# Stakeholder Workshop: Offshore Motus Monitoring Framework

Workshop Summary
June 8, 2022

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# Disclaimer

Funding for this report was provided by the New York State Energy Research and Development Authority (hereafter "NYSERDA") with additional support from the U.S Fish and Wildlife Service Migratory Bird Program. The views and opinions expressed herein do not necessarily state or reflect those of the United States government or any agency thereof, nor NYSERDA or any state government or agency thereof. In addition, the views and opinions expressed herein do not necessarily represent the views of all workshop participants, Biodiversity Research Institute, or U.S. Fish & Wildlife Service. Further, NYSERDA, the State of New York, and the contractors by which this report was prepared make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report.

# Additional Information

This workshop is part of a broader effort among U.S. Fish & Wildlife Service Migratory Bird Program, Biodiversity Research Institute, University of Rhode Island, and Birds Canada to develop standardized protocols for using coordinated radio telemetry to monitor birds and bats in offshore environments. A pdf of presentations from the workshop and more information on the project are available at https://briwildlife.org/offshore-motus-guidance/.

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# Background

There are information gaps on the offshore movements of volant (i.e. flying) wildlife due to technological limitations and logistical challenges of offshore monitoring. The study "Development of Monitoring Protocols for Automated Radio Telemetry Studies at Offshore Wind Farms," funded by NYSERDA in 2019, is developing standardized guidance to inform the use of coordinated radio telemetry to monitor individual movements of volant wildlife in order to quantify species-specific exposure to offshore wind energy development at site specific and regional scales. Use of automated radio telemetry will build off the Motus Wildlife Tracking System[1], an international network of receiving stations ('Motus stations') and studies using digitally-coded radio transmitters ('Motus tags') operating on shared frequencies. Detailed protocols will enable the offshore wind industry to use standardized approaches to monitor a wide range of avian and bat taxa, including threatened and endangered species, and improve our understanding of how these species use offshore environments. The team of collaborators involved in this project include: Pamela Loring and Scott Johnston from U.S. Fish & Wildlife Service; Kate Williams, Andrew Gilbert, Evan Adams, Julia Gulka, and Edward Jenkins from the Biodiversity Research Institute; Peter Paton, Doug Gobeille, Erik Carlson, and Rob Deluca from the University of Rhode Island; and Stuart Mackenzie and Lucas Berrigan from Birds Canada. The project is funded by the New York Energy Research and Development Authority and overseen by project managers Kate McClellan Press and Greg Lampman.

The overall aims of the project are to develop standardized protocols for study design, monitoring methodologies, and data coordination in the U.S. Atlantic for implementation of automated radio telemetry in pre- and post-construction monitoring at offshore wind projects. Project components include:

- Monitoring framework (*focus of this workshop)* – strategic framework and guide for using Motus technology to monitor wildlife in relation to offshore wind energy development;
- Guidance document – detailed guidance for setting up and operating Motus stations on offshore wind turbines and buoys;
- Online study design tool – interactive tool to help arrange arrays of Motus stations to optimize site-specific study designs at offshore wind projects and map detection coverage of offshore receiving stations;
- Simulation study – modeling study using animal movement data to inform estimates of detection and uncertainty using Motus technology;
- Motus Data Framework – centralized framework and portal to coordinate data from the Motus Wildlife Tracking System from all birds and bats detected by stations on offshore wind turbines, monitoring buoys, and receiving towers along the Atlantic coast and Outer Continental Shelf (OCS).

The above components are being developed with strong input from stakeholders via a series of workshops with offshore wind developers, environmental non-governmental organizations (eNGOs), regulators, resource managers, and researchers with expertise using the Motus Wildlife Tracking System and other technologies. Strong stakeholder guidance is key in providing the best possible protocols to end-users.

