

Maine Floating Offshore Wind Research Array

Pre-application Siting and Stakeholder Summary, Dec. 2020 to July 2021

July 12, 2021

In November 2020, Governor Janet Mills announced the State's intent to pursue a floating offshore wind research array in federal waters of the Gulf of Maine, via an application for a research lease area from the U.S. Department of the Interior Bureau of Ocean Energy Management (BOEM).

Beginning in December 2020, the State conducted significant outreach and analysis to inform the location and research priorities of the research array in preparation for the State's application to BOEM. The application is the first step in a multi-year process for permitting the research array, which includes numerous additional opportunities for public input. For more information, visit the Governor's Energy Office's (GEO) research array [webpage](#).

Call for Public Feedback on Preferred Research Array Site

By Friday, July 30rd

The ***Pre-application Siting and Stakeholder Summary*** (below) is a draft summary detailing the stakeholder process to determine a site for the research array, the input provided during this process, the state's initial results, and the next steps to determine a final site to submit to BOEM.

We encourage review of the summary information and are seeking any further feedback on the preferred site being considered.

GEO will present this information during the final
Research Array Work Session on July 13, 2021 at 4:00 pm – 6:00 pm

Register at:

https://cbuilding.zoom.us/meeting/register/tJMtduyqTMpEt2q_sJGTcH5gyeEWs7JA4aZ

Please provide feedback and any additional information that may be helpful in determining a final site for the research lease via this [form](#) by Friday, July 30, 2021.

Introduction

This document is a summary of the stakeholder process, input to date, results to date, and next steps. This included a dozen public meetings, attended by hundreds of people, and incorporates feedback and perspectives heard throughout the process. Perspectives on the proposed project varied, with some expressing concern, some in strong support, and others expressing strong disapproval. The GEO is appreciative of the time and attention given to this effort and remains committed to working with stakeholders through a transparent and open process throughout the duration of its work on this project. In addition to the public engagement, GEO worked with the Department of Marine Resources (DMR), Maine Department of Inland Fisheries and Wildlife

(IFW), and other agencies to analyze the Area of Interest (AOI) for the siting of the proposed research array.

The document outlines a Narrowed Area of Interest with a preferred site for the research array within that area. Before making a decision on the final site for the State's submittal to BOEM, GEO is accepting additional information and feedback on the location of this preferred site. Once the application is submitted to BOEM, there will be a separate review process, which will include a National Environmental Policy Act (NEPA) review and opportunity for additional public input before a research lease is issued.

Public Engagement

The Governor's Energy Office (GEO), in partnership with the Department of Marine Resources (DMR), the Maine Department of Inland Fisheries and Wildlife (MDIFW) and other state agencies, worked with the facilitation assistance of the Consensus Building Institute (CBI) to develop a variety of opportunities to involve and engage existing ocean users and stakeholders. The engagement process was structured to: 1) inform and educate the public about the project; 2) solicit ideas, data, experiences, expertise and first-hand knowledge to inform the siting of the research array; 3) understand the potential concerns and conflicts with existing ocean users and resources; and 4) initiate a dialogue to consider how to avoid or mitigate potential impacts. By doing this, the State's intent was to offer a more extensive engagement process to gather information and feedback around identification of a final proposed lease area than has been typically performed in other offshore wind siting processes. Given the important opportunity that offshore wind presents for Maine, and the known concerns by stakeholders such as the fishing industry, the State felt this deliberative pre-application process was prudent and essential. The State made clear to attendees that participating in sessions did not constitute approval nor endorsement of offshore wind development in the Gulf of Maine generally or the research array in particular.

The public engagement process included four public meetings, one introductory workshop, five work sessions, two webinars, six meetings with Lobster Zone Councils, and numerous informal conversations with fishermen, interested individuals, scientists, and organizations (full list of public meetings can be found [here](#)). Additionally, Frequently Asked Questions (FAQ), an interactive map viewer, and a regularly updated website were utilized. A brief summary is provided below.

Event	Date	Purpose	# of Attendees
<i>Introductory Meetings</i>	Dec. 15 Dec. 16 Dec. 17 Dec. 22	Introduce Maine's proposed approach, intent, objectives, and process for moving forward	432
<i>Initial Foundational Workshop</i>	Feb. 5	Share more information on floating technology, siting criteria, data sets and tools available, and potential research themes and questions	249
<i>Informational Webinars</i>	Feb. 26 March 26	Inform interested stakeholders in the building of off-shore floating technology (webinar #1) and offshore wind cable laying within an array and to land fall (webinar #2)	202
<i>Fisheries Work Sessions & Wildlife Work Sessions</i>	March 5 March 10 March 26 March 31	For both wildlife and fisheries, two sessions each were held to explore and contribute data, identify areas of lesser and greater use conflict, consider configuration or turbines within a site, and what research questions might be of greatest interest	400

<i>Fishing Industry Specific Meetings</i>	March/ April	DMR conducted seven public meetings with Lobster Zone Councils and groundfishermen to share information on the proposal and obtain feedback	
<i>Individual meetings and discussions with ocean users and stakeholders</i>	Winter/ Spring	State agencies had numerous informal conversations with individual fishermen, organizations, and the public about the proposed project.	
<i>Joint Work Session</i>	July 13 th Register here	A final work session will be held to share all data and considerations made to date, refine and narrow likely lease area, and discuss next steps in the lease application process	

Research Framework

The research array is driven by the need to increase our understanding of floating offshore wind in the Gulf of Maine and the potential opportunities and impacts to the marine environment and existing activities. Through stakeholder dialogue, the State solicited input on key research questions and areas of focus for the research array. Based on this feedback, GEO, in coordination with other state agencies and scientific experts, will encapsulate key areas of potential research for the project into a research framework that will be submitted with the final application to BOEM. The framework outlines the areas of potential focus but does not make any formal decisions about the specific research that will be conducted at the site. A full research plan will be developed for the project, with input from stakeholders.

The research that will be conducted at the research array will fill existing data gaps with the goal of reducing uncertainty around impacts from floating offshore wind projects on existing ocean users and the ecological environment to inform the responsible development of future wind projects in the Gulf of Maine. Studies conducted at the research array will augment existing research, monitoring, and impact assessment guidance for offshore wind, in particular work being conducted by existing regional research consortia with specific focus on floating technologies and priority needs for the Gulf of Maine. Research at the array will be above and beyond what is required for purposes of project design and permitting. Earlier this month, the Governor signed bipartisan legislation, which created the offshore wind research consortium to manage the research at the research array. The scope and the scale of the research will be dependent on available funding. To jumpstart the funding effort, the 2021 Supplemental Budget signed by the Governor, included \$3 million for research activity related to offshore wind and this research array.

Initial Siting Criteria and Process

The State considered a variety of inputs to identify a potential area of interest for a research array within the entire Gulf of Maine and for preliminary stakeholder consideration.

- Proximity to existing high-voltage nearshore interconnection points and areas with higher energy demands. The State identified two possible interconnection points for this project - Maine Yankee (Wiscasset) or Wyman Station (Yarmouth) substations.
- The State proactively set a standard of at least 20 statute miles from shore, limiting impact to nearshore fishing grounds and ecosystem, and coastal viewshed.
- At 16 square miles, the research lease area is smaller than most traditional commercial leases. The smaller scale limits the total energy capacity to not more than approximately 150 MWs, and some economies of scale in construction. Therefore, a research project has more constrained economic considerations than a large, commercial scale project.

