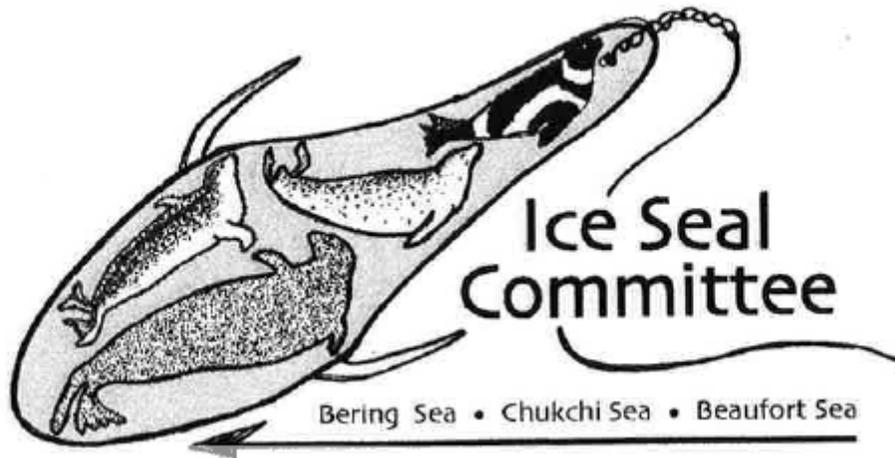


The Subsistence Harvest of Ice Seals in Alaska— a Compilation of Existing Information, 1960–2012

**Approved by the Ice Seal Committee
on 24 January 2014**



A Report of the Ice Seal Committee

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 past five years (2008-2012), only 6 of the 64 (9%) coastal communities 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.

Ice Seal Committee. 2014. The subsistence harvest of ice seals in Alaska – a compilation of existing information, 1960-2012. Pages 1-76.

Introduction

Bearded (*Erignathus barbatus*), ringed (*Pusa hispida*, also *Phoca 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, and using 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 by community shows how important seals are to communities and how many are needed. This information will become more important if climate change or other factors reduce the number of seals in a population or changes where they are found. In situations where no data is available more conservative decisions are often made to conserve the resource than would be necessary if good harvest data were available. Reliable estimates of the numbers of seals in each population do not exist because it is difficult to count them. Aerial surveys are the best tool but they are expensive and dangerous and although some seals are counted, the number in the water and not counted is unknown. 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.

The Ice Seal Committee (ISC), originally called the Ice Seal Working Group, was formed in December of 2004 and consisted of five delegates, one from each of the five regions where ice seals occur in Alaska (Fig. 1). The purpose of the Ice Seal Committee as stated in the bylaws is “to preserve and enhance the marine resources of ice seals including the habitat; to protect and enhance Alaska Native culture, traditions, and especially activities associated with subsistence uses of ice seals; to undertake education and research related to ice seals.” The ISC has identified the collection of harvest information as a priority. Collecting and reporting harvest information demonstrates concern for the resource and is an important contribution to management that federal managers have not been able to accomplish. This report serves to compile existing ice seal harvest information for the years 1960–2012 to determine where and how often harvest information is being collected and where efforts need to be focused in the future.

Background

Seal harvest data has never been collected on a regular basis, statewide. Most recent information comes from household surveys done intermittently, often when money is available due to development projects (e.g., mining or oil and gas). Interestingly, the most comprehensive harvest data was acquired for a different objective. From 1927 to 1972, hunters were paid a \$2–\$6 bounty to turn in noses of seals they harvested. The original purpose of the bounty was to encourage the harvest of seals in order to decrease predation on commercial fish species. As the bounty program was expanded north it became apparent that the bounty was more important for monitoring harvest than for fish depredations. Approximately 64 coastal communities harvest ice seals in western and northern Alaska, harvest monitoring statewide is a substantial project.

Urgency of collecting harvest information

With the listing of ringed and bearded seals as threatened under the ESA there is an urgent need to document recent harvest. Although subsistence harvest was not a factor in the reasons for listing (i.e., it was not thought to be causing declines in either population) it is the only mortality that is potentially under management control. Now that both species are considered “depleted” under the Marine Mammal Protection Act there will likely be pressure from outside of NMFS to reduce harvest as a conservation measure. The current level of harvest is thought to be at a sustainable level. Knowing what that harvest level is will be important for defending harvest levels in the future.

Concerns of subsistence users

Subsistence users have concerns about the collection of harvest information. Seal hunters fear that if they report the number of seals they catch each year federal managers will use it to establish regulations, such as a seasons and bag limits, and will require them to buy a license to hunt seals. Currently, marine mammals are the only animals that can be harvested without a license and there is no season or bag limit, however, marine mammals can only be harvested by Alaska Natives and only in a non-wasteful manner. This system fits best with subsistence hunting practices and needs because seal hunting is opportunistic, can occur at any time of year, and a seal hunter may provide seals for multiple families within the community making the concept of a bag limit difficult. Even though it is not the intention of NMFS to impose such limits, limits are something the subsistence users have experienced for many other subsistence resources they rely on.

Law enforcement actions over licenses, duck stamps, and hunting and fishing regulations, in rural communities have resulted in arrests that upset many people and created a situation that makes conducting surveys difficult. Alaska Natives fear that reporting their subsistence activities could get them in trouble and thus are reluctant to volunteer such information.

Limitations of the harvest survey data

Extrapolating harvest data across villages, regions, and years is not appropriate at this time. Many factors influence seal harvest and there is high variability within communities, between communities, and within regions. For example, during the past five years (2008-2012), only 6 of the 64 (9%) coastal communities have been surveyed in two consecutive years or more. Each community is different and hunting methods, seasons, and success depends on when seals are available in their area and the local weather conditions. The time of year hunters are able to access seals also changes each year for each community. Because of these factors and the related variability it may not be appropriate to extrapolate data from surveyed communities to unsurveyed ones until more information has been collected to better understand the variability. The goal of the ISC is to collect ice seal harvest information as consistently in as many of the 64 communities as possible so that a statewide harvest estimate by species can be made annually.

Methods

Household Survey

Currently, the most used 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 refer 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, months of harvest, struck and loss, and age, the more information the more useful the data is. Harvest information is collected in five regions. 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.

The information reported on a household survey must be analyzed in a manner that allows for expansion to the entire community. Therefore some terminology must be understood to clarify what the number presented truly means. The information recorded on the survey forms is the reported harvest or reported 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 cover 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 or 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 a certain species of seal used for subsistence during a particular year is the estimated harvest plus the estimated struck but lost and is called the “take”. When the number of seals taken is presented in this report, this 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 85% of the houses in Hooper Bay, %S=.85, and they reported harvesting 546 ringed seals (R) then the estimated number harvested would be:

$$e = \frac{R}{\%S} = \frac{546}{.85} = 643 \text{ ringed seals.}$$

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. A 95% confidence interval is an estimate on how confident we are with the estimation. This means that as the survey is repeated 95% of the time the confidence interval will contain the true number of seals taken. The more surveys that are conducted will make the estimate more precise. This is calculated by using the formula:

$$CI (\pm) = \frac{t_{a/2} \times S_e}{n} \times FPC$$

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

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

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

$$FPC = \sqrt{\frac{N-n}{N-1}}$$

where “N” is the number of households in the community pooled over the five years and “n” is the number of pooled households surveyed during the five years. The FPC is a way to account for the number of households that were surveyed where the more you survey the lower your confidence interval is meaning the better your estimate is. If the survey contacted every household in the community the FPC would go to zero and the confidence interval would go to zero meaning that you are 100% positive the number is correct because you are not estimating for households not surveyed.

The number of seals percapita show how many seals were taken per person living in the community during that year. This is calculated by dividing the number of seals by the number of people living in the community. For example, the number of bearded seals taken per capita during 2008 is: 194 (bearded seals taken)/1101 (number of people living in Hooper Bay during 2008) = .176. This shows that Hooper Bay took .176 bearded seals for every person living in Hooper Bay during 2008, or Hooper Bay took 1 seal for about every 6 people living in the community.

Bounty Records

Bounty records are available from 1927 to 1972. The bounty started in south central Alaska as a way to minimize harbor seal impacts on commercial salmon fisheries in the Stikine, Taku, and Copper rivers (Brooks 1958). Harbor seals were defined as “hair” seals and gradually the bounty was extended further north because ice seals are also included in the general category of “hair” seals. In 1962, the bounty was extended to all “hair” seals north of the Arctic Circle (Burns *et al.* 1964). In most areas it took a couple of years for the bounty system to become recognized by hunters, but by 1968 most communities were participating (Burns 1968). The bounty ended in 1972 with the passage of the Marine Mammal Protection Act (MMPA).

Ratings

In order to evaluate the information, we developed a rating system. Take information for each year and community is assigned a rating for general comparison. For example, the bounty estimates are rated good and poor, based on the reports from the years in which they were collected. Poor ratings occurred during years when the people in the communities did not know the bounty was available, thought it had ended, chose not to participate, or if the bounty was collected for only part of the year. Bounty data with a poor rating should be viewed as lower than a minimum estimate of take for that year. A “good” rating occurred when the majority of the community participated in the take or where take was estimated based on bounty records, local observer estimates, and hunters in the community.

Household surveys are broken into three categories; poor, good, and census. A “poor” household survey is one where the survey sampled a small percentage of the households in the community or where the survey only covered a partial year. A “good” survey sampled more than 30% of the households in the community and properly estimated the results for the whole community. A “good” rating also reported results for an entire 12 month period. A “census” rating is where a survey sampled every single household in the community and recorded every seal caught during the 12 month period. A census is the most accurate count of the seals taken because every household is surveyed and every seal taken is accounted for.

Bounty Poor-	B
Bounty Good-	B*
Household poor-	HH
Household good-	HH*
Census-	C

Take by Region

Ice seal take information for over 60 communities in Alaska (Fig. 1.) is presented. The communities are broken into the five regions that represent them on the Ice Seal Committee. There are many more communities in Alaska that benefit from ice seal takes through trading, sharing, and traveling to the coast for hunting, but these are most of the main seal hunting communities.

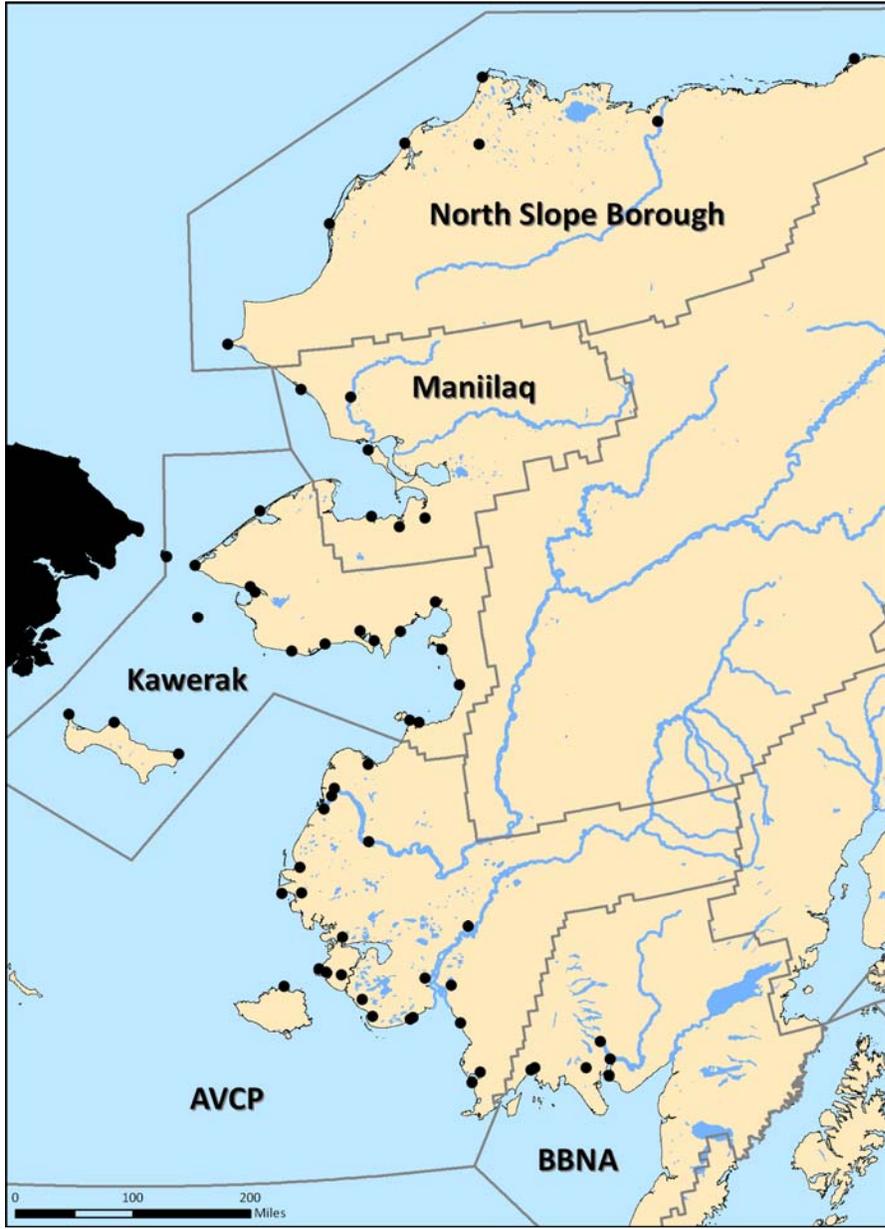


Figure 1. Alaska regions and communities that harvest ice seals.

North Slope: The North Slope region represented by the North Slope Borough includes northwestern and northern Alaska from Point Hope to the Canadian border. There are six communities in this region that harvest ice seals (Fig. 2). Bearded seals are the preferred species for food and umiak coverings. Ringed seals are also common for food and blubber that is usually rendered into seal oil.

The North Slope Borough, Department of Wildlife Management (DWM) has collected subsistence take information each year (1994-present) on all animals that are taken for subsistence use (e.g., marine mammals, moose, caribou, fish, and birds) by conducting household surveys. The surveys are conducted by local surveyors hired by the DWM. The local surveyor records the data from each household in a manner that keeps the households identity confidential. The results are reported as community totals. Although the North Slope Borough has been successful in collecting ice seal take information from each community between 1994 and 2010, only limited information is currently available due to budget and staffing constraints.

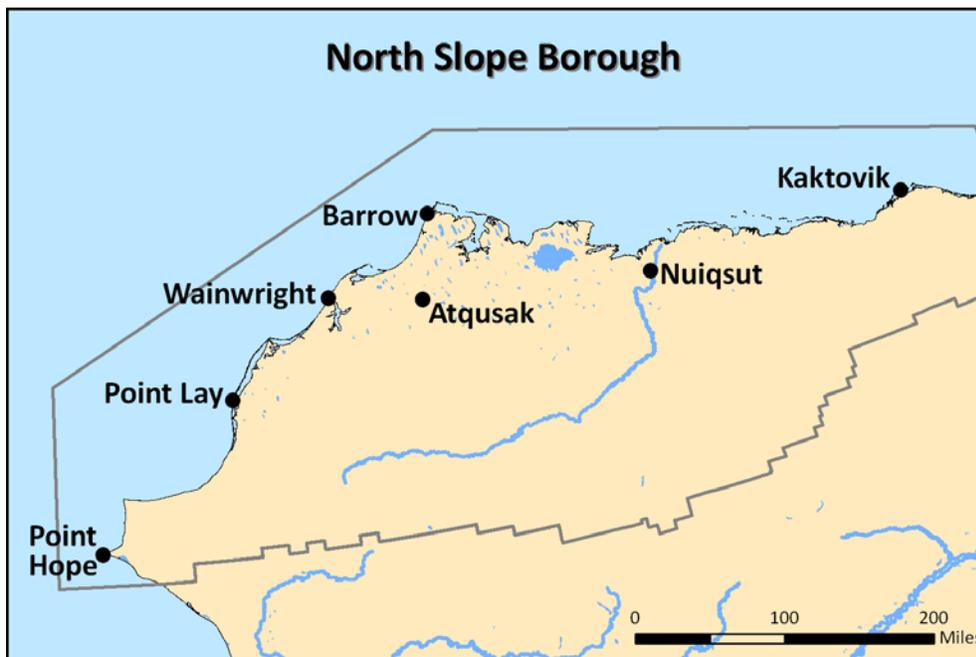


Figure 2. North Slope Borough communities that regularly harvest ice seals.

Kaktovik –Four bounty estimates and five household survey estimates are available, the most recent is from 2003. Primarily a whaling community, Kaktovik also has access to land mammals, but they take seals when available. Take data has been collected since 2003 by DWM, but only the information shown in Figure 3 and Table 1 is available.

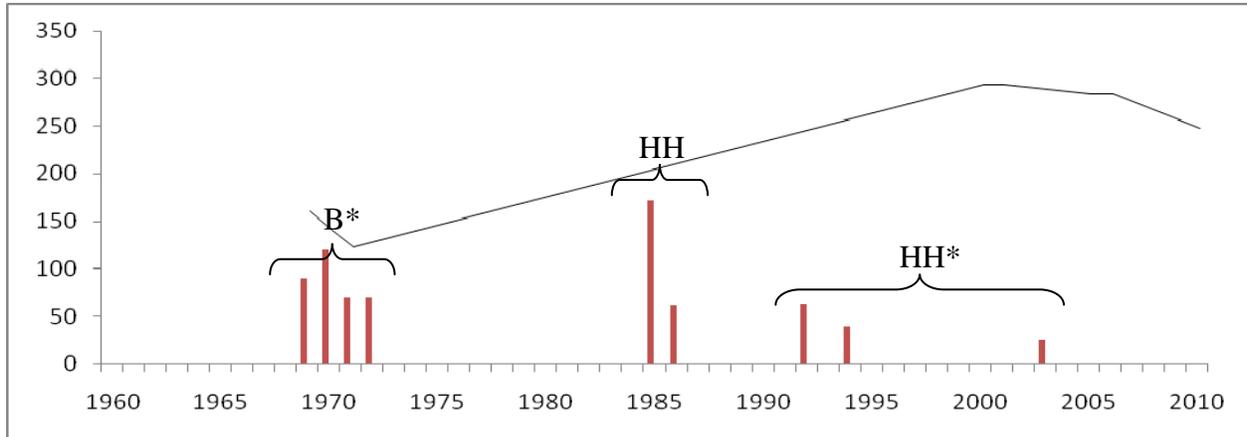


Figure 3. Estimated seal take (red bars) and human population (black line) for Kaktovik, Alaska. Numbers are from Burns (1970, 1971, 1972, 1973), Pedersen (1986), Fuller (1997), Bacon (2009), and Commerce (2013).

Table 1. Number of people, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Kaktovik, Alaska. Numbers are from Burns (1970, 1971, 1972, 1973), Pedersen (1986), Fuller (1997), Bacon (2009), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1969	160	bounty	good					90	0.56
1970	123	bounty	good					120	0.98
1971	123	bounty	good					70	0.57
1972	123	bounty	good					70	0.57
1985	188	household	poor	21	151	0	0	172	0.91
1986	194	household	poor	17	44	1	0	62	0.32
1992	246	household	good	17	39	7	0	63	0.26
1994	240	household	good	21	16	3	0	40	0.17
2003	280	household	good	8	17	0	0	25	0.09

Nuiqsut – No bounty records are available, but six household surveys estimates are, the most recent is from 2000. Located 35 miles inland, seal hunting in Nuiqsut is likely more opportunistic and more dependent on ice and weather conditions than other communities along the coast. Residents of Nuiqsut moved from Barrow in 1974-75 when the community was incorporated, previously it had been a seasonal hunting location. Take data has been collected since 2003 by DWM, but only the information shown in Figure 4 and Table 2 is available.

