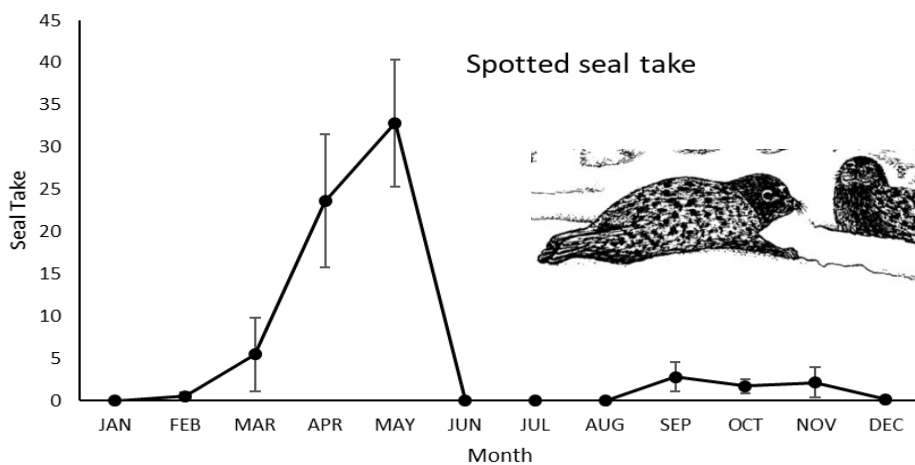
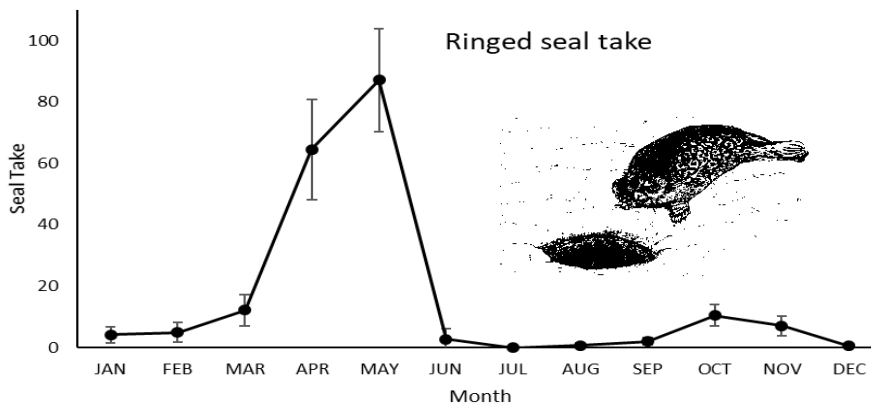
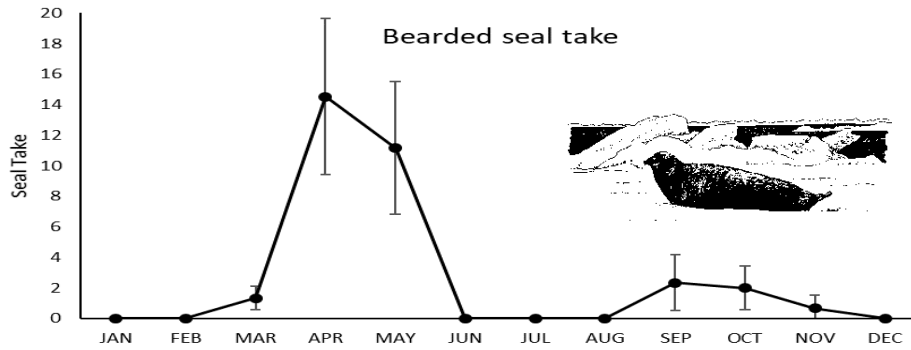


Tununak Ice Seal Harvest Report

2008-2012 and 2016 Summary



Tununak Ice Seal Harvest Report 2008 – 2012 and 2016 Summary

Final report approved February 2019

By:

Mark Nelson, Ryan Adam and Justin Olnes

Alaska Department of Fish and Game

Fairbanks, Alaska

justin.olnes@alaska.gov

and

Carl Inakuk

Tununak, Alaska

Acknowledgements

James James and the Tununak Tribal Council were very helpful in making the project a success in Tununak. The Ice Seal Committee (ISC), National Marine Fisheries Service (NMFS), and the State of Alaska (State Wildlife Grants) have all contributed funding for the project. Jennifer Hooper and Tim Andrew with the Association of Village Council Presidents (AVCP) have both been instrumental in getting the project started, and the community of Tununak has been fantastic in their participation in the survey since 2008.

