank, but should not be & the reason is not clear)	-9
Unknown to respondent	-8
freeze	1
How do you gather your herring spawn on kelp?	
handpick	1
rake	2
If yes and you no longer participate why?	
No response.	Blank
No longer fish due to closure of commercial spawn on kelp fishery.	1
low price on herring fishery	2
Retired	3
Used to fish but did not state reason why no longer fish.	4
Do you have any questions, comments, or concerns about the 2011 subsistence herring spawn on kelp harvest?	
No response.	Blank
Regulations	1
environmental damage/pollution	2
increased distance to acquire SOK	3
Competition	4
good season	5
the commerical boats fish too early and the herring are not able to spawn	1 and 4
too much commercial fishing so no more kelp from Anchor Point to Right Hand Point	1 and 4
have to go further out to collect SOK	2
had a good harvest year	5

-continued-

Appendix C.–Page 2 of 2.

concerns about pollution nearby the village from commercial ships	2
concerns about commercial ships anchoring close to the village	2
commercial boats engage in illegal ivory trade	3
should limit the purse seiners quota	1 and 4
Suggestions for future management.	
No response.	Blank
move fishing/processor grounds	1
need for community education	2
regulations	3
competition	4
commercial boats should fish one year on, one year off	3 and 4
commercial boats should not be allowed to fish before the herring spawn	3 and 4
commercial boats should not be allowed to fish so close to the village	3 and 4
stop commercial fishing for herring	3 and 4
place a subsistence committee, or specialist, in the village	2
allow commercial fishing only where herring are, not in spawning areas	3 and 4
move the processors away from the village, they are no longer used by the people of the village	3 and 4