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Department of Marine Sciences
Presents a Seminar by

David Wiley

NOAA/Stellwagen Bank National Marine Sanctuary

Investigating the Underwater Behavior of Humpback Whales as an Aid to Understanding Entanglement and Ship Strike

Ship strikes and entanglement in bottom-set fishing gear are major mortality factors for humpback whales. We used multi-sensor acoustic or video recording tags placed on whales to understand their underwater behavior and how that relates to whale vulnerability. We used the custom data visualization package “TrackPlot” to produce 3D maps of tagged whale behavior during feeding (i.e. bubble-netting and bottom feeding) and combined these with prey and substrate mapping to understand variables that influence where, when and how whales feed. We then used these data to investigate the potential for humpbacks to be vulnerable to ship strike or entanglement based on water column use (i.e., percent of time spent at depths where they could co-occur within the draft of commercial ships or the vertical rise of bottom-set fishing gear). Vulnerability to ship strike was calculated as percent time from the surface to a depth of 9.1m (average depth of area vessels based on AIS information). Vulnerability to entanglement was calculated as percent time spent from the bottom to 5m above, with bottom identified by characteristic side-roll feeding as identified in the tag record. We combined water column-based vulnerabilities to quantify the total vulnerability of humpback whales to human activity (ship strike and entanglement), and investigated hourly aspects of vulnerability. On an hourly basis, time spent by humpbacks vulnerable to ship strike ranged from 27% at 2300hrs to 53% at 0900hrs, and for entanglement ranged from 0% at 0700hrs to 50% at 2300hrs. Cumulatively, vulnerability ranged from 40%; 0800hrs – 80%; 2400hrs. Our results demonstrate that humpback behavior (e.g., feeding and breathing) in the Gulf of Maine cause them to spend the majority of their time at depths that make them vulnerable to potentially lethal interaction with ships and fishing gear. As humpback whale survival requires them to occupy these portions of the water column, vulnerability can only be modified by changes in anthropogenic activity, with increases or decreases in the amount of activity or its penetration into the water column translating into increases or decreases in vulnerability and associated mortality.

Host: Hannes Baumann
Time & Date: 11:00 am, Friday, October 4, 2019
Place: Marine Sciences Building, Seminar Room 103

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Dr. David Wiley is the Research Coordinator for NOAA's Stellwagen Bank National Marine Sanctuary, a federally designated marine protected area off the coast of Massachusetts and New Hampshire. His research focuses on the ecology of large whales, seabirds and forage fish. His numerous publications include being featured on the cover of journals as diverse as Conservation Biology, Behaviour and Environmental Management. His many awards include a Gulf of Maine Visionary Award, the Society for Marine Mammalogy's award for Excellence in Scientific Communication and the US Department of Commerce's Gold Medal for Scientific Leadership. He is a recipient of an Ian Axford/Fulbright Fellowship in Public Policy and is adjunct faculty in the School of Science and Mathematics at the University of Massachusetts - Boston and the Department of Fisheries and Wildlife at Oregon State University. His research has been highlighted on BBC, Discovery Channel, National Geographic Channel and PBS documentaries and featured in National Public Radio, Ocean Geographic, New York Times and numerous other media outlets. Dr. Wiley has also mentored a wide range of students that are becoming the next generation of conservation biologists.