

Year-round Presence of Beaked Whales off Cape Hatteras North Carolina

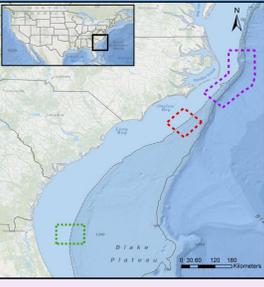
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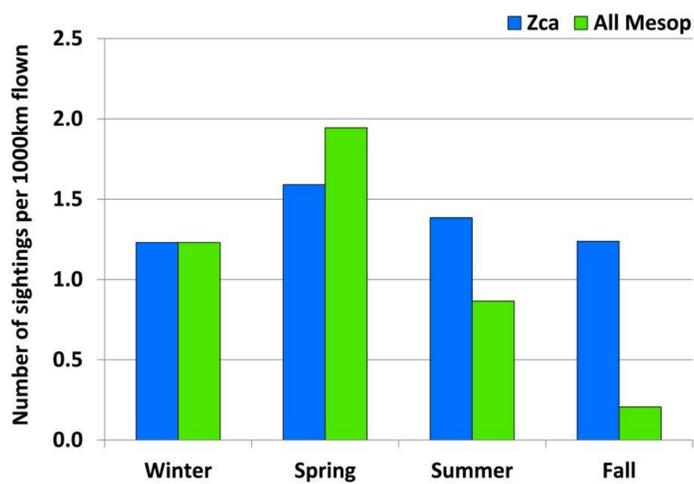


ABSTRACT

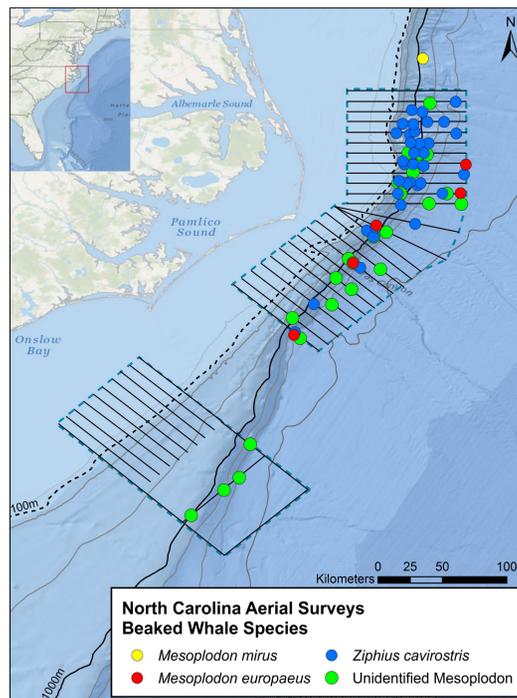
We conducted monthly aerial surveys off Cape Hatteras, NC, USA as part of an ongoing monitoring project of sites utilized by the US Navy for training and testing activities along the US Atlantic coast. Survey tracklines extend from shallow continental shelf waters, across the continental shelf break, to deep pelagic waters. During surveys we record the geographic position of each marine mammal sighting, take extensive photographs of each animal, and review these images in the lab to confirm species identification. Characteristics utilized to identify beaked whales to species are based upon our sightings of adult males with erupted teeth and from comparisons with images of stranded animals. Between May 2011 and December 2014, we recorded 63 beaked whale sightings, representing 173 individuals. Beaked whales were observed in every month of the year, with the highest number of sightings (n=42) from May through August. The most commonly encountered species, observed in every month of the year, was *Ziphius cavirostris* (n=36 sightings, 106 individuals). *Mesoplodon* spp. (n=27 sightings, 67 individuals) were encountered in all months except September and October. Five of these mesoplodont sightings could be identified to species with *M. europaeus* (n=4 sightings, 12 individuals) and *M. mirus* (n=1 sighting, 2 individuals) identified from May through July. All beaked whales were encountered along the continental shelf break suggesting a restricted distribution. This area has recently been opened by the US Bureau of Ocean Energy Management to offshore oil and gas exploration. The geographic distribution of beaked whales off Cape Hatteras overlaps the "Manteo Prospect" and is included in the areas of interest identified in six pending permits for large-scale, commercial seismic surveys. The cumulative impacts of seismic surveys are of special concern as deep-diving beaked whales have been shown to be vulnerable to high-amplitude, impulsive anthropogenic sounds.



