

AERIAL SURVEYS OF BELUGAS IN COOK INLET, ALASKA, September and October 2008

Kim E. W. Shelden¹, Kimberly T. Goetz¹,
Christy Sims¹, and Barbara A. Mahoney²

¹National Marine Mammal Laboratory, Alaska Fisheries Science Center
National Marine Fisheries Service, NOAA
7600 Sand Point Way NE, Seattle, Washington 98115

²Alaska Regional Office, National Marine Fisheries Service, NOAA
222 W 7th Ave., Box 43, Anchorage, Alaska 99513

ABSTRACT

The National Marine Fisheries Service (NMFS) conducted two aerial surveys focused primarily in lower Cook Inlet, Alaska, 19-20 September and 22 October 2008, in an exploratory effort to look for belugas in Kamishak Bay. Each survey (4 flights totaling 8.9 flight hours in September and 1 flight for a total of 3.5 flight hours in October) was flown in a twin-engine, high-wing Aero Commander aircraft at an altitude of 244 m (800 ft) and speed of 185 km/hr (100 kt), consistent with NMFS' surveys of Cook Inlet conducted each year since 1993. The 2-day survey in September 2008 included a coastal trackline (flown 1.4 km offshore) down the western side of the inlet from the Little Susitna River to Cape Douglas, mid-inlet tracklines, and a coastal trackline along Kachemak Bay the first day; and a coastal trackline of the upper inlet north of Point Possession and the Beluga River tidal flats on the second day. The October 2008 survey included the coastal areas from Cape Douglas to the Little Susitna River. The primary intent of these surveys was to document beluga groups in Kamishak Bay with a secondary objective to test paired video cameras during the September survey. The video camera used during past surveys (2003-2005) was paired with the high-definition video camera used in 2006-2008 to test for changes in resolution between formats. Belugas were not observed in lower Cook Inlet during either survey, though other marine mammals such as harbor seals, Steller sea lions, and sea otters were seen. Belugas were found in the upper inlet in Turnagain Arm (4 groups), Chickaloon Bay (1 group), and Knik Arm (2 groups) and comparison video was obtained of groups in Turnagain Arm (15 video passes) for testing purposes. The location of a dead beluga stranded in Turnagain Arm was confirmed during the 19 September survey.

Introduction

The National Marine Fisheries Service (NMFS) conducts annual aerial surveys to study beluga (*Delphinapterus leucas*) distribution and abundance in Cook Inlet, Alaska. These surveys typically occur in June and have been repeated each year since 1993 (Rugh et al. 2000, 2005). Aerial surveys to document calf rearing areas (Sims et al. 2003, 2007) have been conducted since August 2005. Surveys have also been conducted during fall, winter and spring months (e.g., Rugh et al. 2004) to document year-round beluga distribution in the inlet. These projects are in cooperation with the Cook Inlet Marine Mammal Council (CIMMC) and the Alaska Beluga Whale Committee (ABWC).

Until 1999, the subsistence harvest of Cook Inlet belugas was unregulated (Mahoney and Shelden 2000) and abundance estimates indicated this stock had declined by more than 50% between 1994 and 1998. A moratorium was placed on the hunt and NMFS designated the stock as depleted under the Marine Mammal Protection Act (65 FR 34590) on 31 May 2000. The small population, approximately 300-400 whales, has not shown signs of recovery (Hobbs and Shelden 2008) and given their unique year-round occupancy of Cook Inlet and isolation from other Alaska beluga stock (O’Corry-Crowe et al. 1997, Laidre et al. 2000), in October 2008, this distinct population segment (DPS) of belugas was listed as endangered under the Endangered Species Act (73 FR 62919).

The primary objective for the aerial surveys in September and October 2008 was to investigate fall distribution in the lower inlet based on opportunistic sightings of belugas reported in Kamishak Bay and adjacent bays during these months. A second objective during the September survey was to use paired video cameras to document beluga groups for analysis of video quality differences between camera formats. For three years (2003-2005), Cook Inlet beluga abundance surveys relied on a mini digital video camera with resolution of 720 x 480 pixels (a Sony DVCAM, DSR-PDX10 Model L10A). However, with advancements in technology, in 2006, we replaced the camera with a new HD video camera (JVC GR-HD1) which provided higher resolution of 1280 x 720 pixels. During the September survey we paired the two cameras in order to determine if the change in resolution influenced the detection of beluga whales. Because belugas counted in the video are used in determining the annual abundance estimate, quantifying any differences in the ability of the two cameras to detect belugas is important.

