

GCOOS

ANIMAL TELEMETRY NETWORK

WORKSHOP SUMMARY REPORT

Identifying Regional Needs and Priorities for Animal
Telemetry Observations of Aquatic Species

JANUARY 23-24, 2018
DOUBLETREE BY HILTON
NEW ORLEANS,
LOUISIANA



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WORKSHOP SPONSORS

Thanks to our planning committee, sponsors, and all who helped to make this workshop a success. Special thanks to Chris Simoniello and Helen Worthington for their valuable assistance in preparing this report. We also thank LGL Research Associates, Inc. for hosting the evening reception.

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The photos on pages 5, 7, and 11 were taken aboard the Florida Institute of Oceanography R/V Bellows during a successful research cruise conducted April 17–21, 2017 by five scientists, two graduate and 40 undergraduate students from the New College of Florida, Eckerd College, Mote Marine Laboratory, and The Nature Conservancy. The cruise on the R/V Bellows was designed to enhance knowledge about the shark species using southwest Florida's coastal habitats. According to Dr. Jayne Gardiner, Assistant Professor of Biology at New College of Florida, "It's amazing how many studies we supported in a five-day trip, while also giving two groups of college students an exciting, hands-on learning experience." The group fitted sharks with advanced tags and collected data and samples to serve multiple projects at our institutions and elsewhere. Blood samples and ultrasound results will support studies of shark pregnancy by our colleagues at University of North Florida, and clips of fin tissue will support assessments of genetic diversity. Data from acoustic and satellite tags and recaptures of conventional (plastic) ID-tagged sharks are important for understanding shark populations in the Gulf of Mexico overall, and they can be compared with past data to investigate possible changes over time. Multiple shark species are valuable to Gulf fisheries and to ecosystems where they serve as top predators in the food web, maintaining a healthy community.

WORKSHOP OUTLINE

As called for in the U.S. Animal Telemetry Network (ATN) Implementation Plan, the GCOOS (Gulf of Mexico Coastal Ocean Observing System), and the U.S. IOOS (Integrated Ocean Observing System) convened a Gulf of Mexico regional ATN workshop on January 23–24, 2018. Workshop participants from multiple agencies and organizations, including the National Oceanic and Atmospheric Administration (NOAA), the National Park Service (NPS), the Bureau of Ocean Energy Management (BOEM), Port Tampa Bay, LGL Ecological Research Associates, Inc., The Nature Conservancy (TNC), INAPESCA, CINVESTAV, multiple state agencies and universities, and more worked together over the two days to address four objectives:

Objective I.

Identify and prioritize regional telemetry research and potential keystone monitoring and observational needs.

Objective II.

Review the existing regional telemetry observing assets and scientific capabilities in the region.

Objective III.

Document existing examples of commercial and resource manager stakeholder uses of telemetry data.

Objective IV.

Identify data management challenges and mechanisms for regional data aggregation with national linkages for data management, sharing, and collaboration.

Twenty-one speakers covered topics that provided perspectives from the resource management, commercial, and research communities.

For breakout discussions, the participants were organized into two groups, each of which addressed the following two topics:

- A. Identify animal telemetry observation needs in the GCOOS region versus assets currently in place to collect data.
- B. Identify potential projects that could demonstrate the value of an integrated ATN in the Gulf of Mexico.

<https://ioos.noaa.gov/project/atn/>

Cover Photo (also pages 3, 8, 9, and 24): Bottlenose dolphins travelling along the coast off Sarasota, Florida (wishing they could have a satellite-linked tag). Photo credit: Chicago Zoological Society's Sarasota Dolphin Research Program, taken under NMFS Scientific Research Permit #15543.

WORKSHOP HIGHLIGHTS

I. STAKEHOLDER MONITORING/OBSERVATIONAL NEEDS

- Federal support is essential for multi-year marine animal telemetry data collection to detect changes in trends of habitat use and productivity from natural and other causes.
- Important international collaborative efforts are in place to help manage the longline tuna fishery in the Gulf of Mexico (GoM).
- The conservation goals of Port Tampa include eliminating/reducing impacts to protected species, promoting best practices in the industry, and building partnerships with environmental agencies and researchers.

II. EXISTING OBSERVING ASSETS

- Florida Atlantic Coast Telemetry Network (FACT):
45+ groups, 3,784 acoustic tags, 916 receivers, 86 species, 2 countries, 5 states, U.S. territories
- Louisiana Department of Wildlife and Fisheries: Calcasieu: 60 receivers; Lake Pontchartrain: 90 receivers
- Mississippi State University, Grand Bay National Estuarine Research Reserve, and U.S. Geological Survey: Hundreds of tags on brown pelicans in Mobile Bay region since the oil spill and dozens of Motus receiver stations in Texas, Louisiana, and Mississippi
- Texas A&M, Corpus Christi/Harte Research Institute: Texas Acoustic Array Network (TEXAAN)
- Dauphin Island Sea Lab Coastal Alabama Acoustic Monitoring Program: 55 receivers
- Mote Marine Lab Sarasota Dolphin Research Program: the world's longest-running dolphin monitoring program (1975)
- New College of Florida: Directional acoustic gates to identify shark nursery and essential fish habitats (150 tags deployed)
- University of Florida, Florida Keys line: 46 arrays. 1,240 receivers, 2,000+ tags
- University of Southern Mississippi: Bay St. Louis Array, Ship Island/Dog Keys Pass, Pascagoula River/Estuary
- Texas A&M University Galveston: Receivers are placed at choke points along the barrier islands, 65 receivers in summer 2018 in eastern Galveston Bay

Redfish being released back into Lake Pontchartrain after having an acoustic transmitter surgically implanted. Photo credit: Gabe Griffin/Louisiana Department of Wildlife and Fisheries



III. STAKEHOLDER USE OF TELEMETRY DATA

- Inform oversight activities, conduct impact analyses and inform mitigation actions, understand habitat use and how the animals use the Gulf of Mexico ecosystem, predict where animals are in space and time, determine site fidelity, and identify potential threats across range.
- Assess effects of anthropogenic disturbances, biodiversity maintenance, species conservation, fisheries assessment, and management of preserves.
- Determine the overall importance of offshore platforms as spawning aggregation sites, identify reef fish spawning aggregations in the Gulf of Mexico and connectivity among sites, and define the relationship between production and aggregation.
- Generate the scientific and technical databases that are used to strengthen the management of the longline tuna fishery in the Gulf of Mexico through the bilateral relationship between Mexico and the United States.
- Avoid major impacts to protected resources and incorporate them into industry best practices (BMP).

