

AERIAL SURVEY OF BELUGAS IN COOK INLET, ALASKA, AUGUST 2005

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Abstract

The National Marine Fisheries Service conducted a photographic aerial survey of belugas (*Delphinapterus leucas*) in Cook Inlet, Alaska, 11-12 August 2005, with the express purpose of documenting the proportion of calves at a time when it was likely that all calves of the year were born. During the standard abundance surveys conducted in early June, some calves are probably not yet born. The aerial survey in August (10.1 flight hrs) was flown in a twin-engine, high-wing aircraft at an altitude of 244 m (800 ft) on a trackline 1.4 km offshore, consistent with annual surveys for beluga abundance in Cook Inlet as done since 1993. Two observers searched for whales on the left side of the aircraft, and two searched on the right; however, there was no attempt to conduct independent searches. After finding beluga groups, a series of aerial passes was made with three observers counting surfacing whales while paired video and digital still cameras captured images for analyses. The sum of the aerial counts was 236 belugas for 11 August and 277 belugas for 12 August, numbers that represent a rough index of abundance uncorrected for missed whales. The counts from August 2005 were higher than uncorrected estimates from June during the past seven years. Laboratory analyses of the video tapes will determine whether or not the number of whales actually was higher in August than in June 2005.

Introduction

The National Marine Fisheries Service (NMFS) has conducted annual aerial surveys to study the distribution and abundance of belugas in Cook Inlet each June/July since 1993 (Rugh et al. 2000, 2005). In addition to estimating abundance, an important consideration in evaluating the health of any stock of whales is to document its reproductive capacity. Although early summer has been an ideal time for the abundance surveys considering the probability of experiencing good weather and maximum daylight (shortly before the summer solstice) at a time when most belugas are known to concentrate in a few areas (Rugh et al. 2005), June is not as ideal for assessing the number of beluga calves because not all are born by then. In general, belugas calve between March and September, mostly in June and July (Hazard 1988). Accordingly a study was initiated in August 2005 to record calves-of-the-year in digital still images (as per Sims et al. 2003). The intent is to document the ratio of new calves (very small and dark, almost black) to yearlings (small and a dark gray) and adults (white) when most calves are born but before calf mortality might significantly reduce numbers.

Methods

The survey aircraft, a Turbo Commander AC690A (*N57096*), has twin-engines, high-wings, and large windows that maximize the search area. An opening window behind the copilot seat allowed for photography. One observer sat in the copilot seat. A second observer was behind the pilot (left side) during searches for whale groups but moved to the right side of the aircraft for counts. A third observer was on the right side for searches and for doing photography. The fourth observer was in the left rearmost seat as a data recorder but could also conduct counts of whales from the right side. Unlike the protocol used during the abundance surveys, during the August survey, observers did not rotate positions, and an intercom system provided open communication, as there were no independent search efforts. A laptop computer was used to record sighting data as well as location data from a portable Global Positioning System (GPS). Data entries included routine updates of time, locations (every two seconds), percent cloud cover, sea state (Beaufort scale), glare (on the left and right), and visibility (on the left and right). Visibility was documented in five subjective categories from excellent to useless; conditions rated poor or worse were considered unsurveyed. The survey was primarily coastal to search areas where belugas are typically seen in summer (Rugh et al. 2000). The trackline was kept 1.4 km offshore as monitored with an inclinometer.

Because the specific dates of the survey were determined by aircraft availability, no attempt was made to coordinate the trackline with tide conditions, which has been the preferred pattern during abundance surveys. On 11 August, low tides were at 06:17 and 18:22; on 12 August, low tides were at 07:04 and 19:09.

After whales were seen, the aircraft flew directly over them to document the location; then a pattern of aerial passes was made for counts and photographs of the whales. Counts began and ended on a cue from the front observer. This provided a precise record of the

duration of each counting effort. The daily aerial counts in Table 1 are medians of the primary observers' counts on multiple passes over each group. The process of using medians instead of maximums or means reduces the effect of outliers (extremes in high or low counts).

A digital video camera (a Sony DVCAM, DSR-PDX10 Model L10A) was used to document beluga groups for later analysis in the laboratory. This allows precise documentation of whale counts as a function of viewing time recorded to 1/30 sec (Hobbs et al. 2000b). Counts from video can be used to determine abundance estimates with appropriate application of correction factors (Hobbs et al. 2000a). Paired with the video camera was a digital still camera (Nikon D1X with a 80-200mm Nikkor AF lens). The digital still images provide greater detail to help detect calves, which are darker than the adults and do not rise above the surface as much as white adults (Sims et al. 2003).