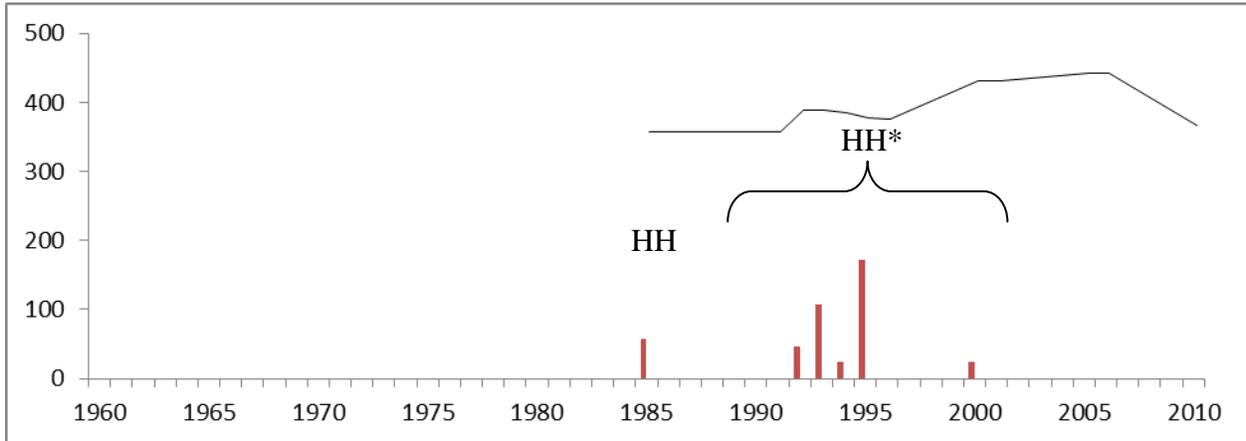


Figure 4. Estimated seal take (red bars) and human population (black line) for Nuiqsut, Alaska. Numbers are from Fuller (1997), Bacon (2009), and Commerce (2013).

Table 2. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Nuiqsut, Alaska. Numbers are from Fuller (1997), Bacon (2009), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1985	358	household	poor	15	40	2	0	57	0.16
1992	388	household	good	16	24	6	0	46	0.12
1993	390	household	good	6	98	4	0	108	0.28
1994	380	household	good	0	24	0	0	24	0.06
1995	376	household	good	17	155	0	0	172	0.46
2000	431	household	good	0	25	0	0	25	0.06

Barrow – Nine bounty estimates and nine household survey estimates are available, the most recent is from 2003. Estimating take information in Barrow is more difficult because it is the regional hub for the North Slope Borough and it is harder to identify and contact subsistence seal hunters. The 1962 bounty is labeled as “Good”, because it includes an estimate based on the number of bounties plus what else was thought to have been taken outside of the bounty. The actual take though was probably much higher than indicated based on the report. Take data has been collected since 2003 by DWM, but only the information shown in Figure 5 and Table 3 is currently available.

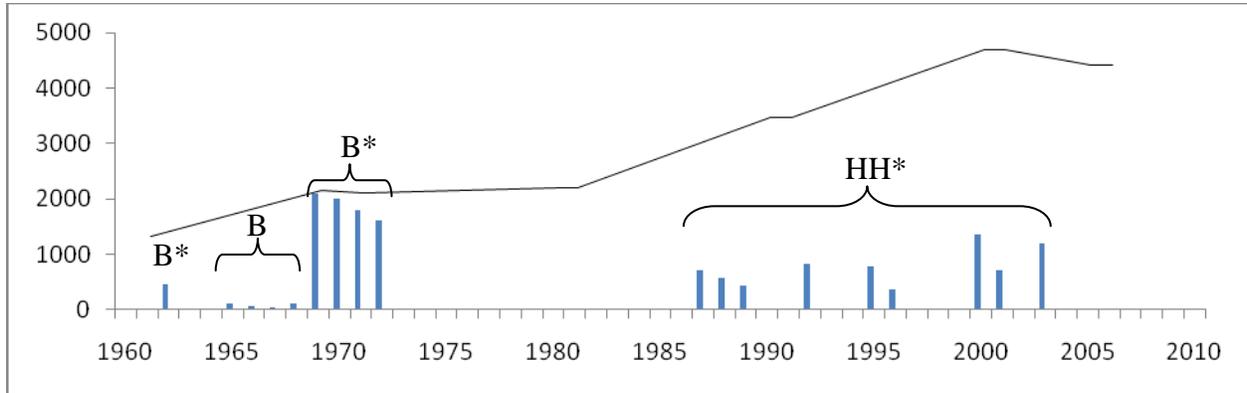


Figure 5. Estimated seal take (blue bars) and human population (black line) for Barrow, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Braund (1993a), Fuller (1997), Bacon (2009), and Commerce (2013).

Barrow continued.

Table 3. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Barrow, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Braund (1993a), Fuller (1997), Bacon (2009), and Commerce (2013).

year	AK Native Population	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	1215	bounty	good					450	0.37
1965	1215	bounty	poor	40	54	20	0	114	0.09
1966	1215	bounty	poor					63	0.05
1967	1215	bounty	poor					31	0.03
1968	1215	bounty	poor					102	0.08
1969	1215	bounty	good					2100	1.73
1970	1830	bounty	good					2000	1.09
1971	1830	bounty	good					1800	0.98
1972	1830	bounty	good					1600	0.87
1987	2117	household	good	236	466	2	0	704	0.33
1988	2117	household	good	179	388	4	0	571	0.27
1989	2117	household	good	109	328	4	0	441	0.21
1992	2117	household	good	463	300	65	0	828	0.39
1995	2117	household	good	431	345	0	0	776	0.37
1996	2117	household	good	192	180	0	0	372	0.18
2000	2620	household	good	729	586	32	0	1347	0.51
2001	2620	household	good	327	387	7	0	721	0.28
2003	2620	household	good	776	413	12	0	1201	0.46

Atqasuk – No bounty records and only two household survey estimates are available from 1994 and 1998. Located about 60 miles inland, Atqasuk hunters occasionally travel to Barrow to take seals. Even though only a few seals were reported caught by Atqasuk hunters, sharing and bartering with other coastal communities is likely an important part of community subsistence needs. Atqasuk took 12 seals in 1994, 6 ringed and 6 bearded. Three bearded seals were taken in 1998 in June (Bacon 2009).

Wainwright - Nine bounty estimates and four household survey estimates are available, the most recent is from 2003. Located 70 miles southwest of Barrow, Wainwright subsistence revolves around whaling and caribou hunting. When whales and caribou are not available seal hunting occurs. Wainwright was established in 1904 when a school was built there and incorporated in 1962. Take data has been collected since 2003 by DWM, but only the information shown in Figure 6 and Table 4 is currently available.

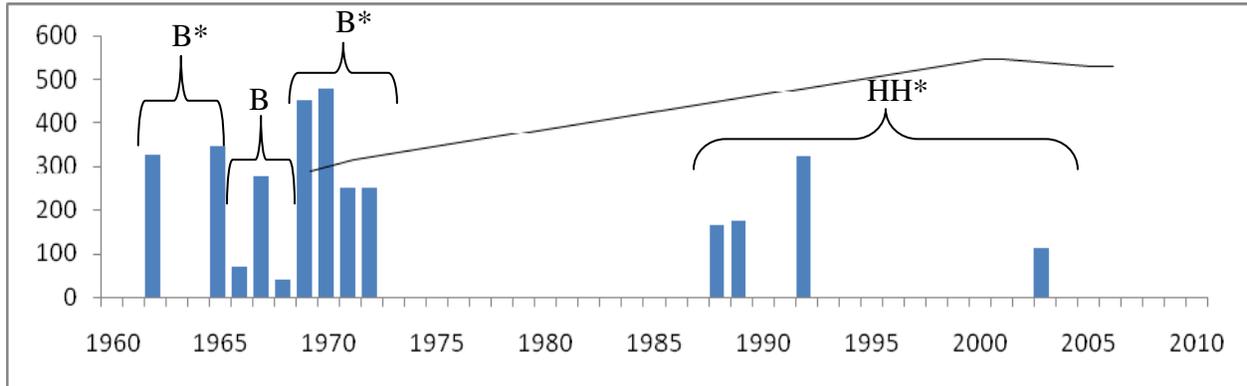


Figure 6. Estimated seals take (blue bars) and human population (black line) for Wainwright, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Braund (1993b), Fuller (1997), Bacon (2009), and Commerce (2013).

Table 4. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Wainwright, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Braund (1993b), Fuller (1997), Bacon (2009), and Commerce (2013).

year	People	method		Number of Seals					Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon	Total Take	
1962	290	bounty	good					328	1.13
1965	290	bounty	good	100	205	40	0	345	1.19
1966	290	bounty	poor					69	0.24
1967	290	bounty	poor					277	0.96
1968	290	bounty	poor					40	0.14
1969	290	bounty	good					450	1.55
1970	315	bounty	good					480	1.52
1971	315	bounty	good					250	0.79
1972	315	bounty	good					250	0.79
1988	497	household	good	97	63	5	0	165	0.33
1989	497	household	good	74	86	12	0	172	0.35
1992	536	household	good	159	153	10	0	322	0.60
2003	522	household	good	79	27	3	0	114	0.22

Point Lay – One bounty estimate and three household survey estimates are available, the most recent is from 2003. Pt. Lay is located 150 miles southwest of Barrow protected from the ocean by the Kasugaluk Lagoon. The community does not usually participate in bowhead whaling, but has a similar hunt and culture associated with beluga whale hunting. In 1929-30 several families moved from Pt. Hope to Point Lay and joined a few other families starting the community. The village site has moved three or four times between the late 60’s and late 70’s finally settling at their current location. During the later bounty years this community was likely not participating in hunting near Pt Lay. Take data has been collected since 2003 by DWM, but only the information shown in Figure 7 and Table 5 is currently available.

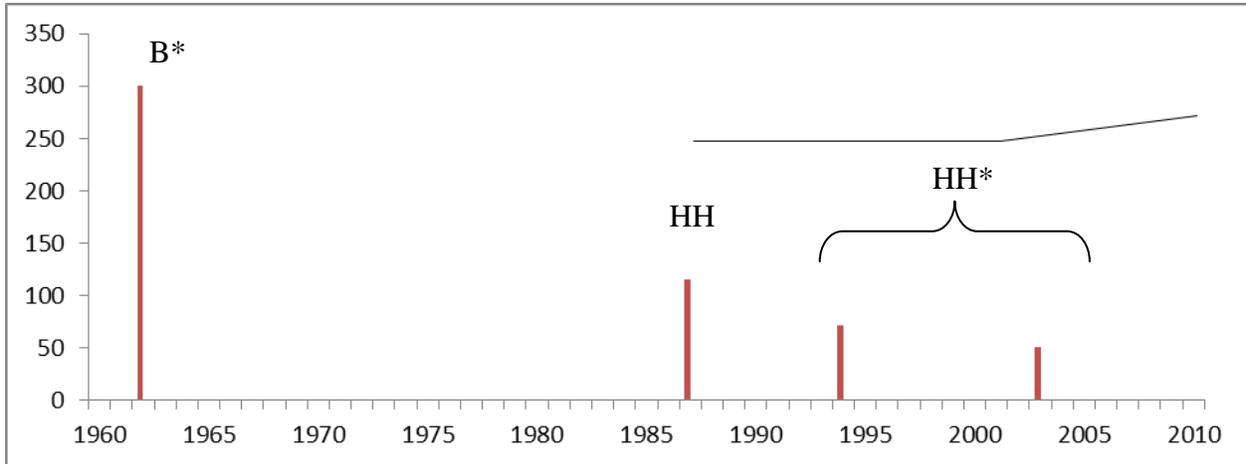


Figure 7. Estimated seal take (red bars) and human population (black line) for Pt. Lay, Alaska. Numbers are from Burns (1964), Fuller (1987), and Bacon (2009), and Commerce (2013).

Table 5. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Point Lay, Alaska. Numbers are from Burns (1964), Fuller (1987), and Bacon (2009), and Commerce (2013).

year	People	method		Number of Seals					Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon			
1962	?	bounty	good					300		
1987	247	household	poor	13	49	53	0	115	0.47	
1994	247	household	good	32	17	23	0	72	0.29	
2003	247	household	good	32	17	2	0	51	0.21	

Point Hope- Nine bounty estimates, one census estimate, and four household survey estimates are available, the most recent is from 2000. Point Hope was the center of the first environmental impact study required because of a federal project to use atomic energy to excavate a harbor near Cape Thompson (Wilmovsky 1966, O'Neill 1994). This work resulted in a census survey in 1961 which is the only time a full census survey has been collected in any community in Alaska. A census survey means that the researchers believe they counted every seal that was taken that year so no estimate was needed. Harvest data has been collected since 2003 by DWM, but only the information shown in Figure 8 and Table 6 is currently available.

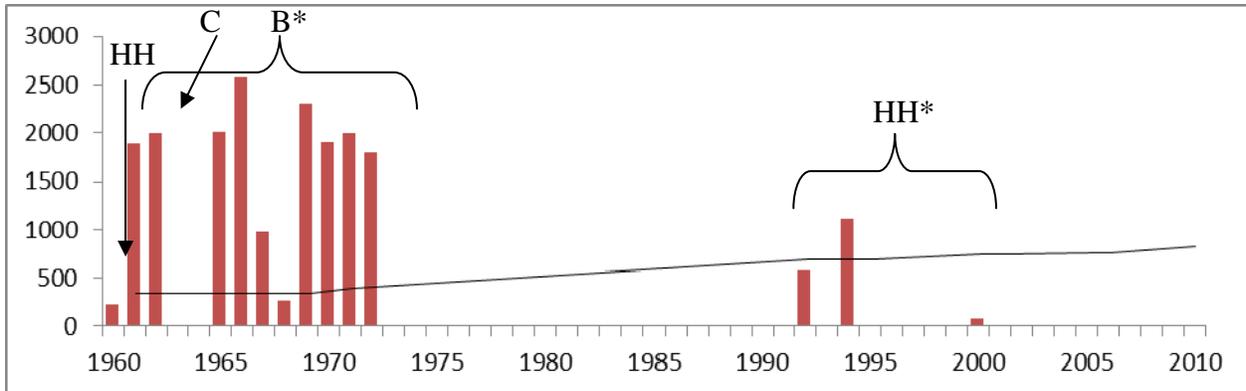


Figure 8. Reported and estimated seals taken (red bars) and human population (black line) for Pt. Hope, Alaska. Numbers are from Johnson (1966), Burns(1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Fuller (1997), Bacon (2009), and Commerce (2013).

Table 6. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Point Hope, Alaska. Numbers are from Johnson (1966), Burns(1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Fuller (1997), Bacon (2009), and Commerce (2013).

year	People	method		Number of Seals					Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon			
1960	337	household	poor	28	210	1	0	239	0.71	
1961	337	census	good	177	1708	2	4	1892	5.61	
1962	337	bounty	good					2000	5.93	
1965	337	bounty	good	250	1616	150	0	2016	5.98	
1966	337	bounty	good					2571	7.63	
1967	337	bounty	good					980	2.91	
1968	337	bounty	good					264	0.78	
1969	337	bounty	good					2300	6.82	
1970	386	bounty	good					1900	4.92	
1971	386	bounty	good					2000	5.18	
1972	386	bounty	good					1800	4.66	
1992	697	household	good	160	365	50	0	575	0.82	
1994	689	household	good	21	1100	0	0	1121	1.63	
2000	755	household	good	57	28	0	0	85	0.11	

Northwest Arctic: The Northwest Arctic Region is represented by Maniilaq, which is the nonprofit arm of the NANA Corporation within the Northwest Arctic Borough, Maniilaq supports natural resource and subsistence programs and coordinates representation on the Ice Seal Committee. Three coastal and three inland communities regularly hunt seals in this region (Fig. 9).



Figure 9. Northwest Arctic communities that regularly take ice seals.

Kivalina – Ten bounty estimates and seven household survey estimates are available, the most recent is from 2007. Kivalina has a strong bowhead whaling history, however they have taken few bowheads recently and may be relying more on seals now.

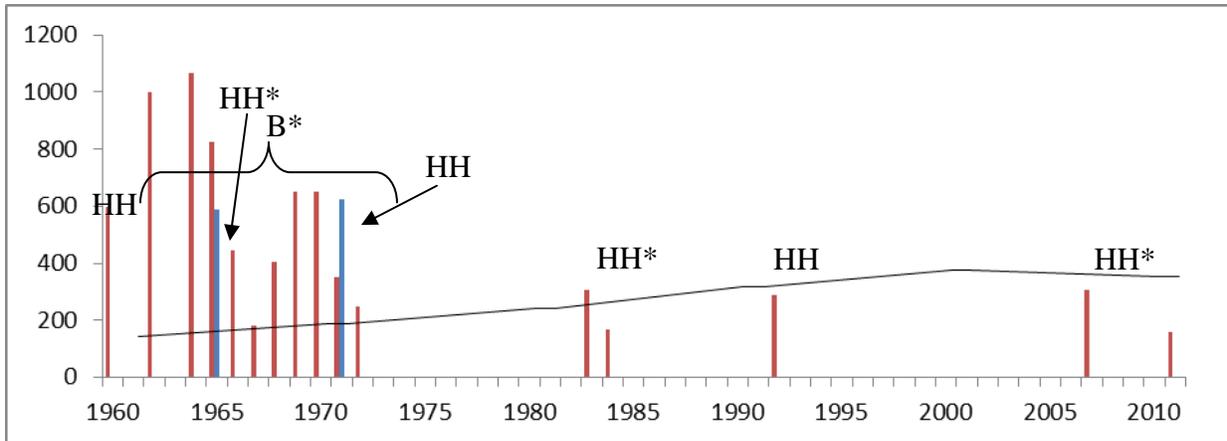


Figure 10. Estimated seal take (bars) and human population (line) from Kivalina, Alaska. Two estimates per year (one from the bounty and one from household surveys) were available for 1965 and 1971. The household survey estimates are presented as blue bars. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Saario (1966), Burch (1985), Community Subsistence take Information System (CSIS) (1992), Shiedt (2012), and Commerce (2013).

Kivalina continued.

Table 7. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Kivalina, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Saario (1966), Burch (1985), Community Subsistence take Information System (CSIS) (1992), Shiedt (2012), and Commerce (2013).

year	People	method		Number of Seals					Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon	Total Take	
1960	142	household	poor	117	478	0	0	595	4.19
1962	142	bounty	good					1000	7.04
1964	188	bounty	good	153	908	4	0	1065	5.66
1965	188	bounty	good	100	652	75	0	827	4.40
1965	188	household	good	119	467	1	0	587	3.12
1966	188	bounty	good					445	2.37
1967	188	bounty	good					182	0.97
1968	188	bounty	good					407	2.16
1969	188	bounty	good					650	3.46
1970	188	bounty	good					650	3.46
1971	188	household	poor	125	500	1	0	626	3.33
1971	188	bounty	good					350	1.86
1972	188	bounty	good					250	1.33
1983	241	household	good	134	172	1	1	308	1.28
1984	241	household	good	60	109	1	0	170	0.71
1992	317	household	poor	139	110	30	8	287	0.91
2007	352	household	good	229	71	4	2	306	0.87
2011	352	household	good	123	16	21	0	160	0.45

Noatak – Six bounty estimates and two household survey estimates are available, the most recent is from 2007. Noatak is located on the Notatak River about 55 air miles north of Kotzebue. Seal hunters must travel downriver usually during spring to hunt seals in Kotzebue Sound.

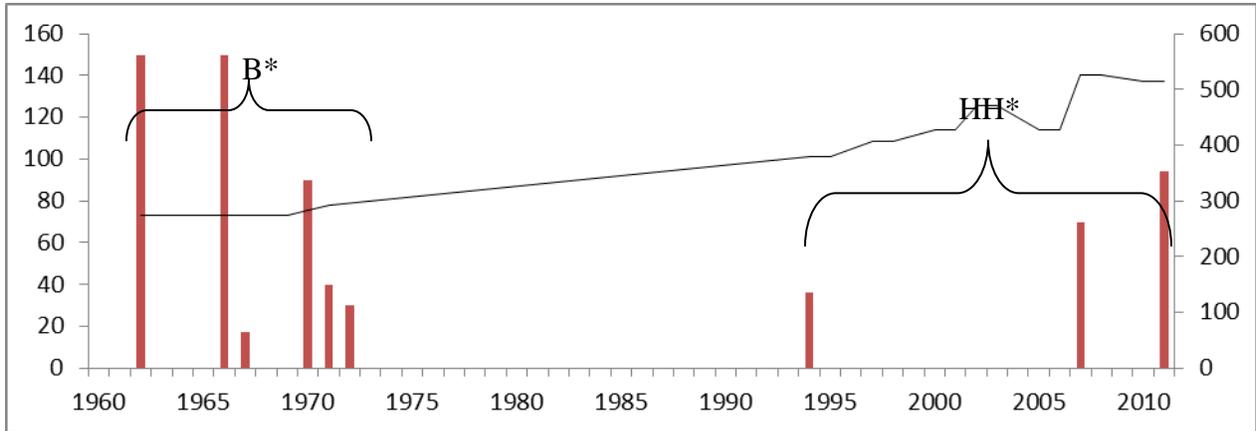


Figure 11. Estimated seal take (red bars) and human population (black line) for Noatak, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Magdanz (1995b, 2010), Shiedt (2012), and Commerce (2013).

