

## Subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos during 2007

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### ABSTRACT

In 2007, 63 bowhead whales (*Balaena mysticetus*) were struck during the Alaskan subsistence hunt resulting in 41 animals landed. Total harvest for 2007 was similar to recent years. The average number of whales landed in the 10 previous years was 41.1 ( $SD = 7.5$ ). The efficiency (# landed / # struck) of the hunt was 65%, which is lower than the average during 1997-2006 (mean = 79%,  $SD = 7\%$ ). Challenging sea ice, weather conditions, equipment malfunctions, and struck whales diving under the short-fast ice contributed to a lower efficiency in 2007 compared to the previous 10 years. These conditions especially affected hunters at Point Hope and Barrow during spring. The spring hunting efficiency was 61% compared to 76% for the autumn. Of the landed whales 17 were males and 24 were females. Of the 23 females of known length, 12 were presumably mature (>13.4m in length). Four of the mature females were examined closely. Of these four, three were pregnant. Biologists could not closely examine the other mature females because the whales were harvested in more remote villages or were butchered in the water.

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 next five-year block quota will begin in 2008 (<http://www.iwcoffice.org/meetings/meeting2007.htm>).

The subsistence hunt typically takes place in spring and autumn as whales migrate between the Bering and Beaufort seas. Hunters on St. Lawrence Island may take whales during the winter as well. These hunts 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 the 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. In recent years, we have been able to collect additional detailed information and some tissues samples from harvested whales landed at Kaktovik, Saint

Lawrence Island, and other villages. We assisted the AEWG 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 2007 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, length, dates, and fate of struck and lost whales for all whaling villages were obtained from the AEWG. 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 13.4 m in length are considered to be sexually mature (George *et al.* 2004). Previously, we assumed sexual maturity at a total length of 14.2 m for females (Tarpley and Hillmann 1999). Additional data and analysis has refined this length to 13.4 m, 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 13 m are considered to be sexually mature (O'Hara *et al.* 2002).

## RESULTS AND DISCUSSION

In 2007, 63 whales were struck during the Alaskan subsistence hunt. The total number of whales landed ( $n = 41$ ) in 2007 matched the average number of whales landed (per year) over the previous 10 years (1997-2006: mean = 41.1 whales,  $SD = 7.8$ ).

Hunting conditions during spring 2007 were problematic particular for the Chukchi Sea villages. Ice and weather conditions prevented hunters from Little Diomedea and Kivalina from striking a whale and Wales from landing a whale. In the Bering Sea villages conditions were generally good. Gambell hunters took the first whale of the season on 3 April and Savoonga hunters landed three whales in mid-April during a period of good weather (Table 1). At Barrow, 13 whales were taken between 24 April and 27 May (Table 1).

The success of the spring hunt is sensitive to environmental conditions (George *et al.*, 2003), thus the spring hunt (specifically) is quite vulnerable to effects from climate change. At Point Hope and Barrow, ice and weather conditions, equipment problems, and struck whales diving under the shorefast ice lowered the efficiency of the spring harvest. As a result, the efficiency of the spring harvest was 61% whereas the efficiency of the autumn hunt was 76% (Table 2).

Thirteen 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 three whales during 31 August to 7 September. Both villages had suitable weather for hunting. At Barrow, the autumn hunt occurred during five days of fairly high east winds during early October when seven whales were landed. The Barrow hunters adapted their hunting strategy and captured all their whales in Chukchi waters during the autumn 2007 hunt. Over the past 35 years, nearly all autumn whales have been harvested east of Point Barrow in the Beaufort Sea. The fact that sufficient numbers of whales were available to be hunted in the Chukchi during autumn just west of Barrow may reflect the increased population size, changes in distribution, available food resources in the Chukchi Sea, and/or other factors.

Overall, of the 22 whales that were struck and lost in 2007, four had a fair chance of survival, six had a poor chance of survival, four died, and eight whales had an unknown chance of survival. The estimates of survival are based on the hunting Captain's assessment (Table 2 and 3).

