

The Role of Acoustic Communication in the Foraging Success of Bowhead Whales

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Bowhead whales (*Balaena mysticetus*) are affected by Arctic ice conditions that regulate the timing and route of their migration through the Bering, Chukchi, and Beaufort Seas. Bowheads are baleen whales that feed on zooplankton (primarily copepods and krill), and the distribution of their prey is also strongly influenced by ice conditions. Thus, as summer sea ice recedes because of Arctic warming, significant changes are expected in the distribution of bowhead whales. Baseline studies of foraging ecology and the factors that promote foraging success are urgently needed to document behaviors and conditions prior to the anticipated disappearance of summer sea ice over the continental shelf. A potentially important component of foraging success for baleen whales is acoustic communication between individuals, yet little is known about the use of sound in baleen whale cooperative foraging.

With support from the Clark Arctic Research Initiative, I along with several of my colleagues, designed a project to simultaneously study the foraging behavior of and acoustic communication among feeding whales off Barrow, Alaska, during the late summer, using advanced tagging, tracking, and sampling technologies. Bowheads return to this important feeding area during the late summer and early fall on their migration from the Canadian



Bowhead whale

summer feeding grounds in the Beaufort Sea to their wintering grounds in the Bering Sea. We began our project in August of 2007 and spent an entire month looking for bowhead whales in the waters off Barrow. Despite many hours at sea during that month, we never encountered a single bowhead whale that we could tag and study. That year was a particularly warm year, and it was thought that the whales' migration past Barrow may have been delayed because the seasonal formation of ice was slowed. Unfortunately, we came home with no data that year.

We returned to Barrow in 2008 and were fortunate to find many bowheads in the region. However, we found them extremely difficult to approach for tagging. We must be within about 20 feet of a whale to be able to deploy a suction-cup attached tag, but these whales were far too evasive to allow us to get that close. On only one occasion on our last day at sea, did we come close enough to tag a whale; however, the tag only remained attached for a few minutes. In addition to being evasive, close-up photographs revealed that the bowheads we encountered had



extremely irregular skin with numerous bumps and divots which made attaching a suction cup nearly impossible.

To overcome these problems we have developed a new tagging method that relies on a tag which is fired from a compressed-air launcher, allowing launches from a much greater range than the pole-deployment method. Moreover, this tag attaches with a dermal anchor (a small needle that implants in the skin and blubber), thus making the whale's skin condition irrelevant to the attachment process. This new tag has been designed, developed, tested and approved for use by both a WHOI review panel and the Federal Permit Office. The results have been extremely promising, and we hope to return to Barrow with the anticipation of finding bowhead whales, tagging them, and ultimately being able to study the relationship between the whales' foraging behavior and acoustic communication.

I am sincerely thankful to the Clark Arctic Research Initiative for supporting my research and look forward to sending a final report on our tagging efforts.

