Maine Offshore Wind Initiative

# Maine Offshore Wind Roadmap

March 1, 2022

## Table of Contents


**Summary of Draft Initial Recommendations from Working Groups**

**Energy Markets and Strategies Working Group**

**Supply Chain, Workforce, Ports and Marine Transportation Working Group**

**Fisheries Working Group**

**Environment and Wildlife Working Group**


## DRAFT Initial Recommendations from Working Group Discussions

The draft initial recommendations presented below reflect ongoing conversations and analysis occurring in the four Working Groups of the Maine Offshore Wind (OSW) Roadmap. The Working Groups will continue to refine the content of these initial recommendations in response to ongoing technical analyses, draft initial feedback from the Advisory Committee, and continued dialogue among working group members and stakeholders.

In their current form, the recommendations are intended to signal the general content and focus of the work to date; they are not intended to represent the final consensus of the groups, nor should they be interpreted as endorsed in whole or in part by any individual member or participant in the process.

# Maine Offshore Wind Roadmap

## Summary of Draft Initial Recommendations from Working Groups

March 1, 2022

## Energy Markets and Strategies Working Group

- *Recommendation 1:* Establish and initiate a floating offshore wind requirement and procurement process.
- *Recommendation 2*: Pursue policy and programmatic designs to achieve cost-effective offshore wind deployment.
- *Recommendation 3*: Continue to pursue regional collaboration in support of offshore wind industry development.

## Supply Chain, Workforce, Ports and Marine Transportation Working Group

### *Supply Chain*

- *Recommendation 1*: Formally establish and initiate a clear and consistent state policy for OSW, along with a sustained, sequenced effort to support it.
- *Recommendation 2*: Establish strong support and advocacy for all OSW opportunities, including supply chain companies, ports, workforce and research.
- *Recommendation 3*: Pursue national and international opportunities to prepare and promote Maine's supply chain and address current and future supply chain gaps.
- *Recommendation 4*: Provide support and pursue regional opportunities to ready Maine's OSW supply chain and address current and future supply chain gaps.
- *Recommendation 5*: Explore opportunities to support Maine businesses suited to build and/or retrofit smaller OSW vessels (e.g., Crew Transfer Vessels, tugs, Service Operations Vessels), as well as operate and service all types of OSW vessels.

### *Workforce Development*

- *Recommendation 1*: Strengthen OSW Career Exploration Opportunities for K-12 and CTE Students
- *Recommendation 2*: Increase OSW Opportunities in Maine's Postsecondary Education Institutions
- *Recommendation 3*: Enhance & Expand OSW Training & Registered Apprenticeship Opportunities
- *Recommendation 4*: Encourage High-Quality Jobs

- *Recommendation 5*: Promote Equity in Workforce Development
- *Recommendation 6*: Coordinate & Collaborate Regionally to Attract Skilled Workers

### *Ports*

- *Recommendation 1*: Move forward with port development plans with urgency.
- *Recommendation 2*: Discuss with neighboring states in the region with OSW goals.
- *Recommendation 3*: Discuss with OSW developers the infrastructure needs of all East Coast OSW projects to best inform the state as it moves forward with planning and design of OSW infrastructure.
- *Recommendation 4*: OSW port activity is significant and impacts to ocean users should be considered/studied in ports that could potentially exist to support OSW, starting in Searsport.
- *Recommendation 5*: Continue the ongoing work of evaluating multiple ports in Maine that could support OSW projects in the GOM and/or the Northeast.
- *Recommendation 6*: Pursue federal funding to develop OSW port infrastructure.
- *Recommendation 7*: Expose Maine's ports-related supply chain to various stages of offshore wind projects – first with fixed, and then transitioning that experience and relationship building into floating.

## Fisheries Working Group

- *Recommendation 1*: Work with BOEM and other federal agencies to strongly encourage or require OSW developers to develop and implement clear communications plans and notification procedures.
- *Recommendation 2*: Work with BOEM and other federal agencies to strongly encourage or require offshore wind developers follow procedures that encourage full engagement with the fishing industry from ME, NH and MA during survey operations.
- *Recommendation 3*: Advocate for geophysical and geotechnical data gathered by OSW developers to be made available in accessible and usable formats to the public on a regular and timely basis.
- *Recommendation 4*: Work with BOEM and other New England states to pursue establishment of a series of monitoring requirements for offshore wind leaseholders - prior to construction, throughout construction and post-construction - including baseline biological, physical oceanography, and benthic habitat monitoring.
- *Recommendation 5*: Provide and actively seek out other funds to sustain necessary research and monitoring during the OSW development and implementation process.
- *Recommendation 6*: Engage with fishermen, scientists, and other stakeholders with expertise in fisheries, wildlife, and the environment to compile and map the areas of known concentration of priority species and habitat and fishing activity in order to appropriately cite wind energy

lease areas in the Gulf of Maine.

- *Recommendation 7*: Request that the U.S. Coast Guard conduct a port access study to determine necessary formal and informal transit to fishing grounds and how such potential wind energy areas may adversely affect transit; work with BOEM to address as appropriate in wind energy area or lease issuance.
- *Recommendation 8*: Request a port impact assessment by the appropriate state or federal agency(ies) to determine if the vessels fishing in proposed OSW areas would be concentrated in certain ports and any implications for the port's local economy and shoreside businesses.
- *Recommendation 9*: Advocate for BOEM and the Gulf of Maine Interagency Task Force to prohibit the construction of offshore wind turbines within (XX) nautical miles or less from the Maine coast [to be defined] to avoid and minimize OSW development and fisheries conflict.
- *Recommendation 10*: Encourage and assist BOEM in providing active and direct engagement with Maine's fishing industry in the development of wind energy areas through workshops, meetings, dockside conversations, and other engagement, in a robust and meaningful way.
- *Recommendation 11*: Assess existing State statutory and regulatory authorities related to the permitting for OSW turbines and transmission cables through an equity lens related to fisheries impacts and take action to implement corrective actions identified in the assessment as appropriate.

## Environment and Wildlife Working Group

- *Recommendation 1:* Map existing data to identify where areas of greatest conflict between OSW energy development and wildlife may currently exist in the Gulf of Maine federal waters and identify data gaps that need to be filled to inform offshore wind leasing.
- *Recommendation 2:* Initiate and lead an effort to conduct benthic habitat surveys in areas of the Gulf of Maine with no or poor bathymetry data or benthic habitat information.
- *Recommendation 3:* Initiate and seek federal funding for a coordinated below and above water ecological baseline monitoring study in identified areas of the Gulf of Maine.
- *Recommendation 4:* Conduct tracking studies on ESA-listed birds in the Gulf of Maine, as well as marine and non-marine birds, marine mammals, and fish species especially vulnerable to impacts from OSW energy development.
- *Recommendation 5:* Investigate the potential benefits of and process by which the State of Maine may use its federal consistency review authority under the federal Coastal Zone Management Act to address issues of concern regarding OSW energy development in federal waters, including potential changes to state laws and rules.

# Energy Markets and Strategies Working Group

**Draft Initial Recommendations – February 24, 2022**

## Purpose of this draft

This document sets forth the initial draft recommendations of the Maine Offshore Wind Roadmap Energy Markets and Strategies Working Group (EWG). These initial draft recommendations reflect feedback from the Maine Offshore Wind Roadmap Advisory Committee and will benefit from further input from a range of stakeholders.

## Context and rationale

These initial draft recommendations reflect the Working Group's discussions around offshore wind and its role in delivering carbon reduction and achieving renewable energy goals for Maine in a cost-effective manner, in the context of a broader regional transition away from fossil fuels.