Methods

The survey aircraft used in September and October 2008, an Aero Commander 680 (*N98UP*), has twin-engines, high-wings, and more than 8-hours of flying capability. Bubble windows were at the right forward, left forward, and left rear observer positions, maximizing the search area. Standard survey altitude was 244 m (800 ft) and ground speed was approximately 185 km/hr (100 knots). The intercom system provided communication among the observers, data recorder, and pilots. The data recorder used a laptop computer equipped with a custom built aerial survey program to download location data from a portable Global Positioning System (GPS) and to record sighting information. Data entries included routine updates of time, locations, percent cloud cover, sea state (Beaufort scale), glare (on the left and right sides of the aircraft), and visibility (on the left and right sides). Visibility was documented in five subjective categories from excellent to useless; conditions rated poor or useless were considered unsurveyed. Each start and stop of a transect leg was recorded.

Paired video cameras were used to document beluga groups in upper Cook Inlet and to test side by side video quality. The lens on both the Sony PDX-10 DVCAM (2003-2005) and the JVC GR-HD1 video camera (2006-2008) was set to wide angle to capture the entire beluga group. Video footage from the cameras will be analyzed in the laboratory to obtain precise counts of belugas and to quantify any differences in beluga counts that may have been due to changes in resolution between the DVCAM (720 x 480) and the HD (1280 x 720) video formats.

Results

A total of 8.6 hours was flown around Cook Inlet 19-20 September and a total of 3.5 hrs on 22 October 2008. Of the flight hours, 6.8 hours (1396.9 km) in September and 1.5 hours (306 km) in October were spent on survey effort (i.e., not including time on the runway, deadheading without a search effort, circling whale groups to conduct counts, or periods with poor or useless visibility).

On 19 September, survey effort began at the Little Susitna River and continued south into Tuxedni Bay. We then surveyed across the inlet to Anchor Point, continuing into Kachemak Bay, and around Homer spit before landing to refuel. We completed a coastal survey around Kachemak Bay to Seldovia before heading west. Approximately 20 km east of Augustine Island, we turned south towards Cape Douglas where the coastal survey was resumed. Due to sufficient on-effort coverage earlier in the day, we terminated search effort upon reaching Tuxedni Bay. After the team received a call concerning a dead beluga stranded in Turnagain Arm, effort started again at Chickaloon Bay. The aerial team confirmed the stranding report and samples were collected from the dead beluga whale later that evening. In addition to the dead whale, about 6 belugas were observed near McHugh Creek in Turnagain Arm (Fig. 1). No belugas were seen in lower Cook Inlet (south of 60°43'N). Other marine mammals observed during the survey included: 25 harbor seals (*Phoca vitulina*) hauled out in Tuxedni Bay, 317 sea otters (*Enhydra lutris kenyoni*) (average group size = 7, median = 3) in groups in Kachemak Bay, 12 harbor seals in Kachemak Bay, 15 Steller sea lions (*Eumetopias jubatus*) hauled out north of Cape Douglas and 15 sea otters in scattered small groups (average group size = 1.4, median = 1) from Cape Douglas to Iniskin Bay in Kamishak Bay (Fig. 1).

On 20 September, the upper inlet survey covered the entire shoreline north of Point Possession and the Beluga River tidal flats (Fig. 2). The morning survey included Turnagain Arm, Chickaloon Bay, a mid-inlet trackline, Beluga River, Susitna River, Little Susitna River, and the shoreline to Point Mackenzie. The afternoon survey included all of Knik Arm. Belugas were found in Turnagain Arm (3 groups), Chickaloon Bay (1 group), and Knik Arm (2 groups). Other species were not observed. In total, we collected 22 minutes of video footage during 15 circling passes over the three beluga groups found in Turnagain Arm.