Use of harvest data

Due to high variability in seal harvest numbers (among years, within communities, among communities, and within regions), harvest data presented here should not be extrapolated to other communities or regions at this time. For example, during the five-year span of 2008-2012, only 6 of the 64 (9%) coastal communities that harvest ice seals have been surveyed in two consecutive years or more. In addition, hunter concerns regarding the misuse of harvest data make extrapolation of harvest numbers inappropriate at this time. We are working toward a better understanding of harvest variability and community needs by conducting more and consecutive surveys with the goal of being able to report a statewide ice seal harvest in the future. Until then, please contact the Ice Seal Committee for guidance prior to using these harvest data.

Nelson, M., R. J. Adam, J. Olnes, and C. Inakuk. 2018. Tununak ice seal harvest report 2008-2012 and 2016 Summary. Report to Tununak and the Ice Seal Committee. 15 pp.

Introduction

Bearded (*Erignathus barbatus*), ringed (*Pusa hispida*), spotted (*Phoca largha*), and ribbon seals (*Histiophoca fasciata*) are the species of Alaska's seals collectively called ice seals because of their association with sea ice and their dependence on it for feeding, resting, and pupping. Ice seals are an important component in maintaining Alaska Native subsistence culture because seals are a source of food; skins are used for clothes, boats, and crafts. Hunting, processing, using, and sharing seals is an important part of Alaska Native culture and heritage. To document subsistence needs and to show that harvests are sustainable, the number of seals used by a community should be determined and reported annually. Reporting subsistence seal harvest information by community shows how important seals are to communities and how many are needed. This information is especially important now because climate change or other factors may change the number of seals in a population or change when they are available to hunters. Concerns over how climate change may affect their populations in the future have led to bearded and ringed seals being listed as "Threatened" under the Endangered Species Act. Although the National Marine Fisheries Service (NMFS) has said limiting harvest is not a management action they are pursuing in response to this listing, there is still great concern among subsistence users that harvest will be restricted. Often in situations where no harvest data are available more restrictive decisions are made to protect the resource than would be necessary if good harvest data were available. Learning more about the current level of subsistence harvest of ice seals, which is thought to be sustainable, could also provide valuable information about the size of seal populations where little information is available.

Methods

Project Approval

Tununak and two other communities (Quinhagak and Hooper Bay) were chosen as communities for the harvest monitoring pilot project in 2008 because of their willingness to participate in the project. The Ice Seal Committee (ISC), the Association of Village Council Presidents (AVCP), and the Tununak Tribal Council were presented with the project goals and all agreed that the project was necessary to show the importance of seals for subsistence needs. The Tununak Tribal Council approved the project before any surveys were conducted in their community.

Survey Instrument

Based on pilot studies, the most preferred harvest collection method is a household survey. A household survey consists of a survey technician, preferably locally hired, surveying a predetermined number of households in a community. Survey questions are related to the number of seals harvested by the household. The level of detail varies; some surveys record only the number of each species per year, while others record the number of individuals by sex, month of harvest, struck but lost, and age. The more detailed information is more useful but it makes the surveys take longer and cost more. Ice

seals are used for subsistence in five different regions of Alaska, and each region has unique needs, concerns, and desires of the people in that region that should be considered when planning a survey. Sometimes a harvest calendar is provided prior to the survey for people to keep track of their harvest before being surveyed. A household list is used by the surveyor to keep track of which households have been surveyed, but is kept confidential so there is no way to associate the harvest reported to an individual hunter or household.

Survey timing

In Tununak, most hunters start hunting when the ice breaks up in the spring and are busy hunting or fishing until after the ocean freezes in the late fall. Therefore, the best time to conduct household surveys is during the winter before the spring breakup. The goal is to begin the surveys after the first of January, to record harvest for the previous calendar year, and have them completed by mid-April. For example, a survey, conducted in March of 2017, would collect information about seals harvested during the calendar year (Jan-Dec) 2016.

