Workshop on Collaborative Conservation for Common Bottlenose Dolphins in Mississippi State Waters: 11-13 January 2021

Summary of Presentations, Data Needs, and Collaboration Opportunities

The purpose of this workshop was to enhance conservation of common bottlenose dolphins (dolphins) in Mississippi (MS) state waters by fostering collaborations and strengthening capacity for science, management, and marine mammal health. The workshop included researchers and managers from organizations and institutions across MS, and was convened by the National Marine Fisheries Service (NMFS). The Marine Mammal Commission (MMC) moderated the discussion and prepared this summary.

Workshop Objectives

- Provide an overview of the current status, health, and survival of dolphins in MS state waters
- Provide an overview of current threats impacting dolphins in MS state waters and related management challenges
- Discuss the current status of research activities in MS state waters and identify critical uncertainties
- Identify data, research, and partnership gaps and priority needs to address critical uncertainties and inform conservation of dolphins in MS state waters
- Determine immediate and long-term activities to address priority needs, and
- Identify and foster opportunities for coordination, communication, and collaboration.

Workshop Agenda and Discussions

Day One: The MS-based organizations each gave round-robin presentations on their current and future research and management priorities, focal areas, and critical uncertainties in the study of threats, status, and health of dolphins in MS state waters.

Day Two: The NMFS Southeast Fisheries Science Center, Southeast Regional Office, and Office of Protected Resources staff gave presentations on the status of dolphin stocks in MS state waters, major threats, stranding patterns, Unusual Mortality Events (UMEs), and health factors. Participants discussed critical uncertainties and priority needs regarding the status of dolphin stocks and primary threats.

Day Three: Participants continued discussion of threats, how abundance estimates are derived by NMFS, examples of successful collaborations in the Gulf of Mexico and elsewhere, and wrap-up/action items.

Presentation Highlights

Organizational Overviews

- Institute for Marine Mammal Studies (IMMS) has a 35+ year history working on dolphins and other marine mammals in the northern Gulf. Their expertise is in stranding response and research, rehabilitation, education, and outreach.
- The Mississippi State University College of Veterinary Medicine (MSU-CVM) has a long-standing history of research in aquatic animal health. They have board-certified veterinary pathologists and epidemiologists as well as veterinarians experienced in clinical care and advanced imaging of marine animals in addition to laboratories experienced in the specialized testing necessary for marine animals.
- The Mississippi Aquarium has emerging capabilities to provide veterinary care for captive dolphins and conduct baseline research to further understanding of wild dolphin behavior, physiology, and threats.
- The Mississippi Department of Environmental Quality (MS DEQ) serves to strengthen state partnerships and foster collaboration, coordination, and enhanced capacity in accordance with state priorities. It also represents the state on its DWH Trustee Implementation Group.
- The Mississippi Department of Marine Resources (MS DMR) coordinates state-funded research efforts regarding water quality and marine resources. Its focus is on water quality parameters associated with marine ecosystems.
- The National Fish and Wildlife Foundation (NFWF) has provided funding through its Gulf Environment Benefit Fund to enhance the capacity of the marine mammal stranding program and make information from strandings more accessible and useful for management.
- University of Southern Mississippi (USM) has a history of marine mammal research and is expanding its

technological capabilities to support coastal resilience, understanding of coastal and ocean issues, and the Blue Economy. It offers technology and infrastructure to further marine research in the Gulf.

- The NMFS Southeast Fisheries Science Center (SEFSC) Marine Mammal and Turtle Division (MMTD) conducts research on Gulf marine mammals. MMTD staff have conducted marine mammal abundance surveys since the 1970s, and participate in tagging/telemetry studies, bycatch monitoring, and age and growth studies. MMTD staff focus also on developing habitat models, bycatch estimation, passive acoustic monitoring, coordination of stranding and UME response for the Southeast, and genetics analyses to assist in species identification and stock structure.
- The NMFS Southeast Regional Office (SERO) coordinates management and conservation activities regarding marine mammals and implementation of the Marine Mammal Protection Act, including coordination and administration of the stranding response program.
- The Office of Protected Resources' (OPR) Marine Mammal Health and Stranding Response Program leads NMFS's implementation of marine mammal response and health investigations through strong partnerships, collaboration, and sound science. The program oversees UME response and investigations, stranding and entanglement response, bio-surveillance, health and stranding data management, and health studies on live and dead marine mammals.