IV. IDENTIFY DATA MANAGEMENT CHALLENGES

- Most ports have a master buildout plan. If we can identify where expansions will be taking place and get ahead of the activity with data, there will be clear value in the information.
- Real-time telemetry creates volumes of data, so we are always looking for novel ways to subset, parse, and compress the data, then reassemble/re-create at the other end.
- Multi-year monitoring is needed to detect changes in trends of habitat use and productivity from natural and other causes. The majority of oil and gas activities are in deep, federal waters, so these deeper offshore regions need to be a focus for continued and future studies.
- Enhanced networking and coordination in the Gulf of Mexico are needed by advocating large-scale, multi-taxa proposals that can improve integration of multi-species and interdisciplinary data.
- Acoustic telemetry code-space issues across vendors are problematic. The tagging community needs to find a way to incentivize acoustic tag vendors to collaborate. It is difficult to broaden the network if systems are not compatible.

New College of Florida student Mackenna Jensen working on the deck of the Florida Institute of Oceanography vessel R/V Bellows at sunset. Photo credit: Chip Litherland/New College of Florida



WORKSHOP CONCLUSIONS

OBJECTIVE I: Identify and Prioritize Regional Telemetry Stakeholder and Research Keystone Monitoring/Observational Needs.

THEME A: Collect marine animal telemetry data that can assist Gulf ports in implementing their commitment to reduce and eliminate impacts on the multiple protected species of fish and wildlife with whom they share the estuary.

THEME B: Identify a network of offshore platforms to be equipped with acoustic telemetry receivers and passive broadband hydrophones.

THEME C: Develop a plan for integrated research and monitoring of living marine resources in the Gulf that is coupled closely with the U.S. Animal Telemetry Network.

THEME D: Advocate for creation of an organized Gulf-wide avian telemetry system that can be nested within Motus.

FEDERAL AGENCIES

The Bureau of Ocean Energy Management (BOEM)

The role of BOEM is to support multi-year marine animal telemetry data collection that is defined through their Environmental Studies Program in order to detect changes in trends of habitat use and productivity from natural and other causes. BOEM continues to support a significant amount of satellite telemetry while also providing increasing support of acoustics to better understand site fidelity with platforms. Species of interest include eastern brown pelicans, green and Kemp's Ridley turtles, red snapper, sperm whales, and Florida manatees.

INAPESCA (Instituto Nacional de Pesca, México)

INAPESCA's focus is on tagging large pelagic (yellowfin and bluefin tuna) to help support the longline tuna fishery in the Gulf of Mexico. A king mackerel study is also underway.

STATE AGENCIES/RESOURCE MANAGERS

Louisiana Department of Wildlife and Fisheries

The LDWF is using marine animal movement information to inform and solve fisheries management challenges. Acoustic telemetry activities include tracking speckled trout (244), juvenile bull sharks (18), and adult red drum (64) in Lake Pontchartrain and (jointly with the U.S. Fish and Wildlife Service and LSU graduate students) studying spotted sea trout in Calcasieu to generate baseline behavior data.

Mississippi State University/Grand Bay National Estuarine Research Reserve (NERR)

Work is focused on avian species and identifying how threats are changing through space and time. Among the species of importance are brown pelicans, American oystercatchers, and clapper rails. They strongly advocate creation of a Gulf-wide avian telemetry system that can be nested within the Gulf's observing infrastructure.

NGO

The Nature Conservancy

TNC is primarily interested in satellite tagging data to understand movement of pelagic fishes, sea turtles, and mammals. They have primarily been funded for satellite tags but are interested in acoustic gates (especially international corridors of movement) and passive acoustics.

COMMERCIAL/PRIVATE SECTOR

Port Tampa Bay

Because the port is located on Florida's largest open-water estuary, which is home to many protected species of fish and wildlife, Port Tampa Bay welcomes the collection of marine animal telemetry data that can assist them in implementing their commitment to reduce and eliminate impacts from the port on those multiple species.

LGL Ecological Research Associates, Inc.

LGL goals are to select and justify a network of offshore platforms to be equipped with acoustic telemetry receivers and passive broadband hydrophones and develop an integrated monitoring and research plan that is coupled closely with the U.S. Animal Telemetry Network. Selected ATN sites should be reefed in place to maintain continuity of the monitoring array over time.



New College of Florida student Lukas Heath releasing a blacktip shark after a full physical workup, including genetic sample, blood sample and ultrasound to determine pregnancy status plus dual tagging with acoustic and conventional dart tags. Photo credit: Chip Litherland/New College of Florida, taken under Florida Fish and Wildlife Conservation Commission Special Activities License SAL-1666-SRP (New College of Florida) and SAL-0041-SRP (Mote Marine Laboratory).

OBJECTIVE II: Identify the Existing Telemetry Observing Assets and Scientific Capabilities in the Region.

FEDERAL

NOAA/National Marine Fisheries Service (NMFS)

Primary species of interest is the Queen conch (*Strombus gigas*). From 2014–2017, 98 animals (V9-2H tags) have been tagged for a total of 487 tag-days in Salt River Bay (St. Croix); project is expected to continue through 2018. Work is leveraged through the USCAN (U.S. Caribbean Acoustic Network) federal and non-federal partners. USCAN has collected data on 27 different species, with more than 60 million detections from a total of 900 tags.

INAPESCA (Instituto Nacional de Pesca, México)

The Observer Program on board the commercial longline tuna fleet in the Gulf of Mexico is an effective way to collect information to be obtained **in real time** to identify the interaction and the evolution of this fishery.

STATE

Florida Atlantic Coast Telemetry (FACT)

45+ groups
3,784 acoustic tags
916 receiver
86 species
2 countries
5 states
U.S. territories

Louisiana Department of Wildlife and Fisheries

Calcasieu: sea trout (172), 60 receivers
Lake Pontchartrain: speckled trout (244), bull sharks (18) and adult red drum (64), 90 receivers

ACADEMIC

Mississippi State University, Grand Bay NERR, and U.S. Geological Survey

Brown Pelicans – Mobile Bay Region

~200 satellite tags (some with, some without GPS) deployed since the oil spill
Objective: Quantify interactions with oil/gas infrastructure.

Motus Receiver Stations

Texas

American oystercatcher, other shorebirds
14 receiver stations; 15 individuals marked
Objective: Determine non-breeding movements, activity patterns.

Louisiana

Not taxa specific – provide infrastructure for researchers
10 receiver stations; 125 'foreign' recaptures
Objective: Provide research/animal tracking infrastructure.

Mississippi

Clapper Rails, other foreign recaptures
6 receiver stations, 37 individuals marked
Objective: Estimate annual survivorship.