Data Analysis

The completed household survey forms were sent to Mark Nelson at Alaska Department of Fish and Game (ADFG) in Fairbanks. The surveys were counted and checked for completeness and then the surveyor was paid based on the number of surveys completed. Information from the surveys was entered into a Microsoft Access database and checked for accuracy and duplication. The number of completed household surveys was compared against the total number of households in the community to determine the percentage of households surveyed. The percent surveyed is used to estimate the number of seals harvested by households not surveyed to get a harvest estimate for the entire community. The information is always presented as a community estimate and never by household to protect the privacy of individual households.

The information recorded on the household survey forms is the reported harvest and struck but lost. This information is used to calculate estimated harvest and estimated struck but lost for the entire community. We must estimate for the entire community because the surveys do not include every household in the community and this is how we account for the number of seals used by the households not surveyed. The estimated harvest and the estimated struck but lost are the numbers that are presented in reports because they represent the subsistence needs for the entire community. The total number of seals by species used for subsistence during a particular year is the estimated harvest plus the estimated struck but lost and together is called the “take.” **So “take” as presented in this report refers to the estimated harvest plus the estimated struck but lost.** The formula for estimating the number of seals harvested in the entire community is:

$$e = \frac{R}{\%S}$$

Where “e” is the estimated number of seals harvested, “R” is the reported number of seals harvested, and “%S” is the percentage of households surveyed. For example, during 2012 we surveyed 57% of the

households in Tununak, %S = 0.57, and they reported harvesting 21 ringed seals (R), then the estimated number harvested would be:

$$e = \frac{R}{\%S} = \frac{21}{0.57} = 37 \text{ ringed seals.}$$

The estimated number of seals harvested is then added to the estimated number of seals struck but lost to determine a total “take” for the community. After obtaining an estimate of total take for several individual years, we can then calculate the average annual take across years and our level of certainty around this estimate. A 95% confidence interval provides a range of numbers within which the actual number of seals taken by the community lies. The more households that are surveyed and the more years that surveys are conducted, the closer the estimate is to the actual number of seals taken by the community or the more precise the estimate is. The confidence interval is calculated by using the formula:

$$CI (\pm) = t_{\alpha/2} \times SE \times FPC$$

where CI stands for confidence interval, “ $t_{\alpha/2}$ ” is the measure of precision you want to use (we will use 95%), “SE” is the standard error of our estimated take, and “FPC” is the Finite Population Correction. The “SE” is calculated by the formula:

$$SE = \frac{SD}{\sqrt{n}}$$

Where “SD” is the standard deviation around our estimate of the take, and “n” is the size of our sample. The standard deviation (SD) is calculated as:

$$SD = \sqrt{\frac{\sum(e_i - \bar{e})^2}{n}}$$

where “ e_i ” is each year’s estimated seal take and “ \bar{e} ” is the average seal take across years. The “FPC” is calculated by the formula

$$FPC = \sqrt{\frac{H-h}{H-1}}$$

where “H” is the total number of households in the community pooled over the years being considered and “h” is the pooled number of households surveyed during those years. The FPC is a way to account for the number of households that were surveyed where the more you survey the narrower your confidence interval becomes (meaning the better your estimate). If the survey contacted every household in the community the FPC would go to zero and the confidence interval would then be equal to the number of seals harvested, meaning that you are 100% positive the number is correct because you are not estimating for households not surveyed.

The number of seals *per capita* is a way to show how many seals were taken per person living in the community during that year. The number of people living in the community changes so to compare

current harvest to past harvest we also present the harvest *per capita*. Larger communities are also likely to take more seals for subsistence than smaller communities, but by looking at seals taken per person, we can compare the level of use by community. Number of seals *per capita* is calculated by dividing the number of seals by the number of people living in the community. For example, the number of ringed seals taken *per capita* during 2012 equals: 219 (ringed seals taken) divided by 321 (people living in Tununak during 2012) = 0.6. This means that Tununak took 0.6 ringed seals for every person living in Tununak during 2012, or Tununak took 3 ringed seals for every 5 people.

The information is presented to the communities by reports, posters, and oral presentations at tribal and community meetings. The numbers must be approved by the community in which they were collected before they can be shared. Once approved, the numbers are included in the annual ice seal harvest report (Nelson 2017) that is presented annually to the ISC.