Table 8. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Noatak, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Magdanz (1995b, 2010), Shiedt (2012), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	275	bounty	good					150	0.55
1966	275	bounty	good					150	0.55
1967	275	bounty	good					17	0.06
1968	275	bounty	good					0	0.00
1970	293	bounty	good					90	0.31
1971	293	bounty	good					40	0.14
1972	293	bounty	good					30	0.10
1994	380	household	good	36	0	0	0	36	0.09
2007	526	household	good	60	6	4	0	70	0.13
2011	514	household	good	65	3	25	1	94	0.18

Kotzebue – Seven bounty estimates and five household survey estimates are available, the most recent was a series of three household surveys collected between 2002 and 2004. The variation between these three years is notable. As the regional hub, estimating take information for Kotzebue is more difficult because it is harder to identify and contact subsistence seal hunters due to the larger population of people and the higher percentage of non-Natives living there.

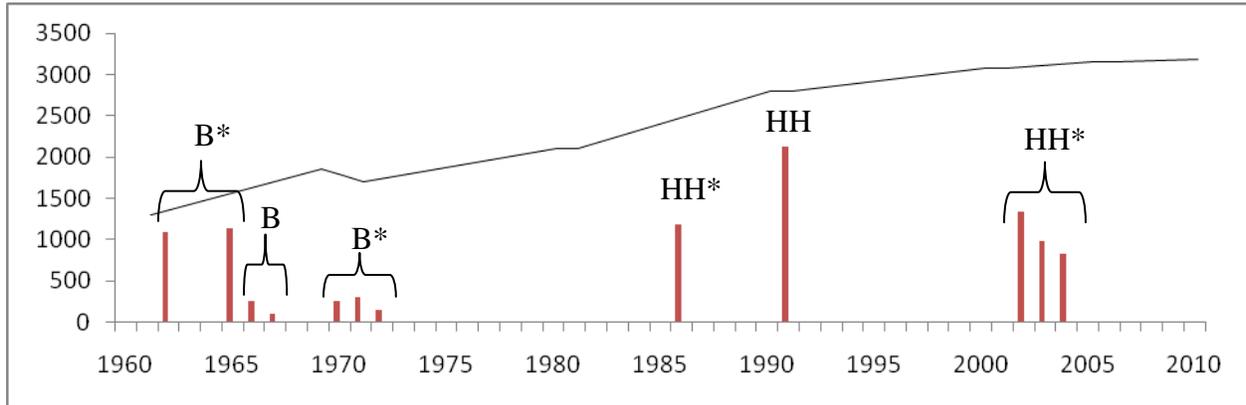


Figure 12. Estimated seal take (red bars) and human population (black line) for Kotzebue, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), CSIS (1992), Georgette (1993), Whiting (2006), and Commerce (2013).

Table 9. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Kotzebue, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), CSIS (1992), Georgette (1993), Whiting (2006), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	1300	bounty	good					1085	0.83
1965	1855	bounty	good	100	731	300	0	1131	0.61
1966	1855	bounty	poor					255	0.14
1967	1855	bounty	poor					105	0.06
1968	1855	bounty	poor					0	0.00
1970	1696	bounty	good					250	0.15
1971	1696	bounty	good					300	0.18
1972	1696	bounty	good					150	0.09
1986	2100	household	good	537	440	201	0	1178	0.56
1991	2800	household	good	963	914	251	0	2128	0.76
2002	3156	household	poor	533	265	532	1	1331	0.42
2003	3156	household	good	508	121	351	3	983	0.31
2004	3156	household	good	486	67	267	2	822	0.26

Buckland – Four bounty estimates are available, and only one harvest estimate is available since 1972. Buckland is somewhat inland and manages a reindeer herd, but likely relies on seals for part of the year.

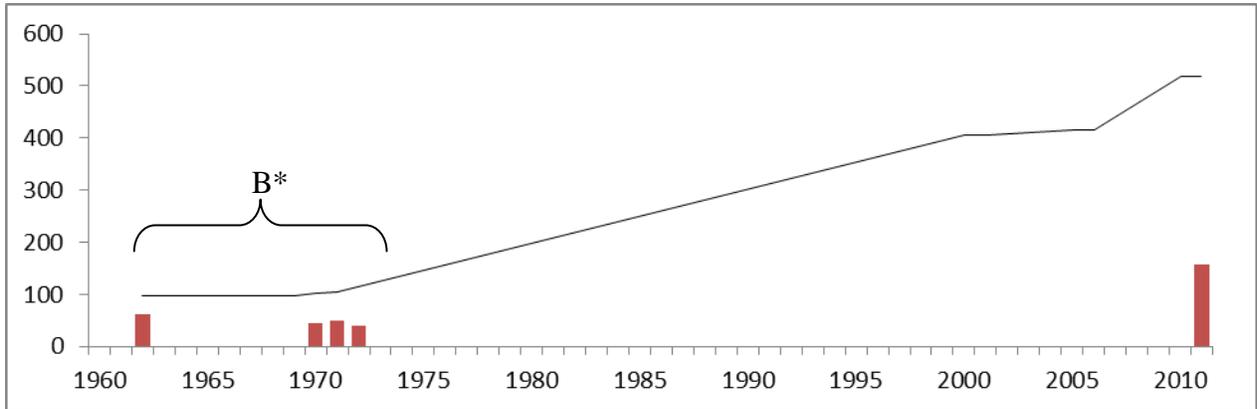


Figure 13. Estimated seal take (bars) and human population (line) from Buckland, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973), Shiedt (2012), and Commerce (2013).

Table 10. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Buckland, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973), Shiedt (2012), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	98	bounty	good					61	0.62
1970	104	bounty	good					45	0.43
1971	104	bounty	good					50	0.48
1972	104	bounty	good					40	0.38
2011	519	household	good	47	26	84	0	157	0.30

Candle –Bounty records are only available for 1968 when 28 seals were bountied. No current seal take information is available.

Deering – Seven bounty estimates and two household surveys (1994 and 2011) are available for Deering.

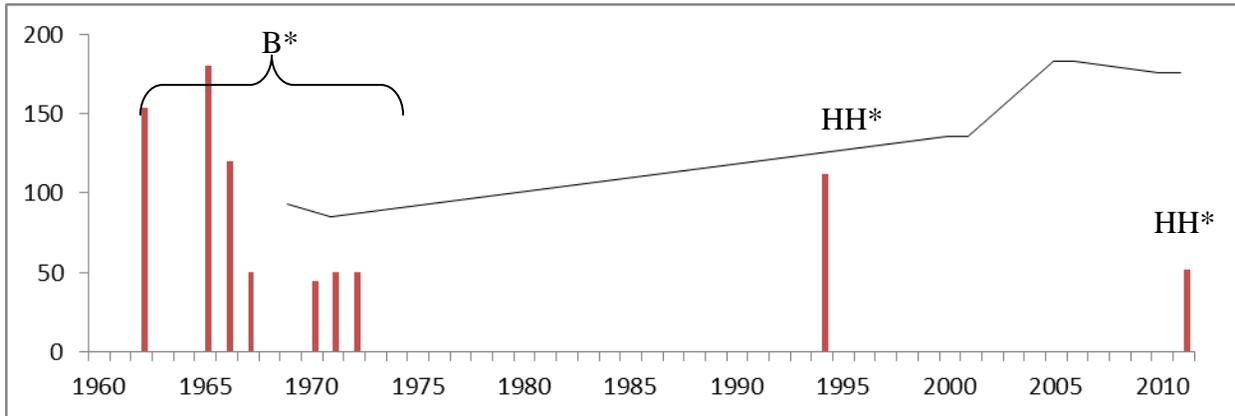


Figure 14. Estimated seal take (red bars) and human population (black line) for Deering, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1969, 1970, 1972, 1973), Magdanz (1995a), Shiedt (2012), and Commerce (2013).

Table 11. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Deering, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1969, 1970, 1972, 1973), Magdanz (1995a), Shiedt (2012), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	93	bounty	good					154	1.66
1965	93	bounty	good	40	100	40	0	180	1.94
1966	93	bounty	good					120	1.29
1967	93	bounty	good					50	0.54
1970	85	bounty	good					45	0.53
1971	85	bounty	good					50	0.59
1972	85	bounty	good					50	0.59
1994	136	household	good	75	8	29	0	112	0.82
2011	176	household	good	49	0	3	0	52	0.30

Bering Strait: Kawerak is the nonprofit arm of the Bering Straits Native Corporation, and they manage natural resource and subsistence issues for the region. At least 17 communities hunt seals in this region, including three communities that live on islands in the Bering Sea (Fig. 15).



Figure 15. Bering Strait communities that regularly take ice seals.

Shishmaref – Eight bounty estimates and four household survey estimates are available, the most recent is from 2005. Located on a barrier island just north of the Bering Strait, Shishmaref has historically taken many seals for subsistence.

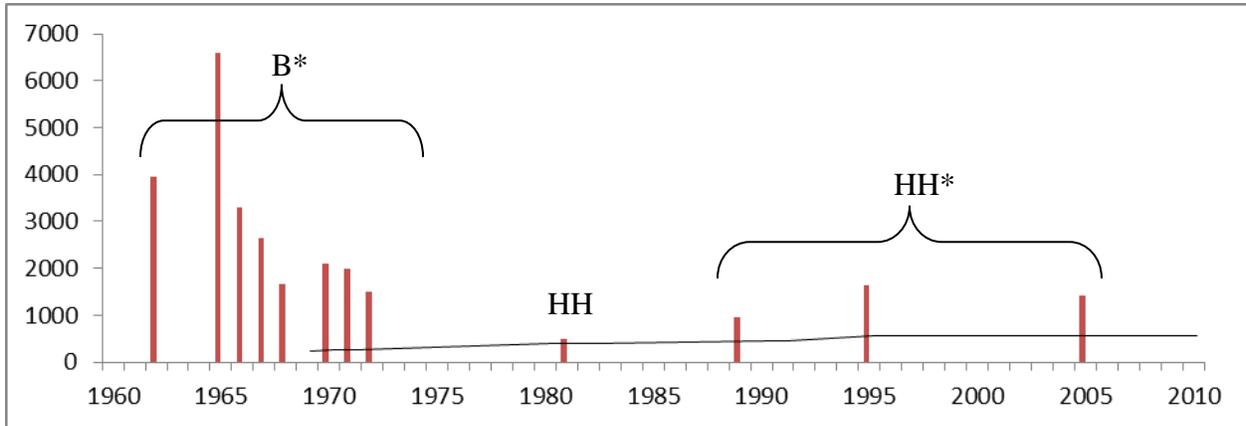


Figure 16. Estimated seal take (red bars) and human population (black line) for Shishmaref, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990, 1995b), Ahmasuk (2007), and Commerce (2013).

Table 12. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Shishmaref, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990, 1995b), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	240	bounty	good					3956	16.48
1965	240	bounty	good	1000	4404	1200		6604	27.52
1966	240	bounty	good					3291	13.71
1967	240	bounty	good					2651	11.05
1968	240	bounty	good					1658	6.91
1970	267	bounty	good					2100	7.87
1971	267	bounty	good					2000	7.49
1972	267	bounty	good					1500	5.62
1981	393	household	poor	131	230	136	0	497	1.26
1989	456	household	good	191	360	360	39	950	2.08
1995	572	household	good	588	520	513	19	1640	2.87
2005	571	household	good	591	518	292	14	1415	2.48

Little Diomedede – Eight bounty estimates and two household survey estimates are available. Little Diomedede relies almost exclusively on marine mammals and seabirds. Seals are likely extremely important, however, current take data is not available.

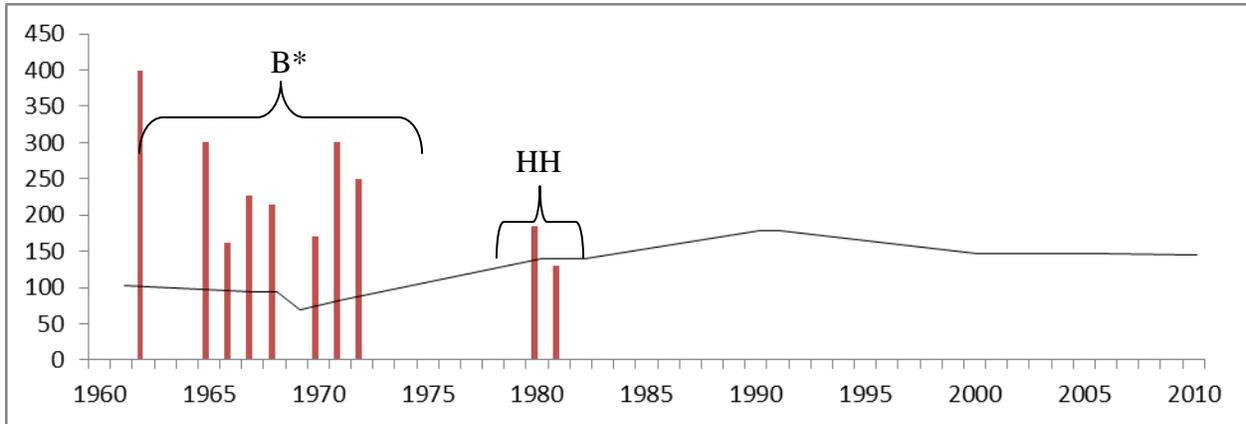


Figure 17. Estimated seal take (red bars) and human population (black line) for Little Diomedede, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (1980), Sherrod (1982), and Commerce (2013).

Table 13. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Little Diomedede, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (1980), Sherrod (1982), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	103	bounty	good					400	3.88
1965	94	bounty	good	70	130	100	0	300	3.19
1966	94	bounty	good					161	1.71
1967	94	bounty	good					227	2.41
1968	94	bounty	good					214	2.28
1970	84	bounty	good					170	2.02
1971	84	bounty	good					300	3.57
1972	84	bounty	good					250	2.98
1980	139	household	poor					185	1.33
1981	139	household	poor	48	65	17	0	130	0.94

Wales – Eight bounty estimates and four household survey estimates are available, the most recent is from 2005. Wales is located on the Cape of Wales of the Seward Peninsula which is a prime spot for hunting marine mammals.

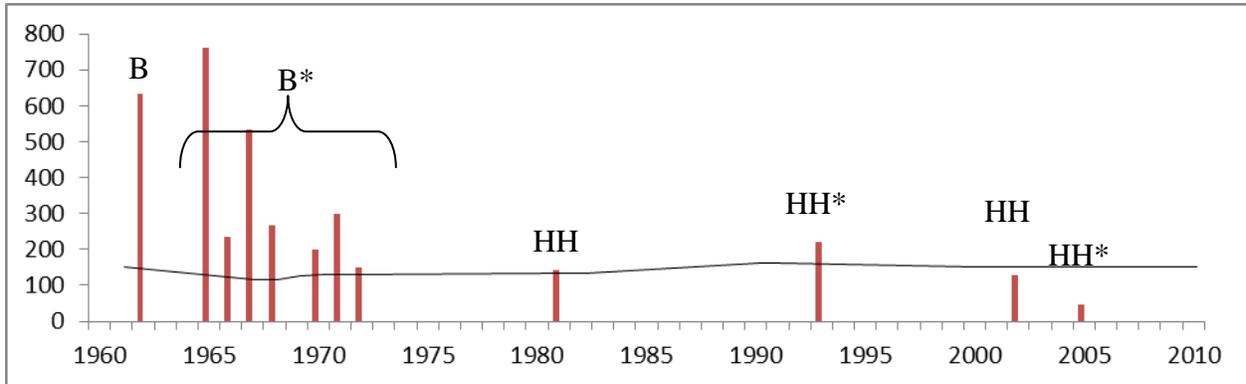


Figure 18. Estimated seal take (red bars) and human population (black line) for Wales, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1995b), Ahmasuk (2007), Kawerak (unpublished), and Commerce (2013).

Table 14. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Wales, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1995b), Ahmasuk (2007), Kawerak (unpublished), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	115	bounty	poor					632	5.50
1965	115	bounty	good	75	636	50	0	761	6.62
1966	115	bounty	good					234	2.03
1967	115	bounty	good					534	4.64
1968	115	bounty	good					266	2.31
1970	131	bounty	good					200	1.53
1971	131	bounty	good					300	2.29
1972	131	bounty	good					150	1.15
1981	132	household	poor	33	69	39	0	141	1.07
1993	161	household	good	106	77	39	0	222	1.38
2002	152	household	poor	50	39	21	18	128	0.84
2005	152	household	good	42	3	1	0	46	0.30

Brevig Mission - There are seven bounty estimates and six household survey estimates available, the most recent is from 2005. Brevig Mission was historically a reindeer herding community, but also relies on seals for subsistence.

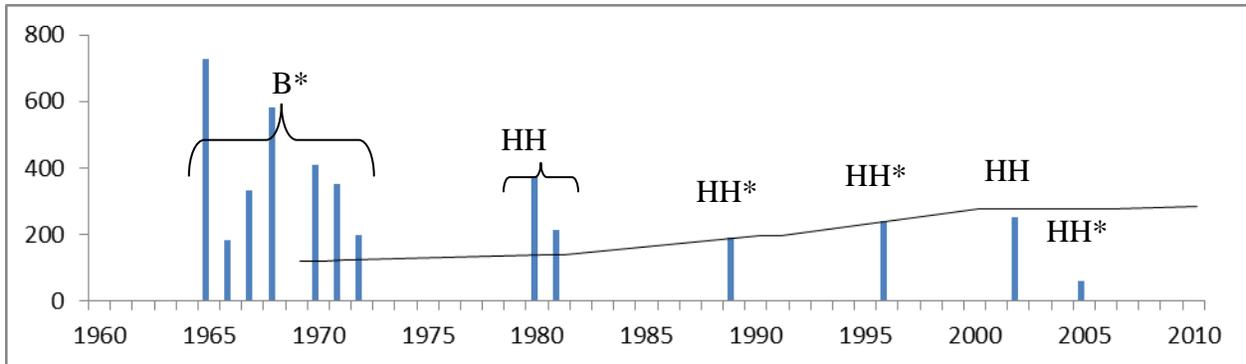


Figure 19. Estimated seal take (blue bars) and human population (black line) for Brevig Mission, Alaska. Numbers are from Burns (1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990), Georgette (1998), Ahmasuk (2007), Kawerak (unpublished), and Commerce (2013).

Table 15. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Brevig Mission, Alaska. Numbers are from Burns (1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990), Georgette (1998), Ahmasuk (2007), Kawerak (unpublished), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1965	120	bounty	good	70	559	100	0	729	6.08
1966	120	bounty	good					183	1.53
1967	120	bounty	good					332	2.77
1968	120	bounty	good					581	4.84
1970	123	bounty	good					410	3.33
1971	123	bounty	good					350	2.85
1972	123	bounty	good					200	1.63
1980	138	household	poor					373	2.70
1981	138	household	poor	15	121	77	1	214	1.55
1989	198	household	good	26	100	63	0	189	0.95
1996	276	household	good	52	89	85	14	240	0.87
2002	276	household	poor	81	67	102	1	251	0.91
2005	276	household	good	9	11	40	1	61	0.22

Teller - Eight bounty estimates and two household survey estimates are available, the most recent is from 2005.