Texas A&M University Corpus Christi

- Collaborates with the Texas Acoustic Array Network (TEXAAN)
 - Cedar Bayou: 18 receivers
 - Spotted Sea Trout - 20
 - Red Drum - 15
 - Aransas Pass: 47 receivers
 - Spotted Sea Trout - 20
 - Red Drum - 35

Texas A&M University Galveston

- Perform southern flounder, coastal sharks, tuna, and billfish work in collaboration with University of Texas Rio Grande Valley in Brownsville.
- Place receivers at choke points along barrier islands; 65 receivers in summer 2018 in the eastern part of Galveston Bay with the next phase focused on the western part of the bay.
- Rio Grande Valley: VPS array (12 receivers).
- Five gates from Mexico to the Texas/Louisiana border make up the Western Gulf of Mexico Coastal Gates system working with Ocean Tracking Network, Harte Research Institute, and National Park Service.
- Acoustic tags on flounder, drum, trout, and bull sharks.
- Satellite tags on tuna, blue and white marlin, and sailfish.

University of Louisiana at Lafayette

- Use passive acoustic monitoring to study the effects of anthropogenic noise on marine mammals with partners at Scripps Institution of Oceanography and Cornell University. Information about regional whale and dolphin populations and niche habitat use can be extracted.

University of Southern Mississippi

- Bay St. Louis Array.
- Ship Island/Dog Keys Pass.
- Pascagoula River/Estuary.
- Acoustic tags: Gulf sturgeon (260 since 2008), red drum (18), bull sharks (10), spotted sea trout (16), grey snapper (20), grouper (9), Atlantic sharpnose/bonnethead and blacktip sharks (28).

University of Florida

- Lionfish, red drum.
- Florida Keys line: 46 arrays, 1,240 receivers, 2000+ tags.

New College of Florida

- Directional acoustic gates deployed near the main mouth of the Manatee River and Terra Ceia Bay to identify shark nursery habitats and essential fish habitats (150 tags deployed)
- Tags with 10-year battery life are becoming available and are creating opportunities for long-term studies, including blacktip shark philopatry (46 tags are “live” through 2026-2027).

Dauphin Island Sea Lab

- GPS satellite tags North Gulf of Mexico to Florida (15 since 2009).
- Mobile Bay: Seasonally deployed receivers (7).
- Coastal Alabama Acoustic Monitoring Program (CAAMP) 55 receivers in Alabama coastal waters, red drum (291 since 2015), and speckled trout (109 since 2017).

CINVESTAV (Center for Research and Advanced Studies of the National Polytechnic Institute), México

- Perform hawksbill sea turtle telemetry work to gather ecological and biological information about the decreasing number of nests.
- Cooperate with TNC on blueways to understand how nesting females are connected throughout the Gulf and to understand accumulated threats—natural and human. Seven countries are involved in satellite tracking and mark/recapture methods.

NGO**Chicago Zoological Society/Mote Marine Lab**

- Sarasota Dolphin Research program is the world’s longest-running dolphin monitoring program (since 1975).
- Approximately 160 individual animals spanning five generations in the Sarasota Bay population. Recent work is focused on development and testing of new electronic tags and applications, especially for post-intervention monitoring.
- 44 receivers deployed, some on nearby reefs. 24 spotted eagle rays, and 5 bull sharks tagged to date.

OBJECTIVE III: Document Existing Examples of Commercial and Resource Manager Stakeholder Uses of Telemetry Data.

THEME A: Foster informed management decisions and international collaboration in protecting the health of the Gulf of Mexico.

THEME B: Predict where animals are in space and time, determine site fidelity, and identify potential threats across range.

THEME C: Strengthen the management of the longline tuna fishery in the Gulf of Mexico through the bilateral relationship between Mexico and the United States.

FEDERAL AGENCIES

The Bureau of Ocean Energy Management (BOEM)

BOEM uses the results of telemetry-related research to inform oversight activities, conduct impact analyses and inform mitigation actions, understand habitat use and how the animals use the Gulf of Mexico ecosystem, predict where animals are in space and time, determine site fidelity, and identify potential threats across range. BOEM works closely with Mexico on issues related to deep water drilling.

INAPESCA (Instituto Nacional de Pesca, México)

The data collected by INAPESCA are used to generate the scientific and technical databases that strengthen the management of the longline tuna fishery in the Gulf of Mexico through the bilateral relationship between Mexico and the United States in the framework of collaboration within the International Commission for the Conservation of Atlantic Tuna (ICCAT).

STATE AGENCIES

Louisiana Department of Wildlife and Fisheries, Mississippi State University, Grand Bay NERR, and U.S. Geological Survey/Clemson University

Work is focused on avian species and identifying how threats are changing through space and time. The team looks at habitat use changes and movement cycles on various time scales. Research questions include: 1) Migratory connectivity (Motus, GPS satellite, geolocators), 2) Spatial/temporal overlap with conservation threats in marine/coastal environment (GPS satellite, VHF), 3) Habitat use/movement patterns throughout annual cycle (Motus, GPS satellite, VHF), and 4) Annual and short-term survival (Motus, GPS satellite, VHF).

NGO

The Nature Conservancy

In both coastal and offshore waters, the TNC uses animal telemetry data to support :

- Assessment of effects of anthropogenic disturbances
- Biodiversity maintenance
- Species conservation
- Fisheries assessment
- Management of preserves

The telemetry data, used by the TNC Blueways Conservation Decision Support Tool, fosters informed management decisions and international collaboration in protecting the health of the Gulf of Mexico. The accompanying online mapping tool provides support for planners, government officials, and ocean advocates to understand marine species blueways, threats, and key stopovers.

COMMERCIAL/PRIVATE SECTOR

Port Tampa Bay

- Avoid major impacts to protected resources and bad public relations.
- Incorporate marine animal protection and tracking into industry best practices (BMP).
- Strengthen sustainable corporate résumé.
- Easy link into existing e-monitoring network.

LGL, Ecological Research Associates, Inc.

LGL uses the telemetry data they collect to: better understand red snapper site fidelity on platforms and fishing mortality on platforms; determine the overall importance of offshore platforms as spawning aggregation sites; identify reef fish spawning aggregations in the Gulf of Mexico and connectivity among sites; define the relationship between production versus aggregation; determine the extent and importance of platforms as critical habitat for sea turtles; contribute to a better understanding of distribution, migrations, and habitat utilization patterns by different life stages of sea turtles; and provide better stock delineation of coastal/ocean bottlenose dolphin ecotopes to improve precision of incidental take estimates.



New College of Florida students Sandra Domenech, Maggie Hoffswell and Dani Zeris with Dr. Jayne Gardiner working up a juvenile tiger shark before tagging and releasing it with a satellite tag and a conventional numbered dart tag.

Photo credit: Chip Litherland/New College of Florida, taken under Florida Fish and Wildlife Conservation Commission Special Activities License SAL-0041-SRP (New College of Florida) and SAL-0041-SRP (Mote Marine Laboratory).