# Workshop Summary

This workshop was held virtually on June 8, 2022 and included 40 participants (Appendix A). Workshop objectives included: 1) introducing the Offshore Motus Monitoring Framework; 2) discussing ideas for

[1] https://motus.org/

tag deployment strategies; 3) obtaining initial feedback from stakeholders on the framework; and 4) discussing opportunities for further stakeholder engagement. See Appendix B for workshop agenda.

## Overview of Offshore Motus Monitoring Framework

Pamela Loring (U.S. Fish & Wildlife Service) introduced the overall project and the monitoring framework. The main goals include to: 1) optimize Motus station coverage at site-specific and regional scales; 2) coordinate tag and station deployment; and 3) develop standard workflows and tools using best available science. She covered topics including potential considerations for tagging studies, site-and regional-level research questions, covariates, current (decentralized) approaches, and the benefits and examples of a centralized approach.

### *Q&A and Discussion*

- **Geographic scope** – Given that offshore wind development is occurring in the southern Atlantic and there will soon be leases sales in the Gulf of Mexico and Pacific, we need to ensure that there is broad collaboration on these types of efforts. Workshop participants indicated that developers in other regions are aware of and active in the Motus network and that requirements for engagement in the Motus network by the Bureau of Ocean Energy Management will likely be consistent across regions.

## Detecting Birds at Offshore Motus Stations

Evan Adams (Biodiversity Research Institute) provided an overview of how project collaborators have been using what we know about Motus tags to think about study design to optimize detection probabilities. Topics covered included calibration tests on the Block Island Wind Farm and coastal stations to improve our understanding of the different dimensions of detection probabilities, results from simulation studies that provided insight into how the number of stations, number of tags deployed, and flight height, influence detections and associated uncertainty.

### *Q&A and Discussion*

- **Understanding the number of tagged birds that did not use the target area as opposed to tag failure** – the more tagging data and detections both offshore and otherwise that we have, we can start to build in additional information into our understanding of detection probabilities.
- **Use of Motus for flight height information** – There will be additional considerations for study design if your main interest is flight height information, as this requires simultaneous multi-antenna detections, which is an area that project collaborators are actively working.
- **Accounting for tag detections at different frequencies (166 and 434 MHz) –** The focus of field work conducted under the NYSERDA project was to calibrate 434 MHz. We intend to use calibration methods developed as part of this project to calibrate 166 MHZ in future efforts.
- **The relationship between flight height and detection probability –** There is generally a positive relationship between flight height and detection probability, as evidenced by far greater detection ranges recorded during calibration surveys of test tags on a plane (maximum range 81 km) relative to a tag mounted on a pole (maximum range 8 km)

## Motus Power Analysis to Inform Tag Deployment

Juliet Lamb (The Nature Conservancy) provided an overview of work regarding a power analysis to inform tag deployment using existing Motus data for piping plover and common terns to evaluate appropriate sample sizes and distributions for transmitters. The main goals of this effort included: 1) assess the number of tagged individuals required to represent population-level occupancy patterns; 2) assess the number of tagging sites and years required to maximize detection of occupied sites; 3) evaluate how layout of receiving stations relative to tagging sites affects detection probability. Overall, at least 100-150 individuals are needed to represent site use of regional metapopulations, with factors affecting sample size including geographic range, connectivity, clumped landscape distribution, and research question complexity. We should prioritize multi-site studies, especially for dispersed species, see diminishing returns after two years of sampling, and need to account for transmitter duration and network layout. The full manuscript is available at:
https://movementecologyjournal.biomedcentral.com/articles/10.1186/s40462-022-00363-0

### *Q&A and Discussion*

- **How a "site" is defined** – depending on the species, "site" may be clearly defined as a colony in the case of common terns, whereas piping plover are more dispersed along the landscape, leading to "site" being characterized as a geographic clump of individuals.
- **Representativeness of the population** – there was discussion around the degree to which the "population" defined in the power analysis (i.e. the sites where tags were deployed) are representative of the broader untagged population. Tagging site selection is important to help ensure representativeness of the population of interest. It may be beneficial to consider tagging birds at migratory stopovers or wintering site to aid in this.
- **The use of common terns as a surrogate for roseate terns** – there is some data from roseate terns that was not included in this analysis given the small sample size, but it would be possible to look at differences to inform our understanding of how good common terns are as surrogates for roseate terns.
- **Applicability across different species/contexts** – it would be valuable to turn this power analysis into a tool that can be used across different species and contexts to inform sample sizes for different studies.