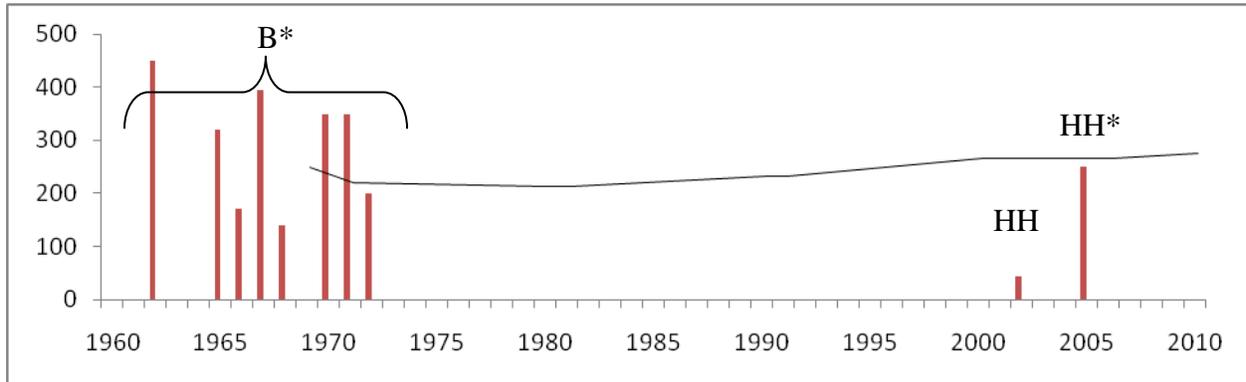


Figure 20. Estimated seal take (red bars) and human population (black line) for Teller, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

Table 16. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Teller, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	249	bounty	good					449	1.80
1965	249	bounty	good	35	135	150	0	320	1.29
1966	249	bounty	good					172	0.69
1967	249	bounty	good					395	1.59
1968	249	bounty	good					140	0.56
1970	220	bounty	good					350	1.59
1971	220	bounty	good					350	1.59
1972	220	bounty	good					200	0.91
2002	265	household	poor	11	0	33	0	44	0.17
2005	265	household	good	77	52	119	3	251	0.95

King Island – Located in the Bering Sea 40 miles due south of Wales. King Island took an estimated 400 seals in 1962 (Burns et al. 1964). By 1967 the population dropped to 320 and about this time the residents of King Island moved to Nome due to social and economic pressures and opportunities. Although the King Islanders continue to hunt near King Island and maintain a distinct identity within Nome, their take is reported as part of Nome’s.

Nome – Eight bounty estimates are available, and only one household survey has been collected in Nome since 1972. As the regional hub for the Kawerak region, estimating take information for Nome is more difficult because it is harder to identify and contact subsistence seal hunters due to the larger human population and the higher percentage of non-Natives living there. Nevertheless, Nome likely takes a large number of seals and should be part of a monitoring program especially since there are no reliable take estimates.

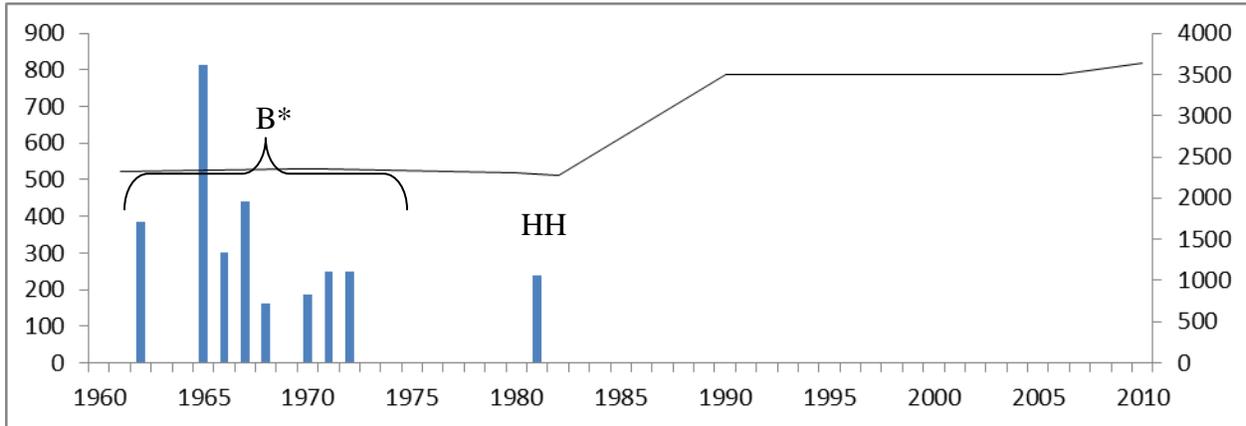


Figure 21. Estimated seal take (blue bars, left axis) and human population (black line, right axis) for Nome, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), and Commerce (2013).

Table 17. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Nome, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	2136	bounty	good					386	0.18
1965	2350	bounty	good	70	130	100	0	815	0.35
1966	2350	bounty	good					300	0.13
1967	2350	bounty	good					441	0.19
1968	2350	bounty	good					163	0.07
1970	2357	bounty	good					185	0.08
1971	2357	bounty	good					250	0.11
1972	2357	bounty	good					250	0.11
1981	2273	household	poor	67	83	87	1	238	0.10

Solomon - Three bounty records are available, but no information has been collected since 1972. At one time, Solomon was a mining town with a large seasonal population, but today there are few resident families.

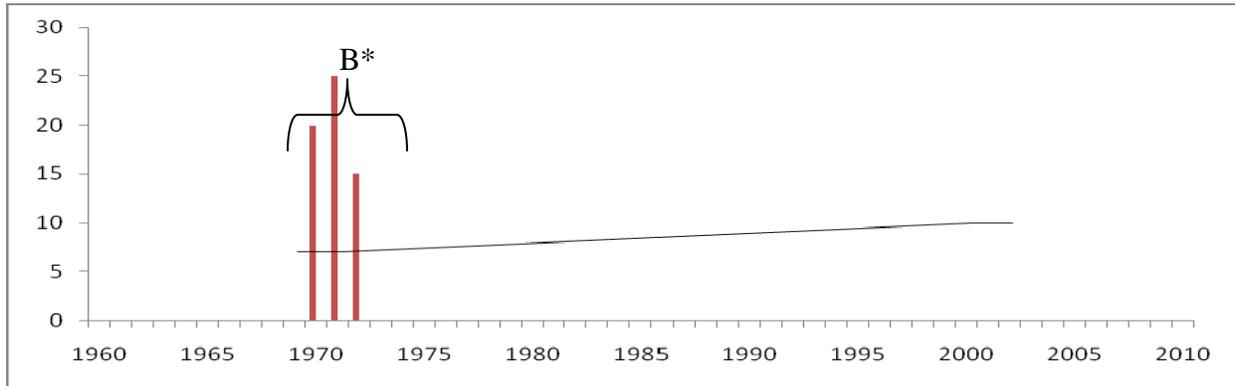


Figure 22. Estimated seal take (red bars) and human population (black line) for Solomon, Alaska. Numbers are from Burns (1970, 1972, 1973), and Commerce (2013).

Table 18. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Solomon, Alaska. Numbers are from Burns (1970, 1972, 1973), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1970	7	bounty	good					20	2.86
1971	7	bounty	good					25	3.57
1972	7	bounty	good					15	2.14

White Mountain - Five bounty estimates and one household survey estimate from 2005 is available for White Mountain, Alaska.

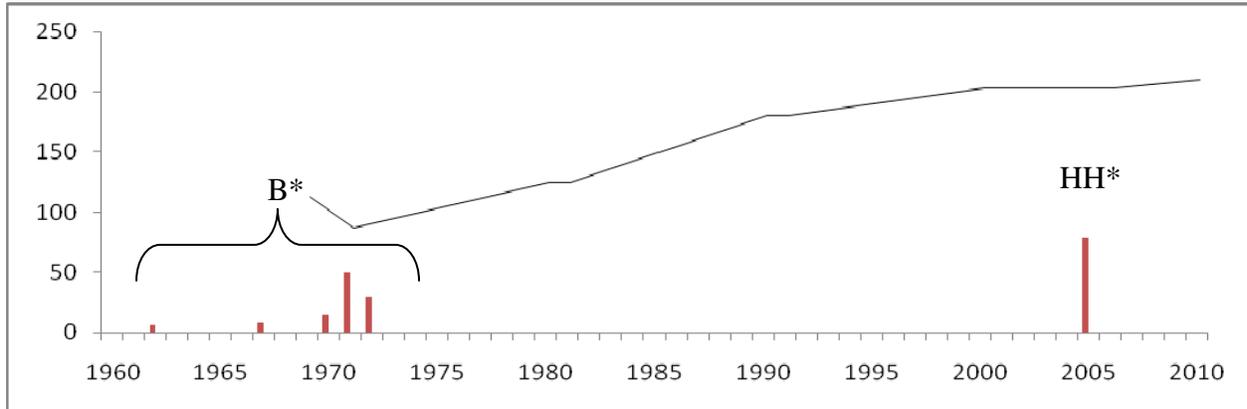


Figure 23. Estimated seal take (red bars) and human population (black line) for White Mountain, Alaska. Numbers are from Burns (1964, 1967, 1968, 1969, 1970, 1972, 1973), Ahmasuk (2007), and Commerce (2013).

Table 19. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in White Mountain, Alaska. Numbers are from Burns (1964, 1967, 1968, 1969, 1970, 1972, 1973), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	113	bounty	good					6	0.05
1967	113	bounty	good					8	0.07
1970	87	bounty	good					15	0.17
1971	87	bounty	good					50	0.57
1972	87	bounty	good					30	0.34
2005	203	household	good	58	1	20	0	79	0.39

Golovin - Eight bounty estimates and four household survey estimates are available, the most recent is from 2002. Golovin is located 70 miles east of Nome on the norther edge of Norton Sound.

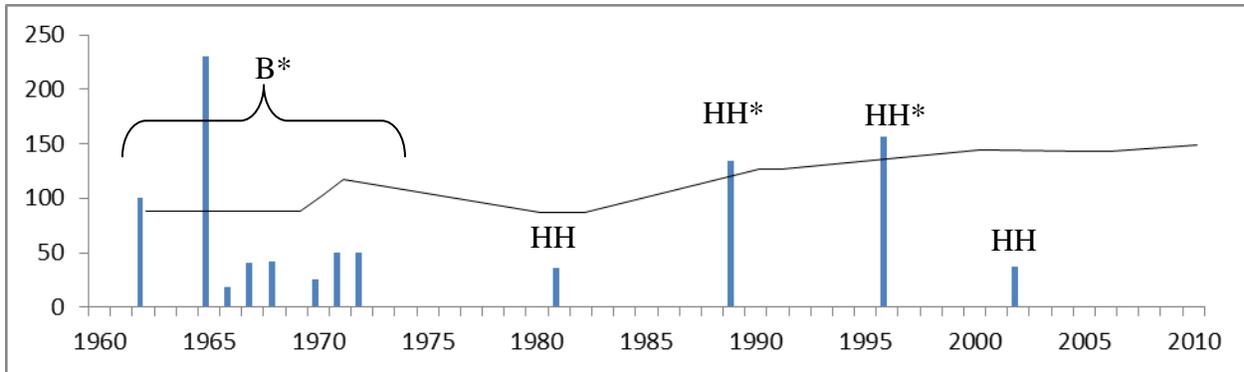


Figure 24. Estimated seal take (blue bars) and human population (black line) for Golovin, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990), Georgette (1998), Kawerak (unpublished), and Commerce (2013).

Table 20. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Golovin, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Magdanz (1990), Georgette (1998), Kawerak (unpublished), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	88	bounty	good					100	1.14
1965	88	bounty	good	60	120	50	0	230	2.61
1966	88	bounty	good					19	0.22
1967	88	bounty	good					41	0.47
1968	88	bounty	good					42	0.48
1970	117	bounty	good					25	0.21
1971	117	bounty	good					50	0.43
1972	117	bounty	good					50	0.43
1981	87	household	poor	9	11	16	0	36	0.41
1989	127	household	good	19	17	98	0	134	1.06
1996	144	household	good	31	77	47	2	157	1.09
2002	143	household	poor	10	7	16	4	37	0.26

Elim - Seven bounty estimates and two household survey estimates are available, but neither harvest survey estimate was conducted in a way to allow extrapolation to the community.

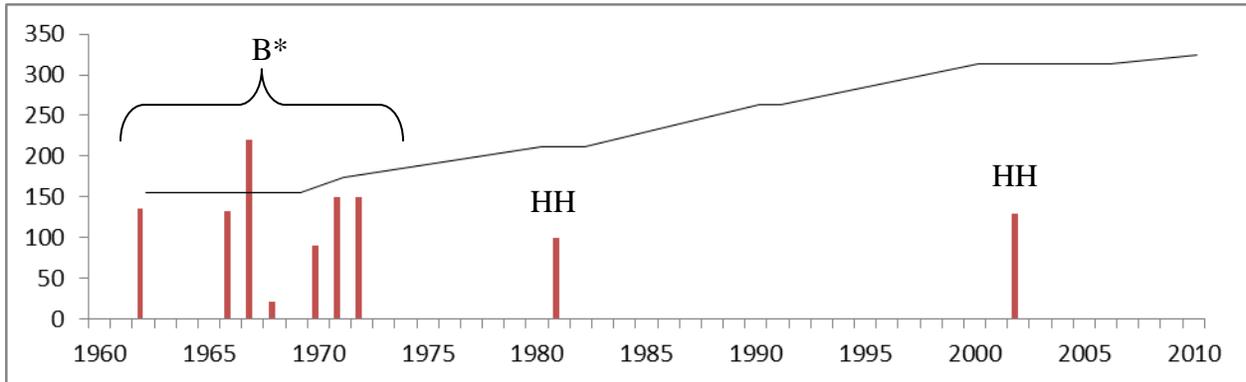


Figure 25. Estimated seal take (red bars) and human population (black line) for Elim, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Kawerak (unpublished), and Commerce (2013).

Table 21. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Elim, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Kawerak (unpublished), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	156	bounty	good					136	0.87
1966	156	bounty	good					133	0.85
1967	156	bounty	good					220	1.41
1968	156	bounty	good					21	0.13
1970	174	bounty	good					90	0.52
1971	171	bounty	good					150	0.88
1972	174	bounty	good					150	0.86
1981	212	household	poor	40	35	25	0	100	0.47
2002	313	household	poor	68	45	15	1	129	0.41

Koyuk - Seven bounty estimates and tow household survey estimates are available, The most recent is from 2005.

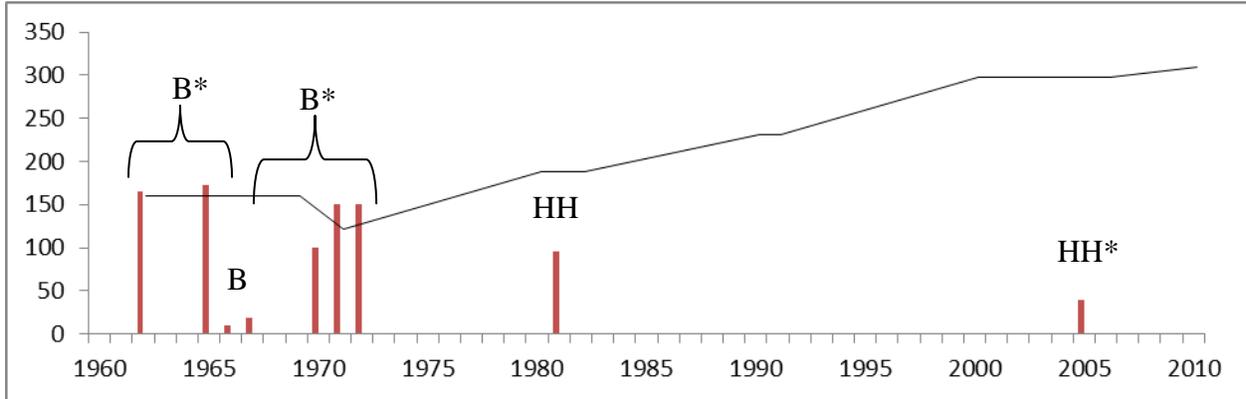


Figure 26. Estimated seal take (red bars) and human population (black line) for Koyuk, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Ahmasuk (2007), and Commerce (2013).

Table 22. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Koyuk, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	160	bounty	good					165	1.03
1965	160	bounty	good	40	82	50	0	172	1.08
1966	160	bounty	good					10	0.06
1967	160	bounty	good					18	0.11
1970	122	bounty	good					100	0.82
1971	122	bounty	good					150	1.23
1972	122	bounty	good					150	1.23
1981	188	household	poor	34	45	16	0	95	0.51
2005	297	household	good	10	7	23	0	40	0.13

Shaktoolik - Eight bounty estimates and three household survey estimates are available, the most recent is from 2002. Shaktoolik was relocated to its current town site in 1967. The new town site is on the coast of Norton Sound between Unalakleet and Koyuk.

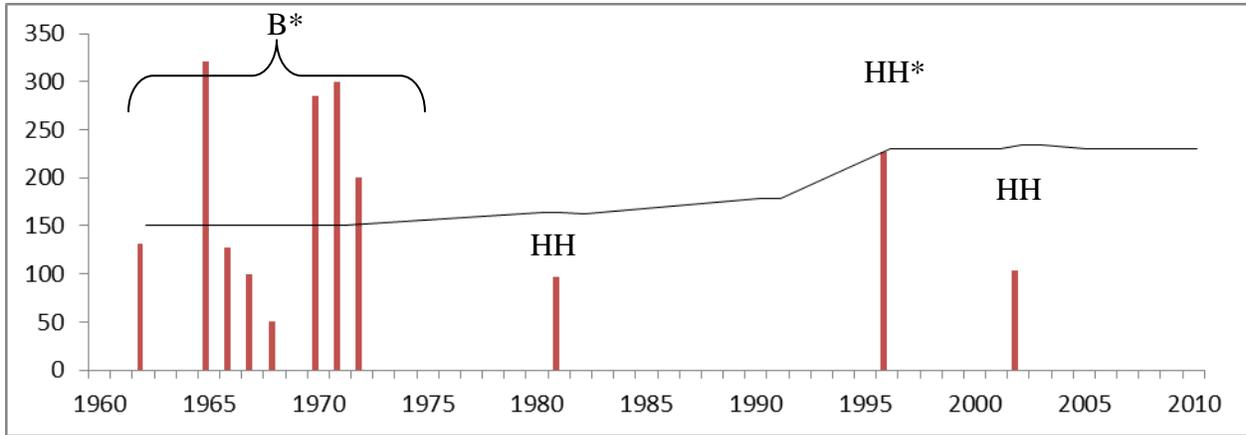


Figure 27. Estimated seal take (red bars) and human population (black line) for Shaktoolik, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Georgette (1998), Kawerak (unpublished), and Commerce (2013).

Table 23. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Shaktoolik, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Georgette (1998), Kawerak (unpublished), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	151	bounty	good					132	0.87
1965	151	bounty	good	70	171	80	0	321	2.13
1966	151	bounty	good					128	0.85
1967	151	bounty	good					100	0.66
1968	151	bounty	good					50	0.33
1970	151	bounty	good					285	1.89
1971	151	bounty	good					300	1.99
1972	151	bounty	good					200	1.32
1981	163	household	poor	42	27	258	0	97	0.60
1996	230	household	good	76	109	41	1	227	0.99
2002	234	household	poor	44	13	47	0	104	0.44

Unalakleet - Seven bounty estimates two household survey estimates are available, the most recent is from 2005.

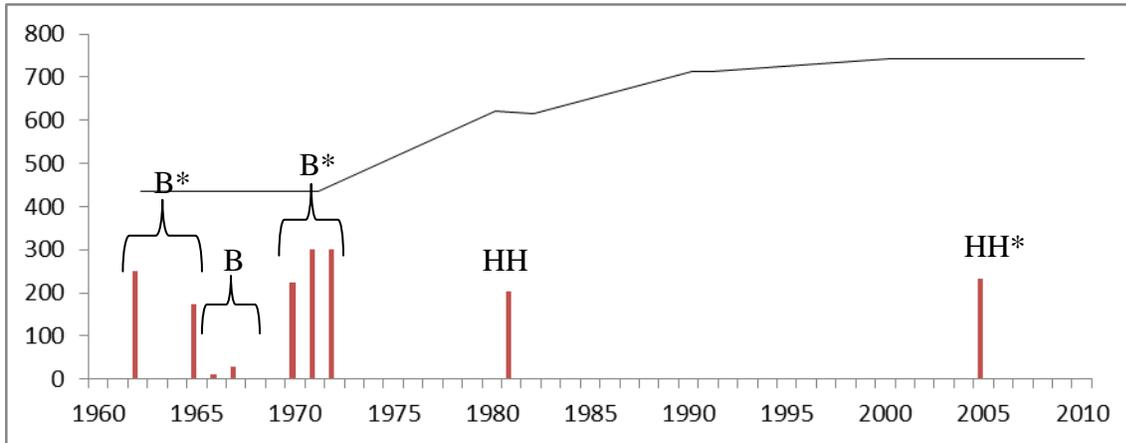


Figure 28. Estimated seal take (red bars) and human population (black line) for Unalakleet, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Ahmasuk (2007), and Commerce (2013).

Table 24. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Unalakleet, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	434	bounty	good					250	0.58
1965	434	bounty	good	40	93	40	0	173	0.40
1966	434	bounty	poor					11	0.03
1967	434	bounty	poor					29	0.07
1970	434	bounty	good					225	0.52
1971	434	bounty	good					300	0.69
1972	434	bounty	good					300	0.69
1981	615	household	poor	58	69	77	0	204	0.33
2005	744	household	good	95	11	125	3	233	0.31

Saint Michael - Six bounty estimates and three household survey estimates are available, the most recent from 2005.