- Under Maine law, enacted with bipartisan support, 80% of electricity used in the state must be from renewable sources by 2030, with a goal of 100% by 2050.[1] Other New England states have established similar requirements.[2]
- Maine has also enacted, with bipartisan support, greenhouse gas emission reduction requirements of 45% below 1990 levels by 2030 and 80% by 2050.[3] *Maine Won't Wait*, the four-year climate action plan released by the Maine Climate Council in December 2020, states "sectors with high greenhouse gas emissions, such as transportation and heating, must shift their energy sources from fossil fuels to electricity and low-carbon fuels to achieve Maine's climate goals."[4] This strategy, often referred to as "beneficial" or "strategic electrification," in addition to enabling decarbonization, can lower overall consumer energy expenditures.[5] Modeling conducted for the Maine Climate Council suggests electricity demand in Maine will approximately double by 2050 as a result of beneficial electrification needed to meet Maine's 2030 greenhouse gas reduction targets.[6]
- The Working Group reviewed initial technical analysis that anticipates deployment of offshore wind in the Gulf of Maine under almost any scenario of New England's shift to renewable energy in the coming years. These recommendations can be further refined as additional analysis related to energy needs is completed.

[1] 35-A MRSA §3210.
[2] https://www.iso-ne.com/static-assets/documents/2021/03/2021_reo.pdf
[3] 38 MRSA §576
[4] https://www.maine.gov/climateplan/sites/maine.gov.climateplan/files/inline-files/MaineWontWait_December2020_printable_12.1.20.pdf
[5] See e.g. https://www.raponline.org/be/
[6] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/GEO_State%20of%20Maine%20Renewable%20Energy%20Goals%20Market%20Assessment_Final_March%202021_1.pdf#page=26

- Offshore wind not only can provide clean power to New England but can also be a major economic driver for Maine creating good-paying jobs around the state. Maine has the 7th highest offshore wind energy potential in the United States.[7]
- Offshore wind has significantly higher production during winter months, while the region's natural gas supplies face growing competition for electricity production and heating in these months, often leading to unsustainable price volatility.[8][9] This makes offshore wind uniquely positioned to help achieve Maine's climate goals.
  Offshore wind costs have fallen dramatically over the last decade, and with increasing global deployment of both fixed and floating foundations, costs are forecast to continue to drop considerably over the next decade. Multiple offshore wind cost forecasts, including those of the U.S. National Renewable Energy Laboratory, predict the Levelized Cost of Electricity[10] from floating offshore wind in the Gulf of Maine will drop significantly by the end of the decade.[11,12]

In this context, the initial recommendations seek to achieve a balanced approach of sending clear signals about Maine's intent around offshore wind (recommendation #1), while taking steps to help achieve cost-effective offshore wind deployment (recommendation #2) and recognizing the importance of regional coordination to advance Maine's interests (recommendation #3). The Working Group remains engaged in other topics, including discussing additional recommendations around transmission and permitting.

## Recommendation #1: Establish and initiate a floating offshore wind requirement and procurement process.

### Overview of recommendation

In order to meet its renewable energy and job creation targets Maine should establish both

(i) a binding floating offshore wind capacity (MW) or production (MWh) target and
(ii) a procurement process to achieve that target.

The capacity or production target should be equal to a meaningful percentage of Maine's forecasted electricity needs by 2050. The procurement process should solicit phased-in incremental installed and

[7] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Task%201%20-%20State%20of%20the%20OSW%20Industry_Final.pdf
[8] See e.g. https://www.iso-ne.com/static-assets/documents/2018/12/2018_iso-ne_offshore_wind_assessment_mass_cec_production_estimates_12_17_2018_public.pdf
[9] https://www.eia.gov/todayinenergy/detail.php?id=51158
[10] Levelized Cost of Energy, or LCOE, refers to the estimates of the revenue required to build and operate a generator over a specified cost recovery period, according to the EIA. It is useful for comparing the expected costs of different generation but does not account for related infrastructure and externalities such as transmission lines, carbon costs or environmental harm, additional pipeline capacity for gas power or costs of backup or standby generation. In the case of fossil fuel technologies LCOE is heavily influenced by expectations about future fuel prices.
[11] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Task%201%20-%20State%20of%20the%20OSW%20Industry_Final.pdf
[12] See also e.g. https://www.bloomberg.com/news/articles/2021-06-23/building-new-renewables-cheaper-than-running-fossil-fuel-plants

operating capacity between 2030 and 2050 to take advantage of falling costs and increased electricity demand. The first procurement tranche should open no later than 2026, or within one year of any federal water offshore lease grants. The procurement should be conducted by the Maine Public Utilities Commission, preferably in coordination with other states, and conducted on a competitive basis with sufficient specificity and prescription to attract highly qualified bidders that can deliver offshore wind at the lowest possible cost.

### Rationale/Key Assumptions

- Gulf of Maine floating offshore wind is necessary for New England states to meet their legislated climate change and clean energy targets, including increased electricity demand associated with transport and heating electrification.
- Maine's electricity demand will approximately double by 2050, requiring substantial new renewable energy resources, of which offshore wind is likely an important component, particularly as costs decline over the long term.
- Given the Gulf of Maine water depths and seabed topography, floating offshore wind is anticipated to be required for future offshore wind projects in federal waters in the Gulf of Maine.
- A bold policy commitment to secure a significant volume of floating offshore wind backed by long-term power sales contracts and financing is necessary to attract offshore wind development and low-cost long-term investors, and to create an environment for supply and service chain investment (e.g., manufacturing, ships, port facilities, service bases) in Maine.
- A predictable and stable policy and regulatory environment is key to attracting necessary investments, given the extended time periods for (i) Federal Bureau of Ocean Energy Management seabed leasing; (ii) necessary port, transmission, other infrastructure and supply chain investments and related permitting and siting; and (iii) site evaluation (seabed conditions, wind, aquatic and fishery impact), permitting, and stakeholder consultation.
- Maine's floating offshore wind procurement should be phased over time to take advantage of the declining costs and lower the average cost to Maine's consumers and businesses.

### Additional considerations/continuing efforts

- The EWG has engaged technical experts to investigate two areas that will continue to inform refinements to this recommendation. These include:
    - Scenario modeling on the role of floating offshore wind in the Gulf of Maine to serve both Maine and New England energy needs through 2050.
    - Identifying best practices for procurement or other development strategies. This review, which includes strategies and tactics from other states and European offshore leaders and interviews with key actors identified in collaboration with the working group, will inform the EWG's refinement of supporting actions to enable this and other recommendations.
- The EWG has discussed various mechanisms to minimize potential cost exposure to ratepayers. Those ideas are included in Recommendation #2.

## Recommendation #2: Pursue policy and programmatic designs to achieve cost-effective offshore wind deployment.

### Overview of recommendation

Globally, the LCOE of floating offshore wind has decreased substantially over the past decade due to improvements in technology, increasing efficiency, and knowledge gained from pilot projects in Europe.[13] Global floating technology costs are declining, at a similar scale to other technologies, based on investments in research and development from the public sector and commercially scaling the technology.

Maine should pursue policy and design programs to achieve cost-effective offshore wind deployment in the Gulf of Maine in the context of achieving renewable energy and emission reductions targets locally and throughout New England. Collaboration with the Department of Energy and other national or international interests, opportunities for leveraging public investment in research, and strategically phased procurement schedules can aid in lowering costs. At a local and regional level, cost declines can arise from establishing the local infrastructure, supply chain, and workforce to support the deployment of floating offshore wind at a commercial scale.