The State established 40 miles from shore as the maximum distance to shore to account for these factors. A project beyond that would likely require an offshore substation and add potential additional costs, which would be prohibitive for a project of this scale.

- Exclusion zones to development including designated shipping lanes and Department of Defense (DoD) exclusion zones were also taken into account.

With these considerations, the State put forward a broad Area of Interest (AOI) of approximately 770 square miles from which to identify a 16-square-mile lease area. The State was aware from the outset that constraints and conflicts within the AOI would further limit the suitability for offshore wind projects.

For a full overview of the siting criteria and process, please visit [here](#).

The public engagement process led to:

- Extending the original application process by several months to provide additional opportunities for public engagement and input;
- Identification of known fishing activity within the AOI;
- Identification of a number of data sets and their analysis to identify uses, including the presence of various wildlife species and fishing activities;
- Refinement of research themes and ideas; and,
- Narrowing the approximately 770 square mile AOI to a smaller, narrowed area (outlined below) from within which the state will identify a 16-square-mile proposed lease area.

A summary of public input and state analysis to date is provided below. More detailed documentation will be provided in the final lease application.

Fisheries Considerations

At GEO's request, DMR conducted an analysis of the AOI, which included a review of available data and a summary of individual interviews. Through that process, DMR put forward a Narrowed Area of Interest where there is less known impact on fisheries activities. The full document can be viewed [here](#). Below is a summary of that effort.

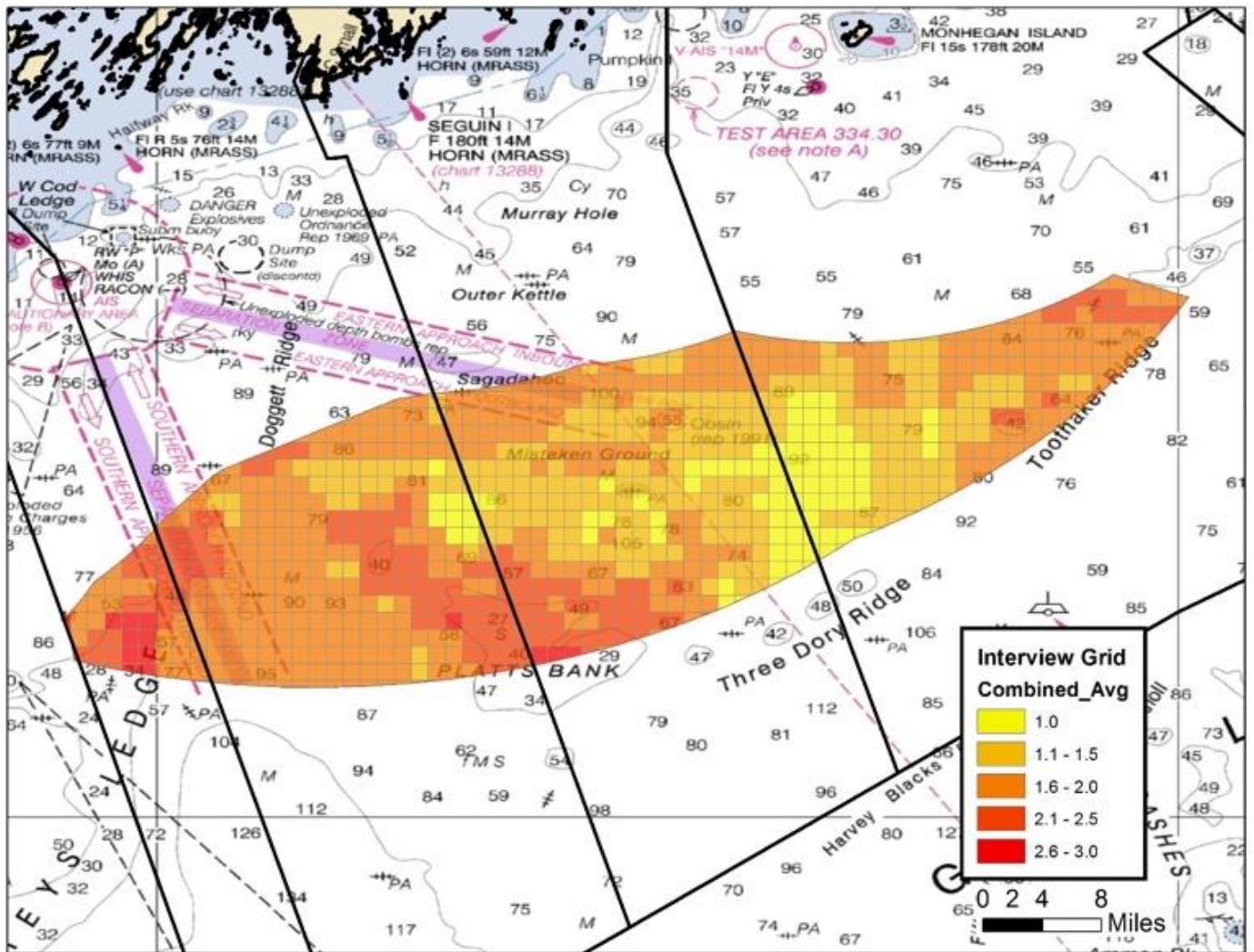
Data Collection - DMR made use of a wide array of publicly available data. An online survey and discussions with state and federal partners, commercial/recreational fishermen, fishing organizations and members of the public enriched DMR's understanding of the data available and how it could be used to inform siting.

Interviews - To gain a deeper representation of activity and provide needed context to the available data, DMR staff had detailed conversations with individuals and small groups affected by the AOI. Interviews were conducted during the winter and spring of 2021, largely through video conferencing or phone calls due to COVID restrictions. At the end of the site selection process, some in person interviews were conducted in a socially distanced manner.

Composite Map - A composite map was generated of affected fisheries considered for this analysis including Lobster, Groundfish, Recreational fishing/Commercial Tuna, Atlantic Herring and Scallop. Groundfish, Scallop and Atlantic Herring activity maps were created using 2011-2014 VMS data available through the [Northeast Ocean Data Portal](#) and standardized into one-minute grids with activity interpreted between zero (no activity) to three (high activity). Lobster and recreational/tuna fishing activity were based on the average reported activity from interviews. The average fishing intensity was then calculated across all fisheries for each one-minute cell. The composite fishery map displays DMR's attempt to characterize fishing activity across all fishing sectors. Fishing activity occurs in all areas of AOI, with various levels of

intensity as identified in the map below. Patterns of high activity follow themes noted within individual fishery uses.

Figure 1. Combined Interview Grid - The combined fishing intensity within the AOI as identified by interviews (lobster, recreational fishery, commercial tuna) and VMS activity (groundfish, herring, scallop). Intensity ranges from one (low, yellow) to three (high, red).