State of the Science

- There is one estuarine stock of dolphins in MS state waters. The stock boundaries encompass MS Sound, Lake Borgne, Bay Boudreau, and adjacent Gulf coastal waters extending one km from the MS Sound barrier islands.
- Abundance estimates are derived from aerial line-transect surveys or small vessel-based Capture-Mark-Recapture (CMR) photo-ID surveys; CMR surveys are currently not inclusive of all MS Sound waters. Additionally, not all photo-ID data are currently used in stock assessments due to differences in methodologies across studies.
- Our understanding of the stock structure of dolphins in MS Sound is limited. Although individual home ranges may be relatively small, recent studies indicate the boundaries of the population may extend into waters outside MS Sound (e.g., Chandeleur Sound).
- Major ongoing threats to dolphins in MS state waters include exposure to episodic low salinity events, fishery interactions (i.e., shrimp trawl, menhaden purse seine, hook-and-line, and crab pot gear), harmful algal blooms (HABs) and other environmental threats, and intentional harm (e.g., shooting).
- There is currently no observer coverage on commercial fishing vessels in MS state waters. Information from strandings, on-water surveillance, and fisher self-reporting suggests that fishery-related mortality is underestimated.
- Dolphins in MS Sound were significantly affected by the Deepwater Horizon (DWH) oil spill. There is concern that changing environmental conditions (e.g., freshwater impacts, extreme weather events) and planned restoration effects (e.g., sediment diversions) could impact recovery.
- Dolphins in the northern Gulf continue to be subject to large-scale mortality events. The most recent mortality event occurred in 2019 (part of the second Northern Gulf UME) and was attributed to exposure to low salinity waters resulting from extreme freshwater discharges, with most of the mortalities occurring in MS and eastern Louisiana.
- The role of oil spills, other contaminants (including persistent organic pollutants, heavy metals, and emerging chemicals of concern), HABs, and diseases on dolphin health represents a significant data gap.
- Funding for marine mammal research is limited. Dolphin research and management efforts could be enhanced through cooperative data collection, the use of standardized sampling and analytical methods, and sharing of information and samples.

Critical Uncertainties and Priority Needs for MS Sound Dolphins

Population Structure and Assessment

- What are the trends in abundance of the MS Sound stock of common bottlenose dolphins?
- What is the degree of genetic connectivity to dolphins outside of the MS Sound region?
- What are biologically meaningful boundaries for the demographically independent population of dolphins that utilize MS Sound waters?

Distribution, Movements, and Habitat Use

- What are the primary prey species for MS Sound dolphins?

- How do individuals within the stock utilize and partition the habitat, and why?
- How do individuals within the stock respond (in terms of movements and health) to changes in salinity?

Health Assessments and Field Studies

- What are baseline health conditions of MS Sound dolphins?
- What is the prevalence of disease, contaminants, lesions, and other health issues in MS Sound dolphins?
- How are dolphins recovering from injuries determined to be caused by the DWH oil spill?
- How are dolphins being impacted by DWH restoration activities?

Mortality and Threats

Freshwater Exposure/Habitat Alteration

- How does freshwater exposure impact dolphin health and survival?
- What is the prevalence and characterization of skin lesions in both healthy and impacted populations?
- What are the systemic impacts of freshwater exposure and what lesions are noted histologically?
- How is the abundance and distribution of dolphin prey species affected by freshwater exposure?
- How do residency patterns affect dolphin responses to freshwater exposure?

Fishery Interactions

- What is the distribution of commercial shrimp trawl effort in MS Sound by gear type (i.e., skimmer, otter)?
- How can quantitative measures of mortality and serious injury in shrimp trawl, menhaden, and trap pot fisheries be better estimated? Can this be achieved through observer coverage, or are alternative methods needed?
- Are there gear modifications that can be made to fishing gear (specifically trawl, hook-and-line, and crab pot gear) that can reduce interaction rates with dolphins?

Intentional Harm

- What is the extent of illegal feeding and other interactions with wild dolphins, by user group? Where and when are those activities occurring? Are they increasing?
- What is the prevalence of harmful/lethal interactions (i.e., gunshot wounds or other evidence of intentional harm)?
- What are safe and effective deterrence techniques that can reduce dolphin-fishery interactions?

Oil Spills/Leaks

- Are MS Sound dolphins recovering from the acute and chronic impacts of the DWH oil spill?
- Are there collaborative data collection and modeling efforts that could be developed to monitor recovery?
- What are the long-term and chronic impacts of exposure to oil and hydrocarbon release events?
- How will we determine successful recovery and restoration?