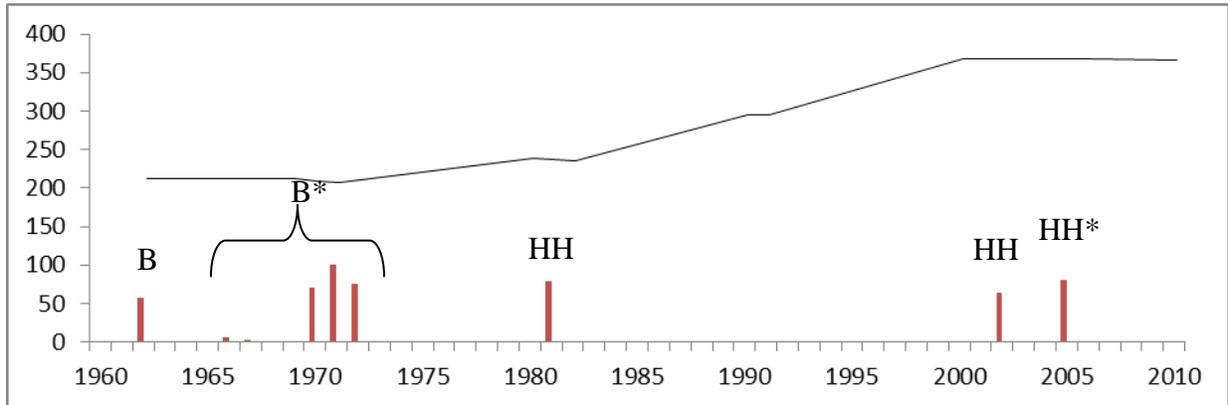


Figure 29. Estimated seal take (red bars) and human population (black line) for St. Michael, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

Table 25. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in St. Michael, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	212	bounty	poor					57	0.27
1966	212	bounty	good					6	0.03
1967	212	bounty	good					3	0.01
1970	207	bounty	good					70	0.34
1971	207	bounty	good					100	0.48
1972	207	bounty	good					75	0.36
1981	334	household	poor	49	19	11	0	79	0.24
2002	368	household	poor	16	3	45	0	64	0.17
2005	368	household	good	44	0	36	0	81	0.22

Stebbins - Seven bounty estimates and five household survey estimates are available for Stebbins, Alaska. The most recent household survey is from 2005.

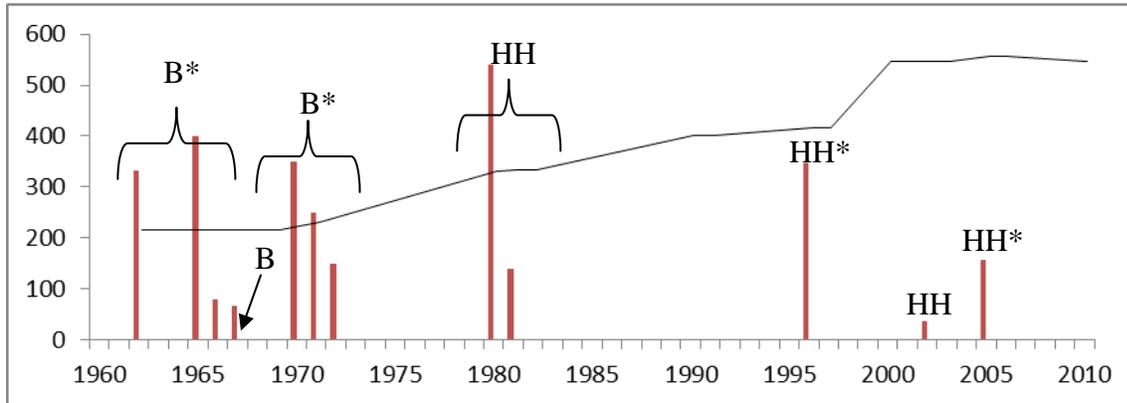


Figure 30. Estimated seal take (red bars) and human population (black line) for Stebbins, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Wolfe (1981), Sherrod (1982), Georgette (1998), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

Table 26. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Stebbins, Alaska. Numbers are from Burns (1960, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Wolfe (1981), Sherrod (1982), Georgette (1998), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	215	bounty	good					331	1.54
1965	215	bounty	good	100	181	120	0	401	1.87
1966	215	bounty	poor					79	0.37
1967	215	bounty	poor					66	0.31
1970	231	bounty	good					350	1.52
1971	231	bounty	good					250	1.08
1972	231	bounty	good					150	0.65
1980	331	household	poor	180	300	60	0	540	1.63
1981	334	household	poor	63	43	32	0	138	0.41
1996	416	household	good					348	0.84
2002	546	household	poor	22	9	6	0	37	0.07
2005	557	household	good	74	16	66	0	156	0.28

Northeast Cape - Two bounty estimates were made before the residents left Northeast Cape for Savoonga, Gambell, or Nome. Bounty records show Northeast Cape took 20 seals in 1967 and 1971 Burns (1967, 1972), which is around the time the community moved.

Gambell - Eight bounty estimates and five household survey estimates are available, the most recent from 2005. Gambell is located on the northern most tip of St. Lawrence Island. Gambell relies heavily on marine mammals for subsistence.

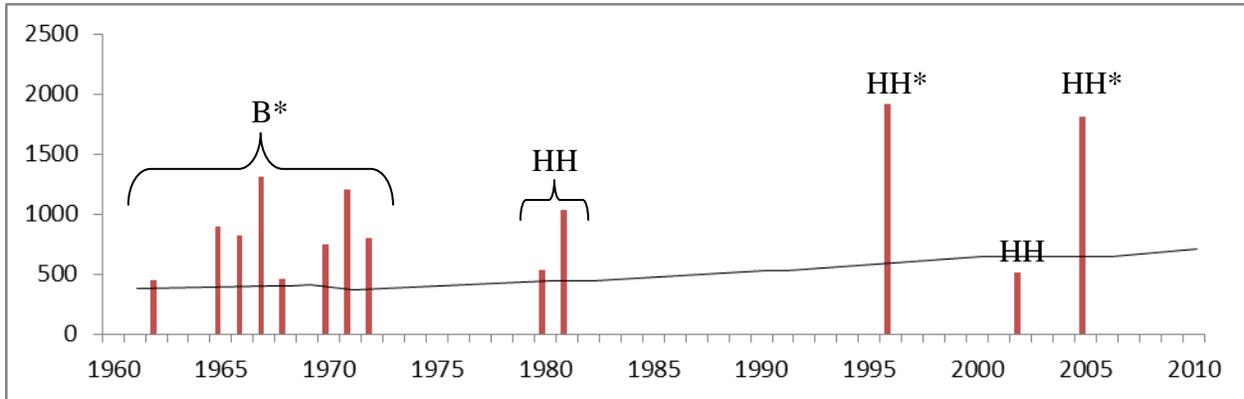


Figure 31. Estimated seal take (red bars) and human population (black line) for Gambell, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (1982, unpublished), Sherrod (1982), Georgette (1998), Ahmasuk (2007), and Commerce (2013).

Table 27. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Gambell, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Kawerak (1982, unpublished), Sherrod (1982), Georgette (1998), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	377	bounty	good					450	1.19
1965	402	bounty	good	200	543	150	0	893	2.22
1966	402	bounty	good					820	2.04
1967	402	bounty	good					1306	3.25
1968	402	bounty	good					458	1.14
1970	372	bounty	good					750	2.02
1971	372	bounty	good					1200	3.23
1972	372	bounty	good					800	2.15
1980	445	household	poor					540	1.21
1981	441	household	poor	361	327	343	0	1031	2.34
1996	525	household	good	750	572	570	30	1922	3.66
2002	649	household	poor	177	141	195	3	516	0.80
2005	646	household	good	752	346	676	36	1810	2.80

Savoonga - Eight bounty estimates and four household survey estimates are available, the most recent is from 2005. Savoonga is located on the north side of St. Lawrence Island. Savoonga is an island community and relies heavily on marine mammals for subsistence.

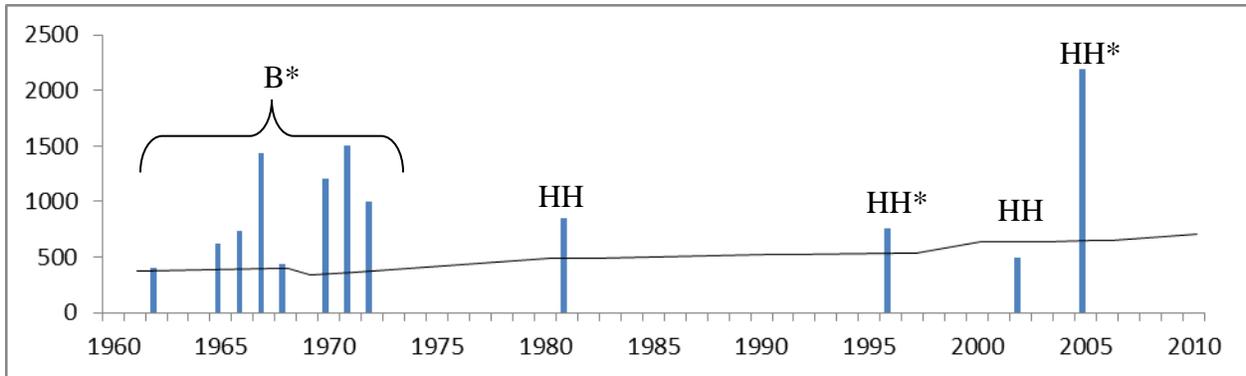


Figure 32. Estimated seal take (blue bars) and human population (black line) for Savoonga, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Georgette (1998), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

Table 28. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Savoonga, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Sherrod (1982), Georgette (1998), Kawerak (unpublished), Ahmasuk (2007), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	374	bounty	good					400	1.07
1965	397	bounty	good	150	321	150	0	621	1.56
1966	397	bounty	good					736	1.85
1967	397	bounty	good					1436	3.62
1968	397	bounty	good					439	1.11
1970	364	bounty	good					1200	3.30
1971	364	bounty	good					1500	4.12
1972	364	bounty	good					1000	2.75
1981	491	household	poor	137	371	293	52	853	1.74
1996	539	household	good	275	237	235	17	764	1.42
2002	642	household	poor	151	199	144	4	498	0.78
2005	654	household	good	700	631	832	33	2196	3.36

Yukon-Kuskokwim Delta: The Association of Village Council Presidents (AVCP) is the nonprofit organization that represents more than 60 communities in the Yukon-Kuskokwim Delta region, 30 of those 60 communities are located along the coast and hunt marine mammals (Fig. 33).

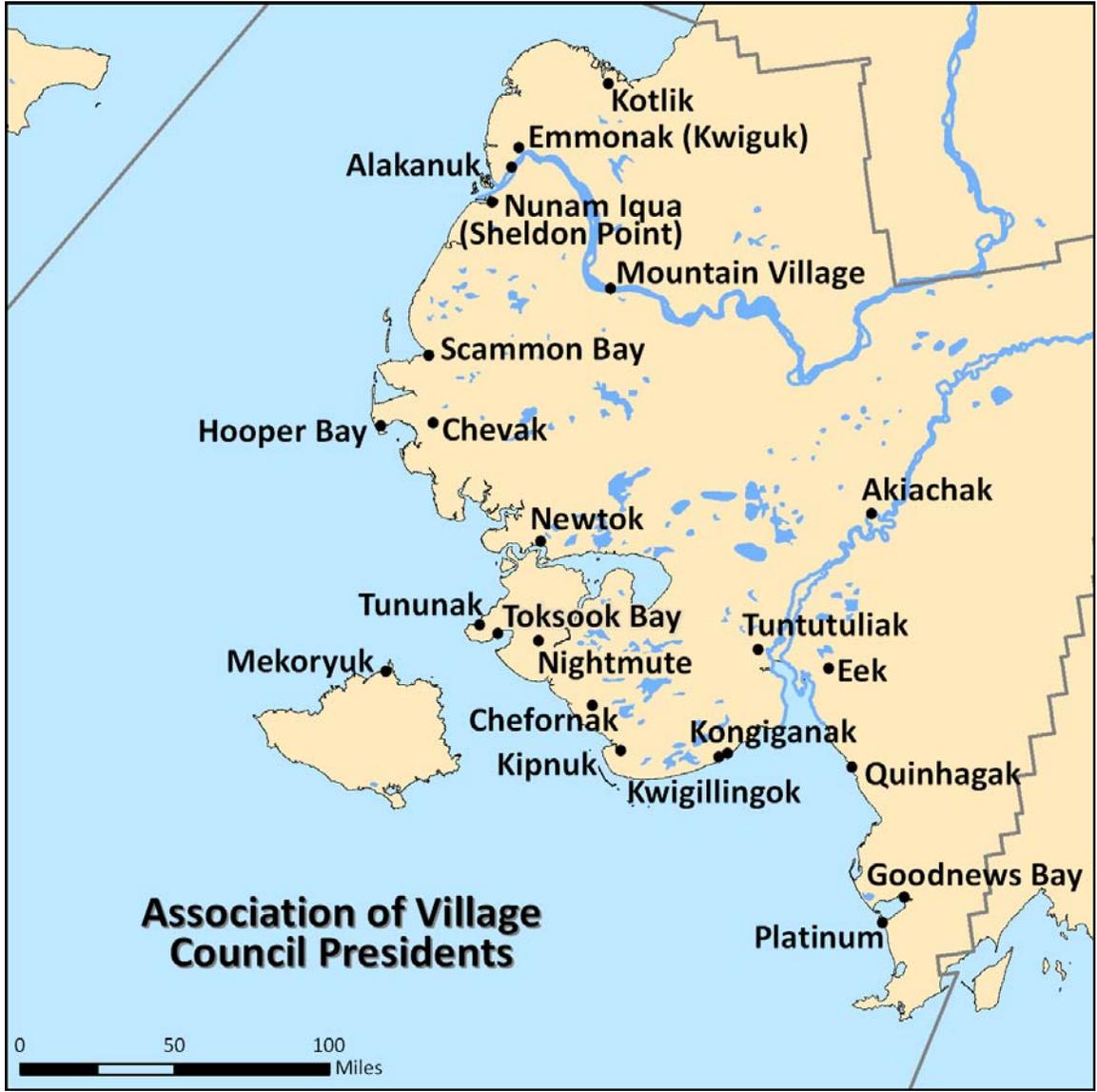


Figure 33. Yukon-Kuskokwim Delta communities that regularly take ice seals.

Kotlik - No bounty estimates and only one household survey estimate is available for Kotlik, Alaska.

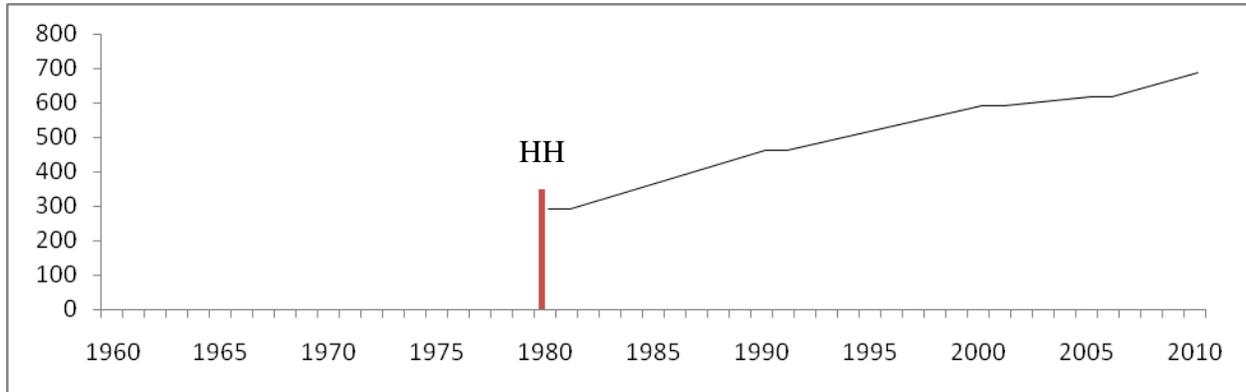


Figure 34. Reported seals taken (red bar) and human population (black line) for Kotlik, Alaska. Numbers are from Wolfe (1981) and Commerce (2013).

Table 29. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Kotlik, Alaska. Numbers are from Wolfe (1981) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1980	293	household	poor	128	140	80	348	1.19	

Emmonak - Three bounty estimates and four household survey estimates are available, the most recent was from a 2011 household survey. Located on the Yukon River near its mouth, Emmonak hunters travel downriver to hunt seals in the ocean, but sometimes take them in the river near the community.

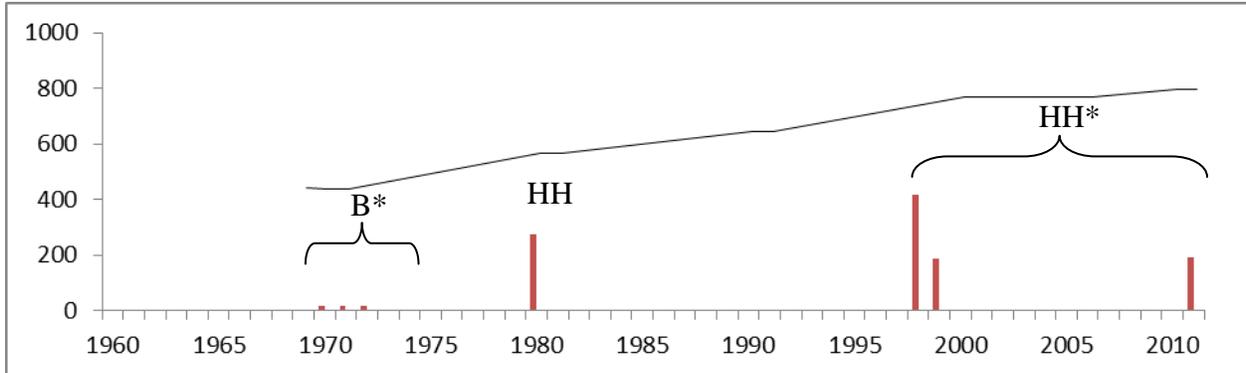


Figure 35. Estimated seal take (red bars) and human population (black line) for Emmonak, Alaska. Numbers are from Burns (1969, 1970, 1972, 1973), Wolfe (1981), and Coffing (1998, 1999), Nelson (2013), and Commerce (2013).

Table 30. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Emmonak, Alaska. Numbers are from Burns (1969, 1970, 1972, 1973), Wolfe (1981), and Coffing (1998, 1999), Nelson (2013), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1970	439	bounty	good					15	0.03
1971	439	bounty	good					15	0.03
1972	439	bounty	good					15	0.03
1980	567	household	poor	39	139	94	0	272	0.48
1998	879	household	good	198	151	60	7	416	0.47
1999	892	household	good	72	66	45	4	187	0.21
2008	834	household	good	136	28	46	7	217	0.26
2011	782	household	good	106	56	28	0	190	0.24

Mountain Village - No bounty estimates are available, but one household survey from 1980 is available for Mountain Village. Located about 70 miles inland, Mountain Village was not part of the bounty program and has only been surveyed for seal take twice. In 1980 Mountain Village took an estimated 138 seals, and in 2010 took 51 (Wolfe 1981, Braem 2012).

Alakanuk - Three bounty estimates and one household survey estimate from 1980 is available. Alakanuk is located near the mouth of the Yukon River.

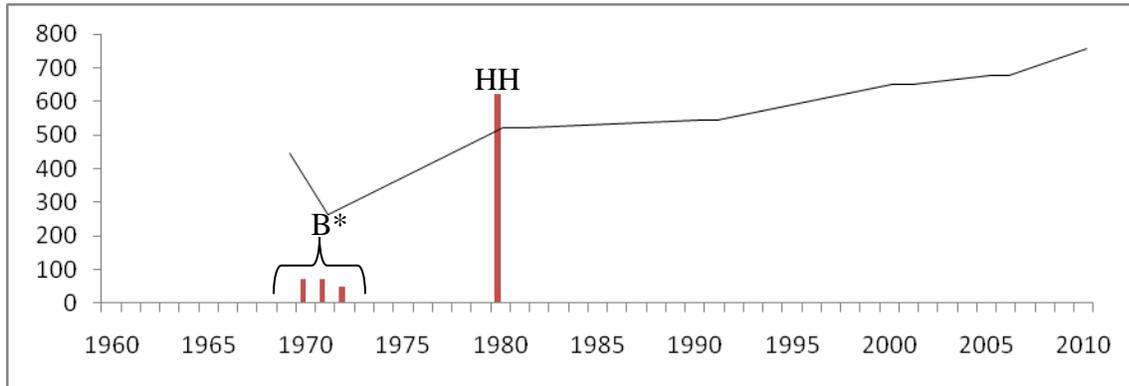


Figure 36. Estimated seal take (red bars) and human population (black line) for Alakanuk, Alaska. Numbers are from Burns (1970, 1972, 1973), Wolfe (1981), and Commerce (2013).