Results

A total of 10.1 hrs were flown around upper Cook Inlet 11-12 August 2005. All flights were based out of Anchorage. Visibility conditions interfered with the survey effort during 0.12 hrs (1 percent of the effective search time). For both days, there was good coverage of most of the survey area within approximately 3 km of shore in upper Cook Inlet north of East and West Forelands (Figs. 1 and 2). Fog occluded parts of the inlet south of Point Possession on 11 August, but all of the shoreline was surveyed on 12 August.

Two beluga groups were counted in the Susitna delta on 11 August (median counts of 27 and 65, respectively), and one beluga group was in Knik Arm (144 whales). On 12 August, two beluga groups were again found in the Susitna delta (98 and 94 whales, respectively), and two beluga groups were in Knik Arm (43 and 42 whales). Median counts of belugas are shown in Table 1, and sighting locations are shown in Figures 1 and 2. The sum of the daily medians was 236 belugas for 11 August and 277 belugas for 12 August. The higher value (277) can be used to compare to median indexes recorded during standard abundance surveys (Rugh et al. 2005). These counts were somewhat higher than estimates from the June surveys during the past seven years (193 in 1998, 217 in 1999, 184 in 2000, 211 in 2001, 192 in 2002, 174 in 2003, 187 in 2004, and 192 in June 2005). These summary counts do not reflect any corrections for missed whales. Calculations for whales missed during these aerial counts and estimates of abundance were described in Hobbs et al. (2000a, 2000b).

Discussion

The 11-12 August 2005 beluga survey of Cook Inlet followed most of the research protocol applied during the standard abundance surveys conducted in June or July each year since 1994. (Rugh et al. 2005). However, because the intent was to collect images of whale groups for comparing ratios of adults to juveniles (white whales to gray or dark whales), there was no need to have independent search efforts. Therefore, all observers had open communication throughout the survey. In addition, it was not necessary to survey mid and lower Cook Inlet because this survey was a sampling effort, and it sufficed to locate beluga groups in areas where the animals are known to inhabit. Whale groups were found between

Beluga River and the Little Susitna River and in Knik Arm – where they are seen almost every year – but whales were not in Turnagain Arm or Chickaloon Bay. Viewing conditions were excellent for most of the survey except for some areas with fog on 11 August.

The uncorrected sum of median estimates (192 belugas) made from the June 2005 aerial observations in Cook Inlet is essentially the same as similar index counts made each year since 1998, generally near 200 whales (Table 2). Index counts made prior to 1998 were higher, generally near 300. These medians must be treated as merely a rough index that provides a quick assessment of the raw counts made from the air. The abundance estimates, with their associated coefficients of variance (CV), are the appropriate values to be used in inter-year trend analyses.

The proportion of calves to juvenile and adult whales will be established through careful analysis of the digital images. However, it is interesting to note that on 12 August, several Natives approached belugas near Big and Little Susitna Rivers where whales were later observed by the aerial crew; unusually high numbers of juveniles and calves were present with the white adult belugas (Rachel Dimmick, pers. comm.).

Acknowledgments

Rod Hobbs has served as Task Leader for the Cook Inlet beluga studies. Dave Weintraub (Commander NW, Ltd., Wenatchee, WA) helped provide us with the aircraft. His investment in this project is greatly appreciated. Our pilot, Jeremy Weintraub, filled a critical role in keeping the aircraft at the preferred altitude and distance from shore while flying intricate patterns over whale groups as they moved in different directions and watching for aircraft in an exceptionally busy airspace. Lilly VanFleet flew with us on both days of this survey and provided sighting information and whale counts, for which we are grateful. Data entries were made on a program originally developed for harbor porpoise surveys in the northeast Atlantic (made available through Debi Palka, Woods Hole, MA; software designed by Lex Hiby of Conservation Research Ltd, UK and Phil Lovell of Sea Mammal Research Unit, Scotland). Christy Sims went the extra mile to prepare cameras and train the field team how to use them. This study was conducted under MMPA Scientific Research Permit No. 782-1719 and has been in cooperation with the Cook Inlet Marine Mammal Council and the Alaska Beluga Whale Commission.