## RWSC Options to Centralize Tag Deployment

Emily Shumchenia (Regional Wildlife Science Collaborative for Offshore Wind; RWSC) provided an overview of the RWSC, including establishment and mission, science plan development by taxa-based subcommittees, which will include methods, approaches, analyses, data and metadata standards, and data management, storage, and sharing. She presented a possible three-phase approach: 1) Phase 1, underway now, includes building from this project with the RWSC Bird & Bat Subcommittee developing a regional tagging strategy as part of Science Plan development; 2) Phase 1A, where the RWSC develops agreements with each project that needs to deploy tags and helps ensure consistency and coordination among tagging projects; and 3) Phase 2, where project proponents contribute to a "tagging strategy fund" held and managed by the RWSC and the RWSC uses these pooled funds to implement the regional tagging strategy.

### *Q&A and Discussion*

- **Inclusion of deployment and maintenance of Motus receiver stations as part of the strategy** – Stakeholders recognize that Motus technology is a powerful tool only if there is a reliable and

strategic network of receiver stations, and thus this should be considered as part of this regional strategy.

## Breakout Group Discussions

Workshop participants split into five breakout groups and were prompted to discuss ideas for strategic tag deployment, and in particular related to the advantages and disadvantages to decentralized and centralized approaches. Key ideas and takeaways from these discussions are outlined below; this is a summary of group discussions and does not necessarily represent the opinions of project collaborators.

### *Decentralized Approach: Advantages*

- Takes independence out of collaborators and requires feedback from third party (RWSC)
- Clear responsibility to achieve project goals and deliverables
- Clear motivation for funding
- Tighter control of project timing
- Less time spent on coordination, providing more time for fieldwork, seeking funding, and other related activities
- Less tension between project and regional goals
- Clarity in species or questions of interest for a given site or project
- May be preferable for project proponents to control data access for legal reasons

### *Decentralized Approach: Disadvantages*

- Data sharing and management more disparate with stand-alone efforts
- Lengthy permitting process may delay permissions and fieldwork
- Less likely to safeguard data for future applications
- Less control over the rest of the Motus network and maximizing the value of that network for a given project
- Stand-alone efforts may be less likely to safeguard data for future applications
- More difficult to make inferences about changes over time and identify drivers of those changes
- There may be limited continuity in the tower network if specific projects are in control of antenna deployment and maintenance
- Increased cost of hiring and training project-specific consultants and experts to carry out tagging, antenna maintenance, and data management

### *Centralized Approach: Advantages*

- Leverages expertise of subject matter experts (including RWSC stakeholder committees)
- Facilitates data sharing and coordination across projects and borders (e.g., standardized methods for data sharing agreements)
- Helps establish field data collection standards, in turn improving data quality in the long-term

- Guidance documents and recommended practices can be developed to more easily incorporate data into data sharing, meta-analysis, and other knowledge synthesis efforts
- May make science appear objective and less biases (removes optics of agenda, individual groups/scientists are not funded directly by developers
- Less risk for endangered species if a centralized approach leads to more strategic approach to tagging (and fewer individuals tagged)
- All parties have to conform to the same set of rules
- May allow for flexibility to share tags and potentially other resources across studies
- More efficient tag purchase process
- Ability to spread sampling across years and geographies rather than sampling based on project-level timelines
- Facilitates continuity of antenna stations across projects and over time as well as strategic deployment/distribution of receivers across the area of interest
- Streamlining permitting requirements across multiple locations/studies
- Easier to respond to future changes in best available technology and science
- Standardization of antenna array based on study design and regional scope rather than site- or project-specific considerations