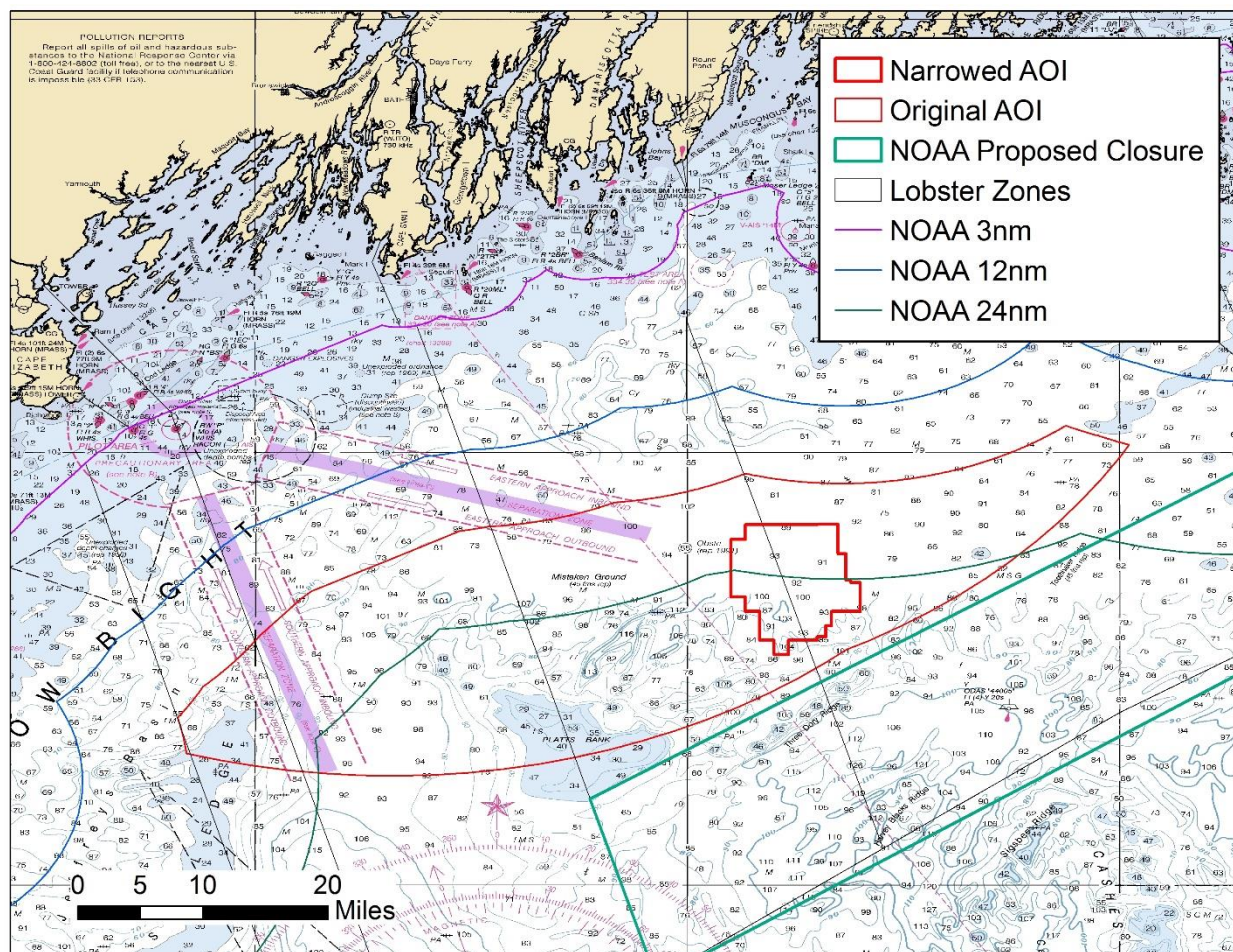


CONCLUSIONS:

- There is no location within the AOI that avoids impact completely; fishing activity varies by time period, activity and level of intensity. Siting the research array in an area with more level bottom and softer sediment to better accommodate anchoring may have greater impact on mobile gear fleets, though lack of fishery-dependent data that represents the lobster fishery's spatial footprint makes it difficult to know this with certainty.

- Areas of depths less than 90 fathoms tend to have overlapping fishery activity and are more broadly used than areas greater than 90 fathoms because lobstering activity drops off significantly at these deeper depths.
- Platts Bank remains the dominant feature within the area, with all fisheries identified using this area. Other areas of high activity were identified in the west around Jeffreys Ledges, in the north around the Mistaken Ground and in the east around Toothaker Ridge.
- In many ways, the AOI represents a transition between inshore and offshore species in composition and fisheries. Lobstering is an inshore dominated fishery that extends into the area, though with significant drop off in activity at greater depths. In contrast, groundfish activity in the area was often described as starting in the area and extending out of the area based on season and targeted species. Bluefin tuna were described to use the area extensively with areas of geologic structure likely holding fish that might otherwise swim through the area.
- Breaking up existing contiguous groundfish tows may impact small vessels' decisions for fishing activity if transit time across a development site is required or fishing grounds are excluded.
- For the research array, there may be potential to reduce localized impacts by working closely with area fishermen on configuration and orientation during the later review process after the application is submitted.
- Fishermen are concerned about the impact of displaced effort from this project - including potential impacts on families, jobs, coastal communities, and their way of life – as well as concerns about the much larger scale of potential future offshore wind developments that could limit or restrict fishing grounds.

Figure 2. Narrowed Area of Interest (Narrowed AOI) – Based on available federal fisheries data and the composite map referenced above, that includes other available data and in-person interviews, DMR identified a Narrowed Area of Interest within the Area of Interest where the least known activity is occurring. (Note that the boundaries of the Narrowed AOI are not exact in this map).



Wildlife Considerations

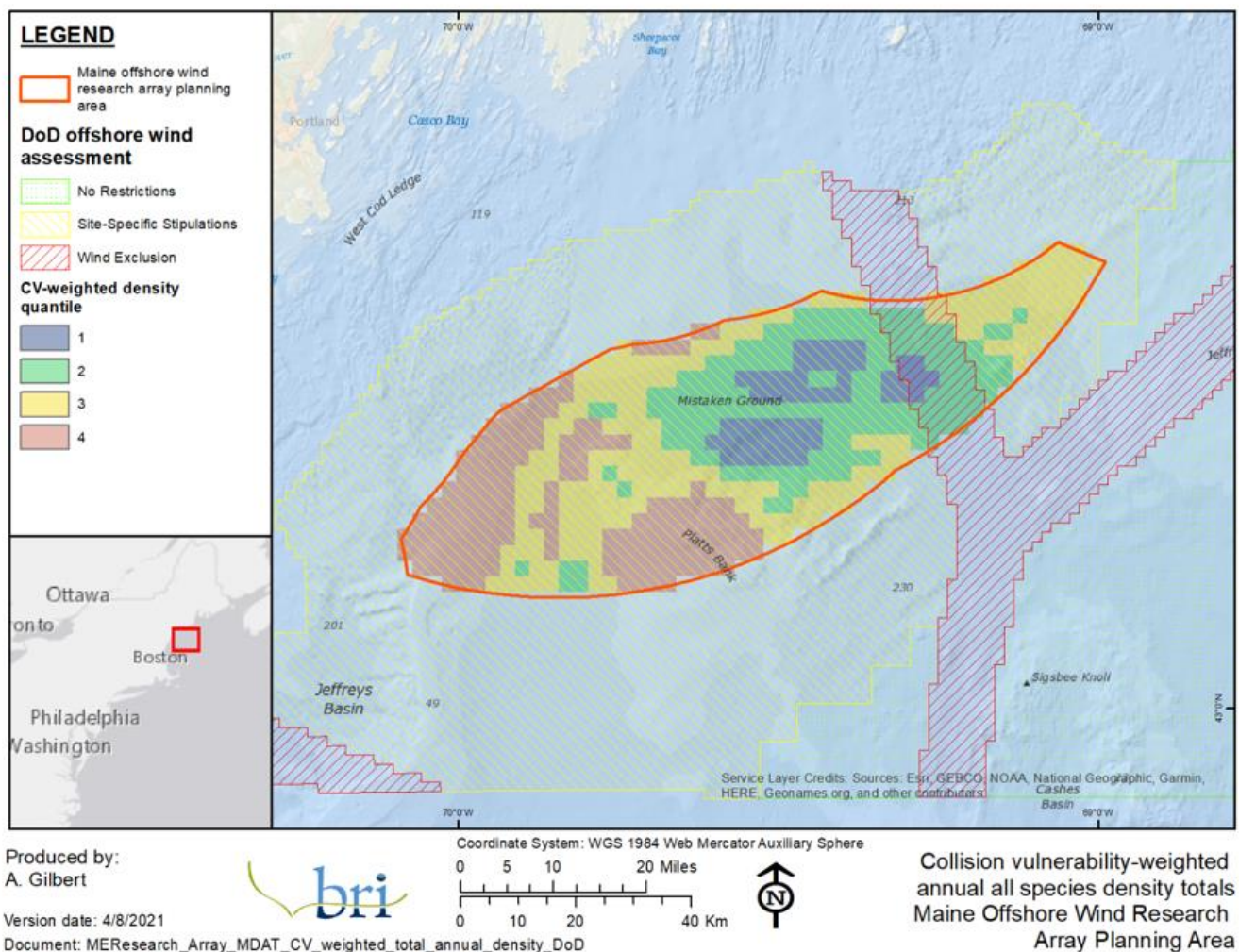
The Gulf of Maine (GOM) hosts over 300 species of seabirds, sea ducks, migrating songbirds, shorebirds, bats, and other species. Offshore population information from aerial and breeding surveys exists for only a limited number of these species in certain locations (such as nesting seabird colonies within certain areas of the GOM), but there are no comprehensive GOM-wide distribution and abundance surveys for all species.