OBJECTIVE IV. Identify Data Management Challenges and Mechanisms for Regional Data Aggregation with National Linkages for Data Management, Sharing, and Collaboration.

Data Management, Accessibility, Sharing, Products, Collaboration

- Real-time telemetry creates volumes of data—always looking for novel ways to subset, parse and compress, and re-create at the other end.
- Landlord ports like Tampa avoid anything that brings additional regulation because they are in global competition for carriers; over-regulating gives them a bad reputation. However, data in hand to move forward is win-win.
- Remotely sensed data are easy to get, but non-remotely sensed data are more difficult (e.g., fisheries movement data).
- While there are Motus (Canadian-based system for avian tracking) receiver stations throughout the Gulf, there is no standardized network to share avian tracking information, technology, or best practices for experiment design and analyses. There is some data sharing via the MoveBank data repository.
- The Observer Program on board the commercial longline tuna fleet in the Gulf of Mexico is an effective way to collect information to be obtained **in real time** to identify the interaction and the evolution of this fishery. While The Nature Conservancy uses some of the ICCAT data, it has not yet integrated observer data into migratory tuna data because a lot of information is scattered and not systematic.
- What products would maximize utility of telemetry data? Synthesized products that show monthly or seasonal patterns? What could we provide that would help ports with their information needs? General information about how many protected species are in the entire port area *or* location-specific information to assist during port expansion or work about to take place? How often do you see particular animals in various parts of habitat (e.g., shallow vs deeper water)? Is having data for ESI statement valuable?
- BOEM is collaborating with the U.S. Navy and IOOS to improve telemetry connectivity throughout the OCS and Gulf. This collaboration can provide unprecedented information about use of the Gulf of Mexico Large Marine Ecosystem.
- Enhanced networking and coordination across taxa groups should be promoted in the Gulf of Mexico by advocating multi-taxa, large-scale proposals that can improve integration of data collection among taxa.

Observing System Infrastructure

- Despite being noisy places, rigs and ports can still provide useful acoustic data.
- It is difficult to broaden the network infrastructure if acoustic systems are not compatible. Strong support was voiced for establishing an acoustic tag code space agreement—a recurring theme across workshops. Concern was expressed about the inability of Lotek and Vemco to collaborate on sharing code space, and the result that conclusions by researchers about what is being tracked cannot be made if there is more than one entity supplying the codes.
- There are additional vendors (e.g., Sonotron [U.S.], Thelma Biotel [Norway]) that might more readily work to make systems interoperable. Investigators who want to be compatible with others tend to use what others in region are using; conversely, other products are used if they do not want to collaborate.
- We need to negotiate with oil and gas companies and federal agencies to keep their existing infrastructure.
- There is typically an eight-week lead time needed to build tags, but for rescue and rehabilitation work, these are lost opportunities. Availability of “tags of opportunity” would be a tremendous value the ATN could provide to the community.
- The oceans are vast; mobile sensors on AUVs can help position assets and increase probability of detection.
- A challenge with current telemetry funding is that long-term projects need flexibility to incorporate new technologies and explore new questions, while still addressing originally funded questions.

- What are the opportunity costs of sustained telemetry observations? (An opportunity cost is a benefit, profit, or value of something that must be given up to acquire or achieve something else.) Since every resource (land, money, time, etc.) can be put to alternative uses, every action, choice, or decision has an associated opportunity cost.

What to Measure and Where

- Sentinel sites: knowing where and when species aggregate can be an important starting point to longer-term monitoring and tracking.
- Most ports have a master buildout plan. If we can identify where expansions will be taking place and get ahead of the activity with data, there will be clear value in the information.
- Multi-year monitoring is needed to detect changes in trends of habitat use and productivity from natural and other causes. Most oil and gas activities are in deep, federal waters, so these deeper offshore regions are a focus for continued and future studies.
- Focus GCOOS efforts on seabird movements as part of a broader view of marine apex predators, including the southern Gulf.
- Vessel-based bycatch information is important. (Understanding ecological impacts of bycatch is *very* important.)
- There are gaps in data because of limited funding. An example showcased by the University of Southern Mississippi compared rigorous gatekeeping on small spatial scales versus a less dense array over a larger area in a quest to determine the least amount of information that can provide an adequate answer for research questions.
- The U.S. ATN aims to provide sustained capabilities for baseline observations, adding to the infrastructure as necessary based on priority needs. The idea that “we do not know what we do not know” came up to emphasize that it is difficult to agree upon infrastructure location without first putting out exploratory arrays. One common area of interest to a variety of stakeholders is movement of species between coastal and offshore areas. If infrastructure is focused on reliable gated areas across choke points, resources can be added as needed for specific questions.



Ashley Ferguson, left, is a fisheries biologist at the Louisiana Department of Wildlife and Fisheries and the founder of Dose of the Coast. Photo credit: Todd Masson, Barataria, Louisiana



Releasing a tagged bottlenose dolphin from a health assessment in Sarasota Bay, Florida. Photo credit: Chicago Zoological Society's Sarasota Dolphin Research Program, taken under NMFS Scientific Research Permit #15543

SPEAKERS

COMMERCIAL, RESOURCE MANAGEMENT, AND RESEARCHER PERSPECTIVES

Topics covering resource management, commercial, and researcher perspectives were presented by invited speakers in three sessions with 30 minutes of panel discussions following each set of speakers.

COMMERCIAL PERSPECTIVES

Representatives from the private sector discussed their interest in regional telemetry activities and how they might relate or be useful to commercial operations, identified applications of animal telemetry information to commercial organizations working in marine systems, and identified commercial/private industry stakeholder needs and concerns.

Animal Telemetry Needs of the Ports

Chris Cooley

Director, Environmental Affairs, Port Tampa Bay.

Tampa Bay is a large and diverse port that spans about 5,000 acres with the mission to manage and develop the Port District for the benefit of the regional economy. The port is a major economic engine in Florida and is located on Florida's largest open water estuary, which is home to many protected species of fish and wildlife. It is the second in the country with a dedicated environmental position. Long Beach, California, is the other. About 80,000 jobs are tied to Port Tampa Bay, which handles about 35 million tons of cargo annually and has an economic value of \$15 billion. It is mainly a bulk material port, with fertilizer going out and other materials tied to the phosphate and fertilizer industries coming in. Their ATN-related conservation goals include eliminating/reducing impacts to protected species, promoting best practices in the industry and building partnerships with environmental agencies and researchers. Port Tampa is also partnering on a bird telemetry project with the Florida Aquarium and Tampa Electric Company (or TECO) based at the Apollo Beach outdoor classroom. Towers are being installed around the state to track migratory birds. Information on the shore birds helps the port plan dredge operations because the spoil islands are used as breeding grounds, especially around August and September.