Table 31. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Alakanuk, Alaska. Numbers are from Burns (1970, 1972, 1973), Wolfe (1981), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1970	265	bounty	good					70	0.26
1971	265	bounty	good					70	0.26
1972	265	bounty	good					50	0.19
1980	522	household	good	176	274	171		621	1.19

Nunam Iqua - No bounty estimates and only one household survey estimate from 1980 is available. Formerly called Sheldon Point, Nunam Iqua is located on the south side of the Yukon River near its mouth and has good access to seals.

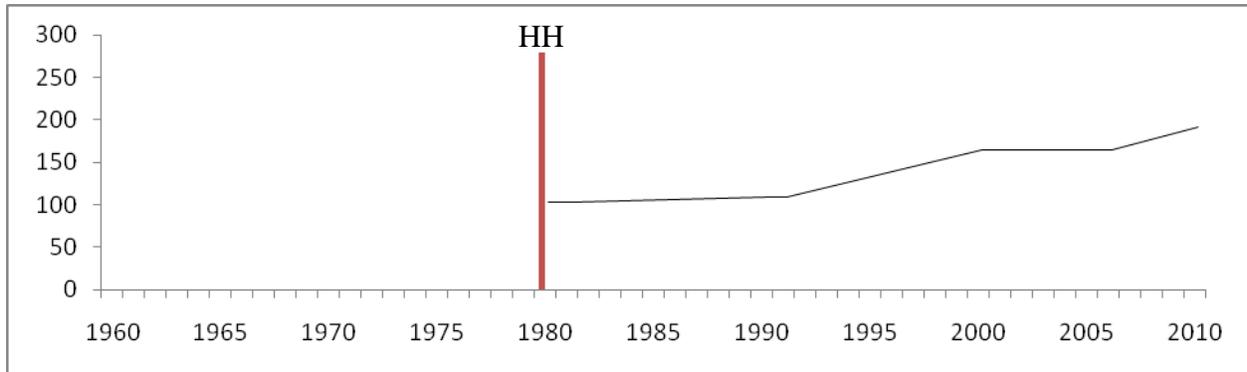


Figure 37. Estimated seal take (red bar) and human population (black line) for Nunam Iqua, Alaska. Numbers are from Wolfe (1981) and Commerce (2013).

Table 32. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Nunam Iqua, Alaska. Numbers are from Wolfe (1981) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1980	103	household	good	69	108	102		50	0.49

Scammon Bay - Eight bounty estimates, and two household survey estimates from 2011 and 2012 are available for Scammon Bay, Alaska.

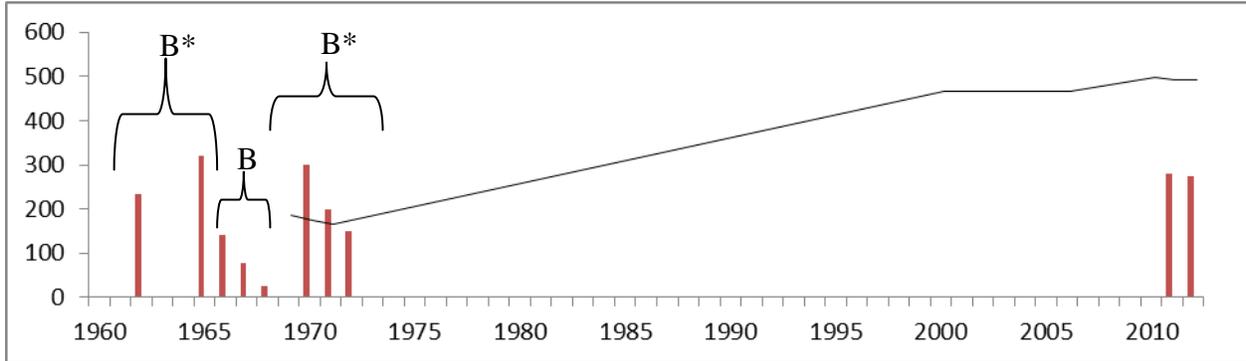


Figure 38. Estimated seal take (red bars) and human population (black line) for Scammon Bay, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Nelson (2013, 2014), and Commerce (2013).

Table 33. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Scammon Bay, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Nelson (2013, 2014), and Commerce (2013).

year	People	method		Number of Seals - Scammon Bay				Total Take	Percapita Take
		type	quality	Bearded	Ringed	Spotted	Ribbon		
1962	185	bounty	good					234	1.26
1965	185	bounty	good	90	129	100	0	319	1.72
1966	185	bounty	good					140	0.76
1967	185	bounty	poor					79	0.43
1968	185	bounty	poor					26	0.14
1970	166	bounty	good					300	1.81
1971	166	bounty	good					200	1.20
1972	166	bounty	good					150	0.90
2011	486	survey	good	82	137	56	4	279	0.57
2012	498	survey	good	51	169	53	2	275	0.55

Hooper Bay - Eight bounty estimates and seven household survey estimates are available, the most recent is a series of surveys from 2008 to 2012. The Alaska Department of Fish and Game in cooperation with the AVCP and the ISC are currently conducting surveys in Hooper Bay.

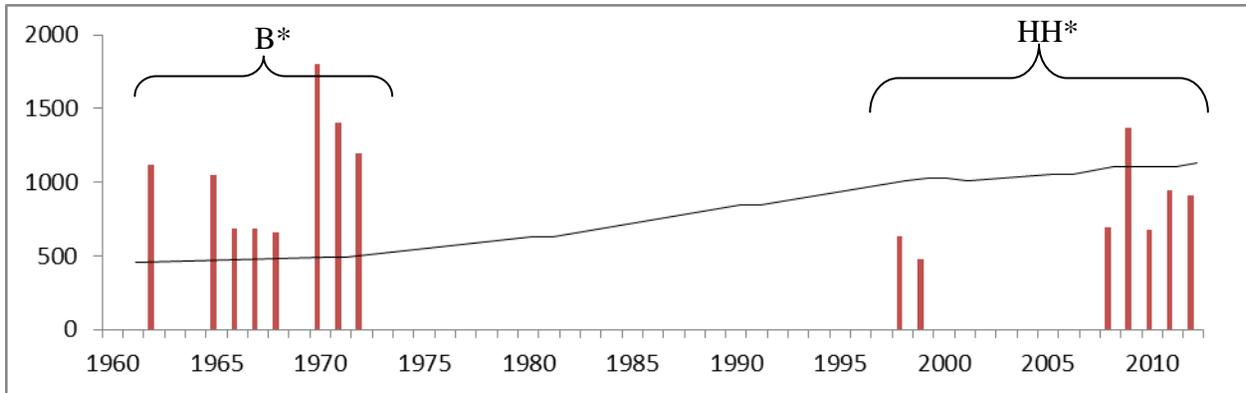


Figure 39. Estimated seal take (red bars) and human population (black line) for Hooper Bay, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Coffing (1998, 1999), Nelson (2009, 2010, 2011, 2013, 2014), and Commerce (2013).

Table 34. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Hooper Bay, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Coffing (1998, 1999), Nelson (2009, 2010, 2011, 2013, 2014), and Commerce (2013).

year	People	method		Number of Seals - Hooper Bay				Total Take	Percapita Take
		type	quality	Bearded	Ringed	Spotted	Ribbon		
1962	460	bounty	good					1114	2.42
1965	460	bounty	good	200	646	200	0	1046	2.27
1966	460	bounty	good					686	1.49
1967	490	bounty	good					683	1.39
1968	490	bounty	good					662	1.35
1970	490	bounty	good					1800	3.67
1971	490	bounty	good					1400	2.86
1972	490	bounty	good					1200	2.45
1998	1012	survey	good	146	409	78	4	637	0.63
1999	1039	survey	good	59	370	48	2	479	0.46
2008	1101	survey	good	193	396	104	0	693	0.63
2009	1112	survey	good	332	889	144	0	1365	1.23
2010	1094	survey	good	148	458	71	0	675	0.62
2011	1121	survey	good	210	674	57	0	941	0.84
2012	1144	survey	good	212	651	46	4	913	0.80

Chevak - Nine bounty estimates and no household survey estimates are available for Chevak. No surveys have occurred in Chevak since the 1972 bounty.

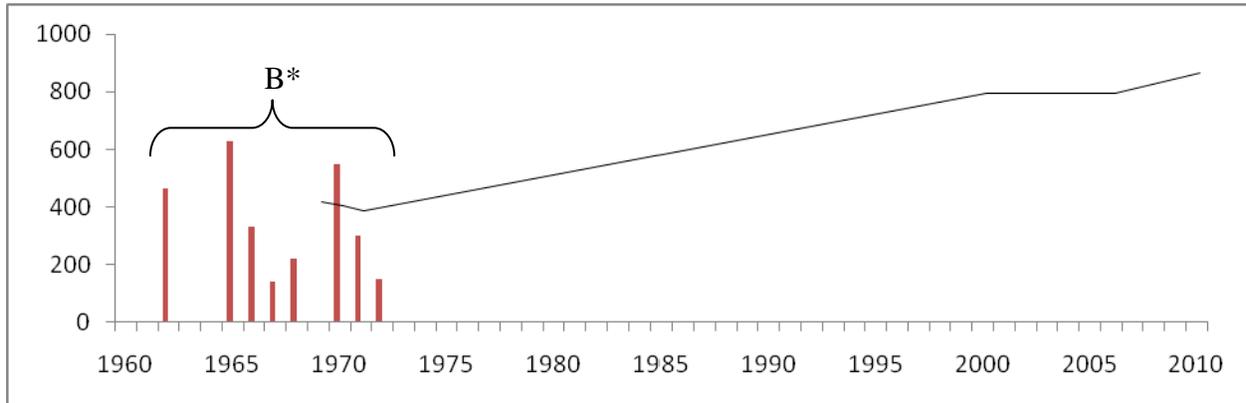


Figure 40. Estimated seal take (red bars) and human population (black line) for Chevak, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

Table 35. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Chevak, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	420	bounty	good					465	1.11
1965	420	bounty	good	100	329	200		629	1.50
1966	420	bounty	good					332	0.79
1967	420	bounty	good					142	0.34
1968	420	bounty	good					221	0.53
1970	378	bounty	good					550	1.46
1971	387	bounty	good					300	0.78
1972	387	bounty	good					150	0.39

Newtok - No take information exists for Newtok.

Tununak - Four bounty estimates and five household survey estimates are available for Tununak, the most recent is a from a monitoring project by the Alaska Department of Fish and Game in cooperation with AVCP and the ISC.

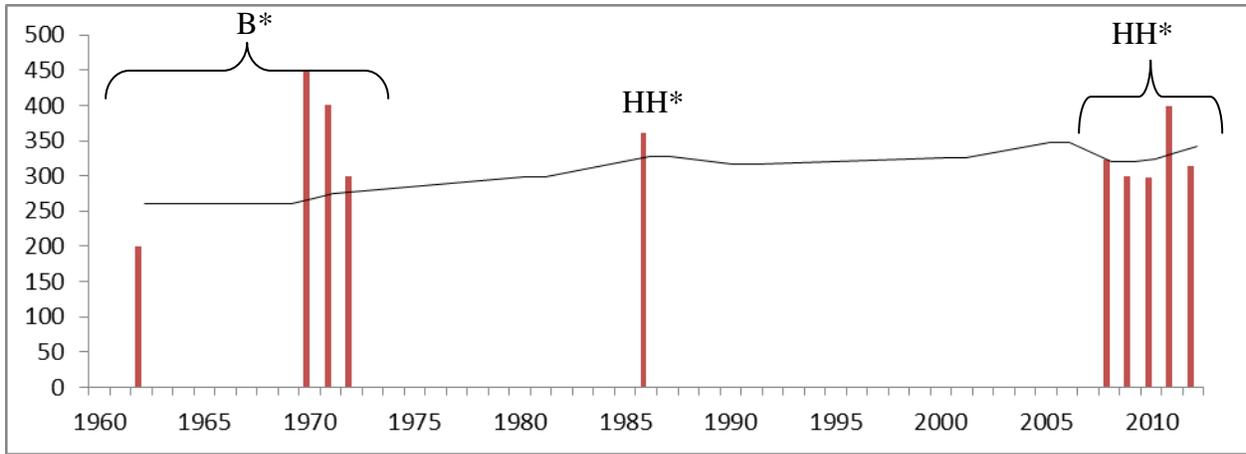


Figure 41. Estimated seal take (red bars) and human population (black line) for Tununak, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973), CSIS (1986), Nelson (2009, 2010, 2011, 2013, 2014), and Commerce (2013).

Table 36. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Tununak, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973), CSIS (1986), Nelson (2009, 2010, 2011, 2013, 2014), and Commerce (2013).

year	People	method		Number of Seals - Tununak				Total Take	Percapita 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	51	0	314	0.92

Toksook Bay - Only two bounty estimates are available for Tooksook Bay.

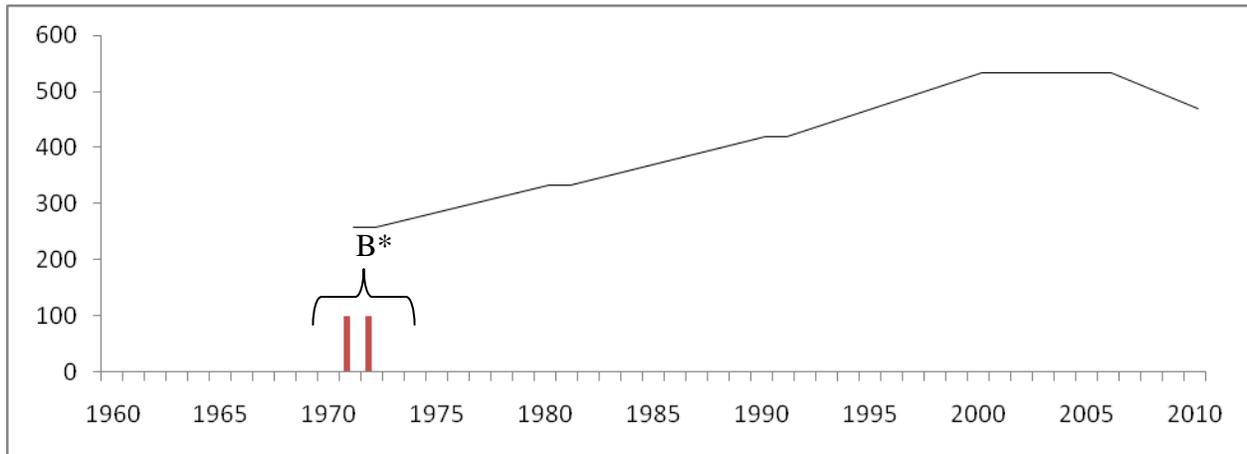


Figure 42. Estimated seal take (red bars) and human population (black line) for Toksook, Bay, Alaska. Numbers are from Burns (1972, 1973) and Commerce (2013).

Table 37. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Toksook Bay, Alaska. Numbers are from Burns (1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1971	257	bounty	good					100	0.39
1972	257	bounty	good					100	0.39

Nightmute - Only three bounty estimates are available for Nightmute, Alaska.

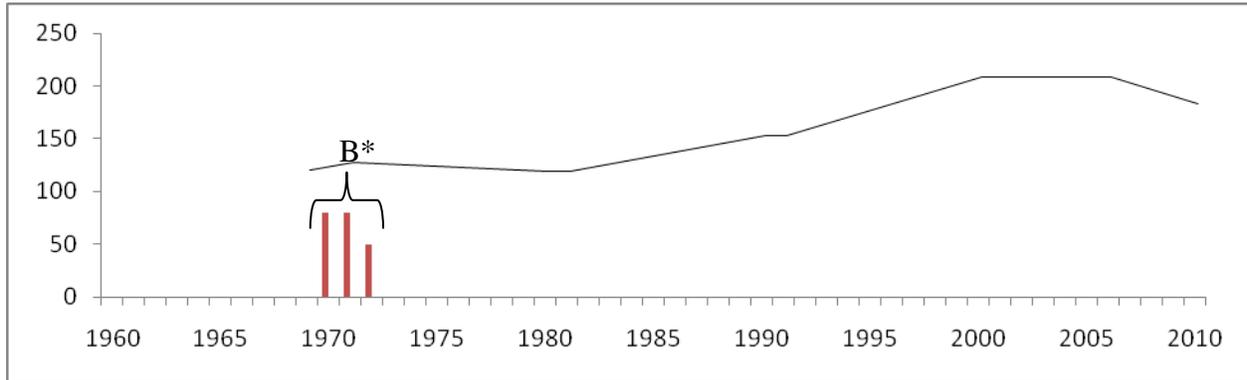


Figure 43. Estimated seal take (red bars) and human population (black line) for Nightmute, Alaska. Numbers are from Burns (1970, 1972, 1973) and Commerce (2013).

Table 38. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data in Toksook Bay, Alaska. Numbers are from Burns (1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1970	120	bounty	good					80	0.67
1971	127	bounty	good					80	0.63
1972	127	bounty	good					50	0.39

Mekoryuk - Eight bounty estimates show high reliance on seals in Mekoyruk, but no surveys are available since the 1972 bounty. Mekoryuk is an island community and probably still relies heavily on seals for subsistence.

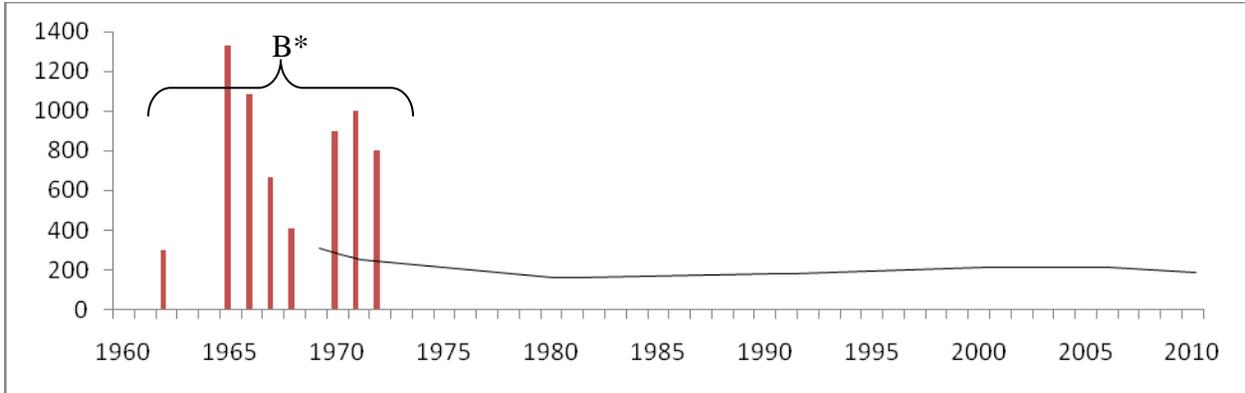


Figure 44. Estimated seal take (red bars) and human population (black line) for Mekoryuk, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

Table 39. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data from Mekoryuk, Alaska. Numbers are from Burns (1964, 1965, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	310	bounty	good					300	0.97
1965	249	bounty	good	300	532	500		1332	5.35
1966	249	bounty	good					1087	4.37
1967	249	bounty	good					668	2.68
1968	249	bounty	good					407	1.63
1970	249	bounty	good					900	3.61
1971	249	bounty	good					1000	4.02
1972	249	bounty	good					800	3.21

Chefornak – Only four bounty estimates are available for Chefornak and no take estimates are available since the 1972 bounty. Chefornak is near the coast and likely relies on seals for subsistence.