The benefits of supporting the development of the industry are likely to be substantial; however, a proactive strategy to reduce the cost of procurements would be beneficial, particularly around the initial procurement phase. Today Maine electric customers face several trends that are driving up electric and energy bills, highlighting the importance of being attentive to costs and who bears them. To be sure, many of the drivers for cost reductions will come from outside Maine, particularly as other markets move aggressively to deploy floating offshore wind at scale. However, specific actions under consideration for Maine are:

- Consider all funding and cost containment mechanisms to support aspects of the industry build out, including transmission infrastructure. The mechanisms can include:
    - Actively pursue – and encourage industry to pursue – federal funding, tax credits, and other mechanisms.
    - Investment Tax Credits, Production Tax Credits and federal loan guarantees are potentially powerful mechanisms. Maine should encourage its federal delegation to develop and support federal funding, tax and loan guarantee opportunities that are specifically geared toward innovative floating technology, given that the technology is at an earlier phase of development than fixed bottom systems, and floating technology will be critical to meeting the country's offshore wind goals.
    - Consider reducing costs, such as financing and insurance, through state mechanisms such as bonds. There is a strong argument that this support will spur economic activity and provide numerous benefits to future generations.
    - Consider and pursue opportunities to lower offshore wind deployment costs through targeted investments in workforce development, ports and infrastructure, and other

[13] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Task%201%20-%20State%20of%20the%20OSW%20Industry_Final.pdf

aspects of the offshore wind supply chain that will create economic benefits in both the short- and long-term.
    - Facilitate direct contract offtake by private, institutional or governmental entities. Examine ways to streamline these opportunities.
    - Consider coordinating purchases with other states, by vesting authority with PUC to allow for Power Purchase Agreement contingency approval (i.e. OSW PPA is approved if Maine contracts for half, and 'X' state/entity contracts for the other half).
    - There are tried and true ways that the PUC currently employs to conduct a procurement to ensure competitiveness and bring more companies and technologies to the table. For instance, it must not dictate specific technologies.
    - Explore additional revenue streams to lower project costs (e.g. hydrogen development).
- Work regionally and internationally to help achieve economies of scale as quickly as possible.
- Continue to support the state-led Research Array to advance the nation's first floating offshore wind research site, establishing Maine as a leader. The Research Array will provide critical data on how floating offshore wind interacts with the Gulf of Maine's marine environment (e.g., fishing industry, shipping, and navigation routes) while advancing Maine's offshore wind economy and informing responsible growth in the United States and beyond.
- Create a Center of Excellence in Maine on floating wind that can be a conduit for research dollars and source of cost-saving innovations. Establishing Maine as a hub for testing and refining new technologies may be beneficial, with further consideration of specific target technologies and other considerations needed.
- Cultivate new and expanded public-private partnerships to accelerate research and development in support of the offshore wind industry. Partnerships could include private funding matched by public dollars and/or sharing of environmental or production data. Maine has initiated a number of partnerships to support offshore wind, including a recent Memorandum of Understanding with the United Kingdom, membership in the National Offshore Wind Research & Development Consortium, Business Network of Offshore Wind Supply Chain Portal, the Regional Wildlife Science Entity, and more.

### Rationale/Key Assumptions

Costs are expected to fall for deploying floating offshore wind, and this Roadmap will take steps to accelerate this decline. This is particularly important given that Maine and New England are experiencing unusually high electricity prices primarily due to fossil fuel price volatility. Achieving beneficial electrification necessary to meet decarbonization objectives requires a careful balance between managing electricity costs while transitioning electricity generation to renewable resources.

Fixed seabed foundation offshore wind went through a similar cost reduction cycle in Europe, with costs per kWh falling 75% over 10 years. Floating offshore wind is anticipated to also continue experiencing rapid cost declines, and other countries are making commitments to deploy at scale.[14] Targeted strategic investments in ports, fabrication technologies, grid infrastructure, and workforce training will accelerate

[14] E.g. 15 GW of floating offshore wind commitments from ScotWind: https://www.crownestatescotland.com/news/scotwind-offshore-wind-leasing-delivers-major-boost-to-scotlands-net-zero-aspirations

the cost reduction and allow Maine to benefit economically from meeting its own energy needs as well as exporting technology and experience.

## Recommendation #3: Continue to accelerate regional collaboration in support of offshore wind industry development.

### Overview of recommendation

In addition to Maine's goals summarized above, the other five New England states all have statutory requirements for clean energy resources, with most requiring similarly significant portions as Maine. All six New England states are participants in the common wholesale energy markets administered by ISO-New England and are thus closely linked from an energy perspective. Recent studies completed on behalf of other states in New England demonstrate the likelihood of significant offshore wind deployment to achieve energy policy and decarbonization objectives, including both fixed foundation resources in southern New England as well as floating resources including the Gulf of Maine.[15] The continued acceleration of renewable energy generation deployment and pursuit of beneficial electrification in Maine and neighboring states will have significant impacts on both the regional transmission and local distribution networks as well as the existing and future generation fleets. The state is therefore best positioned to achieve its own objectives, as well as facilitate and potentially benefit from achievement of other New England states' complementary objectives, by actively pursuing and engaging in regional collaborative efforts in this area.

Maine's efforts in pursuit of regional collaboration should include building upon existing efforts through the New England States' Committee on Electricity (NESCOE) to advance reforms to coordinate regional electricity markets and state laws, as well as transmission analysis and development in furtherance of state policy objectives. Maine should pursue other venues as well, considering new opportunities where appropriate, such as coordinating procurement or transmission to reduce costs.

- Regional coordination is an essential component of offshore wind development in the Gulf of Maine. As such, Maine should work to actively advance specific strategies to achieve regional collaboration around renewable energy.
- Explore specific opportunities to work collaboratively with other states on topics related to offshore wind deployment, including opportunities to maximize regional economic benefits from OSW, joint procurement, and joint analysis. These conversations might lead to a memorandum of understanding or another output. One example of such an MOU is between Maryland, Virginia, and North Carolina.[16] GEO can take the first step by coordinating with other relevant agencies to identify opportunities.
- Existing transmission studies require additional attention to Gulf of Maine issues.
    - The Department of Energy Wind Energy Technologies Office is funding an East Coast feasibility study, led by the National Renewable Energy Laboratory, in which the

[15] See e.g. https://www.mass.gov/doc/energy-pathways-for-deep-decarbonization-report/download, https://portal.ct.gov/-/media/DEEP/energy/IRP/2020-IRP/2020-Connecticut-Integrated-Resources-Plan-10-7-2021.pdf, https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/offshore-wind-deployment-report.pdf

[16] https://files.nc.gov/governor/documents/files/SMART-POWER-MOU_FINAL.pdf

Governor's Energy Office is participating as a technical review committee member.[17] ISO New England is working with states to develop and complete a 2050 transmission study.[18] Maine should help to ensure planning for the Gulf of Maine is fully incorporated into those studies and others as appropriate.

  - Onshore grid updates will likely be required to provide grid reliability for the injection of significant new renewable energy, including offshore wind in the Gulf of Maine as well as southern New England. There are ongoing studies at ISO-New England to examine grid upgrades necessary to support the integration of wind as well as other onshore resources through 2050. Maine should actively seek to participate in these studies and planning processes.

- The Maine PUC should be given explicit authority and direction to work with other states conducting offshore wind solicitations to increase opportunities for collaboration through coordinated purchases that span more than one state.
- Maine should prioritize workforce and infrastructure development with eye toward regional collaboration with southern New England partners.

### Rationale/Key Assumptions

- Maine should seek to build on existing and past efforts, including utilizing and strengthening existing venues such as NESCOE, the New England Conference of Public Utility Commissioners (NECPUC), and ISO New England.
- Interest in the Gulf of Maine spans multiple states. Effective collaboration between states, and between relevant state agencies or actors as appropriate, can support cost-effective deployment that accounts for the interests of multiple states, lowers development risks, and increases overall benefits across the region.
- Maine should seek to keep pace with other states, leading in strategic areas and collaborating where possible without falling behind or taking unnecessary risks.
- Although more study is needed, much is already known about where the potential renewable energy resources are and where the demand for electricity is. At this point, Maine should focus its regional collaboration on supply chain issues, procurement, and transmission options.

### Additional considerations/continuing efforts

- The research described under continuing efforts associated with Recommendation #1 above is also expected to inform additional potential actions the EWG may consider in support of this recommendation.

[17] https://www.nrel.gov/wind/atlantic-offshore-wind-transmission-study.html

[18] https://www.iso-ne.com/system-planning/transmission-planning/longer-term-transmission-studies/

## Emerging areas for additional future recommendations

### Developing and prioritizing a clear and efficient process and rules for siting, permitting, and mitigating potential adverse impacts

- EWG members have and will continue to discuss whether existing processes for engaging the public and key stakeholders in various permitting, siting, and related decision-making are adequate.
- EWG members have also discussed the importance of transparent, stable, and robust permitting requirements, and the processes for establishing such requirements, for fostering both meaningful stakeholder engagement and a favorable environment for investment. Members of other working groups have surfaced similar concepts.
- Discussion on these topics have included, but are not limited to, the importance of clear requirements and setting achievable expectations for developers, signaling stable conditions for investment, and the importance of building and sustaining public support and mitigating areas of potential conflict.
- Ongoing research into best practices deployed in other jurisdictions, as well as continued discussion within the EWG, are expected to support refinement of these discussions into one or more recommendations.