Data Collection – The Maine Department of Inland Fisheries and Wildlife (MDIFW) met with state and federal agencies and stakeholders over several meetings to identify publicly-available wildlife datasets. Stakeholders identified over twenty potentially applicable datasets relevant to offshore wind energy in the Gulf of Maine. Due to the currently limited AOI-specific data, stakeholders and agency staff identified the Marine-life Data and Analysis Team (MDAT) models as the most comprehensive (albeit coarse-scale) wildlife datasets available.

Data Analysis and Mapping - Biodiversity Research Institute (BRI) conducted a [desktop analysis](#) using the MDAT models and a Maine specific vulnerability analysis. BRI presented the

methods and received feedback from stakeholders during public work sessions and reviewed the methods with MDIFW.¹ A series of three maps were created depicting spatial avian risk for 36 species likely to be present within the proposed research array area (detected within 200 km) based on population vulnerability (PV), collision vulnerability (CV), and displacement vulnerability (DV). Vulnerability categories (PV, CV, DV) were used to weight the existing annual MDAT modeled species density estimates to provide an annual estimate of total avian risk across the proposed Research Array area. Since the MDAT models were developed using environmental predictor variables, a separate analysis of covariates in the AOI was not conducted. MDIFW's summary of its work can be found [here](#).

Figure 3. MDAT models weighted by collision vulnerability. Areas in blue indicate the lowest density of marine birds, thus have the least conflict.



¹ Goodale, M.W., A.T. Gilbert, and I.J. Stenhouse. 2021. Supporting Siting of the Maine Research Array. Report to the Maine Department of Inland Fisheries and Wildlife & the Maine Governor's Energy Office. Biodiversity Research Institute, Portland, ME. 13 pp.

CONCLUSIONS:

- The lack of data within the Gulf of Maine at a fine scale makes it difficult to draw specific conclusions, especially for rare species. However, the absence of data does not mean the species are not present.
- Areas to the south of the Gulf of Maine have benefited from substantial large surveys (e.g. MA, NJ, NY, Mid-Atlantic, South Atlantic bight). This data is not yet available for the GOM.
- BRI's results suggest that construction of turbines within an area in the east-central portion of the AOI, around the deeper waters of "Mistaken Ground" and extending east through Platts Basin for about 25–30 miles (40–50 km) provide the lowest potential risk to marine birds (areas in blue) likely due to the area's distance from shore, water depth, and lack of significant underwater features. The Narrowed AOI overlaps with portions of the blue and green areas in the BRI analysis, indicating lower potential risk in the area as compared to some other areas of the AOI.
- In contrast, the shallower areas of the continental shelf tend to have higher concentrations of birds and likely greater potential risk to marine birds (e.g. Jeffreys Ledge and Platts Bank).
- Because other species, such as marine mammals and bats, are likely to be associated with these same environmental characteristics (e.g., underwater features or distance from shore), the Maine-specific MDAT models currently provide the best available comprehensive information to inform siting in areas that minimize impacts generally to wildlife.
- Inclusion of additional movement and habitat use datasets (e.g., tern foraging, peregrine falcon migration) within the AOI will help the State to identify additional target species for further monitoring and study.
- Despite its limitations, existing data on marine mammals indicate:
 - Large baleen whales are distributed throughout the AOI and region.
 - Abundance of baleen whales is highest in the southwest portion of the Large AOI near Jeffreys Ledge and in the region of Platts Bank.
 - The portion of the Large AOI with the lowest abundance of the baleen whale ecological group is to the northeast of Mistaken Ground. Species specific distribution patterns largely follow this overall group trend.
 - Smaller cetaceans, such as large and small delphinids, have the potential to use the area of interest broadly with no known high abundance areas. However, these species are likely to follow patterns of high productivity areas, as noted above, as they target schooling fish species as their primary prey source.
- In conclusion, the Narrowed AOI avoids the areas of greater baleen whale abundance further southwest along ledge and bank, suggesting a likely lower potential risk in the narrowed area as compared to other areas of the AOI

Other Considerations

Navigation

The State held discussions with stakeholders involved in navigation around the Port of Portland, including the Portland Pilots, U.S. Coast Guard, and Cruise Lines International Association (CLIA). Through these conversations, USCG shared [guidance](#) regarding offshore wind on the

Atlantic Coast. During the discussions, concerns raised were mostly in regard to the Traffic Separation Scheme (TSS) and areas just beyond where traffic disperses. Stakeholders advised that the research array should be adequately lit and marked on the navigation chart and the proposed location of the research array should be sited as to not restrict, impede, or create a navigation hazard for safe passage of any deep-draft commercial vessels transiting in or out of the Port of Portland.

