**New Jersey’s Offshore Wind Research & Monitoring Initiative**

New Jersey’s Research & Monitoring Initiative (RMI) is a project that we at the Department of Environmental Protection (DEP) are collectively working on in collaboration with our partners at the Board of Public Utilities.

Earlier this month, the Intergovernmental Panel on Climate Change (IPCC) released its Sixth Assessment Report, and the science has never been clearer that climate change is real, and it is happening now. The report is the strongest call to action from this impressive collection of scientific experts to date. It lends even greater urgency to the need to enact sustainable solutions like Offshore Wind (OSW), that reduce our greenhouse gas emissions.

As we move towards a clean energy economy, we must do so in step with our mandate to protect and responsibly manage New Jersey’s coastal & marine resources. We must understand the resources: as they exist, as they are changing with the climate, as well as how they might change in response to the installation and operation of OSW. This is the goal of our Research and Monitoring Initiative.

Initial funding for this Initiative is provided by developers through NJ’s Second OSW Solicitation in the amount of $10,000/MW. The Initiative is intended to be a rigorous scientific approach addressing the need for research and monitoring of marine and coastal resources during OSW development, construction, operation and decommissioning as recommended in the NJ OSW Strategic Plan.

We will do this with key principles in mind, including maintaining transparency and balance, furthering scientific understanding, using credible and rigorous science, and by being adaptive.

We recognize that there are multiple partners undertaking similar efforts across the Atlantic Coast; so, while we are committed to ensuring that New Jersey’s highest research priorities are met, we are also interested in cooperating with regional partners and experts, such that we are contributing to a broader regional research effort.

**Process**

Based on current understanding of resources of concern, data gaps, and information needs, and informed by both current literature and references pulled together both internally and by analogous groups in the mid-Atlantic, we identified a list of research and monitoring priorities for New Jersey. We expect our understanding to evolve with the continued expansion of and coordination with regional efforts by other states, regional, and federal entities.

This list contains broad categories and includes everything from assessing environmental changes to potential impacts on New Jersey’s fishing industry.

Using these priorities, we will develop strategic scientific questions and where appropriate, create a competitive opportunity to answer them. Some projects are intended to move ahead starting in 2022. Other projects may become part of a long-term research and monitoring plan that will be developed subsequently. And in keeping with our principle about maintaining transparency, the Monitoring Reports will be made publicly available.

The process for establishing research priorities for the RMI with identifying New Jersey’s Resources of Concern. To do so, data were evaluated from the results of the Ecological Baseline Studies conducted by
DEP in 2010, the data contained in the Mid-Atlantic Ocean Data Portal, information about both federally- and state-managed New Jersey fisheries, as well as high-value marine habitats (e.g., Coastal Zone Management Special Areas, the mid-Atlantic Cold Pool) to understand the resources as they exist. Additionally, we conducted an internal literature review – which is ongoing – to gain insight into the current body of knowledge surrounding our marine and coastal resources.

From there, Resources of Concern were identified through questions such as:

- For living resources: is it a threatened or endangered species?
- Are individuals sensitive to a particular known/expected effect?
- Will the habitat (physical, chemical, geological, or ecological) likely be significantly altered?
- Is the habitat of such high value that any potential impact could be significant?

Once Resources of Concern were identified, we formed scientific questions to assess the potential impacts to those resources. The following questions guided the formation:

- Is there convincing evidence that any impact would be negligible?

To answer this question, we conducted extensive literature reviews, sought out stakeholder input, as well as input from local subject matter experts. If the answer was yes, we compiled the relevant information & will be making it publicly available on the upcoming RMI website. If not, the next question was:

- Is the topic being pursued by other entities?

If the answer was yes, we began (and continue) coordinating with that entity. If the potential impacts limited to the development project site (such as pile-driving noise), research into that impact should be included in OSW developer’s project-specific research and monitoring. If not, the topic was considered suitable for the RMI.