### Developing an offshore wind transmission development strategy that prioritizes cost-effectiveness and market deliverability as well as minimizes impacts

- EWG members have discussed how transmission strategies have cross-cutting implications for many of the other recommendations. The technical consultants are preparing transmission analyses that will inform the EWG's consideration of this topic, including reviews of best practices from other jurisdictions and high-level analyses of potential topologies for the Gulf of Maine. This research, as well as continued discussion within the EWG, are expected to support refinement of these discussions into one or more recommendations.
- One aspect to consider closely is how to avoid partially utilizing existing landing points in ways that undermine their full potential. Considerations should be taken for coordinated offshore transmission to take advantage of all available interconnection capacity. A clear understanding of the full capabilities of landing points should be analyzed before putting out an RFP.

## Supply Chain, Workforce, Ports and Marine Transportation Working Group

### Supply Chain

**Draft Initial Recommendations – February 2022**

*All 5 initial recommendations are supported by consultants' preliminary findings.*

***Draft Vision Statement for Offshore Wind Supply Chain***

Maine is a state strongly rooted in natural resource heritage industries and powered by an entrepreneurial spirit. Maine is home to innovative companies who have built upon maritime heritage – of the centuries of working with the wind, the waves, and the tides – to successfully participate in the burgeoning offshore wind sector for the last two decades. Continued innovative growth of a Maine offshore wind supply chain requires there to be a visible, viable business opportunity, both for existing Maine companies and for those we wish to attract. Continued success also requires leadership, support, and advocacy from the State. The recommendations in this document support the continued development of Maine's offshore wind supply chain for fixed and floating technologies and are key to achieving the goals of Maine's Economic Development Strategy, Economic Recovery Plan, Climate Action Plan, and Clean Energy Economy Report.

#### *Recommendation #1: Formally establish and initiate a clear and consistent state policy for offshore wind (OSW), along with a sustained, sequenced effort to support it.*

*Actions*

- Establish clear state policy supportive of offshore wind and informed by a broad spectrum of Maine stakeholders;
- Announce an offshore wind goal or mandate[19] with multiple procurement solicitations and realistic local content and best practice requirements; and
- Develop a timewise ports development plan with a dedicated investment strategy.

*Rationale*

- OSW will likely happen in the Gulf of Maine regardless of Maine's actions; a procurement goal or mandate is likely the only way to ensure economic benefits from the development come to Maine.
    - State-level offshore wind procurement policies are driving U.S. offshore wind developments and related investments.
    - Each state is competing to maximize benefits to their state, there is limited coordination among states at present.
    - Developments in the Gulf of Maine that make landfall in Maine will maximize

[19] With additional work necessary to refine an OSW goal or mandate.

benefits to Maine.
    - Maine should engage stakeholders early and often to maximize opportunities for Maine stakeholders with relevant knowledge and expertise, as well as enhance co-existence of OSW with existing ocean users and the environment.
    - The offshore wind industry doesn't know what Maine wants. Given the degree of investment risk present in this developing industry, investment attraction in Maine is unlikely to occur without a clearly expressed commitment of interest and long term certainty for developers.
    - Transmission constraints, workforce constraints, supply chain constraints may incentivize developments to land in southern New England.

### *Recommendation 2: Establish strong support and advocacy for all offshore wind opportunities, including supply chain companies, ports, workforce, and research.*

*Actions*

- Establish a commissioner-level industry advocate who can help support Maine businesses for offshore wind and speak on behalf of the State in conversations with offshore wind developers, and actively promote Maine as a prospective destination for offshore wind development and related investments.
- Assess whether a person or separate Maine Offshore Wind Business Development Authority outside of state government is needed to support Maine businesses and to facilitate and advance industrial relationships.
- Provide resources and incentives to Maine businesses in offshore wind or interested in pivoting to offshore wind.
- Establish and provide long-term (at least 10 years) support for a central state-driven OSW information hub website that provides clear, accessible, and high-quality business information that a developer may need to evaluate Maine as a potential landing site (whether for offices, ports or OSW developments). The hub should include, at a minimum:
    - Supportive policies
    - Ports, port investments, and related information
    - OSW resource assessments, environmental resource studies, etc.
    - Regulatory information
    - Constraints (transmission, etc.)
    - Supply chain, related sector support, and workforce training & education opportunities
    - Supportive business environment and incentives
- Conduct interviews with major developers to understand the industry perspective on Maine. For example, what limitations do developers see, what constraints are they concerned about, what sort of public-private partnerships facilitate sustainable investments, etc.?
- Conduct interviews with key developers, ports owners/operators, and key contractors

in the region to identify existing or future constraints in the region and how Maine can be a viable resource for services and ports space to support OSW projects south of Maine. Based on this information in a plan, Maine should have a trade delegation heading south and clearly advertising.

- Promote Maine and Maine companies in national and international industry
    - In coordination with Maine industry, help Maine companies foster relationships with developers, ports investors, and higher Tier supply chain companies to learn more about opportunities and develop partnerships that can be leveraged in near-term and long-term OSW projects.
    - Identify speaking/promotional opportunities for Maine industry leaders to further develop/build relationships in OSW.

*Rationale*

- Maine will support industry participation related to both fixed and floating OSW, whether in the Gulf of Maine or in developments further south. The current U.S. pipeline of OSW projects comprises ~40GW with 12 projects being installed concurrently in 2025 and 2026. A 2021 supply chain contracting forecast predicts $109B in private investment in the U.S. offshore wind by 2030 – suggesting ample supply chain opportunity in the U.S. offshore wind sector[20]
    - Involvement in fixed-foundation developments south of Maine will provide an opportunity for Maine entities to access real opportunities today while strengthening our supply chain for future floating offshore wind developments. Additionally, participation in fixed-foundation developments provides an opportunity to start building relationships between Maine entities and European developers and suppliers.
    - Involvement in pilot/pre-commercial floating OSW projects in the Gulf of Maine will provide Maine ports, companies, and workforce the opportunity to strengthen these assets for future floating offshore wind projects. Global deployment projections for floating include 10.7 GW by 2030 and 70 GW by 2040.[21] In federal waters of the United States, much of the high-quality offshore wind resource, including in the Gulf of Maine, aligns with deeper waters that currently require floating technologies.[22] Anticipated upcoming BOEM offshore wind lease areas off Northern and Central California (late 2022), Oregon (late 2023), and the Gulf of Maine (mid-late 2024) will likely be developed with floating technologies.[23]
    - Workforce readying and industry readying should start right away

[20] "Supply Chain Contracting Forecast for U.S. Offshore Wind Power: 2021", Special Initiative for Offshore Wind,2021, https://sites.udel.edu/ceoe-siow/

[21] "Floating Offshore Wind Joint Industry Project Phase II Summary Report", Carbon Trust, 2020, https://prod-drupal-files.storage.googleapis.com/documents/resource/public/FWJIP_Phase_2_Summary_Report_0.pdf

[22] "Offshore Wind Market Report: 2021", NREL, 2021, https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition_Final.pdf

[23] "Secretary Haaland outlines ambitious offshore wind leasing strategy", BOEM, 10/13/21, https://www.doi.gov/pressreleases/secretary-haaland-outlines-ambitious-offshore-wind-leasing-strategy

- Port development has a longer time horizon, but should also start right away

- Maine has significant assets and advantages to unlock the potential of the offshore wind sector for Maine:
  - Significant expertise in engineering and design, permitting, maritime operations, and marine composites already engaged in the offshore wind industry for over a decade;
  - Gateway for international trade;
  - Deepwater ports;
  - Maritime and fisheries industry heritage and expertise;
  - World-leading research and development, educational institutions - a major asset for investment attraction, workforce development, and exportable expertise and technology;
  - A strong manufacturing industry, including composites;
  - Enterprising and engaged citizenry;
  - World class offshore wind resource; and
  - Proximity to East Coast population centers and high demand markets.