Results

Households surveyed

The number of households that participated in the survey in Tununak ranged from 28 in 2011 to 74 in 2016 (Table 1). The number of households in the community increased from 79 in 2008 to 86 in 2016 according to the Tununak Tribal Council and the U.S. Census Bureau records. Only active households (people living in them) were counted toward the total. The “percent surveyed” from each year is used to extrapolate the reported harvest to the entire community (estimated harvest, estimated struck but lost, and total take). Due to past law enforcement actions in the region related to migratory bird hunting, some people are afraid to talk about the resources that they subsist on for fear of facing prosecution, which likely has reduced participation in the surveys. In 2016, however, 86% of all households in Tununak were surveyed, possibly indicating improved trust and the recognized importance of the seal harvest information.

Table 1. Population of Tununak from 2008-2012 and 2016, total number of households, number of households surveyed, and the percent of households that participated in the survey for each year. Population data is from the U. S. Census Bureau and the Tununak Tribal Council.

Year	Population	Number of households		
		Total	Surveyed	Percent surveyed
2008	321	79	54	68%
2009	321	79	44	56%
2010	325	80	36	45%
2011	342	84	28	33%
2012	342	84	48	57%
2016	315	86	74	86%

Sharing seals

Households that use seals far outnumber households that hunt seals, indicating the importance of seals for the subsistence of the entire community (Table 2). In some communities, a few hunters harvest most of the seals and share them with the community. For example, in 2012 only 25% of households reported hunting bearded seals, but 69% percent of households reported using them. Although significant sharing still took place in 2016, fewer households reported hunting or using seals than in prior survey years.

Table 2. Percent of households using and actively hunting seals by species. ‘Use’ is the percentage of households hunting or receiving seals. ‘Hunt’ is the percentage of households that reported hunting seals.

	Bearded seal		Ringed seal		Spotted Seal		Ribbon Seal	
	Use	Hunt	Use	Hunt	Use	Hunt	Use	Hunt
2008	45%	26%	57%	42%	47%	18%	4%	3%
2009	68%	18%	82%	48%	39%	23%	0%	0%
2010	45%	17%	57%	48%	47%	9%	4%	2%
2011	64%	21%	75%	57%	57%	13%	0%	0%
2012	69%	25%	77%	52%	44%	10%	0%	0%
2016	12%	11%	41%	28%	18%	14%	0%	0%
Average	51%	20%	65%	46%	42%	15%	1%	1%

Bearded Seals

The total take of bearded seals has ranged from 21 in 2009 to 44 in 2012 and averaged 33 (± 6) per year (Table 3). In 2016, the total take of 18 was below the average across survey years. The estimated struck but lost ranged from 13% in 2008 to 29% in 2011 and averaged 22% (Table 3).

Ringed Seals

The total take of ringed seals ranged from 162 in 2010 to 257 in 2011 and averaged 197 (± 26) per year (Table 3). In 2016, the total take of 117 was below the average across survey years. The estimated struck but lost ranged from 2% in 2012 to 18% in 2010 and averaged 10% (Table 3).

Spotted Seals

The total take of spotted seals ranged from 26 in 2016 to 100 in 2011 and averaged 70 (± 17) per year (Table 3). In 2016, the total take of 26 was below the average across survey years. The estimated struck but lost ranged from 13% in 2008 to 31% in 2016 and averaged 17% (Table 3).

Ribbon Seals

Two ribbon seals were taken during 2008, and none were taken during any other survey year. No ribbon seals were struck but lost (Table 3).

Table 3. Estimated harvest, estimated struck but lost, percent struck but lost, total take, and per capita seal take for each species of ice seal from 2008 to 2012 and 2016. The bottom line shows the average from all six years and the 95% confidence interval around the average total take is shown in parentheses.

