

Subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos during 2012

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ABSTRACT

In 2012, 69 bowhead whales (*Balaena mysticetus*) were struck during the Alaskan subsistence hunt resulting in 55 animals landed. Total number of whales landed in 2012 was higher than the average for the previous 10 years (2002-2011: mean of landed = 38.9; *SD* = 7.1) as was the number struck (2002-2011: mean struck = 51.4; *SD* = 12.1). The efficiency (# landed / # struck) of the hunt (0.80%) was similar to the past 10 years (mean of efficiency = 77%; *SD* = 0.07%). Total mortality for 2012 was estimated at 66 animals after the estimated fate of the struck and lost whales was considered. Spring hunts are logistically and environmentally more difficult than autumn hunts because of severe environmental conditions and sea ice dynamics. Typically, hunt efficiency during spring is lower than autumn. In 2012, the efficiency of the spring hunt (71%) was lower than the autumn hunt (100%). This was due in part to difficult environmental conditions during spring and that struck whales were lost under ice. Of the landed whales, 29 were females, 24 were males, and sex was not determined for two animals. Based on total length, six of the 29 females were presumed mature (>13.4 m in length). All five (100%) of the mature females that were examined were pregnant.

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

INTRODUCTION

The subsistence harvest of bowhead whales (*Balaena mysticetus*) meets an important nutritional and cultural need for several Native communities in northern and western Alaska (United States) and eastern Chukotka (Russia). The Alaska Eskimo Whaling Commission (AEWC), comprised of 11 communities, locally manages the Alaskan harvest through an agreement with the U.S. 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). Whales were harvested in 2012 under a five-year block quota that began in 2008 (IWC, 2008).

The subsistence hunt typically occurs during spring and autumn as whales generally migrate between the Bering and Beaufort seas. Hunters on St. Lawrence Island in the northern Bering Sea may harvest whales during the winter (i.e., December and January) 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 UAF-Marine Advisory Program and previously with the Alaska Department of Fish and Game, we have collected detailed information and tissue samples from harvested whales landed at Kaktovik, Gambell and Savoonga on 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 during 2012 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) relevant additional observations (hunting conditions, unusual pathology, etc.).

METHODS

Harvest data on sex, standard length, harvest and landed dates, as well as 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 13.4 m in length are considered to be sexually mature; however, females shorter than this can be pregnant and females greater in length can be immature (George *et al.* 2004). Previously, we assumed sexual maturity at a total length of 14.2 m for females (Tarpley and Hillmann, 1999). Males with a total body length greater than 13 m are considered to be sexually mature (O'Hara *et al.*, 2002).

RESULTS AND DISCUSSION

During 2012, 69 whales were struck during the Alaskan subsistence hunt. The total number of whales landed ($n = 55$) in 2012 was larger than the average number of whales landed over the previous 10 years (2002-2011: mean = 38.9 whales; $SD = 7.1$). Subsequently, the total number of whales struck was higher than the previous 10-year average (mean = 51.4; $SD = 12.1$).

Spring Hunting Conditions

A total of 21 bowheads was landed during the spring (Table 1). Hunting conditions during spring 2012 were generally favorable throughout northern and western Alaska.

Gambell and Savoonga, communities on Saint Lawrence Island in the Bering Sea, landed four and six whales, respectively, during the last half of April. After a very cold winter, the first half of April was marked by bad weather. The first pulse of bowheads to arrive at Saint Lawrence Island was observed in mid-April and coincided with favorable hunting conditions. Farther north the ice and weather conditions prevented hunters from Little Diomed and Kivalina from striking a whale.

Hunters at Wales have landed only nine bowheads between 1974 and 2011 (Suydam and George 2012) but were fortunate to land one on 22 April 2012. Point Hope, Point Lay, and Wainwright, on the coast of the Chukchi Sea, landed five, one, and four animals, respectively, between 13 April and 29 May.

At Barrow, the spring shorefast ice apron was much broader than usual at over 10 km in width. However, this did not interfere with the successful spring harvest of 14 whales between 22 April and 16 May.

Autumn Hunting Conditions

Eighteen whales were landed by four villages during the autumn migration (Barrow, Kaktovik, and Nuiqsut; Table 1). Kaktovik hunters landed three whales between 5 September and 2 October. A death in the community and windy conditions caused the hunt to be extended until early October. Hunting conditions were favorable for Nuiqsut where they completed their hunt by landing four whales from 5 to 12 September. At Barrow, nine bowheads were landed, between 1 and 6 October and one other on 19 October. Between 7 and 18 October there were strong westerly winds which prevented

any whale hunting at Barrow. Also, the general sense of the hunters was that whales were further offshore than usual. October also had record-setting warm temperatures so the ocean did not refreeze as it usually does in October.