Animal Telemetry Observation Needs

Benny Gallaway

President, LGL Ecological Research Associates, Inc.

LGL has built its reputation on applied research and providing expert consulting advice. Projects include benchmark environmental surveys and stock assessments with expertise in marine fish and fisheries, sea turtles and marine mammals. The team works in the U.S., Canada and other countries. Infrastructure that would be useful to their work would be a systematic receiver array across the Gulf of Mexico, especially on decommissioned oil and gas platforms. Understanding the ecological value of the platforms (historically, about 4,000 platforms; currently about 2,000) is a priority. Information about where/how animals move between sites is needed to determine if the platforms should be removed, dropped on site, or relocated for artificial reefs. ATN infrastructure can help address numerous topics of concern: red snapper site fidelity on platforms, fishing mortality on platforms, aggregations around sites, production versus aggregation, extent and importance of platforms as critical habitat for sea turtles, and stock delineation of coastal/ocean bottlenose dolphin ecotopes to improve precision of incidental take estimates. One idea was to put receivers in Sargassum to determine how floating habitats are being used.



Manatee mom and calf at Fort DeSoto, Florida.

Photo credit: Chris Simoniello.

RESOURCE MANAGEMENT PERSPECTIVES

Federal and state resource management agencies discussed regional telemetry activities and applications, explained regulatory issues, and identified core regulatory and resource manager stakeholder needs.

Large Pelagic Tagging Program in the Gulf of Mexico

Pedro Ulloa Ramirez

Instituto Nacional de Pesca (INAPESCA), México

The purpose of INAPESCA is to generate the scientific and technical base to strengthen the management of the long-line tuna fishery in the Gulf of Mexico through the bilateral relationship between Mexico and the United States in the framework of collaboration in the International Commission for the Conservation of Atlantic Tuna (ICCAT). The use of electronic tags can provide more information than conventional tags that have previously been used in the Atlantic Ocean. The INAPESCA large pelagic tagging program in the Gulf of Mexico identifies movements of highly migratory species at different scales. INAPESCA and the NOAA Southeast Fisheries Science Center have had a joint effort since 2012 to create a scientific and technical base to inform ICCAT. A formal tuna fleet has been in place since 1982, with an observer program since 1993. Observers on board long liners have a sense of catch, and the information is used to inform site selection for bluefin tuna tagging efforts. Large Marine Ecosystem work includes the U.S., Mexico, and Cuba; there is a king mackerel study underway.

BOEM's Interest in ATN and Tagging

Rebecca Green

Bureau of Ocean Energy Management Office of Environment

The BOEM mission is to manage development of Outer Continental Shelf (OCS) energy and mineral resources in an environmentally and economically responsible manner. Oil and gas, renewable energy, and marine minerals are the three main programs they oversee. Oil and gas have nearly 3,000 active leases, mainly in the central and western Gulf. A renewable energy feasibility study is currently being performed in the Gulf. Marine minerals include offshore sand and gravel for coastal restoration efforts. The OCS Lands Act, National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty, and many other laws and acts govern their work. BOEM is interested in

telemetry-related research to inform oversight activities, conduct impact analyses, understand habitat use, predict where animals are in space and time, determine site fidelity, and identify potential threats across range. Multi-year monitoring is needed to detect changes in trends of habitat use and productivity from natural and other causes. Most oil and gas activities are in deep, federal waters, so these deeper offshore regions are a focus for continued and future studies. BOEM is collaborating with the U.S. Navy and IOOS to launch the multi-agency ATN Program to improve telemetry connectivity throughout the OCS and Gulf. The collaboration can provide unprecedented information about use of the Large Marine Ecosystem. BOEM is currently funding studies that include tagging of eastern brown pelicans, sea turtles, and red snapper in the Gulf region.

Enhanced Networking and Coordination across Taxa in the Gulf of Mexico

Jorge Brenner

*The Nature Conservancy (TNC), Associate Director
of Marine Science, Texas*

The Nature Conservancy mission is to conserve the lands and waters on which all life depends, and their coastal and offshore projects cover a range from biodiversity assessments to impacts of anthropogenic activities. TNC owns a network of preserves and collects data and information to manage them. Migratory species activities within the past three years has focused on identifying corridors of movement or the concept of “blueways.” TNC hopes their Blueways Conservation Decision Support Tool will foster informed management decisions and international collaboration in protecting the health of the Gulf of Mexico. The accompanying online mapping tool provides support for planners, government officials, and ocean advocates to understand marine species blueways, threats, and key stopovers. ATN is a valuable source of information for TNC because it supports movement data—a dynamic piece of information previously unavailable in ocean systems. TNC mainly uses satellite tracking data to understand movement of pelagic fishes, sea turtles, and mammals.



Bottlenose dolphin off Bermuda, with a satellite-linked tag and a DTAG, following a health assessment. Photo credit: Dolphin Quest, Inc.

Avian Telemetry in the Gulf of Mexico

*Auriel Fournier/Mark Woodrey & Pat Jodice
Mississippi State University /Grand Bay National Estuarine
Research Reserve and the U.S. Geological Survey/Clemson
University*

Work is focused on avian species and identifying how threats are changing through space and time. The team looks at habitat use changes and movement cycles on various time scales. A challenge with current telemetry funding is that long-term projects need flexibility to incorporate new technologies and explore new questions, while still addressing originally funded questions. Although there are Motus (Canadian-based system for collaborative avian tracking) receiver stations throughout the Gulf, there is no standardized network to share information, technology, or best practices for experiment design and analyses. There is some sharing via the MoveBank data repository. Like Jorge Brenner (TNC) and “blueways,” their emphasis is on the need for migratory connectivity studies and enhanced coordination across taxa. An added challenge is that freshwater and saltwater environments require different tags for the animals. They strongly advocate creation of an organized Gulf-wide avian telemetry system.

Using Marine Animal Movement Information to Inform and Solve Fisheries Management Problems

*Ashley Ferguson
Louisiana Department of Wildlife and Fisheries*

The LDWF is using marine animal movement information to inform and solve fisheries management problems and is participating in a joint project with Ashley Melancon Baer of the U.S. Fish and Wildlife Service to study spotted sea trout in Calcasieu (172 tagged sea trout, 60 receivers). In addition to the Calcasieu project, LDWF is tracking speckled trout (244), juvenile bull sharks (18), and adult red drum (64) in Lake Pontchartrain to generate baseline behavior data. LDWF is currently exploring a skeleton array with the Florida Fish and Wildlife Conservation Commission to understand how species are adjusting to changes in coastal marshes, to create a baseline for understanding impacts of riverine input to Lake Pontchartrain with the opening of spillways, and to inform CPRA (Coastal Protection and Restoration Authority) diversion projects. They are interested in learning how others are incorporating telemetry data into fisheries management.