*Research Priorities*

With that background, we formed the following short-term research priorities list (Table 1). This list was vetted by the New Jersey Environmental Resources Working Group, and DEP solicited and received feedback on the list from the following entities:

- American Littoral Society
- Anglers for Offshore Wind Power
- Atlantic Shores (Fisheries Liaison)
- Bureau of Ocean Energy Management
- Clean Ocean Action
- Commercial Fishers
- Interstate Passive Acoustic Monitoring Coordination Team
- National Wildlife Federation
- The Nature Conservancy of NJ
- NJ Audubon
- NJ Marine Fisheries Commission
- National Marine Fisheries Service – Office of Protected Resources
- National Oceanic and Atmospheric Administration – Fisheries
- Northeast Fisheries Science Center
The feedback we received fell into three main themes: 1) the RMI should provide a clear process for how projects are developed and will be executed 2) the RMI team should be collaborative, ensuring regional coordination to create economic efficiencies and maximize research dollars, and 3) focus on the highest priority pre-construction data collection, before moving into a phase of construction and operations research and monitoring.
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<thead>
<tr>
<th>Short-term Highest Priority Research &amp; Monitoring Needs</th>
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<tbody>
<tr>
<td><strong>Data Management</strong></td>
<td>1</td>
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<tr>
<td>Data standardization, processing, analysis, housing, QA/QC, and sharing</td>
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<tr>
<td><strong>Environmental Change</strong></td>
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<tr>
<td>Examine impacts of OSW energy development on seafloor, light conditions, and ocean stratification (i.e., how could potential changes in circulation patterns due to OSW development affect geological and physical oceanographic properties, such as the mid-Atlantic Cold Pool?)</td>
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<td><strong>Benthos</strong></td>
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<td>Identify &amp; evaluate valuable bottom habitats (e.g., sand ridges, surfclam beds, SAV in estuaries - use survey work in lease areas to identify habitat types) and organisms (summer flounder, skate, dogfish, horseshoe crab, sturgeon); model potential changes to these habitats and organisms</td>
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<td><strong>Birds</strong></td>
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<td>Develop baseline estimates of population-level distribution information (with focus on Red Knot, Piping Plover, and Roseate Tern) by expanding GPS, Motus, and satellite tag technology to characterize migratory movements – particularly flight altitudes – throughout the NY Bight</td>
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<td><strong>Bats</strong></td>
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<tr>
<td>Update known population data at the proposed development sites (i.e., how many bats will potentially be interacting within the known lease areas)</td>
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<td>Use best available technologies (e.g., nanotags and Motus network) to determine the extent of bat migration/activity offshore in the NY Bight (especially for Hoary, Silver-haired, and Eastern red bats)</td>
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<td><strong>Fishes &amp; Invertebrates</strong></td>
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<tr>
<td>Examine effects of OSW on the distribution/connectivity of fish &amp; invertebrate species and communities (e.g., acoustic tags for horseshoe crabs or species with obligate migration paths)</td>
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<td>Examine the distribution and use of habitat by larvae and juveniles (fishes/crustaceans) in the New York Bight (e.g., nursery function and spawning grounds)</td>
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<td><strong>Sea Turtles</strong></td>
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<tr>
<td>Collate existing data for sea turtle movement, distributions, and habitat use patterns; conduct beach surveys where possible (i.e., how do these animals use the space?)</td>
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<td><strong>Marine Mammals</strong></td>
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<tr>
<td>Estimate habitat use, distribution, and abundance by season (e.g., overwintering harbor seals) for the right whale, other whales and dolphins through supporting regional PAM efforts in the NY Bight; identify environmental variables driving these patterns</td>
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<tr>
<td>Evaluate relative threat of mortality/injury to for the right whale, other whales and dolphins from vessel strikes (including increased vessel interactions due to creation of traffic corridors) associated with OSW and non-OSW activities</td>
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<td><strong>Fisheries</strong></td>
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<tr>
<td>Adapt DEP trawl survey design to allow for comparison of biases/limitations in and outside of OSW development areas and calibrate new time series</td>
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<td>Identify and implement methods to determine how dredge, purse-seine, and trawl fisheries will be affected by construction/during operation; model increased vessel interactions due to creation of traffic corridors</td>
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<td>Develop and implement methods to assess impact of OSW on recreational fisheries (e.g., changes in fish communities within WEA)</td>
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Data Management

- The volume of data being collected (and expected to be collected) because of OSW development is unprecedented.
- This is a once-in-a-generation opportunity to understand the Outer Continental Shelf, its ecosystem, its dynamics with respect to ocean users of all kinds, and how it might be impacted, both positively and negatively, by OSW.
- The key items the RMI team is considering around data management include:
  - Data standardization (so we can make the most of all the data being collected and understand it in a broader regional context)
  - Data processing & analysis
  - Data warehousing
  - Quality Assurance/Quality Control