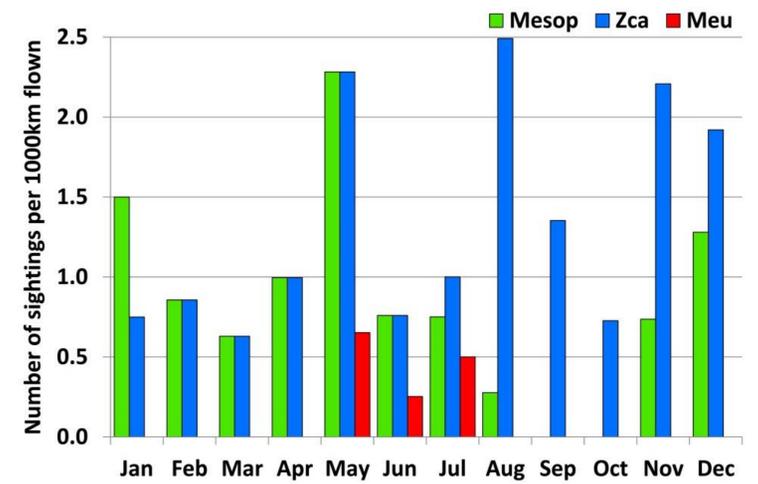
Seasonal Presence of Beaked Whales Off Cape Hatteras



Quarterly sighting rates of confirmed *Ziphius cavirostris* and all combined mesoplodonts confirming year-round presence of beaked whales off Cape Hatteras.



Monthly Presence of Beaked Whales Off Cape Hatteras



Total beaked whale sightings, by species, per 1000km flown, showing year-round presence of *Z. cavirostris* and potential of a fall hiatus of mesoplodonts off Cape Hatteras.

Beaked Whale Species Identification From Aerial Surveys



Z. cavirostris displayed distinctive features characteristic of the species - a relatively robust body, short beak, and head that tended to be lighter in color than body. Body coloration variable among individuals, ranging from pale to dark gray, and rusty to olive brown. Larger individuals tended to display heavier, irregularly linear scarring patterns. The scarring patterns can be used for long-term, individual ID, and a catalogue of *Z. cavirostris* images has been initiated from aerial sightings off Cape Hatteras.



(A & B) Individual adult male *Mesoplodon europaeus* with species-specific mandibular tooth placement less than halfway along the rostrum's length from tip. (C) was sighted with A, and used to ID species-specific coloration patterns, (D-F) sighted without adult male present. Pattern: relatively broad, dark gray to brown stripe along dorsal mid-line, beginning behind cervical region and extending to dorsal fin. Multiple, dark, feathery "tiger stripes" projected laterally from dorsal stripe and terminated above mid-lateral line.



Adult male *Mesoplodon mirus* (inset shows paired teeth at mandibular tip). Body more laterally compressed & rostrum more elongated than *M. europaeus*. Dorsal midline relatively sharp, ridge-like; few linear scars across dorsum. Area around blowhole lightly pigmented. Otherwise body uniformly gray in both individuals. Species recently sighted; additional work ongoing to identify females and juveniles.

Conclusions

- Year-round presence of multiple species of beaked whales with sympatric distributions on and east of the deep continental shelf break. Results support on-going acoustic biomonitoring off Cape Hatteras (see Stanistreet *et al.*, this meeting).
- Species-specific identification characters presented for two mesoplodonts rarely identified in aerial or shipboard survey efforts.
- Cape Hatteras is a cetacean "hot spot" with 20 species from five families recorded to date during US Navy biomonitoring project (McAlarney *et al.*, Roberts *et al.*, this meeting). Area recently opened by the US Bureau of Ocean Energy Management to offshore oil and gas exploration. Potential cumulative impacts of seismic surveys are of special concern to deep-diving beaked whales, known to be vulnerable to high-amplitude, impulsive anthropogenic sounds.