RESEARCH PERSPECTIVES

Representatives from academia, resource agencies, and non-profit organizations showcased telemetry projects focused on a range of species important to the region and explained the purpose of their research. They also discussed current telemetry capabilities in the Gulf of Mexico Region, benefits of and issues with various existing animal tracking technologies being deployed in the region, alternative or new/innovative technologies and methods, and identified research sector needs for these efforts.

End-to-End ATN Data Stewardship by GCOOS

*Matt Howard
Texas A&M University at College Station and GCOOS Data Manager*

Although its data capabilities are extensive, GCOOS’s main ATN interest is in data stewardship—end-to-end handling from shore-side stations to archives with services for users—enhancing data uses and providing access in user-preferred forms and formats. GCOOS also is involved in social media mining activities to capture public comments about beaches to use as a guide for *Everything Beaches* work.



We had no way of knowing that this workshop would be the last time many of us would get to be with our friend and colleague, Matt Howard.

Two short weeks after our workshop, Matt suddenly passed away while at a conference in Seattle. His contributions to ocean research were far-reaching, and his passion for open data sharing provided the foundation for GCOOS. Matt was a tireless worker and was always there to lend a hand.

Rest well, good friend; you earned it.

Review of Satellite Tracking Efforts of Two Sea Turtle Species from Southern Gulf of Mexico

Eduardo Cuevas Flores

CINVESTAV (Center for Research and Advanced Studies of the National Polytechnic Institute), México

CINVESTAV conducts hawksbill sea turtle telemetry work to gather ecological and biological information about the decreasing number of nests. This includes identifying migration corridors, assessing conflicts with fishing ground aggregations and hotspots, marine protected area effectiveness, the influence of ocean features on the sea turtle migrations. CINVESTAV also works with TNC on blueways to understand how nesting females are connected throughout the Gulf and to understand accumulated threats—natural and human. Seven countries are involved in satellite tracking and mark/recapture methods. They are extending the area of study as they gather new information about geographical ranges. The U.S., Mexico, Barbados, Bonaire, U.S. Virgin Islands, Puerto Rico, and Cuba are collaborating. Extensive resources have been invested in the information; the question now is how to build a bridge to connect and collaborate on a management strategy.

Updates on Acoustic Telemetry from the Northwestern Gulf of Mexico

Judd Curtis

Harte Research Institute (HRI), Texas A&M University at Corpus Christi

The Texas Acoustic Array Network (TEXAAN) in Aransas Pass and Packery Channel provides researchers with access to tracking movement of marine life along the entire coast, including various tidal inlets connecting coastal and estuarine habitats. There is limited water exchange in some of the back-bay areas, and they have set up acoustic gateways to study the egress and ingress of species, including red drum and spotted seatrout. They are also looking at fine-scale habitat use by red snapper and preference for different artificial reef materials, as well as red snapper discard mortality. The array includes seven sites for sandbar sharks, and the tracking is done cooperatively among TEXAAN, iTAG, and OTN. The areal extent of the array is project-specific, but some general gateways benefit from long-term infrastructure. However, investment is needed for maintenance of that infrastructure.

Using Animal Telemetry to Study Population Connectivity at Multiple Spatial Scales

Mike Dance

Texas A&M University at Galveston

Movement related to vertical and horizontal oceanographic features, habitat partitioning, basin-scale connectivity, and predatory/prey interactions are among the research topics for Mike Dance, who works with both acoustic and satellite tags and is interested in multi-species interactions and habitat use. Species include southern flounder, coastal sharks, tuna, and billfish. Some work is in collaboration with Rick Klein at the University of Texas Rio Grande Valley in Brownsville. Receivers are placed at choke points along barrier islands. A current project includes having approximately 65 receivers deployed in summer 2018 in the eastern part of Galveston Bay, with the next phase focused on the western part of the bay. Work is performed along with OTN, HRI, NPS and others; there are five gates from Mexico to the Texas/Louisiana border that make up the Western Gulf of Mexico Coastal Gates system. There are acoustic tags on flounder, drum, trout and bull sharks, and satellite tags on tuna, blue and white marlin, and sailfish.

Assessing Connectivity and Efficacy of MPAs

Jennifer Doerr

National Marine Fisheries Service/SEFSC/Galveston Lab

Unfortunately Jennifer Doerr was unable to attend the workshop, but she graciously provided her slides, which were presented by one of her colleagues. Research and network objectives focus on assessing connectivity and efficacy of Marine Protected Areas (MPA) and defining life history parameters by quantifying habitat use and home ranges, and ontogenetic shifts in them, identifying migration patterns and timing, and locating spawning aggregation areas. The primary species of interest is the Queen conch (*Strombus gigas*), and from 2014–2017 98 animals (V9-2H tags) have been tagged for a total of 487 tag-days in Salt River Bay (St. Croix); the project is expected to continue through 2018. Work is leveraged through the USCAN (U.S. Caribbean Acoustic Network) federal and non-federal partners. USCAN has collected data on 27 different species, with more than 60 million detections from a total of 900 tags. The goal is to be able to expand the network to multiple islands by deploying multi-year, localized high density receiver arrays, to increase awareness of the Caribbean Network, and identify potential collaborative opportunities.

Assessing Changes in Regional Populations of Different Marine Mammal Species using Passive Acoustic Monitoring (PAM) Platforms

Natalia Sidorovskaia

University of Louisiana at Lafayette

Natalia is an acoustician conducting work in the littoral acoustic demonstration center. She has GOMRI funding for the Gulf Ecological Monitoring and Modeling consortium (LADC-GEMM) to study the effects of anthropogenic noise on marine mammals. Scripps Institution of Oceanography and Cornell University are consortium members. The work uses passive acoustic monitoring—typically receivers are deployed near the DWH site and picked up four to five months later. Passive acoustic data is allowing information about regional whale and dolphin populations and niche habitat use to be extracted. Sperm whales and beaked whales are among the animals studied. Missing in the work is the ability to correlate marine mammal data with physical and biological processes and prey distributions. Real-time capabilities are needed to get optimal spatial and temporal telemetry information. Sustained Gulf infrastructure will require development of stationary and mobile networks of dedicated and opportunistic acoustic receivers and new software tools for data mining and processing.

