

**Survey Methodologies and  
Reported Sex Compositions  
of Harbor Seal Harvests  
of Alaska Natives, 1995-1997**

by

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## ABSTRACT

Alaska Native hunters consistently have reported higher proportions of male seals to female seals in annual subsistence harvests from 1992-98. This report examines survey methodology as a potential contributing factor to unbalanced sex compositions of subsistence harbor seals reported by Alaska Natives. The report compares estimates of sex compositions derived by two distinct methodologies -- a biosampling methodology and a retrospective recall methodology. Of 77 biosampled seals harvested by ten trained biosamplers in southeast Alaska during 1995-97, 62.3 percent were reported as "male" seals using a biosampling methodology. Of 407 seals (with reported sex) harvested for subsistence uses by the same ten hunters during 1995-97, 61.7 percent were reported as "male" seals using a retrospective recall methodology. Of 3,750 seals (with reported sex) harvested for subsistence uses by Alaska Natives in southeast Alaska during 1995-97, 65.3 percent were reported as "male" seals using a retrospective recall methodology. Two different methodologies across three sets of harvested seals produced similar estimates of sex composition. Based on the convergence of estimates, response bias due to survey methodology is not supported as a factor contributing to unbalanced sex compositions reported for harbor seal harvests.

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## INTRODUCTION

One consistent pattern in the annual subsistence harvests of harbor seals by Alaska Natives from 1992-98 has been unbalanced sex compositions (Wolfe and Mishler 1993, 1994, 1995, 1996, 1997, 1998; Wolfe and Hutchinson-Scarborough 1999). Hunters have consistently reported higher proportions of male seals to female seals in the annual harvest, varying from 2.0 to 2.4 males for every female harvested annually at the statewide level. Considering kills of known sex from 1992-98, 68.1 percent have been reported as males (7,888 males and 3,666 females). Higher proportions of males have been reported in all regional harvests – southeast region (67.8 percent males), North Pacific Rim (70.5 percent), Kodiak Island (69.2 percent), South Alaska Peninsula (75.9 percent), Aleutian Islands (69.6 percent), and Bristol Bay (73.0 percent) (Wolfe and Hutchinson-Scarborough 1999:56).

The reasons for the disproportionate numbers of male seals in harvest reports are uncertain. Segregation of males and females in seal groups hunted by Alaska Natives may be one factor. Another factor may be the greater elusiveness of female seals when disturbed, presenting fewer and more difficult shots to hunters (see Wolfe and Mishler 1998:60-68). However, the contributions of these or other factors as yet have not received independent assessment.

This report examines survey methodology as a potential contributing factor to reported unbalanced sex compositions. Since 1992, subsistence harvest information has been gathered from hunters using face-to-face, retrospective recall surveys administered once or twice a year (cf. Wolfe and Hutchinson-Scarborough 1999:2-13). A hunter has been asked to recall information on seals harvested during the previous survey period, which may be as much as 12 months' duration. It is possible that some level of inaccuracy in reported sex composition may result from this type of methodology, leading to a bias toward male seals in harvest reports. Would unbalanced sex compositions also be reported using alternative data collection methodologies?

An opportunity to independently assess the sex composition of harvested harbor seals using a substantially different methodology arose in the southeast Alaska region. From January 1995 through December 1997, a program for collecting tissue samples from a set of subsistence seals was conducted in the southeast Alaska as part of the

annual harvest assessment program (Turek 1996). The biosampling program provides a second assessment of sex composition of harbor seals harvested for subsistence, albeit for a relatively smaller subset of seals. A comparison of the independent estimates of sex compositions allows for an assessment of “concurrent”, or “synchronic”, reliability, the extent to which alternative methodologies arrive at similar measurements of a variable within a similar time period (Kirk and Miller 1989:42).

## PURPOSE

This paper reports the sex composition of harbor seals harvested in southeast Alaska between 1995-97 as part of a biosampling program. The paper compares the sex composition of seals reported in the biosampling program with the sex composition of seals reported in the annual subsistence harvest assessment program to examine potential relationships of survey methodologies and reported sex compositions.

