Subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos during 2009

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ABSTRACT

In 2009, 38 bowhead whales (*Balaena mysticetus*) were struck during the Alaskan subsistence hunt resulting in 31 animals landed. Total landed for 2009 was a bit less than the average over the past 10 years (1999-2008: mean = 40.1; *SD* = 7.2). The efficiency (# landed / # struck) of the hunt was 82%, which is about the average during 1999-2008 (mean = 78%, *SD* = 8%). Spring hunts are logistically more difficult than autumn hunts because of cold weather conditions and the dynamic physical challenges associated with hunting whales in sea ice. Typically, hunt efficiency during spring is lower than autumn. In 2009, however, the efficiency of the spring hunt (85%) was somewhat similar to the autumn efficiency (80%). This is likely due to the extremely difficult environmental conditions during spring 2009, which resulted in relatively few strikes at Barrow, Wainwright and Point Hope. The few strikes that were used were mostly successful. Of the landed whales, 18 were females, 12 were males, and sex was not determined for one animal. Based on total length, 6 of the 18 females were presumed mature (>13.4m in length). Two of the mature females were examined closely. One was pregnant with a 1.63m female fetus and the other was not pregnant. The other mature females were not closely examined as biologists were either not stationed in the villages or the whales were butchered in the water and access to internal organs was limited. Two landed whales were female calves; 6.2 and 6.6m in length. Both animals were taken during the autumn. Fall calves are nearly the size of yearlings and the hunters mistakenly thought these animals were independent subadults.

KEYWORDS: ARCTIC; *BALAENA MYSTICETUS*; BOWHEAD WHALE; STATISTICS; WHALING-ABORIGINAL

INTRODUCTION

The subsistence harvest of bowhead whales (*Balaena mysticetus*) provides important nutritional and cultural needs for several Native communities in northern and western Alaska (United States) and eastern Chukotka (Russia). The Alaska Eskimo Whaling Commission (AEWC) locally manages the harvest through an agreement with the National Oceanic and Atmospheric Administration (NOAA). The level of allowable harvest is determined under a quota system in compliance with the International Whaling Commission (IWC 1980; Gambell 1982). The quota is based on the nutritional and cultural needs of Alaskan Eskimos as well as on estimates of the size and growth of the Bering-Chukchi-Beaufort seas stock of bowhead whales (Donovan, 1982; Braund, 1992). In 2007, a five-year block quota ended (IWC 2003) and the new five-year block quota begin in 2008 (http://www.iwcoffice.org/meetings/meeting2007.htm). Point Lay, a village located in northwest Alaska, became the 11th AEWC member during 2008 and they re-established their traditional bowhead hunting seasons, primarily spring but also during autumn.

The subsistence hunt typically occurs during spring and autumn as whales migrate between the Bering and Beaufort seas. Hunters on St. Lawrence Island in the northern Bering Sea may harvest whales during the

winter as well. Bowhead harvests are subjected to considerable environmental interference from weather (wind speed and direction, fog, and temperature), stability of landfast ice, and sea ice concentration and type. The success of each hunt is greatly affected by these factors and shows considerable annual and regional variation.

Since 1981, the North Slope Borough Department of Wildlife Management has gathered basic data on landed whales in several communities, especially Barrow. Additionally, with assistance from the Alaska Department of Fish and Game we have collected detailed information and tissues samples from harvested whales landed at Kaktovik, Saint Lawrence Island, Little Diomede Island, and other villages in recent years. We assisted the AEWC in compiling statistics on landed and struck and lost whales (Albert, 1988). The objectives of this paper were to document: (1) the number, location (village), and dates of landed and struck-and-lost bowhead whales during 2009 in Alaska, (2) the estimated fate of struck and lost bowhead whales, (3) basic morphometric data and the sex composition of the harvest, (4) the hunting efficiency of the harvest, and (5) report relevant additional observations (hunting conditions, unusual pathology, etc.).

METHODS

Harvest data on sex, standard length, harvest and landed dates, and fate of struck and lost whales for all whaling villages were obtained from the AEWC. Biologists recorded similar information for most whales taken at Barrow, Gambell, Savoonga, and Kaktovik. Biologists also collected tissue samples and detailed morphometric data.

We estimated the approximate animal age and reproductive status based on several published criteria. Females with a total body length that is greater than 13.4m in length are considered to be sexually mature (George *et al*. 2004). Previously, we assumed sexual maturity at a total length of 14.2m for females (Tarpley and Hillmann 1999). Additional data and analysis has refined this length to 13.4m, although females shorter than this can be pregnant and females greater in length can be immature (George *et al*. 2004). Males with a total body length greater than 13m are considered to be sexually mature (O'Hara *et al*. 2002).

