Humpback Whales (*Megaptera novaeangliae*) Wintering off Puerto Rico

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**INTRODUCTION**

In the NW North Atlantic, migrating humpback whales (*Megaptera novaeangliae*) aggregate at Silver Banks, Dominican Republic, with fewer in waters off Puerto Rico. The present shore-based preliminary study characterizes habitat use, occupancy, and movements of humpbacks wintering off Puerto Rico to clarify the smaller, perhaps “peripheral”, aggregations there. As in other areas, mom-calf nursery pairs occupy near shore habitats, possibly all winter. We described behaviors of mom-calf pairs near human activity, anticipating that the low volume of vessel traffic off Puerto Rico elicits minimal behavioral changes. We utilized passive acoustic monitoring as an indication of humpback occupation in Mona Passage; however, we anticipate infrequent songs as males may exhibit a preference for areas of larger aggregations with receptive females. Observation points were selected on the west and south coasts of Puerto Rico where a view of 185° and up to 9 km were available for scan sampling. Big-Eye and reticle binoculars were employed for spotting whales and describing behavior. For some observations, a theodolite was used for precise positions. Digital identification photography with an 80-200 mm zoom lens was used for assessing durations of occupancy. Preliminary analysis indicates that mother calf pairs are in Mona Passage January - April. Singers are generally not detected after the third week in March. Peak of sightings off the west coast was in February, and a second peak occurred off the south and east coasts in March. Singletones were sighted, often exhibiting energetic, percussive activities. Humpbacks react to the presence of boats and planes by percussive surface activities, or by leaving. Future studies from boat based platforms along with expanded passive acoustic monitoring are needed to determine if the second influx of humpbacks off the south and eastern Puerto Rican coasts is a result of two groups moving separately through wintering habitats.

**METHODS**

- Pilot Study: January 2010- April 2011
- Investigate occupancy, movement, and habitat use of humpback whales.
- Identify small habitats off Puerto Rico serving as nursery areas for humpback whale cows and calves.
- Establish a baseline for measuring occupancy, habitat use, and movement in future seasons.
- Investigate the response of humpback whales to human activity. Our objective is to define human activity eliciting a reaction from humpbacks, including mothers nursing calves.

- Land based platforms: cliffs and lighthouses
- Theodolite tracking
- Big-Eyes and reticle binoculars
- High resolution digital photography
- Passive acoustic monitoring with bottom mounted hydrophones

**RESULTS**

- Singers, singletons, and mother-calf pairs are present off Puerto Rico.
- Groups with more than 3 individuals were not spotted from land based platforms.
- Whales were spotted as close as 100 meters from shore.
- A peak was detected in February off the west coast.
- A second, unexpected peak was detected later in the season off the south coast.
- Human activity occurring in areas where humpbacks were sighted included surfers, parasails, private and commercial vessels of various sizes, fixed wing aircraft, and helicopter traffic.
- Whales responded to vessel traffic with energetic, percussive activity or by leaving.
- Preliminary indications that reaction to vessels may be specific to vessel type warrants further investigation.

**DISCUSSION**

- Boat work to establish duration of occupancy and movement of individuals
- Verify the same mother-calf pairs remain near shore for significant periods of time
- There are indications of a second peak of humpbacks moving into the area off Puerto Rico from the east. Increasing effort earlier and later in the season may help to understand when these whales arrive in the Caribbean, and if they are a separate group moving through the area.
- Continue land based tracking of reaction to human activity.
- Long term studies may indicate site fidelity based on reproductive status for near shore areas away from large breeding aggregations.
- The low density area off Puerto Rico may facilitate a genetic study of calving females. Is there site fidelity of females born in a nursery area, returning to the same area for calving, similar to site fidelity to a developing project and graduate student. Financial support in the form of grants and in-kind contributions are gratefully acknowledged from Sea Star, Galveston Graduate Student Association, Society of Marine Mammal Sciences, Texas A&M University at Galveston Marine Biology Department, the Erma Lee and Luke Mooney Graduate Travel Grant. A special “thank you” to David Mann, Michelle Scharer, Richard Appeldoorn, and Twasha Rawal for sharing data collected from hydrophones off the west coast of Puerto Rico and St. Thomas.

**ABSTRACT**

Humpbacks are remaining off Puerto Rico during winter.
- Indications whales arrive as early as November and leave as late as May.
- Acoustic data from bottom mounted hydrophones recorded individual humpback singers between 2007 and 2011.
- Mother-calf pairs were spotted near shore throughout the season.
- Establishing the area waters off Puerto Rico as a nursery area requires determining occupancy from boat based platforms.

We were able to predict which vessels and aircraft would elicit a change in humpback whale behaviors.
- Dual outboard motors on catamaran hulls, helicopters, and speed boats with parasails resulted in humpbacks leaving, or breaching.
- Sailboats, small personal craft, and surfers did not elicit a change in behaviors.
- Further data collected during the winter of 2012 may be helpful in providing information that minimizes or eliminates disturbances to humpback without disrupting human activity.
- The low density aggregation of humpbacks off Puerto Rico facilitates analysis of behaviors of individuals.
- Silver Banks, off Dominican Republic, is the location for the large aggregation of North Atlantic humpbacks forming surface active groups competing for breeding opportunities. Why would singers (male humpbacks) be found in a low density area populated by mother-calf pairs?

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