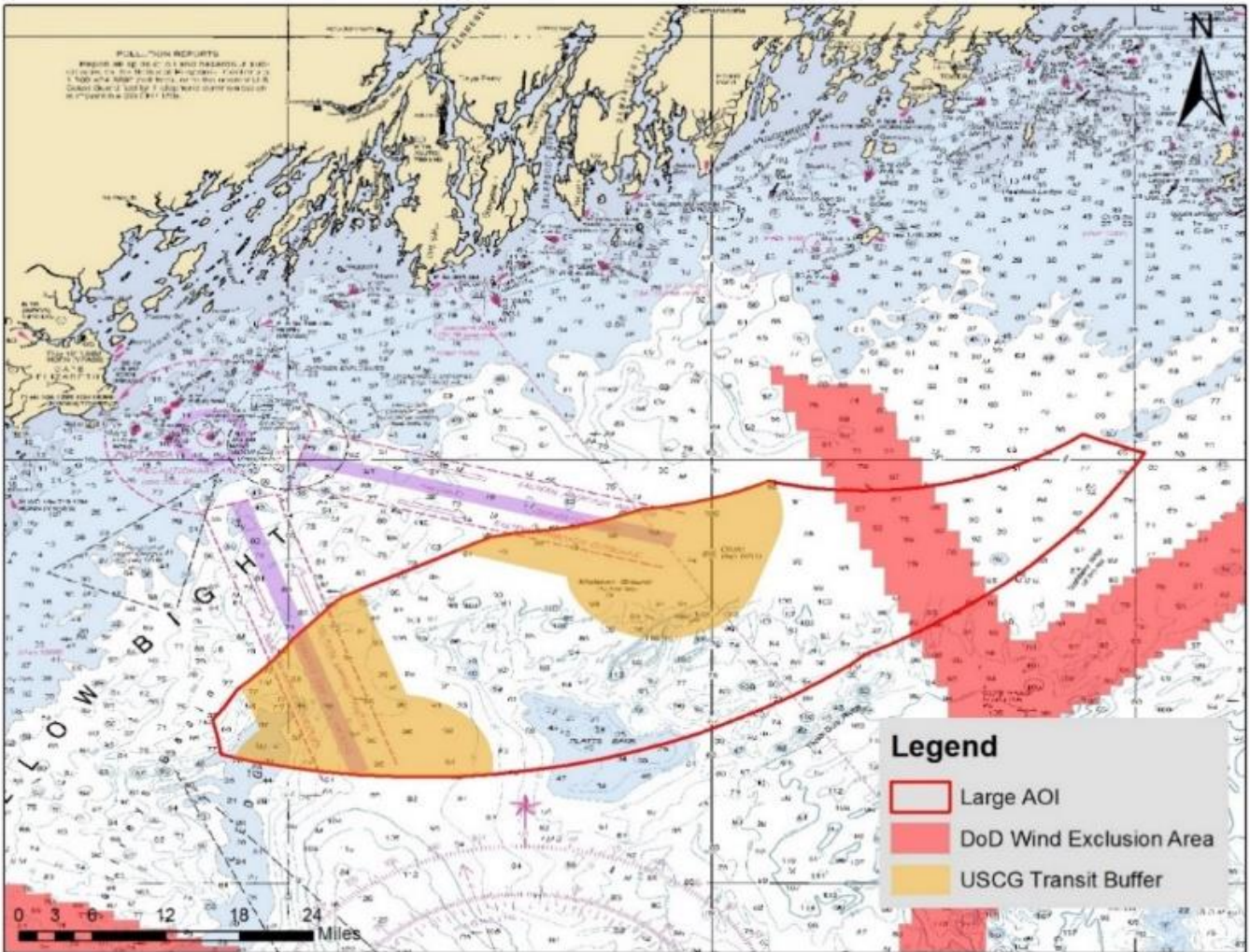
The AOI includes existing shipping and traffic lanes which facilitates both local and international traffic. The Port of Portland, Maine approaches utilize a TSS for commercial vessel traffic, including an Eastern and Southern approach. Both approaches intersect with the State's AOI. The USCG guidance noted above details several key points to determine safe placement of offshore renewable energy sites, including recommended buffer zones in the vicinity of TSSs (2 nautical miles from the side of TSS and 5 nautical miles from the end of TSS).

An initial analysis was conducted on traffic patterns provided through Automatic Information System (AIS) data compiled by the Northeast Regional Ocean Council (NROC) was conducted of the region based on 2019 data which is the most accurate, pre-pandemic data available. AIS data as presented by NROC categorizes the commercial traffic accessing the AOI as light with only a portion of the overall light traffic also using the Eastern TSS lanes.

Vessel traffic is not as heavy compared to ports such as Boston or New York. The regional vessel traffic density is light with very little meeting or crossing situations in confined areas.

The Narrowed AOI maintains the five nautical mile buffer guidance located at the entry/exit of the TSS as closely as possible, which provides ample sea room for a large vessel to maneuver before shaping up to enter the TSS Eastern approach. The State intends to continue assessing the risks related to navigational safety of the proposed research array with the USCG and maritime stakeholders through the various phases of project planning and design, including use of appropriate lighting, charting, markings, and a variety of other methods to ensure safe passage of any vessels transiting in or out of the Port of Portland.

Fig. 4 *USCG Guidance transit buffers, Transit Separation Schemes, and DoD Exclusion Area.*



Defense

The DoD utilizes the area off the Maine coast for a number of activities, as is common in other areas of the country. In 2014, DoD assessed the compatibility of offshore wind development with military assets and activities, in which several areas were identified where significant conflict would exist with offshore wind activities. During this pre-application phase, GEO worked with the DoD to understand activities within the AOI that extend beyond the exclusion areas. Siting the array as far to the east would reduce impacts to DoD activities. Based on these conversations, with the small size of the proposed lease and the location of the Narrowed AOI within the AOI, impacts to activities can be mitigated.

Cabling

While selection of the final interconnection point was not evaluated for the research lease area for application to BOEM, the cabling associated with the research array - both inter-array and to shore - as well as the potential cable landing locations raised significant concerns for stakeholders. Issues included:

- How and when the state will determine the cable landing location (Wyman Station in Yarmouth or Yankee in Wiscasset);

- How and when the state will determine the cable route, including the cable laying; process, cable burying or covering techniques;
- Understanding the impacts of electromagnetic field on fisheries;
- Concerns about potential fishing restrictions over cables;
- Opportunities for onshore opportunities economic development; and
- Potential impacts to nearshore habitats.

The State noted that neither the cable landing nor route is required to be submitted in the initial federal research array application for the lease. However, in future stages of the project development, there will be opportunity for public engagement, including permitting public comment and input from both the State and the federal agencies reviewing the application.

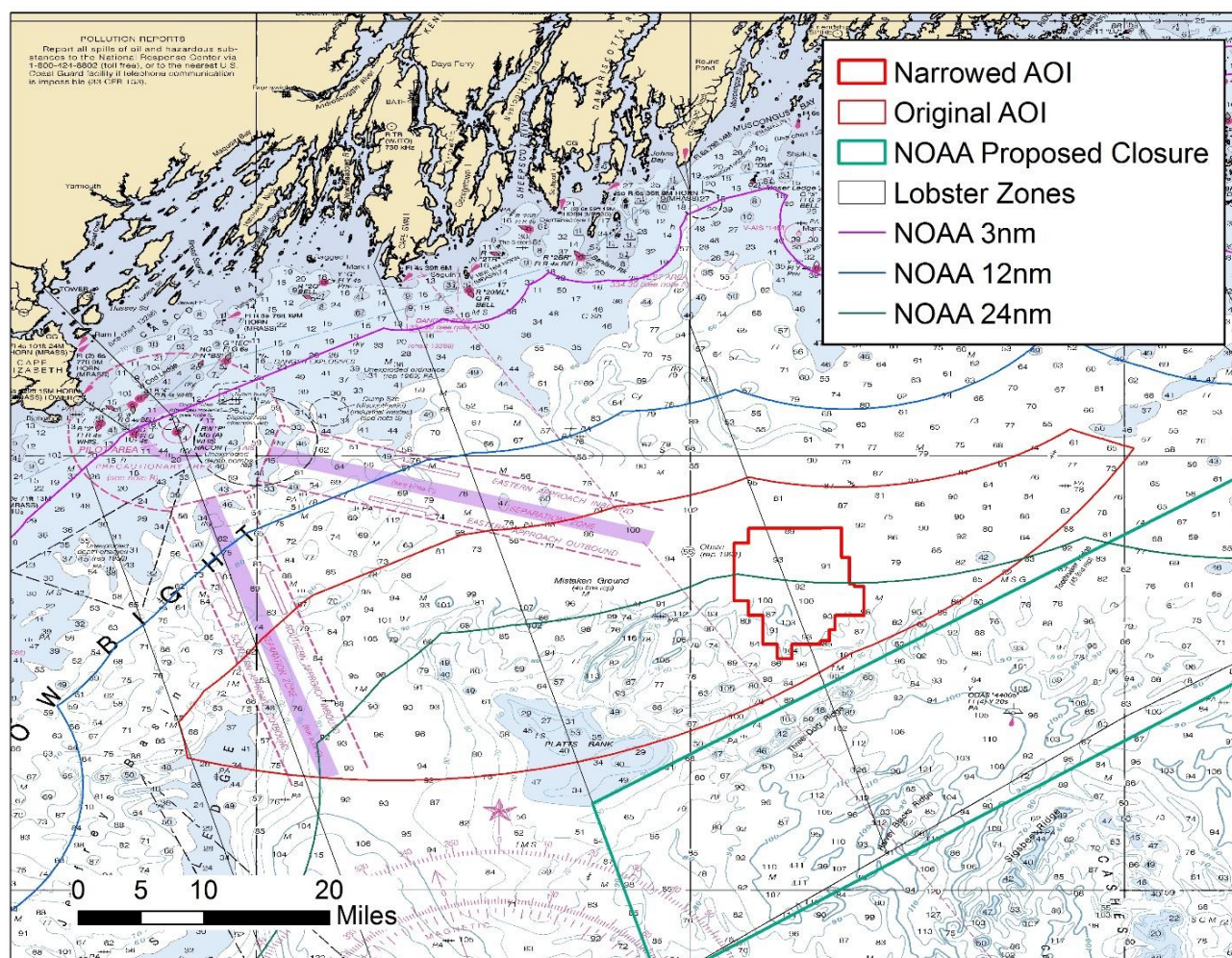
Preferred Site and Configuration of Research Array