RESULTS AND DISCUSSION

During 2009, 38 whales were struck during the Alaskan subsistence hunt. The total number of whales landed (n = 31) in 2009 was less than the average number of whales landed (per year) over the previous 10 years (1999-2008: mean = 40.1 whales, *SD* = 7.2).

Hunting conditions during spring 2009 were similar to conditions in 2008 and were problematic throughout the northern and western Alaskan coast. Ice and weather conditions prevented hunters from Little Diomede, Kivalina, and Wales from striking a whale. Gambell hunters only landed one whale on 23 April (Table 1). Point Hope and Wainwright, on the coast of the Chukchi Sea, landed only one whale each during late May and early June, respectively. These two villages typically land whales in April or early May (Suydam and George 2004). Hunting conditions at Barrow were poor in the spring mainly due to persistent west winds. In spring, leads along the northwestern Chukchi Sea coast of Alaska to the Bering Strait will close with even light westerly winds (George et al., 2003) and preclude whale hunting. Only four whales were landed there between 17 and 23 May (Table 1) partly because of great difficulty in accessing the leads due to an unusual band of frozen slush ice (Inupiat: mugalik) along the lead edge. This also made hauling whales onto the ice an arduous task. During the spring hunt in Barrow, bowheads are more commonly landed in late April or early May. The village of Point Lay landed a 15.1m female on 5 May, its first whale in more than 70 years.

Twenty whales were landed during the autumn migration by three villages (Barrow, Kaktovik, and Nuiqsut; Table 1). Kaktovik hunters landed three whales during the last two weeks of September, and Nuiqsut landed two whales, on 11 and 13 September. The hunt in Kaktovik typically takes place during the first week of September but was postponed due to the death of a community member and bad weather prevented hunting during the second week of September. Nuiqsut experienced high

winds, which precluded hunting in early September. At Barrow, 15 bowheads were landed during the autumn harvest. The harvests extended from 26 September to 10 October. During that period, occasional strong winds (> ~15 knots) precluded hunters from pursuing whales.

Of the 7 whales that were struck and lost in 2009, two had a good chance of survival, one had a poor chance of survival, one died, and three whales had an unknown chance of survival. The estimates of survival are based on the Captain's assessment (Table 2 and 3).

The overall efficiency of the hunt (# landed / # struck) in 2009 was 82%, which is close to the average efficiency over the past 10 years (1999-2008: mean = 78%, *SD* = 8%). The efficiency of the harvest has increased steadily since the mid-1970s, although it seems to have stabilized since the mid-1990s (Suydam et al. 2008). The increase was due to many factors including enhanced communication among hunting crews, training of younger hunters, and improved weaponry.

The success of the spring hunt is sensitive to environmental conditions (George *et al*., 2003), and thus is quite vulnerable to effects from climate change. At Point Hope and Barrow, the efficiency of the spring harvest tends to be lower than the autumn harvest due to ice and weather conditions as well as struck whales escaping under the shorefast ice. However, in 2009, the efficiency of the spring harvest was 85%, although there were few strikes used, whereas the efficiency of the autumn hunt was 80% (Table 2). The timing of the spring harvest in these communities was extremely difficult due to persistent west winds in late April and the first several weeks of May that closed open water leads. There was little open water during the spring near northern villages, thus, very few whales were struck. The strikes that were used were mostly successful It appears that global climate change has contributed to the observed reduction in the stability and predictability of shore-fast ice contributing to a lower efficiency or more difficult hunting conditions in spring hunting locations. Hunter observations confirm thinning sea ice and pressure ridges that are not as large or anchored with multi-year ice. The autumn hunts typically occur in more open water conditions, thus sea ice is less of an influence on success. However, high wind speeds during the open water period in the autumn do contribute to difficult hunting conditions. As climate change causes a greater and longer period of retreat of sea ice, the longer fetch contributes to larger swells that can persist after the wind has abated; however, the overall hunting period has been much longer in recent years due to sea ice retreat. High winds delayed hunts at Kaktovik and Nuiqsut until the latter half of September 2009.

Twelve (40%) of the 30 landed whales of known sex were males. The longest male was 15.2m and the shortest was 8.0m. Based on a length of >13m (O'Hara *et al*. 2002), five males were presumably sexually mature. Confirmation of reproductive status is pending results of histological and hormonal analyses of a subset of the other whales.