The overall efficiency of the hunt (# landed / # struck) in 2007 was 65%, which is lower than the average level of efficiency over the past 10 years (1997-2006: mean = 79%, *SD* = 7%; Figure 1). The efficiency of the harvest has increased steadily since the mid-1970s. This increase was due to enhanced communication among hunting crews, training of younger hunters, and improved weaponry. The efficiency in 2007 was similar to 2001 when persistence ice-choked leads reduced the efficiency of the hunt (Suydam et al. 2002). It is likely that global warming has contributed to a reduction in the stability of shorefast ice, where hunting occurs. Hunter observations confirm thinning sea ice and pressure ridges that are not as large or anchored with multi-year ice. This change in ice conditions contributed to the lower hunting efficiency in 2007.

Sixteen (40%) of the 40 landed whales were males. The longest male was 16.6 m and the shortest was 8.3 m. Four males were presumably sexually mature (O'Hara *et al.* 2002). Confirmation of reproductive status is pending results of histological and hormonal analyses of a subset of those whales.

Twenty-four (60%) of the landed whales were females. The longest female was 16.8 m in length and the shortest was 6.1 m. Based on a length > 13.4 m (George *et al.* 2004), 12 of the females landed in 2007 were estimated to be sexually mature. Biologists closely examined four of these animals. The other mature females were not closely examined because they were landed in remote villages or were butchered in the water where reproductive tracts could not be examined. Three of the four whales (75%) that were examined were pregnant with fetuses 31 cm, 159 cm, and 440 cm in length (Table 1); the latter is among the longest term-fetus carefully measured by a biologist.

The smallest female landed was most likely a calf based on standard length, baleen length and other characteristics. The whale did not have milk in her stomach, but her baleen was 29 cm long. A bowhead that is less than 7.5 m in length and baleen less than 60 cm is typical of a calf (George and Suydam, 2006). Hunters took this whale thinking it was a small independent whale. The animal was swimming alone in the eastern Chukchi Sea near Barrow. Determining the length of a whale while it is in the water is very difficult, and determining the baleen length is impossible.

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Table 1. Village, whale identification number, date landed, length (meters) and sex of bowhead whales landed by Alaskan Eskimos during the 2007 subsistence hunt. Note: The Alaska Eskimo Whaling Commission reports to the U.S. National Marine Fisheries Service the date a whale is struck and not the date the whale is landed, as we do here.

Village	Whale ID#	Date Landed	Length (m)	Sex
Barrow	07B1	4/24/2007	9.8	M
	07B2	4/28/2007	8.6	M
	07B3 <sup>1</sup>	4/30/2007	12.0	F
	07B4	5/1/2007	10.5	M
	07B5	5/5/2007	8.5	F
	07B6	5/6/2007	11.0	M
	07B7	5/7/2007	11.1	M
	07B8	5/16/2007	14.9	M
	07B9 <sup>2</sup>	5/17/2007	14.3	F
	07B10	5/21/2007	16.1	F
	07B11	5/24/2007	15.0	M
	07B12 <sup>3</sup>	5/24/2007	14.8	F
	07B13	5/27/2007	16.6	M
	07B14	10/7/2007	8.1	F
	07B15	10/7/2007	10.1	F
	07B16 <sup>4</sup>	10/7/2007	14.4	F
	07B17	10/8/2007	11.1	M
	07B18 <sup>5</sup>	10/9/2007	6.1	F
	07B19	10/9/2007	8.6	M
	07B20	10/11/2007	8.9	M
Gambell	07G1	4/3/2007	8.8	F
	07G2	5/1/2007	16.3 <sup>6</sup>	F
	07G3	5/1/2007	15.3 <sup>6</sup>	F
	07G4	5/1/2007	15.2 <sup>6</sup>	F
Point Hope	07H1	4/16/2007	Undetermined	F
	07H2	4/28/2007	12.8	F
	07H3	5/17/2007	15.8	F
Savoonga	07S1	4/14/2007 <sup>7</sup>	10.0	M
	07S2	4/15/2007	8.3	F
	07S3	4/16/2007	10.7	M
	07S4	4/27/2007	15.2	F
Wainwright	07WW1	5/5/2007	8.3	M
	07WW2	5/20/2007	16.5	F
	07WW3	5/22/2007	15.8	F
	07WW4	5/29/2007	16.0	F
Kaktovik	07KK1	9/3/2007	8.3	M
	07KK2	9/10/2007	8.1	F
	07KK3	9/11/2007	9.0	F
Nuiqsut	07N1	8/31/2007	10.5	F
	07N2	9/7/2007	11.4	M
	07N3	9/7/2007	14.9	M

<sup>1</sup> Struck on 29 April but landed on 30 April 2007.