GEO Narrowed Area of Interest

Driven by the analysis conducted by DMR, and complemented by the other analyses, GEO will locate the final site within a Narrowed AOI, which is approximately 56 square miles, although the boundaries are not exact.² This area avoids parts of the initial AOI with significant fishing activity, mostly avoids areas with outcropping and upwelling that attract significant wildlife, avoids the TSS shipping lanes and published USCG Guidance regarding TSS buffer areas (except for the far NW corner of the Narrowed AOI), and avoids areas central to DoD activities. The final 16-square-mile site will be located within the Narrowed AOI – and will be determined by the time the State files the application with BOEM.

² GEO made minor modifications to the DMR-outlined Narrowed AOI in order to accommodate the lease shape within the area and to abide by standing leasing practices by BOEM, which delineate areas by Outer Continental Shelf leasing blocks and aliquots as opposed to nautical mile blocks. Except for the maps in the DMR section, all Narrowed AOI maps in this document reflect that technical adjustment.

Figure 5. Narrowed Area of Interest.



Preferred Site of Research Array

Throughout this effort, GEO has worked to balance a multitude of factors when siting the research array, with particular consideration of long-standing industries such as fishing. The initial siting criteria took steps to avoid nearshore waters, which are critical for fishing and recreating. The AOI encompassed the location that was feasible from a technical, cost, and interconnection standpoint. GEO has prioritized avoiding and minimizing impacts to fisheries, wildlife, and existing users. As a result, the final siting of the research array submitted in the lease application to BOEM will be within the Narrowed AOI, where DMR analysis has shown that it minimizes, though does not eliminate, known impacts to fishing activity within the initial AOI.

After identifying the Narrowed AOI, GEO considered a number of factors to determine the preferred site within that area:

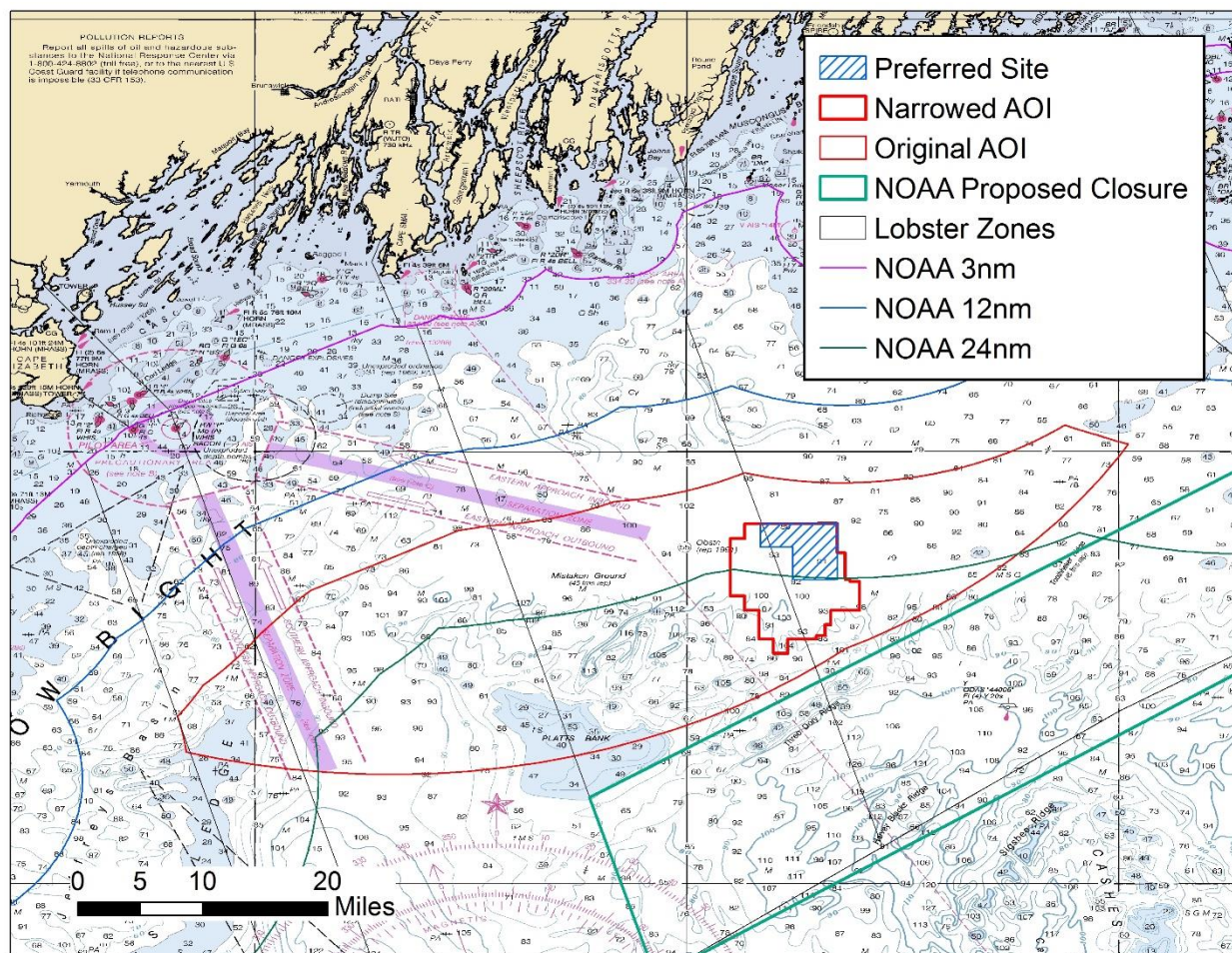
- **Fishing:** There is no known area within the AOI without any fishing activity. Within the Narrowed AOI, there is limited data of lobster activity; given the water depths and substrate, it is anticipated that lobster activity is very limited. There is some level of groundfish activity within the Narrowed AOI, although currently quite limited in comparison to other parts of the AOI and the Gulf of Maine (see DMR section above).