Citations

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Table 1. Median counts of belugas made during aerial surveys of Cook Inlet in August 2005 (maximum counts are shown in parentheses). Dashes indicate no survey, and zeros indicate that the area was surveyed but no whales were seen. Sites are listed in a clockwise order around Cook Inlet.

Location	11 Aug	12 Aug
Turnagain Arm/ Chickaloon Bay	0	0
Pt. Possession to East Foreland	----	0
Trading Bay	----	0
Susitna delta (N Foreland to Pt. Mackenzie)	172 (237)	192 (251)
Knik Arm	64 (82)	85 (118)
Fire Island	0	----

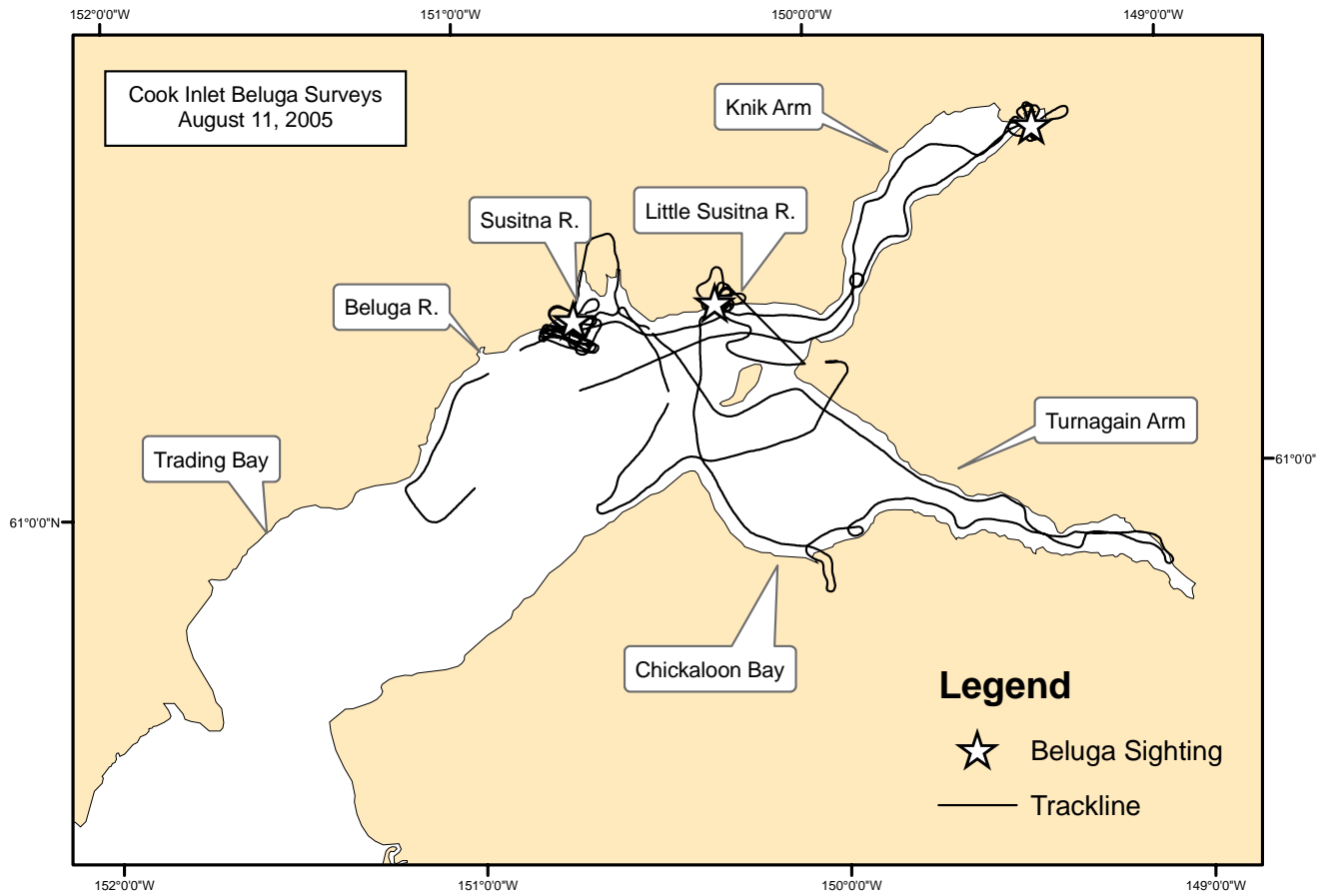


Figure 1. Tracklines and beluga groups seen in upper Cook Inlet on 11 August 2005

