A quantitative analysis of the response of short-finned pilot whales, *Globicephala macrorhynchus*, to biopsy sampling.

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Remote biopsy sampling is commonly used to obtain tissue samples from wild cetaceans. Analysis of these tissues can provide important information on specific identity, sex, pollutant levels, diet, age, and reproductive status. Biopsy sampling is generally considered to be a relatively benign procedure, but all prior attempts to evaluate its impact have relied on subjective assessments of the behavioral response of individuals at the surface. The goal of the present study was to quantitatively assess the short-term effects of biopsy attempts on the behavior of short-finned pilot whales (Globicephala macrorhynchus) equipped with digital acoustic recording tags (DTAGs) off Cape Hatteras, North Carolina. We examined five metrics to determine if the behavior of whales was affected by a biopsy attempt, including: foraging behavior (number of dives, depth of dives, and number of prey capture attempts); time spent within 3 m of the surface; fine-scale body orientation; fluke rate and amplitude; and group vocalization rate. This first quantitative assessment of these quantitative metrics suggested that the short-term reactions to biopsy attempts are likely ephemeral and should not compromise the fitness of the animal. Most individuals exhibited a short-term increase in group vocalization rate following a biopsy attempt, which should be further investigated.

Centralizing Marine Mammal Stranding Data: A Web-based Content Management System

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Marine mammal stranding data may include field and laboratory photographs, morphometric and life history, necropsy reports, histology reports, pathology reports, and medical imaging reports collected by a number of response teams and in multiple formats. Data are typically stored on institution servers or computers and may not be readily available to all interested groups. The Computerized Scanning and Imaging Facility of Woods Hole Oceanographic Institution (WHOI) has developed a website (http://csi.whoi.edu) using free, open-source content management framework (CMF) and content management system (CMS) Drupal. The core functions of CMF and CMS systems are to present information on websites and provide a centralized data editing, publishing and storage platform. We present a description of the CMF and CMS systems, their application in managing stranding data, the advantages of using CMF and CMS (centralized data management, data storage and access, format management, indexing, search and retrieval, and data sharing) and how they provide procedures to facilitate collaborative analyses. Sponsored by the Office of Naval Research (ONR) and Woods Hole Oceanographic Institution (WHOI)

Stereotyped, repetitive gunshot call patterns produced by the North Pacific right whale, *Eubalaena japonica*

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With fewer than 30 individuals remaining, year-round monitoring of the critically endangered eastern North Pacific right whale (NPRW) is crucial. Since 2007, the National Marine Mammal Laboratory has been acoustically monitoring the NPRW using long-term (year-long) passive acoustic recorders deployed throughout the southeastern Bering Sea (SEBS), as well as DiFAR (Directional Frequency Analysis and Recording) sonobuoys deployed during summer field surveys. Stereotyped gunshot call patterns produced by the NPRW were first discovered on sonobuoys during a NPRW survey in 2010. To date, three different patterns have been analyzed from sonobuoys as well as two different long-term mooring sites (55nm apart) in the SEBS. Pattern 1 consists of 15-22 gunshots (avg. = 18; IPI: 1.04s±0.11s) followed by a 250-120Hz downsweep (duration: 0.88s±0.18s). Pattern 2 consists of 8-12 low frequency pulses (avg. = 11; IPI: 2.51s±0.24s) followed by a progression of 15-20 gunshots (avg. = 18; IPI: 3.81s±0.4s). Pattern 3 consists of 5-8 gunshots (avg. = 7) with three discrete, increasing IPIs. Preliminary results show that each pattern has a minimum of 45 iterations repeated over several hours. These patterns have been detected not only throughout a season, but also in two consecutive years (Pattern 1), and in one instance, in non-consecutive years (Pattern 2), indicating long-term stability in pattern structure. Furthermore, there are instances of two different patterns being produced simultaneously, indicating multiple callers. While male North Atlantic right whales have been observed producing long gunshot bouts similar to the reproductive advertisement known in other species (Parks *et al.* 2012), right whales are not known to produce any type of repeated stereotyped pattern. This represents the first study to document stereotyped repetitive gunshot patterning in right whales. The potential significance of these vocalizations and the implications for conservation management will be discussed. [Funded by Bureau of Ocean Energy Management]

An Innovative Approach to Understanding Sound Reception in Odontocetes: Numerical Analysis of the Head-Related Transfer Function

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Head-Related Transfer Function (HRTF) is the acoustic transformation that occurs as sound passes through the head, neck, and peripheral auditory system. The HRTF is one component of directional hearing. Previous studies show that odontocete hearing is directional; unfortunately there is little information describing the parameters of this phenomenon. Understanding how the head transforms received sound is a prerequisite for accurate assessment of risk from anthropogenic sources. We developed the Vibroacoustic Toolkit, a bioacoustic simulator based on marine mammal CT scans, tissue elasticity data, and finite element modeling (FEM) software. For this study, we used the toolkit to calculate HRTF across species and acoustic frequencies. Thus far, we have computed HRTF simulations for two disparate species using similar frequencies, Cuvier's Beaked Whale (*Ziphius cavirostris*) at 42 kHz, and the Long-beaked Common Dolphin (*Delphinus capensis*) at 40 kHz. These virtual experiments show a similar pattern of sensitivity in *both* species. There are three regions or “hot-spots” for best sound reception that can be mapped to a hemispherical screen in front of the head. One hot-spot is straight-ahead of the animal, the other two are down from horizontal and off to either side. Preliminary results also suggest that sound travels differentially through at least two branches or "portals" of the mandibular fat bodies. These two branches attach to distinct locations on the bony tympanoperiotic complexes, one on the tympanic bulla and the other on the medial sulcus of the mallear ridge. We are currently conducting the same analysis for multiple frequencies and for additional odontocete species. This innovative