- **Wildlife:** Based on the modeling outlined above, the Narrowed AOI encompasses areas with the least potential impact with wildlife. Within the Narrowed AOI, areas without outcroppings or upwellings would be preferred from a wildlife perspective.
- **Cost:** From a cost and technical perspective, siting the research array within the AOI, including the Narrowed AOI is possible. Regardless of its location within the Narrowed AOI, this project will be farther offshore than any of its kind, and farther offshore than any offshore project in Europe connected to the mainland and under 300 MW. Projects further offshore cost more due to the cost of the transmission cable, energy losses in longer cable, and cost of transporting technicians to/from the wind farm and a shorter time working on site.
- **Bathymetry:** Initial siting criteria for the project included preference for sand/gravel. Bathymetric data is available on some, but not the southern portion of the Narrowed AOI. Utilizing available data and/or scientific expertise where data is not available, the Narrowed AOI is thought to be mud/gravel bottom, with a few known outcroppings.
- **Navigation:** The Narrowed AOI is outside of the Port of Portland TSS lanes and abides by the USCG guidance regarding offshore wind projects (except for the far NW corner of the Narrowed AOI). The vessel traffic within the Narrowed AOI varies, but is relatively low in comparison to other areas in the Gulf of Maine and through markers, lighting, and other mitigation measures, navigational risk can be minimized.
- **Defense:** The Narrowed AOI and preferred site avoids DoD exclusion areas and the western portion of the AOI, which is more heavily used for DoD-related activities.
- **Research Accessibility:** Distance from shore may have a modest impact on the cost and types of research at the research array.

Based on the above factors, Fig. 6 below outlines GEO's preferred site for the project.

The GEO welcomes feedback on the preferred site and Narrowed AOI to ensure that it has fully captured known activities, information, or data regarding the preferred site and the Narrowed AOI that should be considered to inform the final site selection. After reviewing feedback received, GEO will make a final decision on a 16-square-mile site within the Narrowed AOI for the purposes of its application for a federal research lease from BOEM. Further analysis will take place during the BOEM review and future project design and planning.

Figure 6. GEO Narrowed Area of Interest and preferred site for the research array.



Preferred Lease Layout

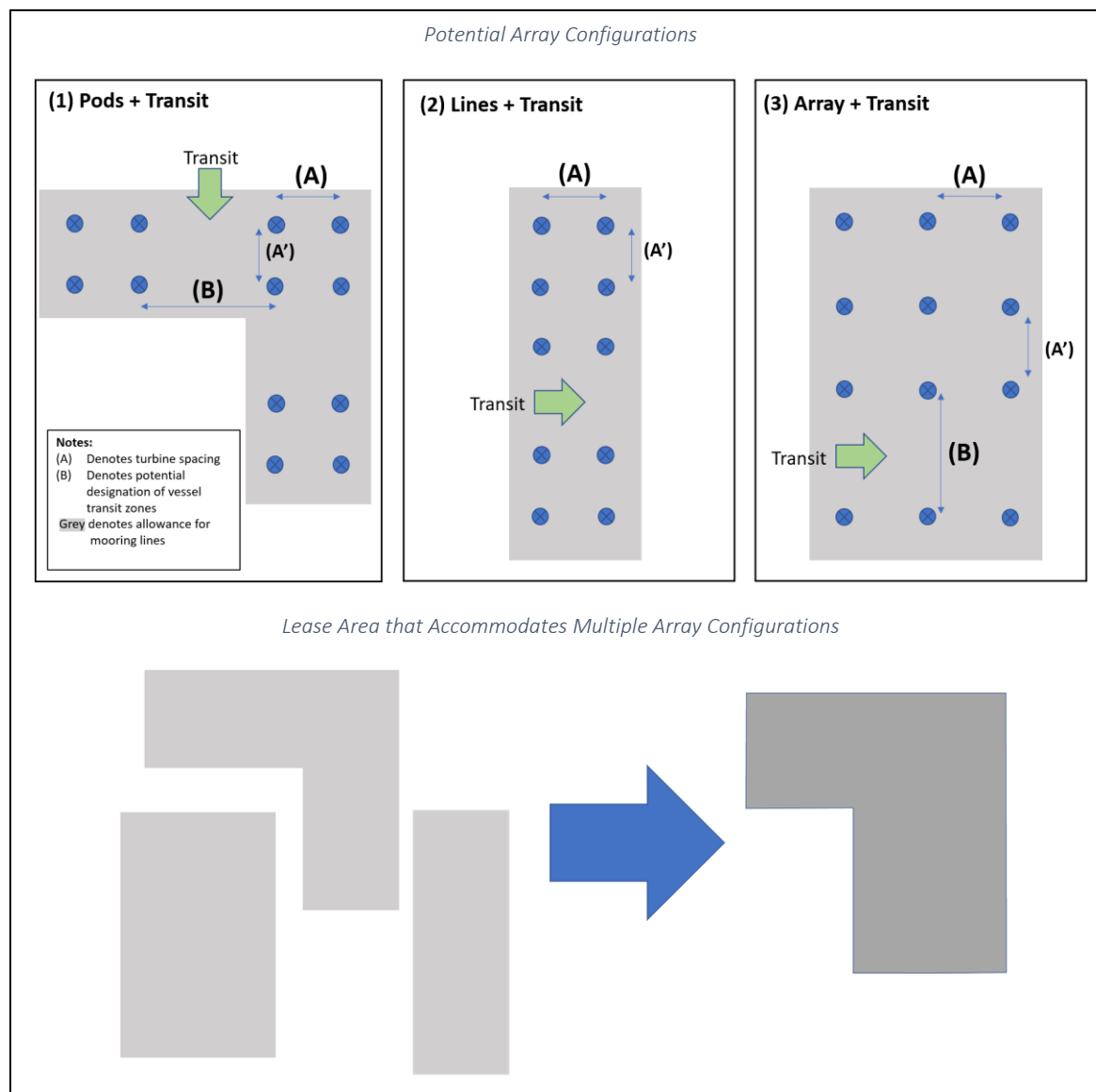
GEO will request a lease for approximately 16-square-miles that allows for flexibility for the final turbine location and layout. Those future decisions will be informed by stakeholder input and based on how to maximize research opportunities while minimizing impacts to resources, consideration of existing activities and uses in the area, and a better understanding of bathymetry after additional survey work is completed.

Below Fig. 7 is an outline of the final shape identified by GEO for the lease, which was informed by the stakeholder discussions, which will allow for flexibility in for future siting. It is important to note that the specific number and locations of the turbines within the site is not known at this time.

In 2021, Governor Mills signed LD 336, which allows for up to 144 megawatts of energy from the research array project. The project will have no more than 12 turbines. The offshore wind turbine market is changing rapidly, with turbines becoming larger in size and producing more megawatts per turbine. When originally launched, it was anticipated that the turbines for this project would be in the range of 10-14 MW. The technology has advanced in the time since initiating the project and it is now more realistic that turbine size will be in the 12-15 MW, which may contribute to reducing the number of turbines at the array.

Once there is additional survey work done to inform micro-siting and the turbine size is determined, GEO and the project developer will work with the public to inform a final confirmation and micro-siting of the array.