Eighteen (60%) of the landed whales of known sex were females. The longest female was 16.4m in length and the shortest was 6.2m. Based on a length > 13.4m (George *et al*. 2004), six of these females were estimated to be sexually mature. Biologists were able to closely examine two mature females. One of the whales (09KK1; Table 1) was pregnant with a female fetus 1.64m in length. The other (09S1) was not pregnant.

The sex of one animal was not determined. DNA testing to determine gender is pending.

The two smallest whales landed were female calves. One animal (09KK3) was 6.6m in length with baleen length of 38cm. The other (09N2) was 6.2m in length but baleen length was not measured. There was no milk present in the stomach of either whale. A bowhead less than 7.5 m in length and with baleen less than 60 cm is typical of a calf (George and Suydam, 2006). These two calves were seen swimming alone in the Beaufort Sea near Kaktovik and Nuiqsut and were mistakenly identified as independent subadult animals. A whale landed in Barrow (09B11) was also short (7.2m) but its baleen was 72cm long, suggesting it was not a calf. Determining the exact length of a whale is very difficult while it is swimming and determining the baleen length is impossible. The length and age at weaning (i.e., independence) is not known for bowheads but likely occurs within the first year.

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Table 1. Village, whale identification number, date landed, standard length (meters) and sex of bowhead whales landed by Alaskan Eskimos during the 2009 subsistence hunt.

Village	Whale ID#	Date Landed	Length (m)	Sex
Barrow	09B1	5/17/2009	8.4	F
	09B2	5/23/2009	14.8	M
	09B3	5/23/2009	14.6[1]	F
	09B4	5/23/2009	?[2]	?
	09B5	9/26/2009	9.8	M
	09B6	9/26/2009	9.9	M
	09B7	9/26/2009	11.3	F
	09B8	9/26/2009	10.3	F
	09B9	9/27/2009	8.7	M
	09B10	9/27/2009	8.9	F
	09B11	9/29/2009	7.2	F
	09B12	9/29/2009	8.7	F
	09B13	9/30/2009	8.0	M
	09B14	9/30/2009	10.2	F
	09B15	10/6/2009	8.7	M
	09B16	10/6/2009	7.8	F
	09B17	10/6/2009	9.9	F
	09B18	10/10/2009	8.4	M
	09B19	10/10/2009	10.6	F
Gambell	09G1	4/23/2009	12.8	M
Kaktovik	09KK1	9/14/2009[3]	15.3	F[4]
	09KK2	9/26/2009	13.2	M
	09KK3	9/29/2009	6.6	F[5]
Nuiqsut	09N1	9/11/2009	14.9	F
	09N2	9/13/2009	6.2	F[5]
Point Hope	09H1	5/30/2009	15.2[1]	M
Point Lay	09PL1	5/5/2009	15.1	F
Savoonga	09S1	4/15/2009	13.5	F
	09S2	4/17/2009	14.9	M
	09S3	4/18/2009	13.3	M
Wainwright	09WW1	6/5/2009	16.4	F

[1] Length estimated because whale was not hauled completely onto the ice.
[2] Whale was brought to the ice edge but was later abandoned because of dangerous ice conditions; it was not measured and the sex was not determined.
[3] Whale was struck on 13 September but landed on 14 September.
[4] Pregnant with a 1.63m female fetus.
[5] Calf.

Table 2. Locations, dates, season, and Captains' estimate of survival for whales that were struck and lost during 2009. Data provided by the Alaska Eskimo Whaling Commission.

Village	Date	Season	Estimated Survival
Barrow	9/29/2009	Autumn	Unknown
	10/6/2009	Autumn	Unknown
	10/6/2009	Autumn	Died (and sank)
Gambell	4/19/2009	Spring	Good
	4/21/2009	Spring	Good
Kaktovik	10/1/2009	Autumn	Unknown
Nuiqsut	9/24/2009	Autumn	Poor

Table 3. Summary of the number of landed bowhead whales and Captains' estimate of survival for whales that were struck and lost during 2009. Data provided by the Alaska Eskimo Whaling Commission.

Village	Landed	Struck & Lost	Total Struck	Estimated Survival[1]
Barrow	19	3	22	2U; D
Gambell	1	2	3	2G
Kaktovik	3	1	4	U
Nuiqsut	2	1	3	P
Point Hope	1	-	1	-
Point Lay	1	-	1	-
Savoonga	3	-	3	-
Wainwright	1	-	1	-
Totals	31	7	38	3U; 2G; P; D

[1] U=unknown; G=good; P=poor; D=died.