Struck and Lost and Hunting Efficiency

Of the 14 whales that were struck and lost in 2012, one had an excellent chance of survival, two had a fair chance of survival, four had a poor chance of survival, five died and an estimated survival estimate was not recorded for two whales. The estimates of survival are primarily based on the Captain's assessment but may be based on our assessment of the Captain's description of the circumstances of the struck and lost whale (Table 2 and 3). This suggests the total hunting mortality for 2012 was 66 whales; i.e., 55 landed, and 11 whales that likely died after being struck and lost based on criteria in Suydam et al. (1995).

Overall efficiency of the hunt (#landed/#struck) in 2012 was 80%, which is similar to the average efficiency over the past 10 years (2002-2011: mean = 77%; SD = 7%). Since the mid-1970s, the efficiency of the harvest increased steadily until about the mid-1990s when it stabilized at about 80%. The increase was due to many factors, including enhanced communication (i.e., improved marine radio capabilities) among hunting crews, training of younger hunters, and improved weaponry (Suydam and George, 2012). However, the efficiency can vary substantially from year to year, primarily due to environmental conditions. For example, 2010 had a relatively low efficiency of 63% for a variety of reasons (see Suydam et al., 2011).

The success of the spring hunt is quite sensitive to variable environmental conditions (George et al., 2003). As such, efficiency varies between seasons and among years. The efficiency of the spring harvest is on average lower than the autumn harvest due to more demanding ice and weather conditions as well as struck whales escaping under the ice. In 2010, the overall efficiency of the spring hunt was quite low at 52%. However, in 2011, the efficiency of the spring hunt improved to 69% despite difficult ice conditions. The efficiency in 2012 was again relatively high at 71%.

The autumn hunts were successful and efficient (100%) in 2012. Twenty whales were landed and none were lost. Autumn hunts typically occur in more open water, thus sea ice is less of an influence on success. However, high wind speeds during the open water period in the autumn can make hunting opportunities extremely difficult (George et al., 2003). As climate change causes a greater and longer period of retreat of sea ice, the increased fetch contributes to larger swells that even persist after strong winds have abated. The overall hunting period has increased in recent years due to sea ice retreat, which possibly offsets inclement weather resulting in poor hunting conditions. For instance, a weather summary for October 2012 (Barrow) noted: "*The mean value was 27.5°F, an astounding positive deviation of 10.3°F above the normal of 17.2°F. This was the result of temperatures that stayed decidedly above normal for nearly the whole month.*" (<http://climate.gi.alaska.edu>).

Sex and Maturity

Twenty four (45%) of the landed whales of known sex (n = 53) were males. The longest male was 16.7 m and the shortest was 7.7 m. Based on a length of >13 m (O'Hara et al., 2002), seven males were presumably sexually mature. Confirmation of reproductive status of the whales is pending results of histological and hormonal analyses from a subset of these whales.

Twenty-nine (55%) of the landed whales of known sex (n = 53) were females. The longest female was 17.7 m and the shortest was 7.9 m. Based on a length > 13.4 m (George et al., 2004), six of the females were estimated to be sexually mature, five of which were examined closely. All five (100%) of those whales were pregnant. While the sample size is low this suggests a high pregnancy rate in 2012 compared with other years. In 2011, for instance, two of seven (29%) presumably mature females were pregnant which is consistent with the long-term average of about 33% (George et al., 2004; George et al., 2011). A 13.6 m female landed at Savoonga in the spring was pregnant with a 3.8 m female fetus. The other pregnant whales were landed in the autumn including: a 14.3 m female at Kaktovik with a 1.5 m fetus; a 16.3 m female landed at Gambell with a 2.4 m fetus; and two females (15.5 and 17.7 m) landed at Savoonga were pregnant with a 2.2 m female fetus and a 3.2 m male fetus (respectively).

The sex of two harvested bowhead whales was not determined. DNA test results to determine the gender of those whales are pending.

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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 2012 subsistence hunt.