Bearded Seals						Ringed Seals					
	Harvested	Struck but lost	Total take	Per capita Total Take			Harvested	Struck but lost	Total take	Per capita Total Take	
2008	26	4	13%	30	0.09	2008	165	28	15%	193	0.60
2009	16	5	24%	21	0.07	2009	223	9	4%	232	0.72
2010	29	11	27%	40	0.12	2010	133	29	18%	162	0.50
2011	30	12	29%	42	0.12	2011	224	33	13%	257	0.75
2012	37	7	16%	44	0.13	2012	214	5	2%	219	0.64
2016	13	5	28%	18	0.06	2016	112	6	5%	117	0.37
Average	25	7	23%	33 (±6)	0.10	Average	179	18	10%	197 (±26)	0.60
Spotted Seals						Ribbon Seals					
	Harvested	Struck but lost	Total take	Per capita Total Take			Harvested	Struck but lost	Total take	Per capita Total Take	
2008	91	6	6%	97	0.30	2008	2	0	0%	2	0.01
2009	37	11	23%	48	0.15	2009	0	0	0%	0	0.00
2010	87	9	9%	96	0.30	2010	0	0	0%	0	0.00
2011	79	21	21%	100	0.29	2011	0	0	0%	0	0.00
2012	44	7	14%	51	0.15	2012	0	0	0%	0	0.00
2016	17	8	31%	26	0.08	2016	0	0	0%	0	0.00
Average	59	10	17%	70 (±17)	0.21	Average	0	0	0%	0 (±0.5)	0.00

Seasonality

Most ringed, bearded, and spotted seals are harvested during the spring (March - May), however some are also harvested during the fall (September to November). Very little hunting occurs during the winter (December – February) and summer (June – August) months. Below are tables and figures for each species of the number of seals taken (estimated harvest + estimated struck but lost) during each month. The tables show the total take for each month and the average of that month for the six years with a 95% confidence interval. The figures show the average number of seals taken each month with a 95% confidence interval.

Table 4. The number of bearded seals taken (estimated harvest + estimated struck but lost) by Tununak each month during 2008 to 2012 and 2016, including the average from those 6 years with a 95% confidence interval.

Bearded Seals														
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK	Total
2008	0	0	3	6	18	0	0	0	3	0	0	0	0	30
2009	0	0	0	14	7	0	0	0	0	0	0	0	0	21
2010	0	0	2	31	4	0	0	0	0	2	0	0	0	40
2011	0	0	3	21	6	0	0	0	9	3	0	0	0	42
2012	0	0	0	7	25	0	0	0	2	7	4	0	0	44
2016	0	0	0	8	7	0	0	0	0	0	0	0	3	18
AVERAGE	0	0	1	15	11	0	0	0	2	2	1	0	1	33
95% CI	(±0)	(±0)	(±1)	(±5)	(±4)	(±0)	(±0)	(±0)	(±2)	(±1)	(±1)	(±0)	(±1)	(±6)

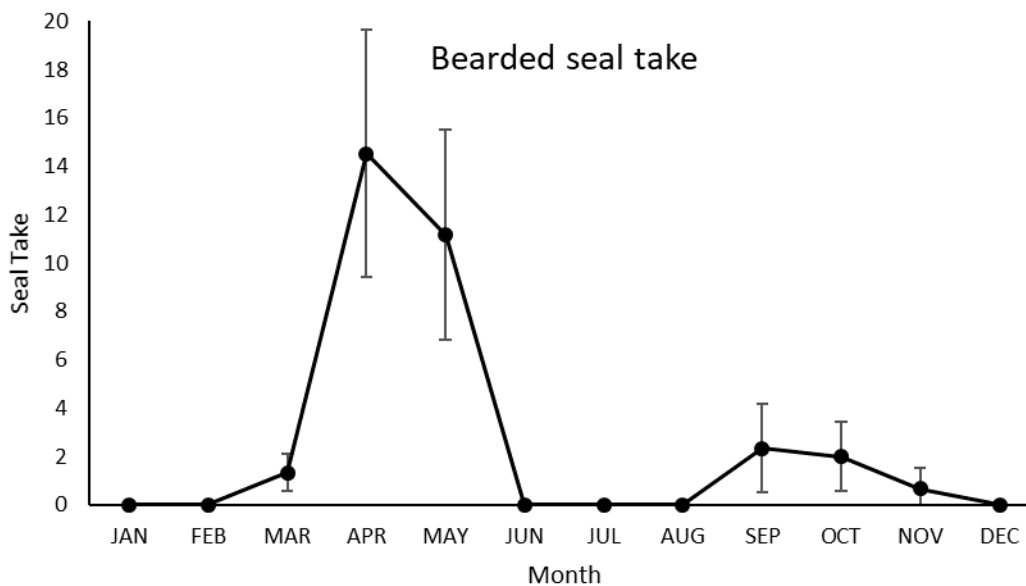


Figure 1. Average bearded seal take for each month by Tununak from 2008 to 2012, and 2016 with a 95% confidence interval (vertical lines).