*Centralized Approach: Disadvantages*

- Risk of too many eggs in one basket if something happens to the RWSC (e.g., delays due to staff shortages)
- Slower to implement for specific needs (e.g., Construction and Operations Plan permitting)
- May require more lead time for planning/coordination purposes
- May be challenging to fulfil needs of developers/permit requirements in a timely manner
- Timing of multi-stakeholder projects can be difficult with monies attached to development that is staggered across years (contributed to a centralized approach when you need data back in a timely manner)
- Disconnect between individual study and regional goals/expertise – adding expertise doesn't always add value for an individual project
- Project responsibility from design to implementation is less clear
- Requires a lot of work by the organization in charge of the centralization, particularly for coordination
- It is only as good as the number of people who buy into the plan
- Additional planning will be required to avoid conflicts of interest regarding participation in and funding by the RWSC
- Potential liability issues for developers relative to data sharing and accessibility

*Data sharing and transparency*

- A singular database for key offshore species will aid in data sharing across projects and permitting actions

- Developing movement data repositories would help create a stronger knowledge base outside the offshore wind community and help to inform siting of future installations and other activities from the start of the process.
- Publicly available metadata on current Motus projects (e.g., species being monitored) would be valuable
- Importance of data sharing for federally listed species (limited impacts for endangered species is valuable) – high incentive for a collective/collaborative approach
- Data storage should be housed outside of the RWSC to ensure long-term availability regardless of the status of the Collaborative
- Documentation needed for RWSC processes for purchasing and other research implementation

*Important considerations in taking a centralized approach*

- Clarity in the degree of control that individual groups maintain particularly in decision-making
- Importance of design structure with a gradient of control and options for project proponents (e.g., graduate student in charge of field research for their project, rather than complete control by RWSC)
- Funding flexibility – grants may be for particular geographic areas and making sure flexibility and discretion for project proponents with specific objectives
- Ensure buy-in – a centralized approach is only as good as the number of people involved
- Can't assume that regional groups will do everything
- Tensions between goals – how do we resolve these tensions to ensure individual projects can achieve their own goals within a larger regional framework
- Identify areas where a centralized approach *won't* work
- It will require time and money to maintain the collaborative network – reliability of the Motus network is key to ensure such a collaboration has value

*Other feedback related to approaches*

- Consider how a strategic framework might differ depending on whether the focus is site characterization or pre- and post-construction detection of impacts, and approaches may differ depending on species, region, and assessment phase.
- It will be important to develop guidance for what a good array looks like, along with maintenance schedules
- A framework for Motus studies is only part of a larger picture. We should also be thinking about large-scale deployments of other types of tags (e.g., satellite tags) for larger birds, and there are benefits to integrating multiple technologies, including barometric tags and radar.
- Short-term need to establish Motus infrastructure so that we can get good data from tagging efforts. There are currently gaps in the tower network that would hinder this research. Thus, we should consider the degree to which in the short-term funding is invested in network infrastructure versus tags.

- Developers will want to control access to towers on turbines – this may work in either scenario, but should be taken into consideration.

*What do you see as the biggest species or geographic data gaps to address using Motus tagging?*

- Relevance of Motus for songbirds, transatlantic migrants, non-listed species, and bats.
    - Passerine migrants, particularly in the Long Island Bight
    - Bats are important but difficult to study - It will be difficult to get data on offshore movement of bats using tags – they will be tagged on shore and only a fraction may use the offshore environment, making sample sizes a challenge.
- Arctic-nesting shorebirds, including ruddy turnstone and whimbrel, as these populations are of conservation concern.
- Phalaropes
- Larger birds – gannets, large gulls, sea ducks
- Wintering species that could be representative of interactions with offshore wind development
- Could use passive acoustic data to inform focal species. There are current efforts focused on automated receiver with machine learning that runs in conjunction with Motus station
- Movement patterns may change even for species that are relatively well-studied
- The degree to which common terns can act as a surrogate for roseate terns