## THE BIOSAMPLING PROGRAM, 1995-97

The harbor seal biosampling program in the southeast region was a cooperative effort involving marine mammal hunters, the Divisions of Subsistence and Wildlife Conservation of the Alaska Department of Fish and Game, the National Marine Fisheries Service, and the University of Alaska (Turek 1996). The marine mammal research program was funded by the National Oceanic and Atmospheric Administration and National Marine Fisheries Service (50ABNF400080 and NA66FX0476). The project was approved by the tribal government of each surveyed community. Technical oversight was provided by the Alaska Native Harbor Seal Commission.

During 1995-97, ten hunters from six communities in southeast Alaska collected biological tissue samples from seals harvested for subsistence uses (Table 1). The six communities in which tissues were collected (Angoon, Craig, Ketchikan, Klawock, Sitka, and Yakutat) were selected to provide wide geographic representation of harbor seal populations in the southeast region, so that tissue samples might be used for genetic stock assessment and dioxin screening (Turek 1996). The ten biosamplers were selected from active seal hunters in each selected community. Each received face-to-face training in collecting, preserving, documenting, and shipping tissue samples. The tissue sampling protocol directed the hunters to record sex, pregnancy status, length,

and weight of each harvested seal. Hunters were trained to take samples which included fat, skin, muscle, liver, kidney, heart, whiskers, and teeth. Whole stomachs were taken from most seals. In 1995, heads were preserved for cranial measurements. There were no special instructions regarding selection of seals for sampling, other than that the seals be harvested by hunters as part of the regular subsistence harvests in the participating communities.

## FINDINGS

### The Sex Composition of Biosampled Seals

Hunters collected tissue samples from 77 harbor seals as part of the biosampling program from January 1995 through December 1997. The sex composition of the 77 biosampled seals is shown in Table 1. There was an unbalanced sex ratio in the set of biosampled seals, with disproportionately more male seals than female seals. Overall, there were 48 males (62.3 percent) and 29 females (37.7 percent) in the set of biosampled seals. This represents 1.7 male seals for each female seal harvested.

### Comparisons with Subsistence Seal Harvests

Figure 1 presents comparisons of the percentages of male seals in the set of 77 biosampled seals with two other seal harvest sets. During 1995-97 (the biosampling years), Alaska Native hunters in 16 communities of the southeast region reported a subsistence harvest of 4,704 seals, of which 2,449 seals were reported as males (52.1 percent), 1,301 as females (27.7 percent), and 954 as "sex unknown" (20.3 percent). Of the seals of reported sex, 65.3 percent were males (see Fig. 1). The estimates of male seals in the biosampled seal harvest (62.3 percent) and the region's subsistence harvest of 3,750 seals with reported sex (65.3 percent) differed by only 3.0 percent.

A second comparison in Fig. 1 is with the complete subsistence harvests of the ten hunters who participated in the biosampling program. In response to the annual harvest assessment survey from 1995-97, the ten hunters reported harvesting 432 seals for subsistence uses, of which 251 were reported as males (58.1 percent), 156 as females (36.1 percent), and 25 as "sex unknown" (5.8 percent) (Table 1). Of the seals of reported sex, 61.7 percent were males (see Fig. 1). For the ten biosamplers as a group,

the estimates of male seals in the set of 77 biosampled seals (62.3 percent) and in the subsistence harvest of 407 seals with reported sex (61.7 percent) differed by only 0.6 percent.

## DISCUSSION

The comparison of the sex compositions of the seal harvest sets in Fig. 1 allows for an examination of the potential relationships of survey methodologies and reported sex compositions. The estimates of sex composition in Fig. 1 derive from two substantially different data collection methodologies.

