

Subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos during 2008

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ABSTRACT

In 2008, 50 bowhead whales (*Balaena mysticetus*) were struck during the Alaskan subsistence hunt resulting in 38 animals landed. Total landed for 2008 was similar to the average over the past 10 years (1998-2007: mean = 40.4; $SD = 7.1$). The efficiency (# landed / # struck) of the hunt was 76%, which is higher than the average during 1998-2007 (mean = 65%, $SD = 8\%$). Spring hunts are more difficult than autumn ones because of challenging sea ice, weather conditions, and struck whales diving under the shore-fast or into the broken pack ice. The efficiency of the spring hunt was 60% compared to an autumn efficiency of 92%. Of the landed whales 18 were males, 19 were females and sex was not determined for one animal. Of the 19 females of known length, 6 were presumably mature (>13.4m in length). Only one of the mature females was examined closely and she had an active follicle. Hunters reported that one mature female was pregnant with a fetus approximately ~3m in length. Most of the mature females were not closely examined as biologists were either not stationed in the villages or the whales were butchered in the water. One landed whale was a (male) calf, 7.2 m in length, which was swimming alone. Hunters thought this animal was an independent subadult.

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

INTRODUCTION

The subsistence harvest of bowhead whales (*Balaena mysticetus*) provides important subsistence needs for several Native communities in northern and western Alaska 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 began in 2008 (<http://www.iwcoffice.org/meetings/meeting2007.htm>). Another village, Point Lay, located in northwest Alaska became the 11th AEW member during 2008. They intend to hunt during spring and, if necessary, 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 variation by year and location.

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, and other villages in recent years. We assisted the AEW 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 in 2008 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 AEW. 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 2008, 50 whales were struck during the Alaskan subsistence hunt. The total number of whales landed ($n = 38$) in 2008 was similar to the average number of whales landed (per year) over the previous 10 years (1998-2007: mean = 40.4 whales, $SD = 7.1$).

Hunting conditions during spring 2008 were problematic throughout the northern and western Alaskan coast. Ice and weather conditions prevented hunters from Gambell, Little Diomedea, Kivalina, Wales, and Point Lay from striking a whale. Savoonga hunters landed two; one on 8 April and one on 27 April (Table 1). Point Hope and Wainwright were able to land two whales each during mid to late May. These villages typically land whales in April or early May (Suydam and George 2004). Hunting conditions at Barrow were more favorable in the spring. Nine whales were landed between 27 April and 11 May (Table 1).

Nineteen whales were landed during the autumn migration by three villages (Barrow, Kaktovik, and Nuiqsut; Table 1). Kaktovik hunters landed three whales during the first two weeks of September, and Nuiqsut landed four whales between 5 and 9 September. Both villages had suitable weather for hunting. At Barrow, the autumn harvest was somewhat longer than in past seasons and occurred from 5 to 23 October. During that period, occasional strong winds ($> \sim 15$ knots) precluded hunters from pursuing whales.

Four whales were landed by Gambell and Savoonga on Saint Lawrence Island in late November and December 2008. Since the mid-to late 1990s, hunters have changed the timing and location of hunting and include a late autumn harvest to adjust to changing environmental conditions as well as an increased whale population (Suydam and George 2004).

Of the 12 whales that were struck and lost in 2008, one had an excellent chance of survival, two had a fair chance of survival, four died, and five 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 2008 was 76%, which is higher than the average level of efficiency over the past 10 years (1998-2007: mean = 65%, *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 was lowered due to ice and weather conditions as well as struck whales escaping under the shorefast ice. As a result, the efficiency of the spring harvest was 60% whereas the efficiency of the autumn hunt was 92% (Table 2). It is likely that global warming has contributed to the observed reduction in the stability of shore-fast ice contributing to a lower efficiency in those locations where hunting occurs in the spring. 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 open water conditions, thus the ice has less of an influence on success.

Eighteen (49%) of the 37 landed whales of known sex were males. The longest male was 17.7 m and the shortest was 7.2 m. Based on a length of >13 m, three males were presumably sexually mature (O'Hara *et al.* 2002), however, one male 12.4 m in length (08B10) was also sexually mature based on the presence of sperm in the epididymis. Confirmation of reproductive status is pending results of histological and hormonal analyses of a subset of the other whales.

