Preliminary Results of the 2010 Ice-based Whale Census at Barrow, Alaska
J.C. George, R. Suydam, and J. Herreman
Department of Wildlife Management,
North Slope Borough, Box 69, Barrow, AK

Introduction
Ice-based surveys to estimate the abundance of the Bering-Chukchi-Beaufort Seas (BCBS) stock of bowhead whales (Balaena mysticetus) have been conducted off Point Barrow since the late 1970s. The 2009 survey marks the 20th survey attempt since 1977 when rigorous efforts to estimate population size started. Whales are counted as they migrate from the Bering to the Beaufort Sea (Krogman et al., 1989; George et al., 2004). The survey requires maintaining a watch for about six weeks during the migration (~15 April to 1 June). Like other high-latitude cetacean surveys, the ice-based census is sensitive to environmental conditions and has failed in about half the attempts since its inception. The primary objectives of the 2010 survey were to estimate the abundance of BCBS bowheads and conduct independent-observer watches from two adjacent perches.

Methods
Ice-based census methods have been described in detail in several papers (Krogman et al., 1989; Zeh et al., 1993; George et al., 2004). As much as possible, we attempted to conduct the census in a manner consistent with past seasons. An intensive safety and counting-method training session was conducted at the start of the census. Visual counts are made from ice pressure ridges (called perches) located near the lead edge (Figure 1). We attempted to maintain three observers on the perch 16 hours a day as daylight allowed. As in past years, one observer operated a theodolite (used for obtaining locations of whales), another recorded data, while all three watched for whales.

We used an independent observer (IO) study design similar to those described by Rugh et al. (2008) for migrating gray whales to estimate detection probabilities. Their approach appears to be a more robust method than the single-blind method for estimating detection probabilities particularly because it is functional at high (> 10 whales/hr) passage rates – which the single-blind method was not. Hence we applied a fully independent observer technique to estimating detection probabilities unlike the semi-independent methods used in earlier surveys (Krogman et al., 1989). Rugh et al. (2008) made whale linkages post-season using a mathematical algorithm; however, we used a “command center” to make matches in real-time when passage rates allowed. In our approach, whale location data were independently radioed from each perch to a logistics base where they were plotted by computer onto a large screen. Custom software (R. Delong, pers. comm., 2010) allowed us to plot whale locations for each perch in a different color, and estimate whale swim speeds and directions, as an aid to matching. This approach broke down under high passage rates (>10 whales/hour) at which point the command center was shut down. Whales from such time periods will be plotted post hoc to make whale linkages in a manner similar to Rugh et al. (2008).

Results and Discussion
A total of 1317 new, 249 conditional and 13 calves were seen in 392 hours of watch from 31 March to 27 May from the primary perch. A total of about 1,200 whales were seen in 307 hours of IO watch. An interesting and unusual feature of the 2010 census was that a significant number of whales migrated past Point Barrow between 31 March and 5 April. In no other previous census since 1978 have whales been recorded that early. Early development of shore leads and a larger population size may have contributed to the early migration. Unfortunately, starting around 12 April the leads closed under westerly winds and did not reopen until 30 April. From past surveys, we know that whale passage is high during the last 10 days of April (Figure 2). Furthermore, during that time 3 of 6 satellite-tagged bowhead whales migrated past Barrow. Based on this information, the census team realized they could not accurately estimate the BCBS abundance in 2010 and decided to focus the entire effort on independent observer watches.

Acknowledgements
We acknowledge the cooperation of the Alaska Eskimo Whaling Commission (AEWC) and the whale hunters of Barrow who supported our studies, helped keep us safe, and allowed us to conduct census operations near their camps on the sea ice.
appreciate funding from the National Oceanic and Atmospheric Administration, the North Slope Borough (NSB) and BP Alaska. We are indebted to the many technicians that put themselves at risk to work on the sea ice and conduct this census.

References

Figure 1. High resolution satellite image of the shorefast sea ice showing trails made by the Inupiat whale hunters and our survey team. The location of the observation perch (NW tip of northernmost trail) was ~ 7 km west of Point Barrow. Map courtesy of Matthew Druckenmiller (University of Alaska Fairbanks; ftmld@uaf.edu). Note the unusual configuration of the landfast ice with the large “point” of ice that attached in April to the west of Barrow. This may have reduced the number of whales seen at our perch.

Figure 2. Total new whales counted by day during the 2010 ice-based census at Barrow. Note that several whales were counted in late March and early April which has not been noted in any previous census. Also note that closed leads precluded counting any whales throughout the last two weeks of April which prevented us from making an abundance estimate.