<sup>2</sup> Pregnant with a male fetus, 445 cm in length.

<sup>3</sup> Pregnant with a 31 cm fetus.

<sup>4</sup> Pregnant with a female fetus, 159 cm long.

<sup>5</sup> This whale was a calf based on body length and baleen length of 29 cm (George and Suydam 2006).

<sup>6</sup> Approximate length, whale measured in pieces.

<sup>7</sup> Struck on 13 April 2007 but landed on 14 April.

Table 2. Locations, dates and estimated fate of struck and lost whales<sup>1</sup>.

Village	Date	Season	Estimated Fate <sup>2</sup>
Barrow	4/24/2007	Spring	Unknown
	4/24/2007	Spring	Unknown
	4/24/2007	Spring	Unknown
	4/28/2007	Spring	Died
	4/29/2007	Spring	Died
	5/5/2007	Spring	Poor
	5/17/2007	Spring	Poor
	5/20/2007	Spring	Fair
	5/23/2007	Spring	Fair
	10/8/2007	Autumn	Died
	10/9/2007	Autumn	Poor
	10/11/2007	Autumn	Died
	Nuiqsut	9/15/2007	Autumn
Point Hope	4/15/2007	Spring	Unknown
	4/16/2007	Spring	Unknown
	4/16/2007	Spring	Unknown
	5/3/2007	Spring	Poor
	5/8/2007	Spring	Unknown
	5/17/2007	Spring	Unknown
Wainwright	5/6/2007	Spring	Fair
Wales	4/14/2007	Spring	Fair
	4/16/2007	Spring	Poor

<sup>1</sup> Data provided by the Alaska Eskimo Whaling Commission.

<sup>2</sup> Whaling captain's estimate of chance of survival for whales that are struck and lost.

Table 3. Summary of the number of landed bowhead whales and estimated fates of whales struck and lost during the 2007 subsistence harvest by Alaska Eskimos<sup>1</sup>.

Village	Landed	Struck & Lost	Total Struck	Estimated Fate <sup>2</sup>
Barrow	20	12	32	3 u; 2 f; 3 p; 4 d
Gambell	4		4	
Kaktovik	3		3	
Nuiqsut	3	1	4	p
Point Hope	3	6	9	5 u; p
Savoonga	4		4	
Wainwright	4	1	5	f
Wales		2	2	f; p
Totals	41	22	63	8 u; 4 f; 6 p; 4 d

<sup>1</sup> Data provided by the Alaska Eskimo Whaling Commission

<sup>2</sup> Whaling captain's estimate of chance of survival for whales that are struck and lost: u=unknown; f=fair; p=poor; d=died.

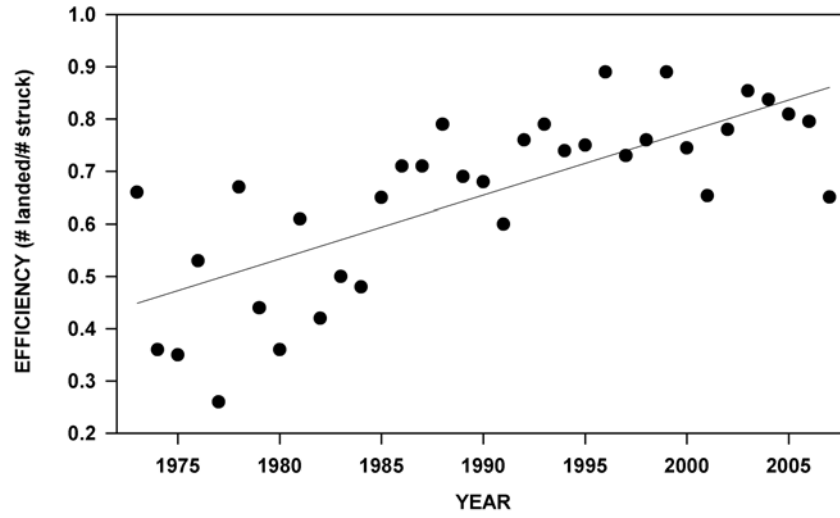


Figure 1. Efficiency (# landed/# struck) of the bowhead whale harvest in Alaska from 1973 to 2007.