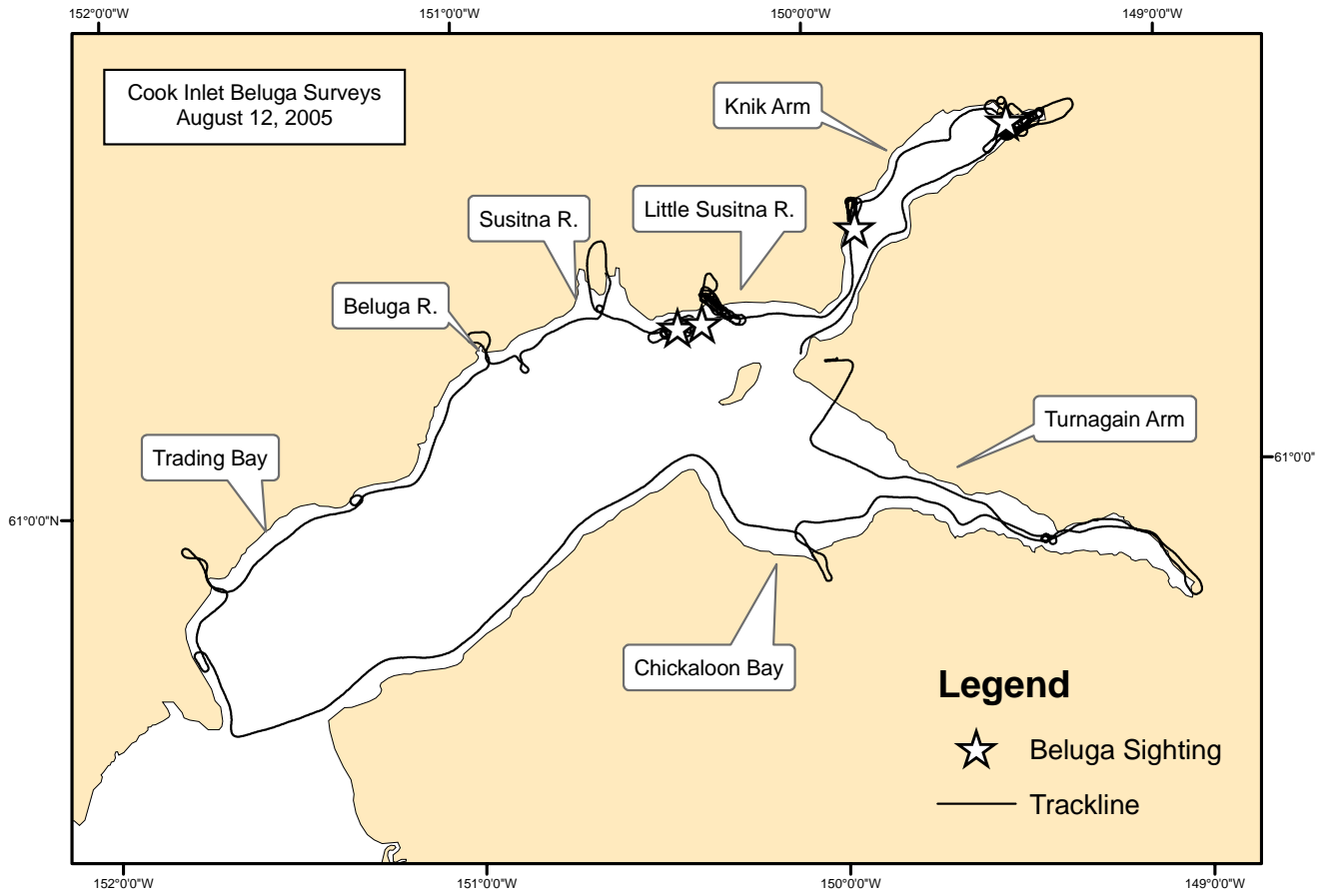


Figure 2. Tracklines and beluga groups seen in upper Cook Inlet 12 August 2005.