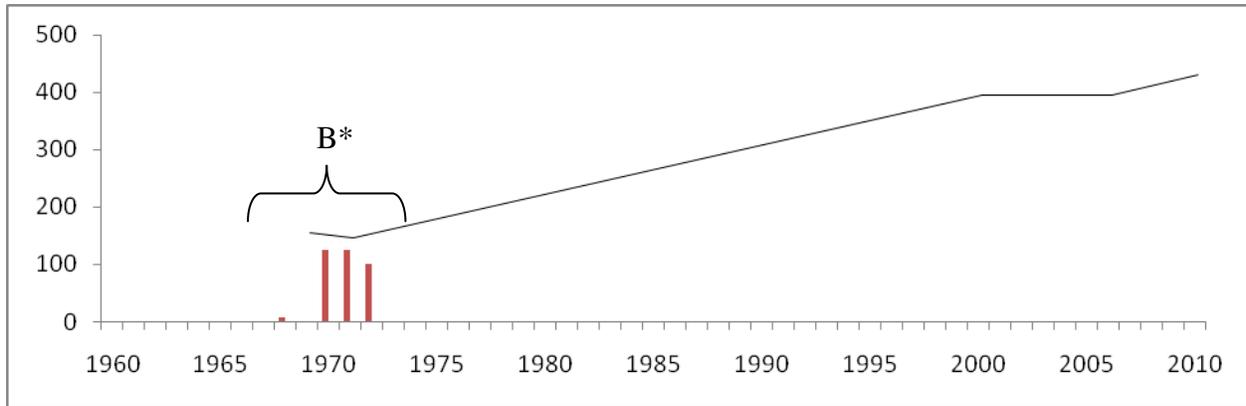


Figure 45. Estimated seal take (red bars) and human population (black line) for Chefornak, Alaska. Numbers are from Burns (1968, 1970, 1972, 1973) and Commerce (2013).

Table 40. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data from Chefornak, Alaska. Numbers are from Burns (1968, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1968	155	bounty	good					8	0.05
1970	146	bounty	good					125	0.86
1971	146	bounty	good					125	0.86
1972	146	bounty	good					100	0.68

Kipnuk - Only four bounty estimates are available for Kipnuk and no estimates are available since the 1972 bounty.

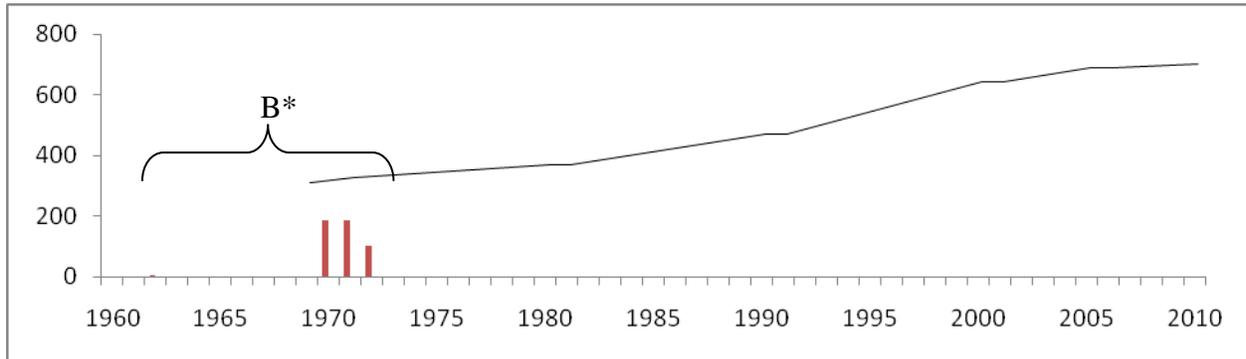


Figure 46. Estimated seal take (red bars) and human population (black line) for Kipnuk, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

Table 41. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data from Kipnuk, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	310	bounty	good					4	0.01
1970	325	bounty	good					185	0.57
1971	325	bounty	good					185	0.57
1972	325	bounty	good					100	0.31

Kwigillingok - Only four bounty estimates are available for Kwigillingok, no estimates are available since the 1972 bounty.

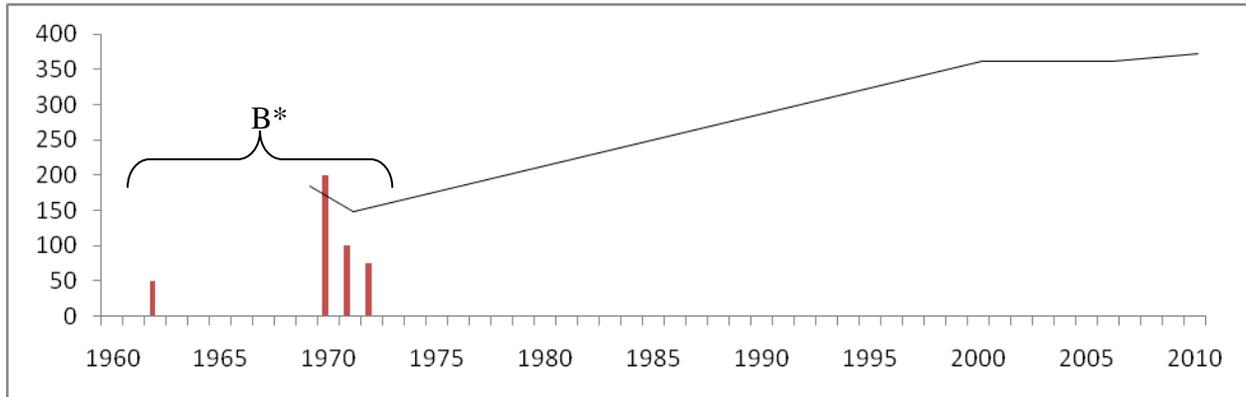


Figure 47. Estimated seal take (red bars) and human population (black line) for Kwigillingok, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973) and Commerce (2013).

Table 42. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Kwigillingok, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	185	bounty	good					50	0.27
1970	148	bounty	good					200	1.35
1971	148	bounty	good					100	0.68
1972	148	bounty	good					75	0.51

Tuntutuliak - Only five bounty estimates are available for Tuntutuliak, no take estimates are available since the 1972 bounty.

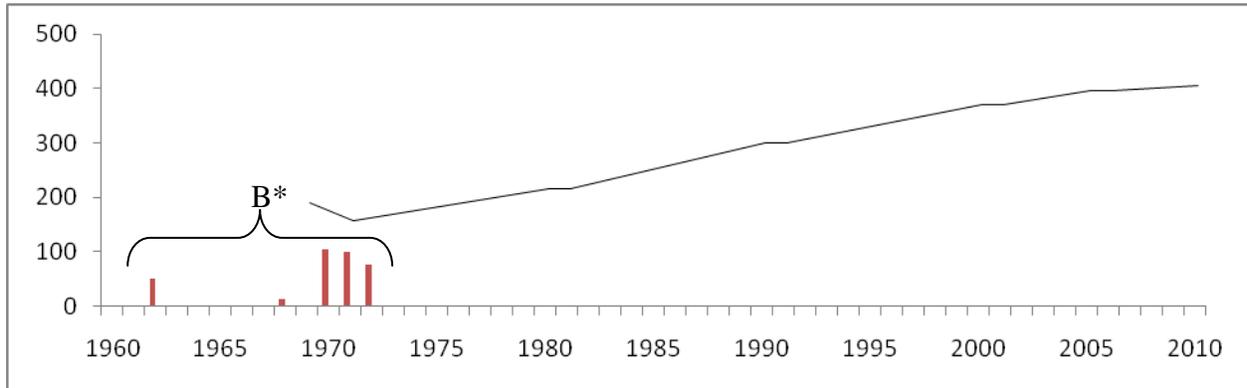


Figure 48. Estimated seal take (red bars) and human population (black line) for Tuntutuliak, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973) and Commerce (2013).

Table 43. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Tuntutuliak, Alaska. Numbers are from Burns (1964, 1969, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	190	bounty	good					50	0.26
1968	190	bounty	good					12	0.06
1970	158	bounty	good					105	0.66
1971	158	bounty	good					100	0.63
1972	158	bounty	good					75	0.47

Akiachak - Akiachak is located about 70 miles up the Kuskokwim River and must travel to the coast to hunt seals. This does appear to happen occasionally and during 1998 Akiachak took 98 seals (Coffing *et al.* 2001).

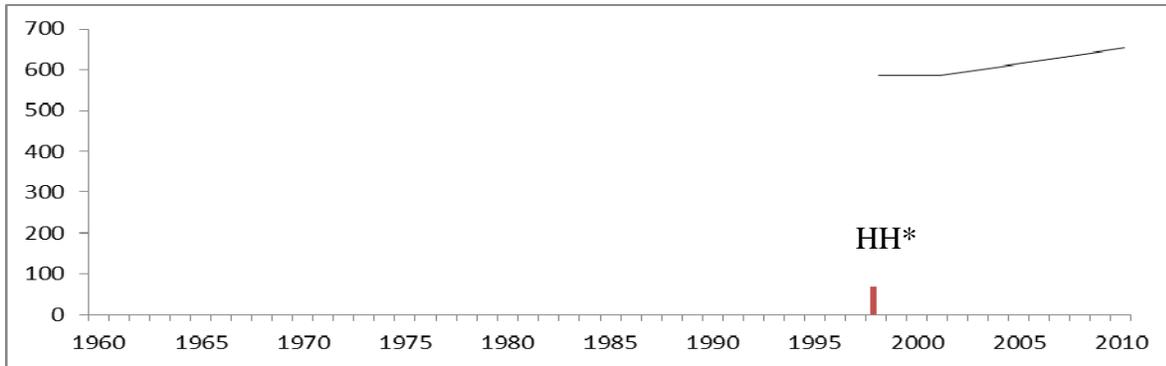


Figure 49. Estimated seal take (red bars) and human population (black line) for Tuntutuliak, Alaska. Numbers are from Coffing *et al.* (2001) and Commerce (2013).

Table 44. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Tuntutuliak, Alaska. Numbers are from Coffing *et al.* (2001) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1998	585	household	good	15	28	26		98	0.17

Eek - Six bounty estimates are available, but no take estimates are available since the 1972 bounty.

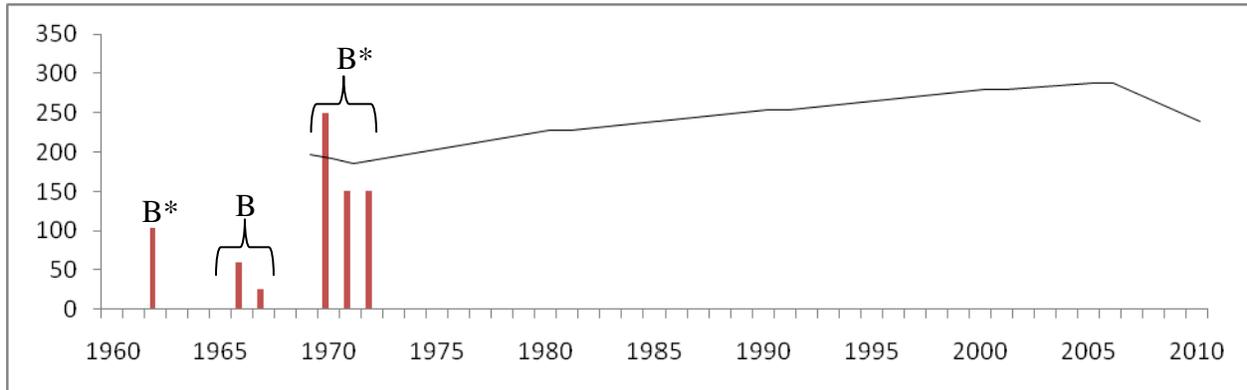


Figure 50. Estimated seal take (red bars) and human population (black line) for Eek, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

Table 45. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Eek, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	197	bounty	good					104	0.53
1966	197	bounty	good					60	0.30
1967	197	bounty	good					25	0.13
1970	186	bounty	good					250	1.34
1971	186	bounty	good					150	0.81
1972	186	bounty	good					150	0.81

Quinhagak - Six bounty estimates and seven household survey estimates are available, the most recent is from the monitoring program by the Alaska Department of Fish and Game in cooperation with the AVCP and the ISC.

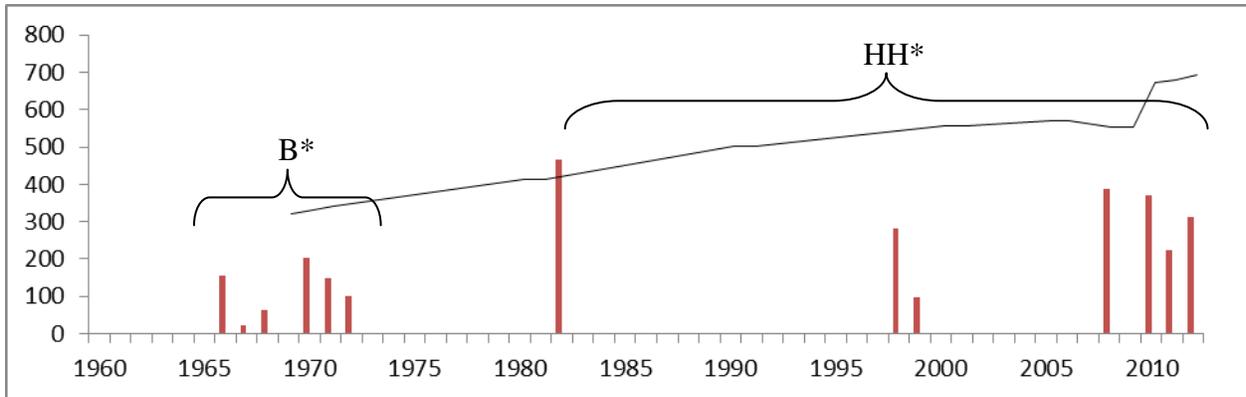


Figure 51. Estimated seal take (red bars) and human population (black line) for Quinhagak, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Wolfe (1984), Coffing (1998, 1999), Nelson (2009, 2011, 2013, 2014), and Commerce (2013).

Table 46. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Quinhagak, Alaska. Numbers are from Burns (1964, 1966, 1967, 1968, 1969, 1970, 1972, 1973), Wolfe (1984), Coffing (1998, 1999), Nelson (2009, 2011, 2013, 2014), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	320	bounty	good					0	0.00
1966	320	bounty	good					157	0.49
1967	320	bounty	good					21	0.07
1967	320	bounty	good					64	0.20
1970	340	bounty	good					205	0.60
1971	340	bounty	good					150	0.44
1972	340	bounty	good					100	0.29
1982	412	household	good	65	114	286	0	465	1.13
1998	567	household	good	34	120	125	2	281	0.50
1999	612	household	good	19	13	66	1	99	0.16
2008	553	household	good	63	115	210	0	388	0.70
2010	672	household	good	29	163	179	2	371	0.55
2011	686	household	good	26	117	78	3	224	0.33
2012	697	household	good	44	140	128	0	312	0.45

Goodnews Bay - Only four bounty estimates and no household survey estimates are available for Goodnews Bay, Alaska.

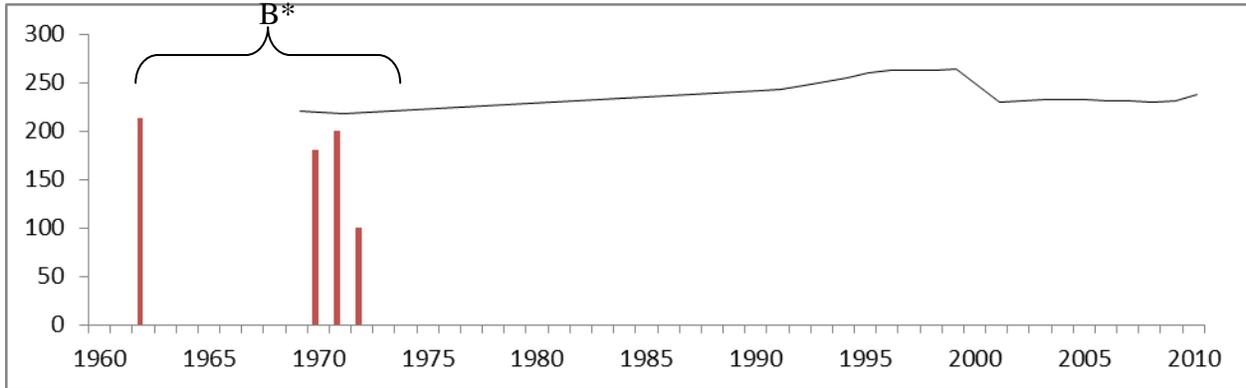


Figure 52. Estimated seal take (red bars) and human population (black line) for Goodnews Bay, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

Table 47. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Goodnews Bay, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	220	bounty	good					213	0.97
1970	218	bounty	good					180	0.83
1971	218	bounty	good					200	0.92
1972	218	bounty	good					100	0.46

Platinum - Only four bounty estimates and no household survey estimates are available for Platinum, Alaska.

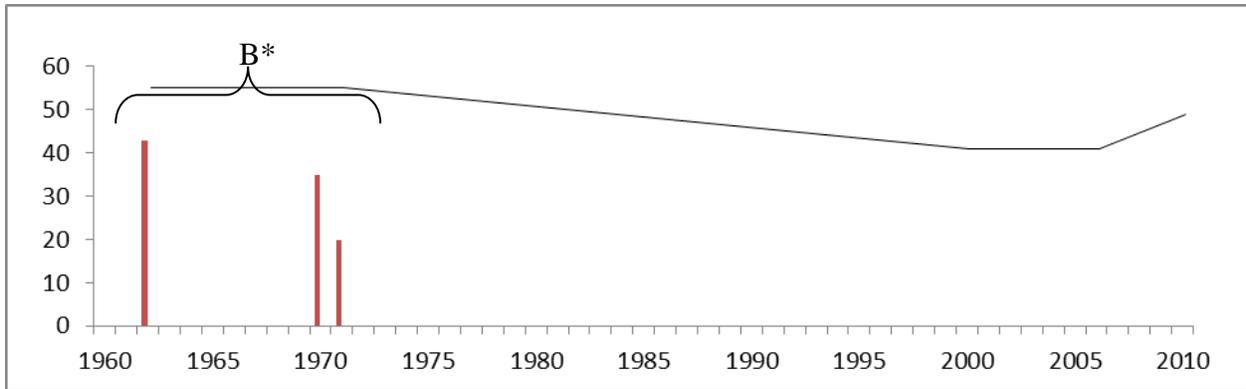


Figure 53. Estimated seal take (red bars) and human population (black line) for Platinum, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

Table 48. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Platinum, Alaska. Numbers are from Burns (1964, 1970, 1972, 1973) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1962	55	bounty	good					43	0.78
1970	55	bounty	good					35	0.64
1971	55	bounty	good					20	0.36
1972	55	bounty	good					0	0.00

Bristol Bay – In northern Bristol Bay, six villages are represented by the nonprofit arm of the Bristol Bay Native Corporation (Fig. 54). Bristol Bay has had some of the most consistency reporting for any region, but the surveys only included spotted seals and harbor seals. The Alaska Department of Fish and Game, Division of Subsistence cooperated with the Alaska Native Harbor Seal Commission to collect take information for harbor seals and sea lions across most of southern Alaska. In northern Bristol Bay spotted seals are taken and reported as harbor seals because they are nearly impossible to tell apart. Spotted seal take was then estimated depending on which month the seal was killed (Oct-May spotted, June-Sept harbor).



Figure 54. Northern Bristol Bay communities that take ice seals.

Togiak - No bounty records, but nineteen household survey estimates are available for Togiak. The Alaska Department of Fish and Game worked with the Bristol Bay Native Association and the ISC to collect the most recent estimates.

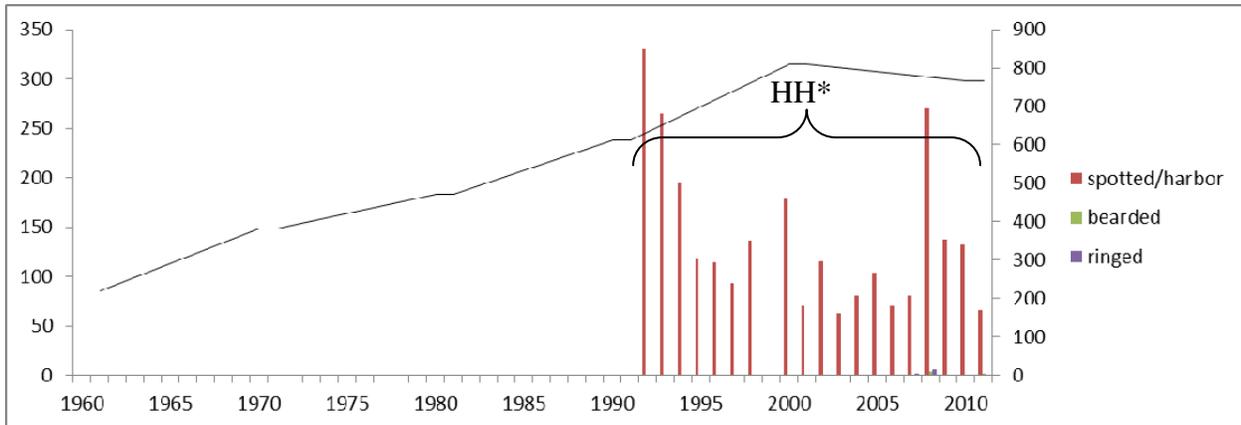


Figure 55. Estimated seals taken (red, green, and purple bars, left axis) and human population (black line, right axis) for Togiak, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Nelson (2009, 2010, 2011, 2013), and Commerce (2013).