Tracking Manatee Habitat Use in the Northern Gulf of Mexico

Kayla DaCosta and Reid Nelson

*Dauphin Island Sea Lab (DISL) Alabama,
and University of Southern Alabama*

Since 2009, the DISL manatee tracking project has tagged 12 animals to help understand migration patterns and habitat use. Animals have been tracked between the Northern Gulf and Tampa. A redundant system of acoustic and satellite telemetry is used, with nine receivers in Alabama and two in Florida, deployed in collaboration with Sea to Shore Alliance, Sea World Orlando and USFWS. Increased spatial cover of hydrophones is needed. The tagged population is male-biased. Because Reid Nelson was unable to attend, Kayla DaCosta presented his work on red drum and speckled trout mortality differences between fishing versus natural causes, range, and site fidelity using the Coastal Alabama Acoustic Monitoring Program (CAAMP) receiver array of 55 receivers in coastal Alabama waters. CAAMP is deployed to study fishing mortality, natural mortality, and fish movement in response to water temperature and salinity levels. Current and future research would benefit from complete coverage of passes into and out of Mobile Bay.

Movement/Migration Ecology, Habitat Associations & Mortality Survival Estimates of Multiple Species in the No. GOM

Paul Grammer (on behalf of Mike Andres)

University of Southern Mississippi, Gulf Coast Research Lab

Research is focused on movement ecology, habitat use and mortality of a variety of species including Gulf Sturgeon, red drum, bull sharks, striped bass, seatrout, snapper and grouper. Movement patterns are correlated with proximity to certain biologic and bathymetric features, and to historic prey information. The team is working around Ship and Horn Islands with Tod Slack, U.S. Army Corps of Engineers (USACE), Engineering Research and Development Center. They are looking at restoration effects on sturgeon which come to feed in late summer/early fall. There are gaps in data because they've had to pull systems as a result of limited funding. The USACE likes the leveraging and is willing to collaborate more if there is support from other groups. The Gulf sturgeon community is tight and finds a way to meet annually.

Sarasota Dolphin Research Program Involvement in Small Cetacean Telemetry in the Gulf of Mexico

Randy Wells

Chicago Zoological Society and Mote Marine Laboratory

The Sarasota Dolphin Research program, led by Randy Wells, is the world's longest running dolphin monitoring program (since 1975) with approximately 160 individuals spanning five generations in the Sarasota Bay population. Recent work is focused on development and testing of new electronic tags and applications, especially for looking at stock structure, residency, and post-intervention monitoring. The threshold for survival after rescue/rehabilitation seems to be ~45 days post-release. The team is working with ATN to examine the impacts tags and attachment designs have on a variety of mammals including bottlenose dolphins, pilot whales, and Franciscanas. There is not a lot of work in the open Gulf of Mexico. Working with bow riding dolphins, the team has built a prototype tag delivery system for open water that also collects genetic samples and is considering more shore-based satellite tag receiving stations (Mote) combined with acoustic receivers to improve collection of nearshore data. The team recommends more tagging in deep water and increasing satellite tagging to include small cetaceans.

Sarasota Bay Acoustic Network: A Collaborative Effort to Study Movement of Multiple Species along the West Coast of Florida

Randy Wells (on behalf of Kim Bassos-Hull)

Mote Marine Laboratory

The Sarasota Bay Acoustic Network involves passive and active acoustics in the Sarasota Bay Acoustic Array, which is focused on gateways between Sarasota Bay and the Gulf of Mexico. There are 44 receivers out, some of these on nearby reefs. Tagging of spotted eagle rays (24 to date) takes advantage of tonic immobility. The animals move southward or offshore during the winter and also leave the area during extreme red tide events. There is interest in learning how bull shark and dolphin movements respond to each other.

Shark Nursery Habitat in the Gulf of Mexico

Jayne Gardiner

New College of Florida

Identifying shark nursery habitats and Essential Fish Habitats is the focus of this work. Directional acoustic gates are deployed near the main mouth of the Manatee River and Terra Ceia Bay. A lot of juvenile black tip sharks are here, but it is not understood if/how females return to natal areas to birth pups or to what degree they stray to other nurseries. Neonatal sharks have been tagged and one left before Irma and returned after the storm until the end of the season—before leaving again with the first cold front. Tags with 10-year battery life are becoming available and are creating opportunities for long-term studies, including blacktip shark philopatry.

The Fact Network

Joy Young

*Florida Fish and Wildlife Conservation Commission
and FACT Network*

The Florida Atlantic Coast Telemetry (FACT) Array is an aggregated set of nearly 1,000 acoustic receivers with representation from groups in eastern Florida, North Carolina, South Carolina, Georgia, Puerto Rico, and the U.S. Virgin Islands, tracking 86 different species with nearly 4,000 tags. The integrated acoustic telemetry community has buying power and receives discounts on tags. There are currently no methodologies for standardized data collection, but it is something the group is discussing. Information from the system can help guide management strategies for species of economic value or those requiring special conservation attention. Georgia/Florida collaboration on tripetail management was provided as an example.

Population Dynamics, Structure and Connectivity of Marine Fishes in the GOM

Will Patterson

University of Florida

Telemetry work is being conducted on lionfish home ranges and site fidelity, reef fish release mortality, red drum spatial dynamics, spawning and catchability, and spatially explicit vulnerability. Currently, work is being conducted on a gear calibration experiment using side-looking passive acoustic receivers from OTN and stereo cameras and is aimed at creating a bio-economic model for a lionfish fishery. Using acoustic telemetry infrastructure requires knowing the objective of questions to be addressed, understanding whether it is the best tool for the job, and determining the opportunity costs of a sustained telemetry observing system. The group was challenged to consider the opportunity costs of sustained telemetry observations.



*Young bottlenose dolphins socializing in Sarasota Bay, Florida.
Photo credit: Chicago Zoological Society's Sarasota Dolphin Research
Program, taken under NMFS Scientific Research Permit #15543.*

BREAKOUT SESSIONS

Two breakout groups were created, and each group was asked to consider the following two topics:

Topic A: Identify marine animal telemetry observation needs in the GCOOS Region vs. assets that are currently in place to collect them.

Topic B: Identify potential projects that could demonstrate the value of an integrated ATN in the Gulf of Mexico.

GROUP I

Facilitators: Bill Woodward, Fred Whoriskey

TOPIC A

The group created a limited matrix to show assets, activities, and capabilities based on input from a few workshop participants. The exercise was intended to provide the ATN with a snapshot of telemetry activities in the region. Although the snapshot developed by this small group was an incomplete picture of the regional acoustic, satellite and archive tagging efforts, the workshop speakers had described their tagging work, so a more comprehensive matrix can be generated from the information in those presentations. A comment was made about the need to balance the reality of infrastructure possibilities with the vision of funding sources. Many factors must be considered in that balance, including cutting across state, federal, industry, and ecological boundaries plus the U.S./Mexico border, recognizing natural barriers between habitats, and adapting to differing management goals.