On 22 October, the team transited to Cape Douglas and began a coastal survey north to the Little Susitna River (Fig. 3). Poor sighting conditions and high winds precluded any exploration of the smaller bays along Kamishak Bay. No marine mammals were observed during this survey.

Discussion

The September and October 2008 surveys continued the time series documenting beluga distribution in months other than June. The primary objective of the September and October surveys was to document beluga whale presence in lower Cook Inlet. Although no belugas were sighted in lower Cook Inlet during the September and October aerial surveys, opportunistic sightings of belugas in Bruin Bay on September 17, 2008 and in Iliamna Bay in October 2008, indicate that during fall belugas are, at times, using the lower inlet bays. Continued monitoring of opportunistic sightings and follow up exploratory surveys of the lower inlet will be needed to confirm the presence and extent of use by Cook Inlet belugas of these lower inlet bays. In addition to this objective, we took this opportunity to document beluga groups found in the upper inlet for analysis of video quality differences between the video camera systems used from 2003-2005 (DVCAM) and 2006-2008 (HD). This information will be used to determine if additional correction factors will be needed in the annual abundance estimates.

Acknowledgments

Rod Hobbs, Task Leader for the Cook Inlet beluga studies, helped coordinate funding for this project. Northern Commanders, LLC provided the aircraft and crew. Our pilots in September and October, Andy Harcombe and Kade Nouwens, filled a critical role in keeping the aircraft at the preferred altitude and distance from shore, while flying intricate patterns over moving whales and watching for aircraft in an exceptionally busy airspace. Two HD video cameras were loaned to our project by Chris Rooper of the Alaska Fisheries Science Center, NOAA. Brad Smith, Jim Wilder and Mandy Migura also participated as observers on the 22 October survey. Data entries were made on a program developed specifically for this project by Niel and Kim Goetz. This study was conducted under MMPA Scientific Research Permit No. 782-1719.

Citations

- Hobbs, R. C., and K. E. W. Shelden. 2008. Supplemental status review and extinction assessment of Cook Inlet belugas (*Delphinapterus leucas*). AFSC Processed Rep. 2008-08, 76 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.
- Laidre, K. L., K. E. W. Shelden, D. J. Rugh, and B. A. Mahoney. 2000. Beluga, *Delphinapterus leucas*, distribution and survey effort in the Gulf of Alaska. *Mar. Fish. Rev.* 62(3):27-36.
- Mahoney, B. A. and K. E. W. Shelden. 2000. Harvest history of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska. *Mar. Fish. Rev.* 62(3):124-133.
- O’Corry-Crowe, G.M., R.S. Suydam, A. Rosenberg, K.J. Frost, and A.E. Dizon. 1997. Phylogeography, population structure and dispersal patterns of the beluga whale *Delphinapterus leucas* in the western Nearctic revealed by mitochondrial DNA. *Mol. Ecol.* 6:955-970.
- Rugh, D.J., K.E.W. Shelden, and B.A. Mahoney. 2000. Distribution of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska, during June/July 1993-2000. *Mar. Fish. Rev.* 63(3):6-21.
- Rugh, D. J., B. A. Mahoney, and B. K. Smith. 2004. Aerial surveys of beluga whales in Cook Inlet, Alaska, between June 2001 and June 2002. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-AFSC-145.

- Rugh, D.J., K.E.W. Shelden, C.L. Sims, B.A. Mahoney, B.K. Smith, L.K. Litzky, and R.C. Hobbs. 2005. Aerial surveys of belugas in Cook Inlet, Alaska, June 2001, 2002, 2003, and 2004. NOAA Tech Memo. NMFS-AFSC-149. 71p.
- Sims, C.L., R.C. Hobbs, and D.J. Rugh. 2003. Developing a calving rate index for beluga in Cook Inlet, Alaska using aerial videography and photography. Abstract (poster) in the Fifteenth Biennial Conference on the Biology of Marine Mammals. Greensboro, North Carolina. 14-19 Dec. 2003.
- Sims, C.L., R.C. Hobbs, K.T. Goetz, and D.J. Rugh. 2007. Using advanced techniques to determine age categories of belugas. Abstract presented at the First International Workshop on Beluga Whale Research, Husbandry and Management in Wild and Captive Environments. 9-11 March 2007. Valencia, Spain.