Table 5. The number of ringed seals taken (estimated harvest + estimated struck but lost) by Tununak each month during 2008 to 2012 and 2016, including the average from those 6 years with a 95% confidence interval.

		Ringed Seals												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK	Total
2008	0	0	7	47	83	16	0	0	4	20	16	0	0	193
2009	5	16	26	118	58	0	0	0	0	2	7	0	0	232
2010	11	7	13	44	76	0	0	0	2	4	4	0	0	162
2011	0	0	21	88	124	0	0	3	0	15	3	3	0	258
2012	9	5	0	49	128	0	0	0	5	11	12	0	0	219
2016	0	1	6	41	53	0	0	1	1	10	0	0	3	117
AVERAGE	4	5	12	64	87	3	0	1	2	10	7	1	1	197
95% CI	(±3)	(±3)	(±5)	(±16)	(±17)	(±3)	(±0)	(±1)	(±1)	(±3)	(±3)	(±1)	(±1)	(±26)

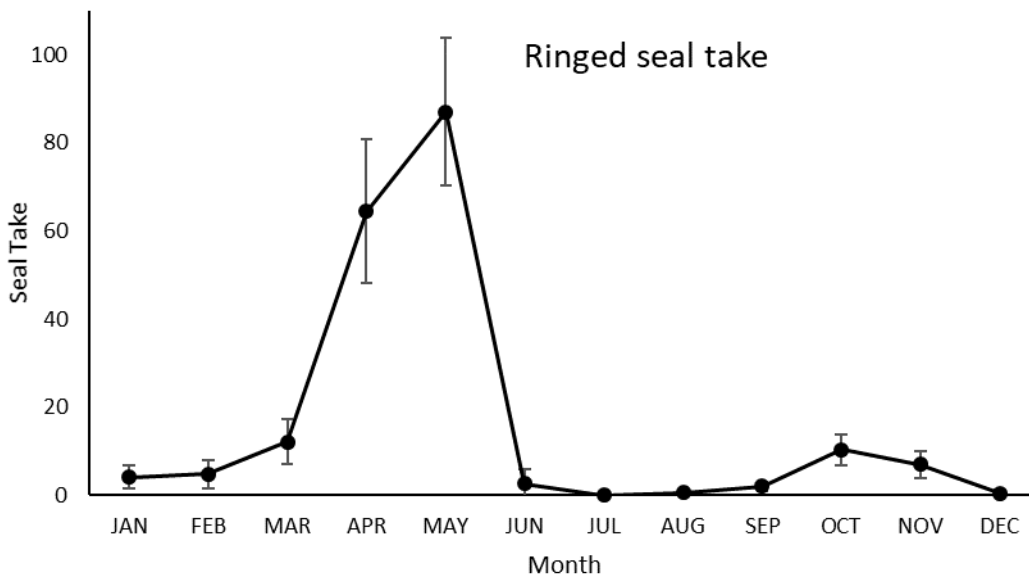


Figure 2. Average ringed seal take for each month by Tununak from 2008 to 2012 and 2016 with a 95% confidence interval.

Table 6. The number of spotted seals taken (estimated harvest + estimated struck but lost) by Tununak each month during 2008 to 2012 and 2016, including the average from those 6 years with a 95% confidence interval.

Spotted Seals														Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK	
2008	0	0	3	20	56	0	0	0	6	4	6	1	0	97
2009	0	0	0	23	25	0	0	0	0	0	0	0	0	48
2010	0	0	9	36	42	0	0	0	7	2	0	0	0	96
2011	0	0	21	46	33	0	0	0	0	0	0	0	0	100
2012	0	2	0	11	26	0	0	0	4	2	7	0	0	52
2016	0	1	0	6	15	0	0	0	0	2	0	0	1	26
AVERAGE	0	1	6	24	33	0	0	0	3	2	2	0	0	70
95% CI	(±0)	(±0)	(±4)	(±8)	(±8)	(±0)	(±0)	(±0)	(±2)	(±1)	(±2)	(±0)	(±0)	(±17)