Nineteen (51%) of the landed whales were females. The longest female was 16.5 m in length and the shortest was 7.6 m. Based on a length > 13.4 m (George *et al.* 2004), six of the females landed in 2008 were estimated to be sexually mature. Biologists were able to closely examine one of those mature animals. One of the whales not closely examined was reported pregnant with a fetus ~3 m in length (Table 1).

The smallest whale landed was a male calf based on standard length, baleen length (42 cm long) and the presence of milk in his stomach. 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). This particular whale was seen swimming alone in the eastern Beaufort Sea near Kaktovik and the hunters thought it was an independent subadult animal. 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 2008 subsistence hunt.

Village	Whale ID#	Date Landed	Length (m)	Sex
Barrow	08B1	4/27/2008	8.7	F
	08B2	4/28/2008	8.8	M
	08B3	5/7/2008	9.2	M
	08B4	5/7/2008	8.7	F
	08B5	5/8/2008	9.2	F
	08B6	5/8/2008	8.6	M
	08B7	5/8/2008	9.2	M
	08B8	5/10/2008	8.4	F
	08B9	5/11/2008	8.4	M
	08B10	10/5/2008	12.4	M
	08B11	10/6/2008	8.9	F
	08B12	10/6/2008	9.3	M
	08B13	10/9/2008	10.6	M
	08B14	10/9/2008	13.6	F
	08B15	10/9/2008	12.7	M
	08B16	10/14/2008	8.1	F
	08B17	10/14/2008	9.0	M
	08B18	10/14/2008	8.3	F
	08B19	10/17/2008	8.2	F
	08B20	10/22/2008	8.7	F
	08B21	10/23/2008	8.3	M
Gambell	08G1	11/30/2008	14.3	M
	08G2	12/1/2008	14.3	F
Point Hope	08H1	5/8/2008	13.7	F
	08H2	5/25/2008	16.0	U
Savoonga	08S1	4/8/2008	7.6 ¹	F
	08S2	4/27/2008	13.7 ¹	M
	08S3	11/27/2008	17.7 ¹	M
	08S4	11/27/2008	16.5 ²	F
Wainwright	08WW1	5/18/2008	16.2	F
	08WW2	5/26/2008	16.2	F
Kaktovik	08KK1	9/6/2008	7.2 ³	M
	08KK2	9/7/2008	12.8	M
	08KK3	9/13/2008	9.8	M
Nuiqsut	08N1	9/5/2008	9.9	M
	08N2	9/6/2008	9.0	F
	08N3	9/8/2008	8.8	F
	08N4	9/9/2008	10.7	F

¹ Total length was estimated based on a fluke width measurement as total length was not available

² Pregnant with a ~3 m fetus.

³ This animal was a calf based on body length, baleen length, (George and Suydam 2006) and the presence of milk in the stomach.

Table 2. Locations, dates, season, and Captains' estimate of survival for whales that were struck and lost during 2008. Data provided by the Alaska Eskimo Whaling Commission.

Village	Date	Season	Estimated Survival
Barrow	5/2/2008	Spring	Died
	5/7/2008	Spring	Excellent
	5/9/2008	Spring	Unknown
	5/15/2008	Spring	Unknown
	5/17/2008	Spring	Died
	5/17/2008	Spring	Unknown
	5/18/2008	Spring	Unknown
	10/22/2008	Autumn	Fair
	10/22/2008	Autumn	Died
Point Hope	5/7/2008	Spring	Died
	5/7/2008	Spring	Fair
	5/8/2008	Spring	Unknown

Table 3. Summary of the number of landed bowhead whales and Captains' estimate of survival for whales that were struck and lost during 2008. Data provided by the Alaska Eskimo Whaling Commission..

Village	Landed	Struck & Lost	Total Struck	Estimated Survival ¹
Barrow	21	9	30	4 U; 1 E; 1 F; 3 D
Gambell	2	-	2	-
Kaktovik	3	-	3	-
Nuiqsut	4	-	4	-
Point Hope	2	3	5	1 U; 1 F; 1 D
Savoonga	4	-	4	-
Wainwright	2	-	2	-
Totals	38	12	50	5 U; 1 E; 2 F; 4 D

¹ U=unknown; F=fair; P=poor; D=died.