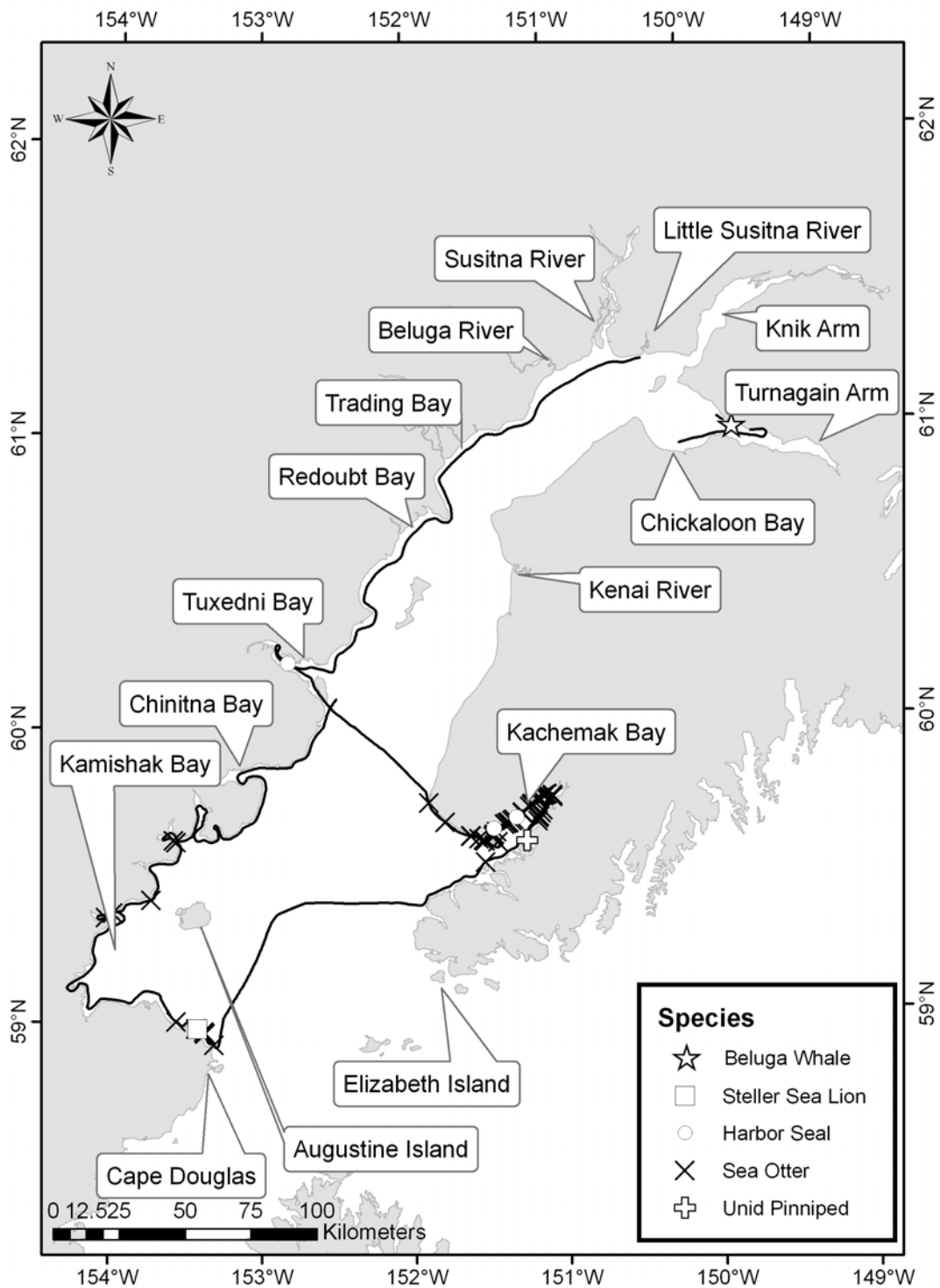


Figure 1. On-effort trackline and marine mammal sightings during the 19-September-2008 Cook Inlet, Alaska, aerial survey.