Togiak continued.

Table 49. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Togiak, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Nelson (2009, 2010, 2011, 2013), and Commerce (2013).

year	People	method		Number of Seals					Per capita Take	Per capita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon	Total Take		
1992	648	household	good			330				0.51
1993	678	household	good			265				0.39
1994	704	household	good			194				0.28
1995	671	household	good			119				0.18
1996	664	household	good			114				0.17
1997	655	household	good			93				0.14
1998	663	household	good			136				0.21
2000	809	household	good			180				0.22
2001	800	household	good			70				0.09
2002	813	household	good			115				0.14
2003	803	household	good			63				0.08
2004	810	household	good			81				0.10
2005	811	household	good			104				0.13
2006	812	household	good			70				0.09
2007	816	household	good	1	2	81	0	84	0.10	0.10
2008	809	household	good	4	6	270	0	280	0.35	0.33
2009	814	household	good	0	1	138	0	139	0.17	0.17
2010	821	household	good	0	1	132	0	133	0.16	0.16
2011	842	household	good	2	0	66	0	68	0.08	0.08

Twin Hills - No bounty records, but fifteen household survey estimates are available for Twin Hills. The Alaska Department of Fish and Game worked with the Bristol Bay Native Association and the ISC to collect the most recent estimates.

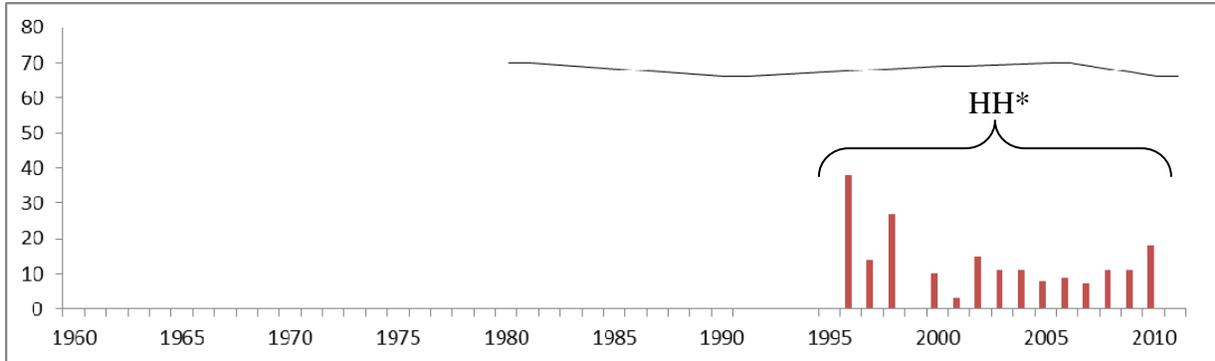


Figure 56. Estimated seals taken (red bars) and human population (black line) for Twin Hills, Alaska. Numbers are from Wolfe (1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Nelson (2009, 2010, 2011), and Commerce (2013).

Table 50. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Twin Hills, Alaska. Numbers are from Wolfe (1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Nelson (2009, 2010, 2011), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take	Percapita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon			
1996	66	household	good			38				0.58
1997	66	household	good			14				0.21
1998	66	household	good			27				0.41
2000	69	household	good			10				0.14
2001	69	household	good			3				0.04
2002	69	household	good			15				0.22
2003	69	household	good			11				0.16
2004	69	household	good			11				0.16
2005	70	household	good			8				0.11
2006	70	household	good			9				0.13
2007	70	household	good	0	0	7	0	7	0.10	0.10
2008	70	household	good	0	0	11	0	11	0.16	0.16
2009	70	household	good	0	0	11	0	11	0.16	0.16
2010	66	household	good	0	0	18	0	18	0.27	0.27

Manokotak - One bounty estimate and fifteen household surveys are available, the most recent from 2007. The surveys indicate that Manokotak takes almost exclusively harbor seals so there is no current ice seal monitoring.

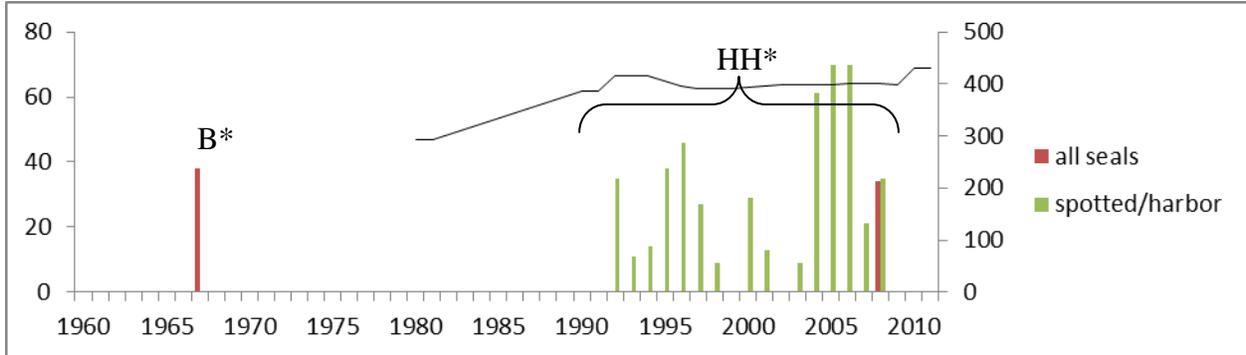


Figure 57. Estimated seals taken (bars, left axis) and human population (black line, right axis) for Manokotak, Alaska. Numbers are from Burns (1967), Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Holen *et al.* (2012), and Commerce (2013).

Table 51. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Manokotak, Alaska. Numbers are from Burns (1967), Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Holen *et al.* (2012), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Per capita Take	Per capita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon			
1967	290	bounty	good					38	0.13	
1992	415	household	good			35				0.08
1993	417	household	good			11				0.03
1994	415	household	good			14				0.03
1995	398	household	good			38				0.10
1996	394	household	good			46				0.12
1997	390	household	good			27				0.07
1998	390	household	good			9				0.02
2000	399	household	good			29				0.07
2001	394	household	good			13				0.03
2002	401	household	good			0				0.00
2003	396	household	good			9				0.02
2004	399	household	good			61				0.15
2005	400	household	good			70				0.18
2006	401	household	good			70				0.17
2007	403	household	good			21				0.05
2008 (Wolfe)	399	household	good			35				0.09
2008 (Holen)	399	household	good	9	3	22		34	0.09	0.06

Aleknagik - No bounty estimates and sixteen household surveys are available, the most recent from 2007. The surveys indicate that Aleknagik takes almost exclusively harbor seals so there is no current ice seal take monitoring.

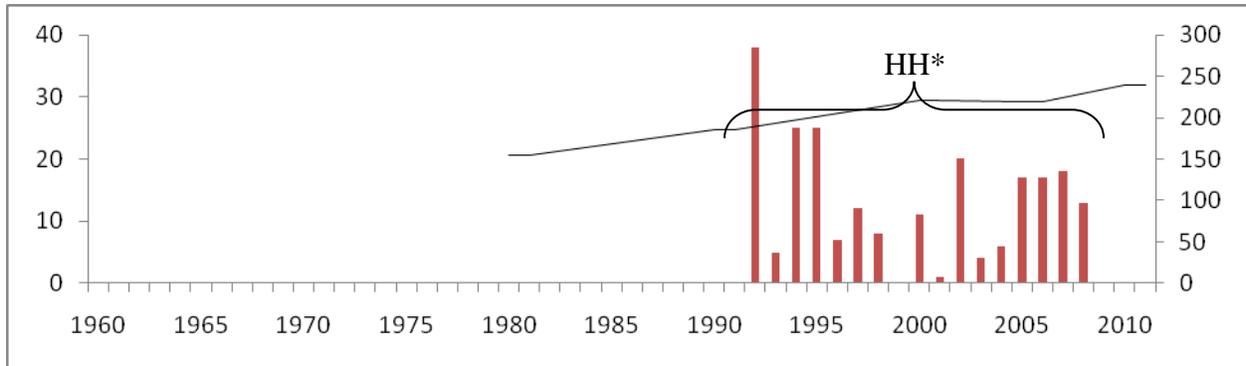


Figure 58. Estimated spotted/harbor seals taken (red bars, left axis) and human population (black line, right axis) for Aleknagik, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b) and Commerce (2013).

Table 52. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Aleknagik, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1992	194	household	good			38		0.20	
1993	195	household	good			5		0.03	
1994	194	household	good			25		0.13	
1995	184	household	good			25		0.14	
1996	182	household	good			7		0.04	
1997	180	household	good			12		0.07	
1998	168	household	good			8		0.05	
2000	221	household	good			11		0.05	
2001	218	household	good			1		0.00	
2002	222	household	good			20		0.09	
2003	219	household	good			4		0.02	
2004	221	household	good			6		0.03	
2005	222	household	good			17		0.08	
2006	222	household	good			17		0.08	
2007	223	household	good			18		0.08	
2008	221	household	good			13		0.06	

Dillingham - No bounty estimates and fifteen household surveys are available, the most recent from 2007. The surveys indicate that Dillingham takes almost exclusively harbor seals so there is no current ice seal monitoring. As the regional hub for the Bristol Bay region, estimating take information for Dillingham is more difficult because it is harder to identify and contact subsistence seal hunters due to the larger population of people and the higher percentage of non-Natives living there.

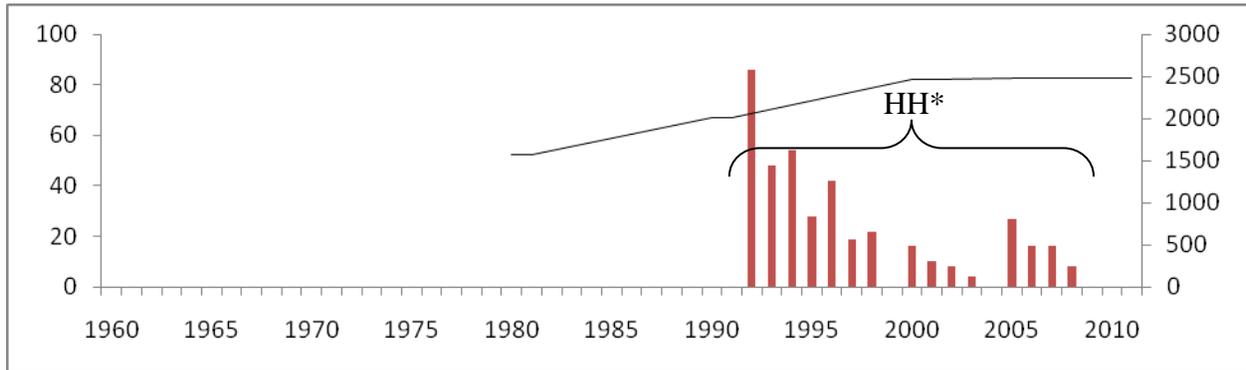


Figure 59. Estimated spotted/harbor seals taken (red bars, left axis) and human population (black line, right axis) for Dillingham, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b) and Commerce (2013).

Table 53. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Dillingham, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b) and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon		
1992	2141	household	good			86		0.04	
1993	2160	household	good			48		0.02	
1994	2163	household	good			54		0.02	
1995	2236	household	good			28		0.01	
1996	2313	household	good			42		0.02	
1997	2358	household	good			19		0.01	
1998	2313	household	good			22		0.01	
2000	2466	household	good			16		0.01	
2001	2438	household	good			10		0.00	
2002	2484	household	good			8		0.00	
2003	2440	household	good			4		0.00	
2004	2463	household	good			0		0.00	
2005	2477	household	good			27		0.01	
2006	2478	household	good			16		0.01	
2007	2483	household	good			16		0.01	
2008	2467	household	good			8		0.00	

Clark's Point - No bounty estimates and seventeen household surveys are available, the most recent from 2007. The surveys indicate that Clark's Point takes almost exclusively harbor seals so there is no current ice seal monitoring.

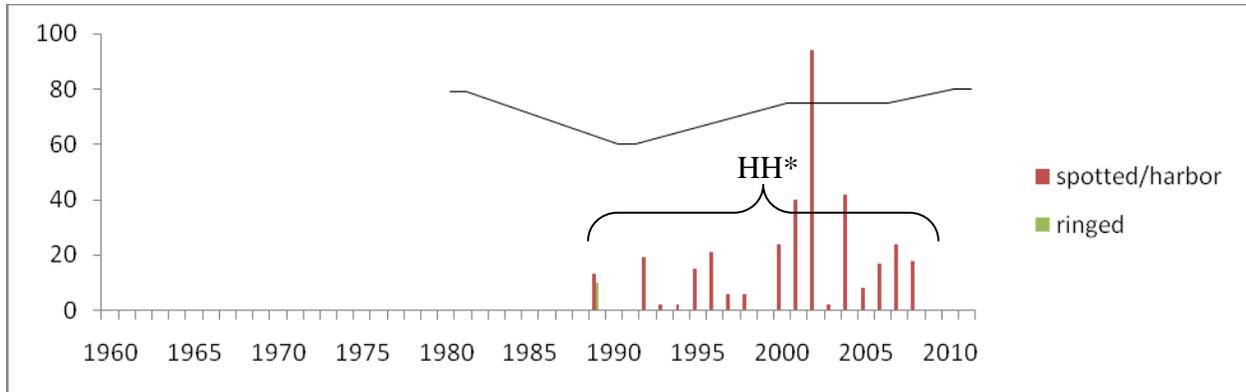


Figure 60. Estimated seals taken (red and green bars) and human population (black line) for Clark's Point, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Seitz (1996), and Commerce (2013).

Table 54. Number of people, survey method and rating, total take (estimated take + estimated struck but lost) for each species, total take for all species combined, and the percapita total take (total take / number of people) for all years with available data for Clarks Point, Alaska. Numbers are from Wolfe (1993, 1994, 1995, 1996, 1997, 1998, 1999, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009a, b), Seitz (1996), and Commerce (2013).

year	People	method		Number of Seals				Total Take	Percapita Take	Percapita Take (spotted)
		type	rating	Bearded	Ringed	Spotted	Ribbon			
1989	56	household	good		10	13		23	0.41	0.23
1992	60	household	good			19				0.32
1993	60	household	good			2				0.03
1994	60	household	good			2				0.03
1995	60	household	good			15				0.25
1996	60	household	good			21				0.35
1997	60	household	good			6				0.10
1998	60	household	good			6				0.10
2000	75	household	good			24				0.32
2001	74	household	good			40				0.54
2002	75	household	good			94				1.25
2003	74	household	good			2				0.03
2004	75	household	good			42				0.56
2005	75	household	good			8				0.11
2006	75	household	good			17				0.23
2007	75	household	good			24				0.32
2008	74	household	good			18				0.24

Discussion

Quality of the data

The best way to present the results of a survey is to estimate the take for the entire community for a 12 month period. Surveys should also collect information on species, month of take, and supplemental questions to understand what is going on the community that year (e.g., bad weather, ice conditions, large construction projects etc.). The good (HH*) surveys collected this information and presented it clearly. These take estimates should be considered the best estimates available. The poor (HH) surveys were usually ones in which the data had been presented with no way to know how or if the rest of the community had been estimated. The poor estimates should be considered carefully and they are usually a minimum take estimate.

Bounty records indicate that the program was unjustifiable as a means to protect or enhance commercial fishing north of Bristol Bay, but was instead viewed as a type of welfare for coastal communities and a means to monitor seal take (Burns et al. 1964). Therefore, I don't believe that the money offered for a dead seal (\$3 most years) was enough to encourage a take of seals much above a normal subsistence take level. There may have been times or years when more people hunted because of the bounty, but most of the variability in bounty years probably had more to do with weather, jobs, and ice conditions. Ringed seal skins were worth \$8.00 in 1962 and spotted seal skins were worth between \$10.00 and \$20.00 (Burns et al. 1964). The good (B*) bounty years were estimated to account for seals that were taken but not bountied. These are the best estimates we have for seal take during that timeframe. The poor (B) bounty years represent at least a minimum take for that year, but might be far below the true minimum.

In Bristol Bay the harbor seal/sea lion survey by the Alaska Native Harbor Seal Commission and the Alaska Department of Fish and Game, Subsistence Division collected some very good information, but estimated the spotted/harbor seal take based on month in which the seal was killed. This probably led to an underestimate of the take of harbor seals and an overestimated take of spotted seals especially in the later years of the study when there was less ice in the region and probably fewer spotted seals. Further genetic testing of the take should be completed to gain a better understanding of what species is present in the area when seals are hunted.

Confidentiality

Harvest monitoring programs strive to maintain complete confidentiality for subsistence users. The raw data sheets with the individual's information are kept confidential and a household number is used instead of the family's name. The information from the data sheets is compiled and only community totals are presented. This protects individual hunters and household identities. Once the data has been compiled and formulated into a usable product the information is brought back to the communities where they have the option of looking at the information and providing comments. This level of confidentiality is important to retain the trust of the communities and subsistence participants. Past surveys may have handled confidentiality a little differently, but the concepts and intent have remained constant.

Struck but Lost

The number of seals that were struck but lost is also very important as it allows an assessment of the total number of animals removed from the population and the true number of seals killed by each community in order to get what the community needs. Reporting the number of struck but lost seals also shows responsibility and concern by hunters and eliminates the need for the federal managers to estimate the number lost, which could be higher than the actual number. Other Alaska Native Co-management groups recognize the benefit of reporting take, including struck but lost, and put great effort into their take reporting (*e.g.*, Alaska Beluga Whale Committee, Alaska Eskimo Whaling Commission, and Alaska Native Harbor Seal Commission).

Recommendations

North Slope (North Slope Borough)

Data collection for the North Slope Region has been the most consistent as household surveys for seal take have been conducted annually since 1994, however due to funding, personnel time and higher priorities the data have not been compiled and presented in citable reports. Funding and or other assistance (*i.e.*, personnel, data analysis) should be provided to the NSB to encourage processing and reporting of these data.

Northwest Arctic (Maniilaq)

In Kotzebue, take data have been collected for five years since the end of the bounty. For Kivalina there are four years of data but in other Northwest Arctic villages data has been collected once or twice or not at all. Kotzebue was last surveyed in 2004 and should be the focus of another survey soon. Deering is another priority community in this region with only one survey since 1972. Deering, Kotzebue, and Kivalina should all be considered top priorities for ice seal surveys.

Bering Strait (Kawerak)

Nome has never completed a survey and no information exists except for the bounty. Collecting take information from Nome is a high priority for this region. The Kawerak survey from 2002 was never completed or published. This information should be finished and made available so it can be used. Diomede has very little information available, but probably takes a large number of seals. Diomede and Nome are the two most pressing communities, but a region wide effort to collect information should be considered.

Yukon Kuskokwim Delta (AVCP)

Chevak, Toksook Bay, Nightmute, Mekoryuk, Cheforak, Kipnuk, Eek, and Goodnews Bay all took more than 100 seals/year during the bounty but have not been surveyed since. All of these communities would be good candidates for conducting surveys with the higher harvesting communities as top priorities especially: Mekoryuk, Chevak, Cheforak, Goodnews Bay, and Toksook Bay. The Alaska Department of Fish and Game in Coordination with AVCP and Tununuk, Hooper Bay, Scammon Bay, Emmonak, and Quinhagak have begun conducting surveys in these communities and continuing these surveys is also a top priority for this region.

Bristol Bay (BBNA)

According to elders in the Togiak, taking bearded and ringed seals was a common occurrence in the past. According to the survey numbers only one or two bearded or ringed seals are taken each year in these areas now. Spotted seals are still taken, but since they resemble harbor seals so closely telling them apart is difficult to impossible and usually requires a genetic test. The top priority for the northern Bristol Bay region should be to increase genetic testing of the harbor/spotted seals to monitor the species composition of the harvest.

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