TOPIC B

Supporting baseline observations and data capabilities are core activities of the ATN, and demonstration projects are central to their success. The ATN goal is to build regional alliances working through the IOOS Regional Associations (RA) to help keep priority telemetry activities going and to add to them as needed. Implementing expanded and sustained marine animal telemetry observations in the Gulf of Mexico can provide a better understanding of the ecological connections between the northern and southern Gulf of Mexico. It can also facilitate leveraging of existing capabilities in the region including GCOOS, Horizon Marine, Fugro, etc., enable stronger connections with the National Academy of Sciences Gulf Research Program, and improve the chance of attracting the resources needed to answer the broad array of large-scale science questions that are already identified for the region.

The GCOOS-RA brings strong capabilities, especially in data management and data sharing standards. Participants shared their frustration that it is hard to find and access summarized telemetry data from the Gulf and is virtually impossible to readily integrate acoustic telemetry data with satellite telemetry data. The telemetry support tool developed for GCOOS by Bob Currier addresses some of these issues. There are also practical benefits to participating in the ATN. Legacy data are preserved, and common analytical code are shared. ATN is also working to offset Argos costs for participating PIs and can act as a bargaining chip to negotiate equipment purchases from vendors.

GCOOS workshop attendees Matt Howard, Natalia Sidorovskaia, Kayla DaCosta, and Eduardo Cuevas Flores.



GROUP II

Facilitators: Mark Luther, Chris Simoniello

TOPIC A

The matrix of telemetry assets developed by the group showed reasonably good coverage near rivers and the coast but lacked coverage near the shelf and offshore. There was discussion about how rigs might be utilized for offshore telemetry and for the research priorities surrounding decommissioned rigs. There was consensus about needing to first know where animals are going before defining where to specifically implement tagging efforts. It would be helpful first to put satellite tags on commercially important/keystone species and use the information to inform placement of acoustic arrays. Vessels, platforms of opportunities, and gliders also have potential to host instruments. An adaptive approach would be ideal where there is a pool of receivers that could be deployed on opportunistic platforms, especially those where other data are being collected to make information most meaningful. The group requested sustained engagement for the Gulf Community of Practice for ATN and asked if funds would be available to support another workshop next year. There was agreement that, if there is serious interest in designing a regional array, more people engaged in Gulf telemetry need to be present to make sure the design is most effective. Early career scientists expressed interest in wanting to learn about effective designs from their colleagues.

Those working with birds suggested pairing in-water and in-air telemetry devices on a single piling to provide unique insight across trophic levels. GCOOS can position themselves to evaluate long-term monitoring and assessment of restoration projects, making ATN valuable to National Academies, RESTORE and others. An example of how the Louisiana Department of Wildlife and Fisheries sturgeon telemetry helped save the U.S. Fish and Wildlife Service millions of dollars during a dredging project was shared.

TOPIC B

A few ideas for a telemetry demonstration project in the Gulf were discussed. Most widely embraced was a region-wide project to understand existing assets, identify areas of opportunities and begin to fill identified gaps. A region-wide array, laid out like spokes around a wheel with a centralized offshore area, would have arrays radiating from inshore/riverine areas to the coast to offshore blue water. A broad spectrum of taxa could be detected by receivers at choke points. Starting points could be Tampa Bay, Mobile Bay, Mississippi Sound, Lake Pontchartrain, and Padre Island. An organized testbed would aim to test both technology and science applications in tandem. A color-coded map could be used to visualize the system, with green showing existing arrays and infrastructure, yellow showing resources that could support the work and red showing where coordinated funding would be needed to fill in missing assets and resources.

Because "we don't know what we don't know" until exploratory work is conducted, the testbed could also inform development of a sustained Gulf ATN backbone of sustained observations to address long-term issues. There was interest in creating a GCOOS work group to focus on ATN development and possibly coordinate a consortium to seek funding for the described demonstration project. Simoniello and Luther were both willing to follow up with participants. There was also interest in having GCOOS host a workshop to help the telemetry community learn how to access and understand Gulf hydrographic information. Luther expressed interest in working with the Florida community. Simoniello will explore funding to host a workshop for the Gulf telemetry community to meet with the GCOOS data management and product development team. Going forward, the group was reminded that it is much easier to support and leverage existing partnerships than to create new ones—so, from the commercial perspective, the more that industry is involved, the easier it is for programs like the ports and military to support the effort. With industry involvement, we are more likely to get a stronger infrastructure and more applications that are of interest to funders. It was also mentioned that sand sediment resources are becoming more important (e.g., BOEM and Bureau of Safety and Environmental Enforcement) and demonstration projects showing the value that telemetry here could create opportunities.

DESIRED OUTCOMES

In advance of the workshop, attendees were asked to identify one or more outcomes they were expecting from their participation. A compilation of these is provided below.

COLLABORATION/NETWORKING

- Enhance networking and coordination across taxa groups in the Gulf.
- Promote multi-taxa, large-scale proposals that:
 - ♦ Focus GCOOS efforts on seabird movements as part of a broader view of marine apex predators, including the southern Gulf, and
 - ♦ Improve integration among taxa in terms of collection (if projects are occurring in the same place, how can they ask questions across taxa, roll into study design, etc.)/interpretation.
- Identify how to better facilitate collaboration with more researchers in the Gulf of Mexico.
- Explore collaborative opportunities with other acoustic telemetry users from all sectors represented.
- Increase awareness of Caribbean network and identify potential collaborative opportunity.
- Increase collaboration opportunities between organizations.
- Determine avenues of collaboration with other telemetry users in the region.
- Learn what we can do, as a network, to increase collaboration efforts.

SCIENTIFIC AND TECHNICAL INFORMATION EXCHANGE

- Understand the need for migratory connectivity studies (including marsh and wading birds).
- Identify locations of “Migratory Blueways” in the Gulf of Mexico.
- Understand current research efforts in the Gulf of Mexico.
- Promote awareness of technological developments, current extent of efforts, and availability of resources for tagging/tracking.
- Network, contribute to development of this ATN, and gain a broader perspective and insight into non-research uses of telemetry.
- Increase awareness of the status of the FACT Network.
- Listen to the concerns and interests of fellow scientists and stakeholders.

INTEGRATED PLANNING FOR MONITORING NETWORKS

- Select and justify a network of offshore platforms to be equipped with acoustic telemetry receivers and passive broadband hydrophones.
- Develop an integrated monitoring and research plan to utilize the described Animal Telemetry Network based on acquired funding.
- Help identify regional monitoring needs.
- Move forward with a regional approach to set the basis of enhanced management using a marine spatial planning approach.
- Establish a long-term goal and outline pathways to develop a continuous real-time telemetry network (noninvasive in the future) in the Northern Gulf of Mexico for the key species of marine mammals.
- Help ensure long-term stability of acoustic networks.



*Pelican at Orange Beach, Florida.
Photo credit: Chris Simoniello.*

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