- Barriers to entry in the offshore wind industry may be mitigated for Maine entities with advanced planning:
  - Barriers include state-based local content requirements, industry-specific certifications, stringent health and safety requirements, high throughput requirements for suppliers, lengthy (5-10 year) contracting timelines, heavy reliance on long-term relationships between suppliers and developers, and varying levels of profitability compared to other industries such as defense and aerospace.[24]
  - Relationship building between European developers, suppliers, and ME entities is critical to overcoming the barriers
    - European companies are leading and will lead US offshore wind developments (BNOW).
    - The bulk of the initial OSW supply chain will be met by European suppliers.[25]

### *Recommendation #3: Pursue national and international opportunities to prepare and promote Maine's supply chain and address current and future supply chain gaps.*

*Actions*

- Identify external market opportunities for market-ready or in-market Maine products and expertise
  - Assist Maine companies and research institutions to identify external market

[24] "Foundation 2 Blade Training Manual, Business Network for Offshore Wind", 2021, at Page 246 to 259.

[25] "Report: Offshore wind supply chain worth $109B over 10 years," AP News, https://apnews.com/article/business new-jersey-atlantic-city-university-of-delaware-wind-power-19b67ff8bf285cf74e5fd19b39037c9b

opportunities in the national and international OSW supply chain.
    - Identify financial resources to support technical assistance and/or market access programs for Maine businesses wishing to pivot and/or access external market opportunities.

- Promote partnerships between Maine firms and international firms wishing to access US-based OSW projects:
    - Position Maine as a landing spot for international companies interested in entering the US OSW market.
    - Evaluate investment attraction assets as they might relate to OSW projects or supply chain partners, engaging municipalities early in this evaluation process, as appropriate:
        - Opportunity Zones (OZ);
        - Foreign Trade Zones (FTZ) as they might relate to import or distribution centers for Maine-based or regional projects;
        - In collaboration with Workforce and Port subgroups and in coordination with the Energy working group, create strategy to promote Maine's workforce and workforce training programs, current and future port developments, existing supply chain partners, and economic development incentives as investment attraction assets.
- Continue supporting and developing the Maine Offshore Wind Supply Chain Registry[26] to highlight and connect Maine companies to offshore wind opportunities.
- For all actions, regularly communicate with industry to ensure programmatic support is meeting the development needs of businesses in, entering, or wishing to enter, the OSW market.

### *Recommendation #4: Provide support and pursue regional opportunities to ready Maine's offshore wind supply chain and address current and future supply chain gaps.*

*Actions*

- Have a clear policy and state objective to bring to regional forums, such as:
    - BOEM Gulf of Maine Renewable Energy Intergovernmental Task Force
    - ISO-NE
- Pursue beneficial regional collaboration:
    - Assess feasibility and benefits of a regional MOU between New England states, including reciprocal content agreements, modeled after the SMART Power MOU between Maryland, North Carolina, and Virginia.
    - Pursue project-specific regional collaboration opportunities.
    - Organize training and education across New England States to foster additional

[26] The Maine Offshore Wind Supply Chain Registry is a component of the Business Network for Offshore Wind's Supply Chain Connect national registry.

regional collaboration.

- Consider supporting a regional or national content requirement to efficiently engage developers in U.S. OSW and enhance Maine's ability to participate in the sector.
- Provide state incentives to foster manufacturing and the supply chain for OSW, particularly for those areas of greatest opportunity for Maine.
- Build capacity to adapt Maine's existing land-based clean energy supply chain and support sector to manufacturing, planning, and design, installation and commissioning, operations and maintenance offshore.

*Rationale (applying to both Recommendations #3 and #4)*

- We have a mismatch between what Maine can offer for supply chain components and what industry needs; this may be true for NH and MA, too. There may be opportunities to collaborate. (Regional)
- The timing is uncertain: commercial leases with floating OSW will start on the west coast according to BOEM's announcement and this may affect the timing of our regional coordination and other supply chain opportunities. (Regional)
- Companies that can or want to engage in the future OSW industry may be able to take advantage of existing opportunities domestically and internationally. (Both)
- Not all Maine companies that could serve the offshore wind industry necessarily want to or are prepared to. (Both)
- By 2050, 60% of offshore wind installations will be in Asia, 22% in Europe, and 16% in North America. (IRENA) (Domestic/International)
- All current (and likely near-future) developers in the U.S. are European. (Domestic/International)

### ***Recommendation #5. Explore opportunities to support Maine businesses suited to build and/or retrofit smaller offshore wind vessels (e.g., Crew Transfer Vessels, tugs, Service Operations Vessels), as well as operate and service all types of offshore wind vessels.***

*Rationale*

- There is a shortage of vessels, vessel services, and vessel operations that will be required along the U.S. Atlantic coast for offshore wind projects in the pipeline (12 projects installed in 2025-2026 with an anticipated need of 25-40 vessels).

***Topics requiring additional discussion:***

- Offshore wind goal or mandate
- Further exploration of regional collaboration, including discussion around formal collaboration discussions between the three Gulf of Maine states led by the three Governors

***Ideas that the Energy Strategies and Markets Working Group is best positioned to develop:***

- Evaluate and address transmission constraints associated with landing large-scale offshore wind developments in Maine.
- Evaluate whether changes are needed to land use regulatory regimes at the state level to ensure cable landfall and OSW-related land-based developments are permitted (e.g., an allowed conditional use).
- Consider pre-permitting transmission cable routes to attract developers and help secure benefits of offshore wind development in the Gulf of Maine for Maine.

***Future supply chain topics for the WG to discuss (not exhaustive):***

- Further discussions and cross-referencing with XODUS' preliminary findings in the Maine OSW Supply Chain Opportunity Assessment (still in draft, not addressed yet). The preliminary findings may:
    - Support this Working Group's initial recommendations;
    - Refine this Working Group's initial recommendations (e.g., further details on regional collaboration); and/or
    - Indicate topical areas the Working Group's initial recommendations are generally missing at this stage, for example:
        - Investments
        - Innovations/Research & Development
        - Wind Energy Area leasing
- Collaborate with Fisheries Working Group to craft additional supply chain recommendations
- Consider a recommendation focused on engaging planning and economic development professionals in Maine to facilitate Maine's participation in the offshore wind sector
- Consider a supply chain recommendation around complementary activities with floating - e.g., green hydrogen and ammonia
- Further consider comments from the Advisory Committee on December 14, 2021:
    - Consider timing and starting some actions earlier to support supply chain development and a ports strategy; provide flexibility to explore various offshore wind opportunities

## Supply Chain, Workforce, Ports and Marine Transportation Working Group

### Workforce

**Draft Initial Recommendations for Discussion – January 2022**

*DRAFT Vision Statement for OSW Workforce:*
Maine people have a strong work ethic and an innovative spirit; qualities that will make our state a global leader in the Offshore Wind Industry. Developing the state's OSW workforce will foster economic opportunities for Maine people and advance the goals of Maine's Ten-Year Economic Development Strategy, Climate Action Plan, and the Strengthening Maine's Clean Energy Economy report. The recommendations in this roadmap will further inclusivity and opportunity, offer new career paths, and ensure high-quality, family-supporting jobs. With critical investments, Maine will develop and attract the talent needed to cement Maine's global leadership role in the OSW industry.

### *Recommendation 1: Strengthen OSW Career Exploration Opportunities for K-12 and CTE Students*

Action 1: Implement opportunities for K-12 career exploration (curricula and awareness) relating to the offshore wind industry; and Science, Technology, Engineering, and Math (STEM)

- Design professional development experiences for K-12/CTE educators to understand and teach OSW and related STEM content already existing in Maine's learning standards. Identify key education partners.
    - Create networks of educators (K-postsecondary) to support robust pathways into OSW careers.
- Develop and implement OSW career exploration opportunities that are available to students in formal and informal learning environments to ensure equitable access to STEM learning related to OSW. Career exploration should emphasize career mobility including career pathways and wages.
    - Engage education partners, communities, employers, organized labor, and industry partners.
    - Look to existing programs and best practices.
- Develop community programs for youth to picture themselves in a clean energy career with Artificial Intelligence (AI) and data science at the core of such a program. Such programs lead to opportunities to incorporate OSW-specific projects, especially in the USM robotic and Oceans Wide Training program.