HABs

- What are the impacts of climate change on HAB types and biotoxin production in MS Sound?
- How are HABs affecting the health, reproduction, and survival of MS Sound dolphins?
- What are the points of care or rapid field diagnostics for biotoxins that can be applied in MS Sound?

Contaminants

- What are the background levels and trends of contaminants in MS Sound dolphins?
- How are the levels and trends of contaminants in dolphins impacted by freshwater incursion into MS Sound?
- How are contaminants affecting the health, reproduction, and survival of MS Sound dolphins?

Diseases

- What are the background levels and trends of diseases in MS Sound dolphins?
- How are diseases affecting the health, reproduction, and survival of MS Sound dolphins?

Cumulative Impacts

- What are the potential impacts on MS Sound dolphins of exposure to multiple stressors?

- How do we incorporate modelling on the population consequences of multiple stressors into our assessment of MS Sound dolphin health, reproduction, and survival?

Opportunities for Developing Data Standards, Enhancing Data Sharing, and Expanding Collaborations

Data Standards and Data Sharing

- A long-term, cooperative survey plan for the MS Sound region is needed to enhance information available to assess stock abundance and track trends in abundance, and for integrating data across seasons, areas, and programs. The plans should build on previous and ongoing efforts to standardize and share data streams (e.g., GOMDIS). The plan should specify also the survey area(s) and methods that can be applied consistently across seasons, and at what intervals. The methods should address standardized data collection, processing, and analysis of survey data.
- NMFS SEFSC offered to convene a workshop on field survey methods (particularly for vessel-based CMR studies) and analytical approaches to estimate abundance, as part of developing a long-term, cooperative survey plan.
- Standardized data and sample collection methods, sample analyses, and data/sample sharing plans are also needed for investigations of stranded dolphins (e.g., what tissues are best for what types of analyses), cause of death determinations, and health evaluations of live free-swimming dolphins through remote visual assessments, remote sample collection, and targeted studies.
- Encourage sharing of long-term data series (e.g., dorsal fin photos).

Collaborations

- Vessels, equipment, and expertise are available at NMFS, IMMS, the MS Aquarium, MSU, USM, and MS DMR for expanding field studies to under-sampled areas (e.g., western MS Sound, Lake Borgne, and Bay Boudreau), under-sampled seasons (e.g., winter) and for conducting more comprehensive necropsies and laboratory analyses.
- Collaborations are needed to develop appropriate methods to monitor dolphin-fisheries interactions in MS Sound.
- Stronger collaborations are needed with first responders to support investigations of cetaceans affected by oil spills and other environmental disasters (following regional disaster response guidelines).
- Consistent, standardized, collaborative efforts to integrate across studies and locations are critical to improve understanding of the health and status of MS Sound dolphins.
- Models to determine ecological tipping points of aquatic resources could be expanded to include dolphins.
- Data gaps should drive research and tool development, integrating live and dead animal studies.
- Data sharing, consistency, integration, and collaboration are needed to address increasing challenges.
- Tool and technique development is a priority and could be an opportunity for leveraging across programs/agencies.

Workshop Invited Organizations/Participants

- IMMS: Moby Solangi, Theresa Madrigal
- MSU: Mark Lawrence, Debra Moore, Bill Epperson, Stephen Reichley
- MS Aquarium: Holley Muraco, Kurt Allen, Alexa Delaune, Sean Perry
- MS DEQ: Valerie Alley, Robbie Kroger
- MS DMR: Paul Mickle (now with MSU), Michael Brainard, Traci Floyd
- NFWF: Michael Sharp
- NMFS Office of Protected Resources: Donna Wieting, Teri Rowles
- NMFS SERO: Laura Engleby, Stacey Horstman, Erin Fougéres
- NMFS SEFSC MMTD: Keith Mullin, Patricia Rosel, Lance Garrison, Jenny Litz, Melissa Soldevilla, and others
- USM: Kelly Lucas
- Dauphin Island Sea Laboratory (Alabama): Ruth Carmichael
- Audubon Institute (Louisiana): Gabriela Vazquez
- MMC: Vicki Cornish and Connor Fagan (moderators), France Gulland, Randall Reeves

The following is a link to the agenda, a more detailed meeting summary, and reference documents: https://tinyurl.com/2021-MS-BD-Workshop