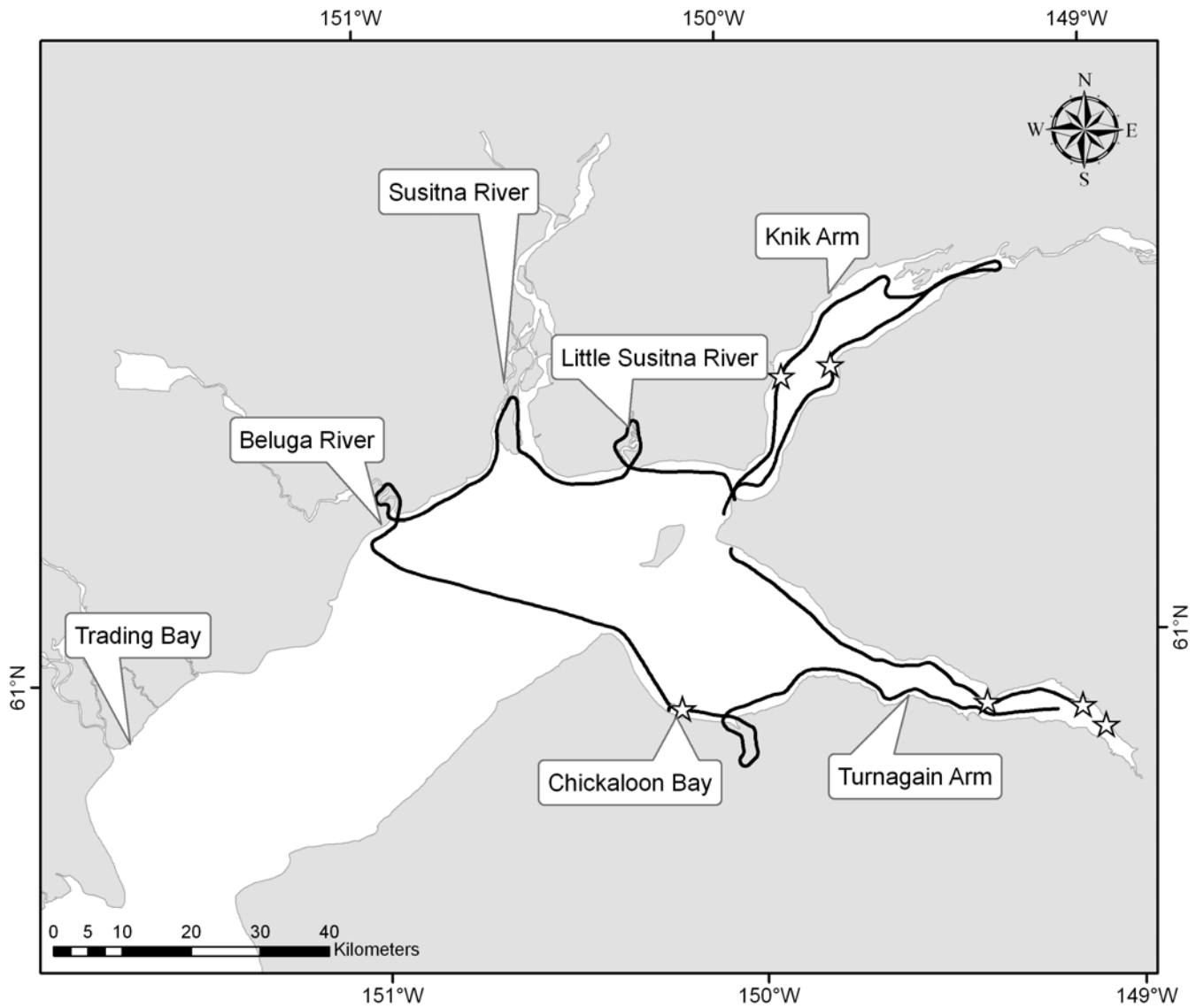


Figure 2. On-effort trackline and beluga sightings (stars) during the 20-September-2008 Cook Inlet, Alaska, aerial survey.