Action 2: Position Maine's 27 Career and Technical Education (CTE) Centers to generate a talent pipeline by offering OSW career exploration, OSW-related course work and work-based learning opportunities.

- Recognize the importance of the CTE programs in preparing Maine's OSW workforce and:

- Promote the value of CTEs to schools, students, and parents by highlighting career pathways, outcomes, and anticipated wages.
- Strengthen and expand partnerships between post-secondary, industry, organized labor and CTEs.
- Remove policy and regulatory barriers to CTE participation.
- Formalize a pathway for CTE students to transition into Pre-Apprenticeship and Registered Apprenticeship programs.

Example: The Massachusetts Clean Energy Center's Vocational Internship Program (VIP) enhances the talent pipeline for Massachusetts clean energy companies and places skilled labor from vocational high schools in paid clean energy internships during the academic year.[27]

Action 3: Expand OSW internship, work-based learning, and Pre-Apprenticeship offerings to all secondary students, charting a pathway to Registered Apprenticeship[28] programs in the trades

Maine Example: The University of Maine Composite center has successfully engaged high school interns in their wind energy-related research & development efforts. As other internship, Pre-Apprenticeship, and Registered Apprenticeship opportunities increase, ensure OSW employers and organized labor are included.

Other State Example: New Mexico collaborative with Los Alamos National Laboratory – A new partnership between the Laboratory, high schools in the region, and the NM Building and Construction Trades Council (NMBCTC) is creating a talent pipeline to fill in-demand positions at the Laboratory and in the wider community. The program prepares high school students for craft trades using a nationally-recognized Multi Core Craft Curriculum (MC3) developed by North America's Building Trades Unions (NABTU).[29]

Action 4: Engage and support tribal educators and leaders.

*Rationale*

Maine's 10-year Economic Development Strategy (EDS) and the Governor's Economic Recovery Committee prioritizes career exploration as a key workforce development initiative. The Maine Jobs and Recovery Plan includes a $25 million investment in career exploration across the K-12 system. Developing Maine's talent with early exposure to Offshore Wind career opportunities

[27] https://www.masscec.com/students

[28] A "registered apprenticeship" (RA) is administered by the Employment and Training Administration's Office of Apprenticeship (OA) within the U.S. Department of Labor (DOL), in conjunction with State Apprenticeship Agencies (SAAs). RAs are nationally-recognized, occupational training programs delivered by sponsors—employers, employer associations, and labor management organizations. Employers cover the costs of training, wages paid to apprentices, costs of managing the program, and costs associated with time spent by senior employees to mentor and train apprentices.

[29] New Program Offers High-schoolers Path to Trade Apprenticeships, DOE, https://www.energy.gov/articles/new-program-offers-high-schoolers-path-trade-apprenticeships

will build a strong pipeline of dynamic workers who have a range of interests, skills, and experiences.

### *Recommendation #2: Increase OSW Opportunities in Maine's Postsecondary Education Institutions*

Action 1: Create Maine's Offshore Wind Foundation, modeled after the UMaine Pulp & Paper Foundation, to support the creation of educational programs and experiential learning opportunities and provide direct scholarship support to students. Specifically:

- Partner with Maine's higher education institutions to establish specific offshore wind tracks or certificate programs for undergraduate and graduate-level students in engineering, marine sciences, law, and other industry-related disciplines.
- Encourage experiential learning and offshore experiences.
- Develop an international cooperative education/internship program to provide work experience at European and other global job sites.
- Partner with the community college system to prepare and offer GWO certification, or similarly established industry certifications.
- Provide scholarships to address equity concerns.
- Evaluate Vineyard Wind workforce investment program, including the offering of "Offshore Wind 101" in community colleges across the state.

Action 2: Support University-based R&D that can benefit the industry in Maine and outside of Maine. UMaine's Advanced Structures and Composites Center is positioned as the national leader in floating offshore wind research and development. The center has already spun off several successful private companies, including Aqua Ventus. Fostering innovation activity can also help attract top talent and capital to Maine.

Action 3: Support and leverage Maine Maritime Academy's and Northern Maine Community College's Offshore training programs at their Offshore Training Center at Bucksport. This training center will be an important in-state provider of the necessary certifications and credentials for the maritime workers needed for the construction and operations and maintenance phases of offshore wind development.

Action 4: Coordinate with Maine Quality Centers and other workforce training organizations, to increase training opportunities for the following high-demand occupations: Welding, CNC Machining (programs & operators), Quality Control Inspection, Electricians[30], Iron Workers, Concrete Laborers, Operating Engineers. Recognize and adapt to the quickly changing landscape of OSW workforce needs.

Action 5: Declare the University of Maine a Center of National Excellence for Floating OSW. The University is already a national leader in floating OSW research and development, and a formal

[30] BW Research, Maine Offshore Wind Workforce Gaps Analysis, November 2021

announcement will draw prospective talent and funding, further solidifying the University's leadership in the sector.

Action 6: Attract and retain out-of-state students, educators, and researchers to Maine's higher education institutions. Promote Maine as "Education Land". Continuing to promote Maine as a Center of National Excellence for Floating OSW will draw potential talent, employers, and researchers. Once this "cluster" is fully formed, specialized talent will want to stay in Maine to be surrounded by other top talent, employers, and researchers.

*Rationale*

Maine's postsecondary institutions present an opportunity for Maine to further its leadership role in floating offshore wind. Supporting the activities of these institutions can help attract and retain highly-educated and specialized talent in a sector that is poised to see substantial growth in the coming decades. As noted below, each college and university can play a unique role in developing Maine's floating OSW cluster.

- There are ten wind-specific training programs in seven different institutions in Maine. Three community colleges host wind-specific programs, along with three public universities. The other programs are not necessarily specific to OSW but the training is transferable:
    - Four programs are geared towards electrical engineering and electrical technician roles
    - Three (all through Sky Climber Renewables) offer trainings for Wind Service Technician apprenticeships
    - Two are geared towards structural or materials engineering and,
    - One program will allow graduates to work in professional or support service roles related to OSW.[31]
- Northern Maine Community College's Wind Power Technology program offers broad fundamental training in the electrical, electronic, and mechanical aspects of the wind power industry, with a focus on wind turbine maintenance and electrical power production. The National Electrical Code and theory are taught throughout the program.
- The University of Maine is establishing itself as one of the leading national and international sources of offshore wind engineers and professionals. Additionally, UMS and Maine's other higher education institutions are successfully training students in adjacent occupations—mechanical engineering, marine sciences, for example, which can further Maine's OSW industry.
- Maine Maritime Academy (MMA) has already served as a key player in offshore wind development. When the University of Maine deployed the nation's first grid-connected offshore floating wind turbine prototype off the coast of Castine, MMA helped test and conduct analyses on the designs.

[31] Ibid BW Research 2021

Cutting-edge technologies, including data science and artificial intelligence, as well as autonomous aerial and undersea drones, will play an increasingly important role in OSW. Maine can leverage several of its private four-year and graduate-level institutions such as the Roux Institute, University of Maine, and undergraduate institutions offering degrees in these fields, to develop specializations in these fields. The Roux Institute has several master's programs in data analytics, applied machine intelligence, and other data science-oriented programs, while Bowdoin College can support the talent pipeline with computer science undergraduates. Diversifying Maine's OSW expertise into these technologies also presents substantial opportunities for exporting goods and services for future OSW locations around the world.

### *Recommendation #3: Enhance & Expand OSW Training & Registered Apprenticeship Opportunities*

Action 1: Develop and promote training and Registered Apprenticeship (RA) opportunities:

- Prompt industry to create and expand Registered Apprenticeship opportunities and develop mutually beneficial partnerships that grow Maine's talent pool.
- Strengthen ties between work-based learning and classroom experience by supporting and providing technical assistance for high-quality Registered Apprenticeship programming.
- Engage Maine Quality Centers and other training organizations for efficient, relevant, and cost accessible training, engage with stakeholders to promote RA opportunities, particularly to underrepresented populations and non-traditional postsecondary students.

Action 2: Attract new workers into the developing OSW industry cluster without exacerbating existing workforce shortages in other industries. Leverage unemployed residents and dislocated workers from adjacent and declining industries. Tap existing ocean users interested in expanding or adapting their skill sets and Gulf of Maine knowledge to offshore wind.