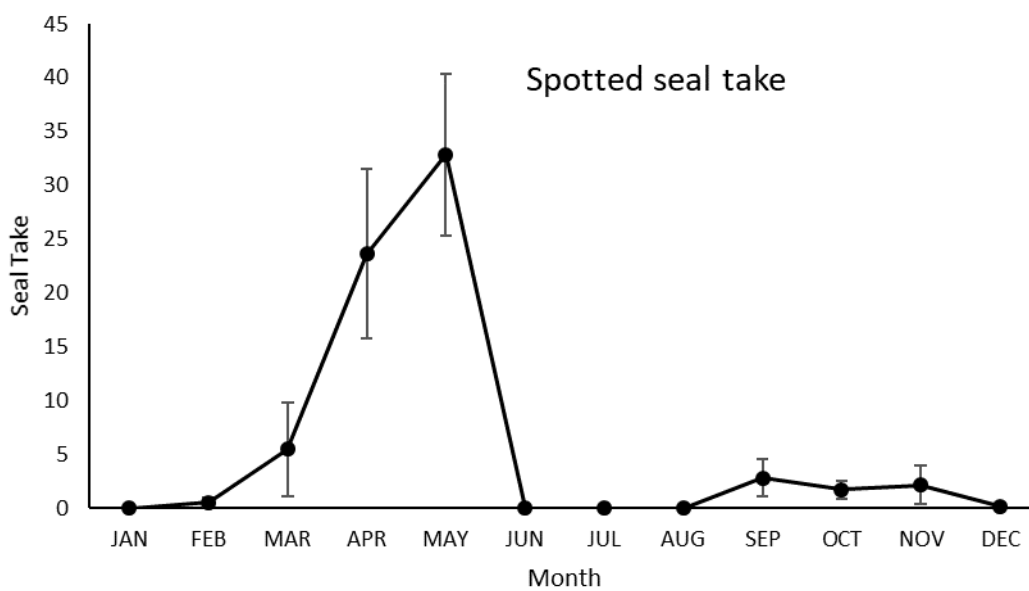


Figure 3. Average spotted seal take for each month by Tununak from 2008 to 2012 and 2016 with a 95% confidence interval.

Hunt Frequency

Supplemental questions regarding the amount of time spent hunting were included in all years of the survey (Table 7). Very few households reported hunting more than in the past, a wide variety of reasons were given for hunting less (e.g., less time, higher gas prices, bad weather).

Table 7. *How often do you hunt now? Of households that hunt, the percent reporting whether they hunt more, same, or less in Tununak.*

	Do you hunt more or less often?		
	More	Same	Less
2008	14%	16%	71%
2009	7%	54%	39%
2010	7%	32%	61%
2011	0%	41%	59%
2012	3%	15%	82%
2016	6%	17%	77%
Average	6%	29%	65%

Seal health

Subsistence hunters and processors have extensive experience handling seals and know when an animal looks sick or unhealthy. A supplemental question was added in 2011 to collect information on the number of unhealthy seals a household encountered. During 2011 and 2012, all households reported that all seals were healthy. Very few seals that are harvested are considered unhealthy by the subsistence households. It is worth noting that during 2011 and 2012 there was an Unusual Mortality Event (UME) where numerous ringed seals were found to be sick with symptoms including hair loss and sores around the eyes, nose and flippers. Many of these seals were found on the beach and unafraid of people. More information about this can be found at the NOAA website <http://www.nmfs.noaa.gov/pr/health/mmume/>. No data on seal health was collected in 2016.

Discussion

Sea ice and weather

Changes in the total take from year to year are mostly due to sea ice and weather conditions. This variability increases the confidence interval around our estimate of the average annual take. Years in which the spring ice stays longer provides more opportunity to hunt seals, especially bearded and ringed seals. Once the ice moves offshore and recedes to the north ringed and bearded seals tend to move with it, decreasing their availability to hunters. When the sea ice breaks up quickly, the spring hunt is shortened, and if bad weather (e.g., wind, waves, fog, or snow) also occurs, hunters may have little opportunity to hunt. During fall, as freeze-up occurs there can be bigger storms and bad weather, but there is also more time to wait for better weather than in spring.