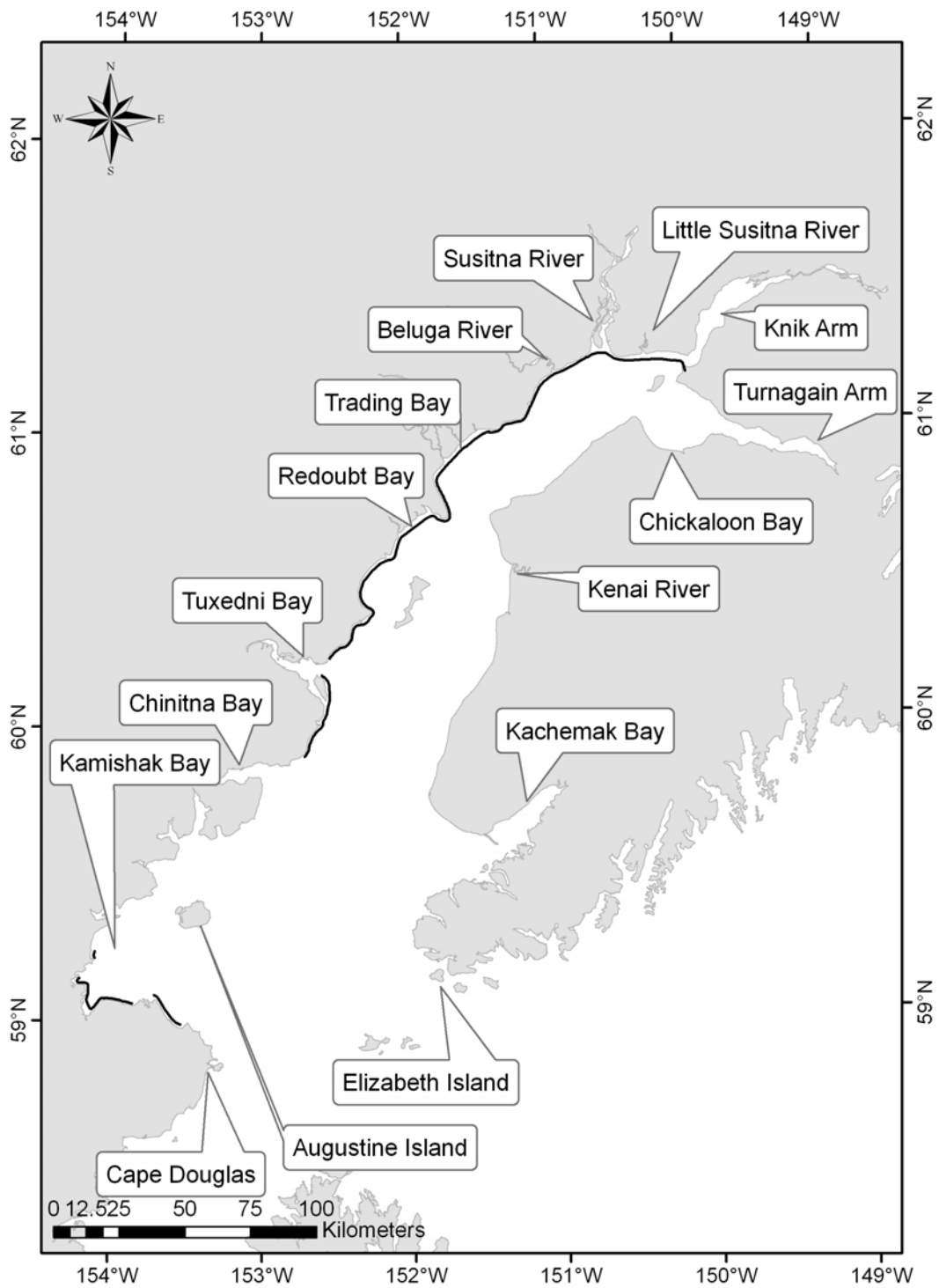


Figure 3. On-effort trackline during the 22-October-2008 Cook Inlet, Alaska, aerial survey.

Cite as:

Shelden, K.E.W., K.T. Goetz, C. Sims, and B.A. Mahoney. 2008. Aerial surveys of belugas in Cook Inlet, Alaska, September and October 2008. NMFS, NMML Unpublished Field Report. 8 p.