- Consider initiatives that provide Maine's fishermen with supplementary income opportunities and remove barriers. Offer free training for relevant certifications or eliminate unnecessarily onerous vessel requirements.

Action 3: Advocate for a clear certification standard for offshore wind workforce, specifically the Global Wind Organization (GWO) certification.

Action 4: Ensure social infrastructure is in place for Maine people to engage in the workforce. Supporting entry and success into OSW-relevant occupations is essential in guaranteeing that Mainers of all backgrounds can benefit from the economic activity.

- Bolster supports and awareness of programs that increase access to transportation, housing, childcare, and other basic needs to ensure Mainers can participate in the OSW economy.

Example: The Building Pathways program in Massachusetts provides a gateway for low-income area residents, particularly in underserved communities, to access family-sustaining careers in the construction industry through apprenticeship preparedness training and advocacy.

*Rationale*

The EDS states that Maine needs to add 75K new workers to our workforce over the next 10 years. Part of that strategy includes welcoming disengaged adults, people with disabilities, new Mainers, and "at risk" young adults. Re-engaging disengaged workers will require significantly increased investment and a higher risk tolerance, as well as additional support coupled with earn-to-learn frameworks. Previous OSW projects have shown that, due to supply chain dynamics and costs, the manufacturing of hulls and construction of turbines are activities most likely to be done in Maine. This presents a substantial opportunity for the state's workforce, particularly among occupations that require some training but less than a four year degree. Registered apprenticeships provide great entrance ramps into these types of careers by allowing participants to earn money while they learn and prepare for a career.

### *Recommendation #4: Encourage High-Quality Jobs*

Action 1: When developing Offshore Wind projects and relevant policies, ensure opportunities for high-quality, family-supporting jobs that offer upward mobility.

Action 2: Ensure safety and health protections—many OSW construction and operations and maintenance jobs will take place miles out at sea and in inclement weather. Given the considerable risk that workers will face in such an environment, proper training and certification, safety protocols, and risk mitigation strategies will be essential to ensuring OSW workers can safely complete their jobs.

Action 3: Build opportunities for Maine companies in data science, artificial intelligence, and robotics –especially in the forestry and aquaculture industries – to expand their expertise into OSW. Jobs that require the development and deployment of cutting-edge technology often offer strong wage and career progression opportunities. These high-education, high-wage jobs also tend to have greater multiplier effects on the local economy.

Action 4: Support Maine's engineering and professional services clusters/hubs of excellence related to OSW. Maine not only has a relatively high concentration of these workers, but these jobs tend to offer family-supporting wages and career progression opportunities.

### *Recommendation #5: Promote Equity in Workforce Development*

Action 1: Address equity and barriers to participation in OSW jobs, Registered Apprenticeships, and other training opportunities to ensure Maine can attract and develop high-skilled workers, protect public health and safety, and support an expanding clean energy economy.

- Document the current diversity of the clean energy sector workforce, and opportunities

to increase access to these jobs for underserved communities.

- Create targeted, earn-to-learn programs that provide work experience and classroom learning to prepare individuals for apprenticeship entry examinations and other certifications and licenses.
    - These training opportunities should provide resources to increase recruitment of women, people of color, vulnerable Mainers and other underrepresented groups. Opportunities should be promoted and accessible to Mainers from across the state.
- Explore barriers to entry into clean energy careers related to credentialing pathways—including license and work experience reciprocity for new and returning Mainers and requirements for individuals entering the clean energy workforce.
- Support training programs to decrease barriers to entry through the provision of wrap-around services, financial incentives for learners to decrease identified barriers and other opportunities.
- Expedite systems to recognize foreign-trained professional credentials and connect immigrants, refugees, and asylum-seekers to OSW training and job opportunities.
- Advance policy and investments that support immigrant workers with English as a Second Language and associated job training, and other supports for new Mainers.

Action 2: Support the New Mainers Resource Center (NMRC) in offering OSW training opportunities. The NMRC is a Portland Adult Education program serving immigrants, refugees, and employers in the Greater Portland area that provides skilled professionals programs, employment and case management, intensive classes focused on job readiness skills, networking opportunities, workshops and other services designed to help New Mainers of all professions overcome barriers to entering the workforce.

> Other State Example (New York): Nontraditional Employment for Women (NEW) prepares, trains, and places women in careers in the skilled construction, utility, and maintenance trades, helping women achieve economic independence and a secure future for themselves and their families. At the same time, NEW provides a pipeline of qualified workers to the industries that build, move, power, green, and maintain New York.

*Rationale*

A recent report by the Maine Center for Economic Policy shows that systemic racism prevents many Mainers of color from reaching their full potential through barriers to hiring, lower wages, lack of protection from the law, and being made to feel unwelcome in the workplace.

For example, in Maine, a woman who is a representative of the racial, Indigenous, or tribal population with a college degree earns only slightly more than a white man with a high school diploma. While three-quarters of white Mainers own their own home, the same is true for fewer than one in four Black Mainers. Mainers who are representatives of the racial, Indigenous, or tribal populations typically experience unemployment and poverty at twice the

rate of white Mainers.[32]

### *Recommendation #6: Coordinate & Collaborate Regionally to Attract Skilled Workers*

Action 1: Attract skilled workers to Maine:

- Expand the Opportunity Maine Tax Credit: This program reimburses student loan payments for college graduates who live and work in Maine through the form of an income tax credit. Eligibility requirements include living, working, and paying taxes in Maine and having an accredited associate, bachelors, or graduate degree, with additional benefits for STEAM degrees.

Action 2: Develop regional workforce strategies:

- Consider the convening of a regional OSW workforce development task force.
- Draw upon a skilled regional workforce and talent pool in partnership with organized labor due to the establishment and implementation of PLAs
- Explore the establishment of a joint Maine Building Trades Training Facility to attract and retain in-state and regional worker talent.

*Rationale*

Building on Maine's existing strengths in the floating OSW industry can help the state solidify its status as a hub for floating OSW activities. The development of an industry "cluster" or a "hub of excellence" within Maine can generate far-reaching positive feedback effects. This type of convergence of research, postsecondary institutions, skilled workforce and businesses have positive feedback effects as workers and employers alike are drawn to them because of greater access to the other. Alongside promoting self-perpetuating growth, industry clusters can help drive innovation as workers are able to cross-pollinate skills and ideas that can revolutionize an industry. [33]

Regional strategies can help facilitate cooperation and coordination. Collaboration between states can allow each state to capitalize on its strengths while leveraging the strengths of its neighbors, increasing project efficiency, and decreasing costs.

[32] Myall, James. Data on racial inequality shows need for solutions to advance racial justice. (June 2019). Maine Center for Economic Policy. Retrieved June 15, 2020 from: https://www.mecep.org/wp-content/uploads/2019/06/MECEP-racial-inequality-fact-sheet-FINAL.pdf

[33] Maine's Economic Development Strategy, DECD, 2019

## Supply Chain, Workforce, Ports and Marine Transportation Working Group

### Ports

**Draft Initial Recommendations – February 2022**

#### *Recommendation #1: Move forward with port development plans with urgency.*

- Searsport is Maine's location for OSW hub port infrastructure, in line with Maine's 3-port strategy and the recent feasibility study and concept design report by the engineering firm of Moffat & Nichol.[34]
- The state should conduct a robust environmental and regulatory/stakeholder/legislative review and begin this work at an early phase in the port development process. The WG was pleased to know that the stakeholder process had already begun and will continue.
- A business case for the development must be made before significant investment in engineering / construction planning is initiated.

#### *Recommendation #2: Discuss with neighboring states in the region with OSW goals.*

- Floating offshore wind should be the future focus for Maine moving forward. The long term OSW energy goals on the US East Coast relies on floating OSW, and Maine could position to facilitate that build out to support multiple states goals.
- WG recognizes that in order for Maine to position itself to take on a role of providing infrastructure to facilitate the floating OSW market on the US East Coast, a significant amount of time to achieve this goal makes it essential to start the planning and permitting process now.