Village	Whale ID#	Date Landed	Length (m)	Sex
Barrow	12B1	22 Apr 2012	10.1	F
	12B2	22 Apr 2012	10.1	F
	12B3	23 Apr 2012	9.9	M
	12B4	23 Apr 2012	8.8	F
	12B5	24 Apr 2012	7.9	F
	12B6	28 Apr 2012 ¹	8.2	M
	12B7	28 Apr 2012	9.0	F
	12B8	28 Apr 2012	8.3	M
	12B9	30 Apr 2012 ²	8.8	U
	12B10	2 May 2012 ³	9.7	F
	12B11	10 May 2012	11.9	M
	12B12	12 May 2012	8.4	M
	12B13	12 May 2012	9.3	M
	12B14	16 May 2012	7.7	M
	12B15	1 Oct 2012	8.4	M
	12B16	1 Oct 2012	10.3	M
	12B17	1 Oct 2012	10.8	F
	12B18	3 Oct 2012	9.4	F
	12B19	3 Oct 2012	9.4	M
	12B20	3 Oct 2012	8.9	M
	12B21	5 Oct 2012	13.3	F
	12B22	5 Oct 2012	9.2	F
	12B23	6 Oct 2012	8.5	F
	12B24	19 Oct 2012	10.1	M
Gambell	12G1	16 Apr 2012	12.6	F
	12G2	16 Apr 2012	8.4	F
	12G3	24 Apr 2012	8.7	M
	12G4	24 Apr 2012	13.4	M
	12G5	27 Nov 2012	16.3	F ⁴
Kaktovik	12KK1	5 Sep 2012	13.4	M
	12KK2	20 Sep 2012 ⁵	10.9	U
	12KK3	2 Oct 2012	14.3	F ⁶
Nuiqsut	12N1	5 Sep 2012	13.2	M
	12N2	10 Sep 2012	12.2	F
	12N3	10 Sep 2012	8.0	F
	12N4	12 Sep 2012	11.2	M
Point Hope	12H1	26 Apr 2012	9.6	F
	12H2	29 Apr 2012	8.2	F
	12H3	9 May 2012	16.1	M
	12H4	11 May 2012	9.0	F
	12H5	12 May 2012	9.2	F
Point Lay	12PL1	13 Apr 2012 ⁸	16.5	F
Savoonga	12S1	14 Apr 2012	12.1	F
	12S2	17 Apr 2012	13.6	F ⁷
	12S3	19 Apr 2012	8.1	M
	12S4	20 Apr 2012	8.2	F
	12S5	20 Apr 2012	8.2	M
	12S6	20 Apr 2012 ⁹	~13.7	M
	12S7	27 Nov 2012	~17.7	F ¹⁰
	12S8	30 Nov 2012	15.5	F ¹¹
Wainwright	12WW1	22 Apr 2012	10.3	M
	12WW2	25 Apr 2012	13.3	M

	12WW3	8 May 2012	8.9	F
	12WW4	29 May 2012	14.4	M
Wales	12W1	22 Apr 2012 ¹²	10.4	F

- ¹ Struck on 27 April 2012
² Struck on 28 April 2012 and recovered as a “stinker” on 30 April.
³ Struck on 27 April 2012 and recovered as a “stinker” on 2 May.
⁴ Pregnant with ~2.4 m fetus (sex undetermined)
⁵ Struck on 12 September but retrieved as a “stinker” on 20 September.
⁶ Whale was pregnant with 1.5 m fetus (sex undetermined)
⁷ Pregnant with 3.8m female fetus
⁸ Struck on 12 April but landed on 13 April
⁹ Struck on 17 April but landed as “stinker” on 20 April.
¹⁰ Pregnant with 3.2 m male fetus
¹¹ Pregnant with 2.2 m female fetus
¹² Struck on 21 April but landed on 22 April.

Table 2. Locations, dates, season, and Captains’ estimate of survival or our assessment based on the Captain’s description, for whales struck and lost during 2012. Data provided by the Alaska Eskimo Whaling Commission.

Village	Date	Season	Estimated Survival
Barrow	28 Apr 2012	Spring	Died
	28 Apr 2012	Spring	Poor
	10 May 2012	Spring	Died
	11 May 2012	Spring	Died
	12 May 2012	Spring	Died
	12 May 2012	Spring	Unknown
	16 May 2012	Spring	Fair
Gambell	19 May 2012	Spring	Poor
	17 Apr 2012	Spring	Unknown
	19 Apr 2012	Spring	Poor
	20 Apr 2012	Spring	Excellent
Wainwright	20 Apr 2012	Spring	Died
	7 May 2012	Spring	Fair
	8 May 2012	Spring	Poor

Table 3. Summary of the number of landed bowhead whales and Captains’ estimate of survival, or our assessment based on the Captain’s description, for whales struck and lost during 2012. Data provided by the Alaska Eskimo Whaling Commission.

Village	Landed	Struck & Lost	Total Struck	Estimated Survival ¹
Barrow	24	8	32	F; 2P; 4D; U
Gambell	5	4	9	E; P; D; U
Kaktovik	3	-	3	-
Nuiqsut	4	-	4	-
Point Hope	5	-	5	-
Point Lay	1	-	1	-
Savoonga	8	-	8	-
Wainwright	4	2	6	F; P
Wales	1	-	1	-
Totals	55	14	69	E; 2F; 4P; 5D; 2U

¹ E=excellent; F=fair; P=poor; D=died; U=unknown.