Environmental Change

- To examine any potential impacts of OSW energy development, we must first understand the existing environment.
- We will be looking to evaluate potential impacts to the seafloor, light conditions, and ocean stratification (i.e., how could potential changes in circulation patterns due to OSW development affect geological and physical oceanographic properties, such as the mid-Atlantic Cold Pool?)
- We also recognize that a key component of accurately answering these questions will be teasing out the effects of climate change from the effects of OSW development. Doing so is no simple feat.
- A comprehensive approach geological, physical, and chemical data collection is needed.
- The potential methods for this work include expanding existing data collection that is going on in our area, such as eco-glider deployments, integrating oceanographic sensors with existing tagging programs, and potentially adding sensors to the turbines themselves to gain more insight into the changes that are happening in our oceans.

Benthos

- We are interested in the effects of OSW development on the seafloor itself, but also the organisms and communities that rely on it.
- The existing habitat mapping that is being conducted by developers (as required by BOEM) is at a coarse spatial scale.
- We seek to identify & evaluate valuable bottom habitats (e.g., sand ridges, surfclam beds, SAV in estuaries) at a finer spatial scale to be able to answer questions pertinent to important NJ species and habitats.
- We plan to use survey work to identify habitat types and the organisms that are obligate users of those habitat types.
- Looking ahead, we would like to be able to model the potential changes to those habitats and species resulting from OSW development.
Sea Turtles

- The first priority for sea turtles will be to collate existing data for sea turtle movement, distributions, and habitat use patterns.
- We would additionally like to conduct beach surveys where possible, to investigate the potential nesting sites in Cape May County, for example.
- The overarching question we look to answer is: how do these animals use the space?
- An important note as we examine historical and current data about habitat and distributions is, again, the impact of climate change on these species.
- It is no longer a question of whether species with distributions to the south of New Jersey will be thermally forced north, but when.
- We must maintain a forward-looking temporal perspective when assessing all of these areas of research, but for sea turtle distribution especially.

Birds & Bats

- The reason for combining these two taxa groups are their alignment in both the essential research questions, as well as the potential methods to be used.
- The first order assessment for these groups will be to update known population data at the proposed development sites (i.e., how many organisms will potentially be interacting within the known lease areas).
- We will use the best available technologies (e.g., nanotags and Motus network) to determine the extent of migration/activity offshore in the NY Bight.
- Particular attention will be given to Hoary, Silver-haired, and Eastern Red bats, as well as Red Knot, Piping Plover, and Roseate Tern, as these are species of particular concern in our area.
- The plan is to develop baseline estimates of population-level distribution information by expanding GPS and satellite tag technology to characterize migratory movements – particularly flight altitudes - throughout the NY bight.

Marine Mammals

- Similar to sea turtles, birds, and bats, our first goal for marine mammals will be to estimate habitat use, distribution, and abundance by season (e.g., overwintering harbor seals)
- Our initial efforts will be to support Passive Acoustic Monitoring efforts which are already underway in New Jersey and throughout the NY Bight.
- Subsequently, we want to identify environmental variables that are driving these patterns – a really important piece of separating the impacts of climate change from those of OSW development.
- For marine mammals, an additional area to evaluate will be the relative threat of injury and mortality from vessel strikes. The creation of traffic corridors has the potential to increase vessel interactions.
**Fishes & Invertebrates**

- We want to emphasize our distinction between assessing impacts to fish & invertebrate species and impacts to the commercial and recreational fisheries that operate off the NJ coast.
- For the biological impact, we will seek to examine the distribution and connectivity of mobile species and communities. Potential methods for collecting these data include acoustic tags for species like horseshoe crabs and organisms with obligate migration paths within the wind energy areas, or near proposed cable routes.
- As with the other taxa-based groups, our goal for fish and invertebrates will be to estimate habitat use, distribution, and abundance by season, so that we can then asses any significant impacts, positive or negative, that OSW development may have.
- We understand that modelling efforts are underway at the federal level to help answer these more predictive questions, and will coordinate to collect data that will calibrate those distribution models.

**Fisheries**

- We hope to adapt the NJDEP trawl survey design to allow for comparison of biases/limitations in and outside of OSW development areas.
- We will also work to identify, develop, and implement methods to assess and mitigate impacts to dredge, purse-seine, and trawl fisheries during construction and operation.
- Along with the regulatory and socio-economic impacts, we will seek to model increased vessel interactions due to creation of traffic corridors (particularly between commercial and recreational fishing sectors, along with other maritime traffic).