Figure 7. Preferred Lease Outline and Potential Array Configurations



Research Themes

The State solicited input on key research questions and areas of focus for the research array from fishermen, scientists, environmental organizations, and the public during the work sessions. Overall, there was strong interest in collecting baseline data and initial monitoring to consider pre-construction and key questions the research array should investigate to better understand potential interaction of floating turbines with wildlife and the marine environment. The research topics identified by stakeholders focused on surveying and assessing how activity patterns of fish and wildlife change around turbines; understanding potential unique stressors of

the turbines; and studying how offshore wind can be developed to optimize its co-existence with wildlife and current users of the marine environment.

In an effort to find common themes across a multitude of possible areas of research at the research array, the research framework will focus on three core themes of research - human dimensions, ecological interactions, and technology development. Ultimately, the much of the research will have crossover within the themes and create an opportunity for an interdisciplinary research strategy.

Human Dimension

Floating offshore wind energy will be an important component of the U.S.'s and State's efforts to reduce carbon dioxide emissions from fossil fuel energy production and the associated contributions to climate change. However, it must be developed in a manner that minimizes impacts to existing uses. Many in the maritime, fisheries, and coastal communities will interact with offshore wind either directly around the research array, or indirectly through support services. For some, offshore wind will provide economic opportunities, while for others the novel industry has the potential to affect how they use the ocean. The State is interested in engaging with individuals and studying how the project interacts with individuals, workers, and communities. Research at the research array will be instrumental in understanding where both human conflicts and opportunities exist, particularly with respect to the following four sub-topics: fisheries, vessel traffic and navigation, socioeconomic impacts on coastal communities, as well as supply chain and workforce development.

Representative Research Questions

- Fisheries:
 - o What portion of mooring lines will become buried over time and allow mobile or fixed gear to operate?
 - o Will vibration manifest in the water column and will there be any impact on the ecosystem?
 - o To what extent are landings impacted within and nearby the wind farm?
 - o How can gear entanglement be detected and removed quickly?
- Vessel traffic and navigation:
 - o Does vessel avoidance of the research array lead to congested areas?
 - o Which navigational radar systems are effective in the research array?
 - o Do offshore wind maintenance vessels cause conflicts with the operation of other commercial vessels?
- Socioeconomic:
 - o How does the research array directly and indirect impact employment and what types of jobs are impacted?
 - o Does the research array increase or decrease tourism?
 - o What impact does the research array have on fishing opportunities, shoreside infrastructure and coastal communities?
- Supply chain and workforce:
 - o Which existing industries can transition to the offshore wind supply chain, particularly for floating?
 - o What jobs skills are required and which training programs are needed?

Ecosystem and Environment

How the ecosystem, including fish and wildlife, respond to fixed bottom offshore wind turbines has been well studied in Europe at both the individual foundation/turbine level and within a configured array. Analyses of fixed bottom turbines have found that some species may collide

with turbines, while other species avoid the turbines altogether. Avoidance has the potential to cause a barrier to migration or cause individuals to be displaced from valuable habitat. Some species have been found to be attracted to the turbines. These effects can be seen both above and below water with fish, marine mammals, birds, and bats.

However, there has been far less data collected to date with respect to ecosystem interactions with floating offshore wind turbines. Research conducted at the research array will begin to fill in those gaps. Research during all project phases is needed in three core areas to understand the interactions of the ecosystem with floating offshore wind energy to inform future projects. We need to improve our understanding of 1) the occurrence of species around the array and how occurrence patterns change through time; 2) the potential stressors of floating offshore turbines, including allisions or entanglement; and 3) how to optimize the co-existence of ecosystems with floating offshore wind turbines and associated components in the Gulf of Maine.

Representative Ecosystem and Environment Questions:

- Occurrence research questions:
 - o Do large cetaceans avoid or swim through the research array?
 - o Are bats present at the array and how does use relate to weather and time of year?
 - o How do fish and wildlife distribution and abundance change?
- Optimizing co-existence with the ecosystem questions:
 - o Are there surface current changes that impact larval/plankton community due to these structures?
 - o Are marine birds attracted to the turbines because of increased foraging opportunities?
- Turbine and research array questions:
 - o How does the research array change the baseline noise levels and, if so, what are the potential effects to marine species?
 - o Are whales at risk of secondary entanglement with derelict fishing gear caught on the Research Array cables?
 - o Does EMF of dynamic or buried cables alter the behavior of benthic resources?

Technology Development

The research array provides a test bed for technology innovation and demonstration that will allow designs, deployment methods and procedures, as well as operations and maintenance methods and procedures to be proved out and refined at a pilot scale, resulting in lower costs, enhanced offshore safety, and more reliability for future larger scale projects.

The use of the word “technology” can be applied at all levels and applications. While one goal is the optimization of floating offshore wind technology, from moorings, to hulls, to control systems, there are also important objectives of improving safety, reliability, decreasing the costs of energy, and minimizing impacts to humans and the environment. With large structures in the open ocean, there is an opportunity use technology to support the environmental and ecological monitoring as well as study climate, weather, and metocean conditions. Monitoring human and ecological activities proximate to the research array can help optimize co-existence, navigation, new vessel design, and inform future supply chain and workforce development opportunities. Technology solutions might also develop to improve access to fishing in these cabled arrays.

Representative Technology questions

- Technology questions:
 - o How can moorings be designed and evaluated to minimize impacts to fishing activities and the ecosystem?

- How do advanced control systems improve efficiencies and lower costs?
- How can the foundation design be improved in terms of efficiencies and reduced deployment time in advance of full-scale projects?
- How can ports be configured to allow local fabrication and launch of offshore wind foundations?
- Monitoring methods questions:
 - What remote sensing technologies will be effective at monitoring below water interactions between floating offshore platforms and mooring systems and fish and marine mammals?
 - What are effective methods to collect data on fisheries in the research array?
 - How can monitoring results be communicated to fishing fleets in a useful manner – whether real time or periodic?

Research Consortium

A key component of the research array is developing and executing a research strategy to answer the most critical questions about interactions with floating offshore wind in the Gulf of Maine. In 2021, the Governor introduced, LD 1619, which was passed with bipartisan support and establishes a consortium to manage the research for the array, including the development of a full research strategy and management of research priorities and projects for the Research Array. The research consortium will be designed to take an integrated approach to research in an open, transparent, and inclusive manner that is informed by the work of regional and national scientific entities. The consortium will work to fulfill the objectives of the research array with input from a variety of Maine interests, state and federal agencies, and external scientific experts. LD 1619 identifies several seats on the consortium board for fishing industry representatives.

Collectively, research at the array will substantially move forward groundbreaking research in floating offshore wind by identifying opportunities and challenges to the human environment, developing methods to avoid and minimize impacts to the ecosystem, and lowering the cost of floating offshore wind energy.

Next Steps – Call for Additional Information & BOEM Review

GEO is accepting feedback on the preferred site by July 30, 2021 via this [form](#).

GEO specifically wants feedback on the preferred site and any additional information to inform a final decision on a 16-square-mile site within the Narrowed AOI.

After reviewing submitted feedback, GEO intends to finalize the lease site and submit a lease application to the federal government.

Once submitted, BOEM will begin its review process, which will include a National Environmental Policy Act review and comment period noticed in the Federal Register. The location of the research lease would be final at the time of lease issuance by BOEM.

The work in Maine will continue on the research array, including relevant discussions in Roadmap working groups that are under development and in the to-be-created research consortium.

For additional information, please contact offshorewind@maine.gov.