## Next Steps

The next steps for development of the Offshore Motus Monitoring Framework include to 1) develop a workshop summary encompassing discussion which will be made available on the project website; 2) continue framework development, incorporating input from the workshop; 3) there will be an upcoming workshop and symposium at the 2022 State of the Science Workshop; 4) there will be opportunities for more detailed feedback, and contact Pam Loring (pamela_loring@fws.gov) if you would like to review the full framework document; and 4) the final study products are anticipated for fall 2022.

# Appendix A: Workshop Participants

Workshop participants are listed in alphabetical order by first name.

| Name | Affiliation |
|---|---|
| Caleb Spiegel | U.S. Fish and Wildlife Service |
| Candice Cook-Ohryn | Shell |
| Cheryl Horton | U.S. Geological Survey |
| Cris Hein | National Renewable Energy Laboratory |
| Darrell Oakley | Equinor |
| David Mizrahi | New Jersey Audubon |
| David Yates | Biodiversity Research Institute |
| Don Lyons | National Audubon Society |
| Doug Gobeille | University of Rhode Island |
| Elijah Lee | Ocean Tech Services, LLC |
| Emily Argo | U.S. Fish and Wildlife Service |
| Emily Shumchenia | Regional Wildlife Science Collaborative |
| Erik Carlson | University of Rhode Island |
| Evan Adams | Biodiversity Research Institute |
| Garry George | National Audubon Society |
| Greg Forcey | Normandeau Associates |
| Holly Goyert | AECOM |
| Joan Walsh | Massachusetts Audubon |
| Julia Gulka | Biodiversity Research Institute |
| Juliet Lamb | The Nature Conservancy |
| Karen Gilland | Normandeau Associates |
| Kate Williams | Biodiversity Research Institute |
| Lucas Berrigan | Birds Canada |
| Marianne Ferguson | National Oceanic and Atmospheric Administration |
| Megan Hayes | Atlantic Shores Wind |
| Mike van den Tillaart | Lotek |
| Pam Loring | U.S. Fish and Wildlife Service |
| Peter Paton | University of Rhode Island |
| Rebeca Linhart | Mount Allison University |
| Ryan Reynolds | Siemens Gamesa |
| Sarah Feeley | Vineyard Wind |
| Sarah Wong | Environment and Climate Change Canada |
| Scott Ambrosia | Vineyard Wind |
| Scott Lawton | Dominion Energy |
| Shilo Felton | Renewable Energy Wildlife Institute |
| Stephanie Vail-Muse | U.S. Fish and Wildlife Service |
| Todd Alleger | Northeast Motus Collaboration |
| Wendy Walsh | U.S. Fish and Wildlife Service |
| Wing Goodale | Biodiversity Research Institute |
| Zara Dowling | UMass Clean Energy Extension |

# Appendix B: Workshop Agenda

## Offshore Motus Monitoring Framework Workshop

**Wednesday, 8 June 2022**

**11:00 am – 1:00 PM (EST)**

| | |
|---|---|
| **11:00-1:10** | **Welcome and introductions** |
| **11:10-11:25** | **Monitoring framework overview** |
| **11:25-11:35** | **Detecting birds at offshore Motus stations** |
| **11:35-11:50** | **Motus power analysis to inform tag deployment** |
| **11:50-12:05** | **Options for centralizing tag deployments** |
| **12:05-12:10** | **Introduction to breakout groups** |
| **12:10-12:40** | **Breakout groups – feedback on centralized versus decentralized approaches to tagging** |
| **12:40-12:55** | **Wrap up** |
| **12:55-1:00** | **Next steps** |