The annual subsistence harvest assessment survey asks hunters to recall the sexes of all seals harvested within the previous survey period, a length of time which can be as much as 12 months prior to the report. The retrospective recall approach is the predominate methodology for estimating subsistence harvests in Alaska by the Division of Subsistence, Alaska Department of Fish and Game (Fall 1990). The retrospective survey methodology may be susceptible to at least three potential sources of error linked to hunter uncertainty. It is possible that some level of inaccuracy results from: (1) memory attrition, due to the retrospective recall period; (2) inattentiveness, due to a surveyed hunter not specifically noting the sex of a seal harvested for subsistence; and (3) confusion, due to a surveyed hunter having to remember the sexes of multiple seals. To accommodate "uncertainty", the retrospective survey methodology provides the category, "sex unknown", as a response option if there is uncertainty about the sex of a harvested seal. Hunters commonly have used this response option. As stated above, 20.3 percent of the 4,704 seals harvested for subsistence in the southeast region from 1992-95 were reported as "sex unknown". However, even with this response option, it is possible that there are errors in reports due to hunter uncertainty. If there is some systematic bias in the errors, wherein seals of uncertain sex are disproportionately reported as "males", then the retrospective survey methodology might be a factor contributing to the unbalanced sex composition reported for harvested seals.

The biosampling methodology allows for a general test of this possible source of response bias. The biosampling protocol used a methodology that substantially differs from the retrospective recall approach. In the protocol for biosampled seals, a hunter was instructed to record biological information from a seal soon after the kill, which in all

cases was within 24-hours. The hunter was instructed to specifically note the sex of each seal harvested as part of the protocol. Information was recorded on a single seal at a time. The biosampling methodology on its face seems much less susceptible to the three potential errors of uncertainty -- memory attrition, inattentiveness to a seal's sex, and confusion among multiple kills -- compared with the retrospective recall survey used in the annual harvest assessment program. The biosampling methodology has a short time interval between the kill and the recording of information, requires the hunter specifically to note the sex of a harvested seal, and deals with a single seal per report.

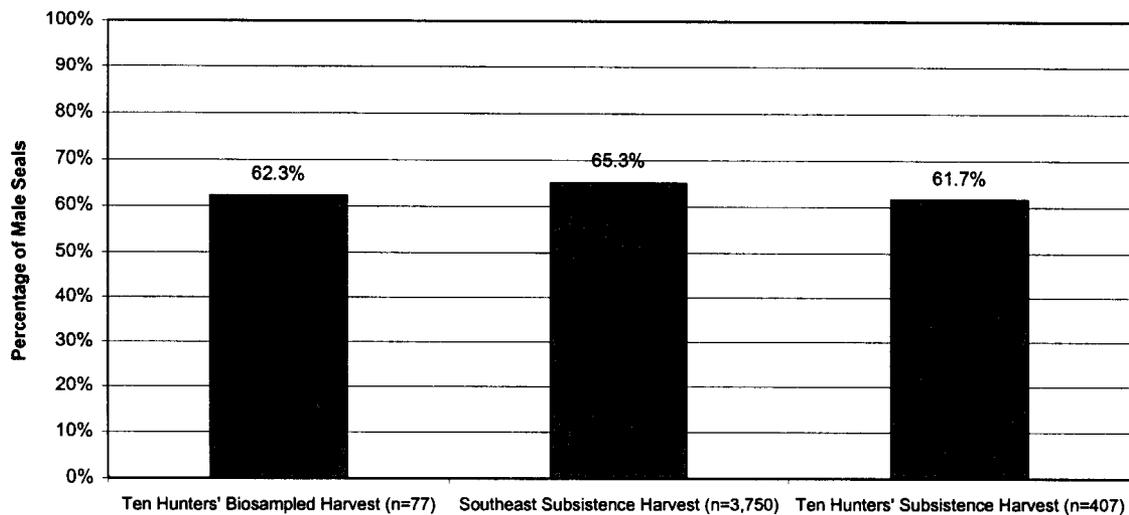
As shown in Fig. 1, the two different methodologies produced similar estimates of sex composition across three different sets of seal harvests. The set of 77 biosampled seals comprised a relatively small subset of the 4,704 seals harvested for subsistence in southeast Alaska during 1995-97, and a subset of the 407 seals harvested for subsistence by the ten hunters participating in the biosampling program. For all three sets of seals, there were similar estimates for sex composition -- about 62-65 percent of the harvests were reported as male seals. The convergence of these estimates using different methodologies provides no support for a response bias due to the type of survey methodology as being a contributing factor to unbalanced sex compositions. "Synchronic reliability" refers to the extent to which two simultaneous observations yield the same information (Kirk and Miller 1989). In this instance, reliability appears to be high because alternative methodologies during the same time period produced similar measurements of sex composition. The convergence of estimates increases one's confidence in the reliability of sex composition information provided by hunters using each methodology.