Comparing to past harvest surveys

A baseline harvest survey that included all subsistence harvested resources was conducted by ADFG, Division of Subsistence, in which they also collected information about ice seals during 1986 (Pete 1986). The data from this survey is presented as total number of seals taken and not broken into harvested and struck but lost. The number of people living in the community has changed since 1986 so we also present the harvest *per capita* to compare current harvest to past harvest (Table 8). Specifics about how the information was collected or how estimates were made were not included in the report. Therefore, we are not sure if we can compare the numbers directly. This illustrates the importance of including detailed methods (or standardizing methods) so that it is clear whether survey results can be compared.

Bounty Data

Prior to 1973, the State of Alaska implemented a bounty on seals in some areas of the state (Table 8). The bounty was implemented to reduce harbor seal numbers to protect commercial fish stocks from predation in the Gulf of Alaska and, although there was no commercial fishing farther north, the bounty was implemented on ice seals anyway and provided the first ice seal harvest data. Comparing the current levels of take to data collected during the bounty years could provide insights to the overall change in numbers of seals taken over the last 40 or 50 years. The information collected during the bounty was rarely reported by species and more often reported as the total number of seals turned in for bounty per year by community. Comparing bounty data to household survey data has some possible problems because the information was collected in different ways with different objectives (Nelson 2017) and the ~\$3 per seal bounty may have been enough of a monetary incentive to take more seals than normal. However, despite the differences we may be able to determine if changes in harvest numbers are due to changes in seal availability, subsistence needs, hunter effort, sea ice, weather, or something else.

Table 8. Number of people, survey method and quality rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the per capita total take (total take / number of people) for all years with available data in Tununak, Alaska. Numbers are from Burns et al. (1964), Burns (1972, 1973), Pete (1986), Nelson and Whitman (2013), and the U.S. Census Bureau.

Year	People	Method		Number of Seals				Total Take	Per capita Take
		Type	Rating	Bearded	Ringed	Spotted	Ribbon		
1962	260	bounty	good	-	-	-	-	200	0.77
1970	274	bounty	good	-	-	-	-	450	1.64
1971	274	bounty	good	-	-	-	-	400	1.46
1972	274	bounty	good	-	-	-	-	300	1.09
1986	328	household	good	60	196	78	27	361	1.10
2008	321	household	good	31	193	97	2	323	1.01
2009	321	household	good	21	232	47	0	300	0.93
2010	325	household	good	40	162	96	0	298	0.92
2011	342	household	good	42	257	100	0	399	1.17
2012	342	household	good	44	219	52	0	314	0.92
2016	315	household	good	19	117	26	0	162	0.51

Conclusion

Using all available information from bounty data (1962-1972), the 1986 survey, and our recent surveys (2008-2012 and 2016), the overall number of seals taken by Tununak hunters appears to have remained relatively unchanged for the last 50 years until 2016 (Table 8). In 2016, roughly half as many seals were harvested than the average of the past ten years (0.51 in 2016 versus average of 0.99 seals per person). Some hunters said they were working and had less time for hunting, gas prices were high, and ice conditions and weather made hunting difficult. We should continue to monitor the number of ice seals needed for subsistence to accurately document the needs of each community and to monitor when climate change and other factors may begin to affect the availability of ice seals for hunters.

References

- Burns, J. J., D. R. Klein, and L. Croxton. 1964. Marine mammal report. Alaska Department of Fish and Game. 28 pp.
- Burns, J. J. 1972. Marine mammal report. Alaska Department of Fish and Game. 28 pp.
- Burns, J. J. 1973. Marine mammal report. Alaska Department of Fish and Game. 29 pp.
- U.S. Census Bureau; 2012-2016 American community survey 5-year estimates. Using American FactFinder; <<http://factfinder.census.gov>>
- Nelson, M. A., and P. Whitman. 2013. Tununak ice seal harvest report 2008 to 2012 Summary. Report to Tununak and the Ice Seal Committee. 15 pp.
- Nelson, M. A. 2017. The subsistence harvest of ice seals in Alaska— A compilation of existing information, 1960-2016. Ice Seal Committee, Report to the Ice Seal Committee. 78 pp.
- Pete, M. C. 1986. Tununak 1986 baseline harvest profile. Using the Community Subsistence Information System. Alaska Department of Fish and Game, Division of Subsistence.