In conclusion, response bias due to survey methodology is not supported as a factor contributing to the unbalanced sex composition reported for harbor seal harvests. Disproportionate numbers of male seals in the annual subsistence harvest are observed using two, substantially different methodologies. The findings suggest that factors other than survey methodology should be examined to explain the disproportionate numbers of male seals in Alaska's subsistence harbor seal harvest.

Table 1. Sex Composition of Biosampled Seals, and Subsistence Seal Harvests of Ten Hunters, 1995-97

Community	Hunter ID	Years	Biosampled Seals, 1995-97				Subsistence Seal Harvest, 1995-97				
			Male Seals	Female Seals	Total Seals	Percent Males	Male Seals	Female Seals	Seals Sex Unknown	Total Seals	Percent Males of Seals with Reported Sex
Angoon	77	1995	0	1	1	0.0%	1	0	2	3	100.0%
Angoon	140	1996-97	2	1	3	66.7%	7	2	6	15	77.8%
Angoon	144	1997	4	2	6	66.7%	12	0	2	14	100.0%
Craig	1	1996	1	0	1	100.0%	2	4	0	6	33.3%
Ketchikan	54	1995-96	4	6	10	40.0%	21	15	10	46	58.3%
Klawock	2	1996	3	2	5	60.0%	72	26	0	98	73.5%
Sitka	4	1995	6	0	6	100.0%	10	0	4	14	100.0%
Sitka	112	1995-96	6	5	11	54.5%	3	9	0	12	25.0%
Sitka	131	1997	13	6	19	68.4%	6	3	1	10	66.7%
Yakutat	50	1996	9	6	15	60.0%	117	97	0	214	54.7%
			<b>48</b>	<b>29</b>	<b>77</b>	<b>62.3%</b>	<b>251</b>	<b>156</b>	<b>25</b>	<b>432</b>	<b>61.7%</b>

Fig. 1. Percentage of Male Seals in Biosampled Harvest and Two Other Seal Harvest Sets, 1995-97



## REFERENCES

- Fall, James A.  
1990 The Division of Subsistence of the Alaska Department of Fish and Game: An Overview of Its Research Program and Findings: 1980-1990. Arctic Anthropology 27(2):68-92.
- Kirk, Jerome and Marc L. Miller  
1989 Reliability and Validity in Qualitative Research. Sage University Paper series on Qualitative Research Methods, Volume 1, Beverly Hills, CA: Sage.
- Turek, Michael F.  
1996 Marine Mammal Bio-Sampling in Southeast Alaska, 1995-96. Memorandum to Bob Wolfe and Bob Schroeder dated September 16, 1996.
- Wolfe, Robert J. and Craig Mishler  
1993 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1992. Technical Paper No. 229, pts. 1 and 2. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Craig Mishler  
1994 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1993. Technical Paper No. 233, pts. 1 and 2. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Craig Mishler  
1995 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1994. Technical Paper No. 236. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Craig Mishler  
1996 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1995. Technical Paper No. 238. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Craig Mishler  
1997 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1996. Technical Paper No. 241. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Craig Mishler  
1998 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1997. Technical Paper No. 246. Division of Subsistence, Alaska Department of Fish and Game.
- Wolfe, Robert J. and Lisa Hutchinson-Scarborough  
1999 The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1998. Technical Paper No. 250. Division of Subsistence, Alaska Department of Fish and Game.