#### *Recommendation #3: Discuss with OSW developers the infrastructure needs of all East Coast OSW projects to best inform the state as it moves forward with planning and design of OSW infrastructure.*

- Maine needs better data around the needs of developers, and how the state could support those needs. Maine should solicit a Request for Information to collect appropriate data from east coast developers interested in Maine as a staging port.
- OSW port infrastructure should be designed to accommodate the requirements of multiple (or all) OSW foundation types.
- Since the infrastructure requirements for floating and fixed have commonalities, considering projects in both modes would likely benefit the state, but WG consensus is that Maine could develop a competitive advantage with floating.

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34 https://www.maine.gov/mdot/ofps/docs/port/MaineDOT%20OSW%20Port%20Infrastructure%20Feasibility%20Study-Concept%20Design%20Report%2011-17-2021.pdf

### *Recommendation #4: OSW port activity is significant and impacts to ocean users should be considered/studied in ports that could potentially exist to support OSW, starting in Searsport.*

- This is important to consider so that OSW infrastructure does not exclude other sectors that could benefit from multiple forms of ocean users (fishing, other marine cargoes, recreation, etc.).
- Maine should consider port improvements that simultaneously meet user needs. This could be achieved through a grant program that targets ocean users impacted by OSW development in Maine, specifically targeting working waterfront facilities.

### *Recommendation #5: Continue the ongoing work of evaluating multiple port facilities (Portland, Eastport, etc.) in Maine that could support OSW projects in the Gulf of Maine and/or Northeast region.*

- Having sites evaluated early in the process will help the state/private sector focus investment for future port needs.
- The market will drive the port requirements for OSW. Investments will occur in phases as the east coast offshore wind pipeline matures with the OSW industry, and the value of a deep water, heavy lift quay side, and unlimited air draft in a protected port increases.

### *Recommendation #6: Pursue federal funding to develop OSW port infrastructure.*

- It is important to begin discussions on funding paths with federal agencies and delegation staff.
- Proceed with OSW infrastructure design to identify a project to submit funding assistance through federal discretionary programs.
- It is important to the WG to stay aware of federal funding programs that may come into existence soon.

### *Recommendation #7: Expose Maine's ports-related supply chain to various stages of offshore wind projects – first with fixed, and then transitioning that experience and relationship building into floating.*

- There will likely be spillover opportunities from projects south of Maine.
- These services could include the following, for example: security, utilities, fuel bunkering, stevedoring, cranes, handling, forklifts, self-propelled modular transporters (SPMTs), trailers, vessel maintenance, ships agent, towage, and waste removal.
- Offshore wind projects in the extensive U.S. pipeline require not only large port facilities, but also smaller port facilities with associated port and logistics services. Provision of these services spans all phases of an offshore wind project. Smaller ports in Maine may aid in these logistical services to support the development surveys and wind farm O&M stages for projects along the U.S. Atlantic coast.

## Fisheries Working Group

**DRAFT Initial Recommendations – January 20, 2022**

*Note: This list is not meant to be exhaustive on this topic, rather building a comprehensive set of recommendations with the working group over time.*

### *Recommendations Pertinent to Pre-Construction Monitoring and Communications Relevant to ALL Offshore Wind Development Off the Coast of Maine*

### ***Recommendation #1: The State will work with BOEM and other federal agencies to strongly encourage or require offshore wind developers to develop and implement clear communications plans and notification procedures.***

a. *Communications* – Outline clear protocols for communication by offshore wind developers with the fishing industry that include the following elements including but not limited to BOEM guidance on these matters:

   1) OSW developers shall establish Fishing Liaison Officers (FLOs) and Fishing Industry Representatives (FIRs) prior to beginning survey, G&G, or other activity on the ocean. The fishing industry should have a meaningful role in selecting the FLO and FIR to ensure they represent and can be legitimate intermediaries with the Maine fishing industry.

   2) OSW developers shall establish a clear communications plan for outreach to fishermen during the life of the project and such plan shall be reviewed by BOEM in consultation with the appropriate states and fishermen advisors. The plan should be updated periodically through the life of the project, including adjustments made to account for lessons learned. Such plans should have clear metrics that measure understanding, engagement, and joint problem solving and not merely information sharing, and quantities of outreach conducted (i.e., # of meetings, # of fact sheets, etc.).

b. *Notification* - Establish pre-survey notification requirements for offshore wind developers with the following criteria:

   1) Fishermen shall be given adequate and effective notice (minimum 45 to 90 days, based on season, distance from shore, and nature of fishing activity in the area) of any survey work conducted by developers or their contractors (geophysical, geotechnical, biological, oceanographic, or other) for general awareness and to move fishing gear.

   2) Aquaculturists shall be given adequate and effective notice (minimum 45 to 90 days) of any survey work conducted by developers or their contractors (geophysical, geotechnical, biological, oceanographic, or other) for general awareness.

3) Developer survey and vessel activities shall be shared in multiple formats on a real-time basis through such tools as a mariners' notice, web-based application, texts, and other means.

4) The survey route provided should include not only track lines but also anticipated buffers for vessel operations and maneuvering outside of survey route, as well as an area for vessel anchoring, jogging or other holding patterns.

c. *Accountability* -- To ensure guidelines are adhered to and issues addressed, develop a verifiable grievance or complaints mechanism that includes a timeline for and documentation of complaints and response taken; regular public reporting of this information; and alternative dispute resolution mechanisms.

***Recommendation #2: The State will work with BOEM and other federal agencies to strongly encourage or require offshore wind developers follow procedures that encourage full engagement with the fishing industry from ME, NH and MA during survey operations, specifically:***

a. Survey vessel captains shall engage with local fishermen prior to activities to understand local dynamics, conditions, and practices to avoid or minimize conflict.

b. OSW developers should always have a contact available when an OSW developer survey vessel is operating who may be contacted via radio or cell phone, which should include a land-based contact as well given challenges of communication at sea at times.

c. A fisherman with extensive knowledge of the area being surveyed should be onboard each survey vessel and compensated appropriately.

d. Survey vessels and developers should be held accountable for deviating from published survey routes, buffer zones and/or other areas identified for vessel operations.

e. OSW developers should have a gear loss compensation program in place prior to initiation of surveys.

f. Survey vessels should run their AIS at all times, regardless of distance from shore.

***Recommendation #3: The State will advocate for geophysical and geotechnical data gathered by OSW developers to be made available in accessible and usable formats to the public on a regular and timely basis (e.g. concurrent with submission of the COP or in advance of the public comment period on the EIS) and that such data should be incorporated into all charting software at the developers' expense.***

### *Recommendation #4: The State will work with BOEM and other New England states to pursue establishment of the following monitoring requirements for offshore wind lease holders:*

a. Baseline biological (marine resource and marine mammal presence) and physical oceanographic monitoring (currents, temperatures, sediment) in proposed areas for offshore wind development, at the developer's expense, should be conducted quarterly for a minimum of:
   1) three years prior to construction;
   2) throughout construction; and
   3) five consecutive years post-construction, then at two-year intervals until decommissioning.

b. Appropriate surveys to monitor marine resources and benthic habitat should also be done along proposed export cable corridors.

c. Survey and monitoring plans shall be independently reviewed by a panel of independent experts not affiliated with or funded by the developer.

d. Trawl surveys or other survey work conducted using fishing gear should utilize a commercial vessel platform operated by industry members with significant familiarity and experience operating within the survey area.

e. Trawl survey work should be conducted using the Virginia Institute of Marine Science (VIMS) Northeast Area Monitoring and Assessment Program (NEAMAP) protocols so it can be incorporated into a broader data set for comparative purposes.

f. To account for post construction concerns on constraints to trawl survey methods, also include a multi-mesh gillnet survey, ventless trap survey, and other methods as needed to ensure a comprehensive approach. In order to calibrate these two surveys, they should be run concurrently with the pre-construction baseline monitoring trawl survey (inside & outside the proposed WEA). Post construction monitoring would then be trawl outside and fixed gear inside.

g. To account for pelagic species, conduct transect acoustic surveys across the area. This will help inform changes in aggregations/distributions.

h. Other survey methods should be considered and implemented such as gill net, tagging, acoustics, aerial surveys, thermal imaging, and other methods, especially accounting for survey methods that are implementable within deep water arrays once constructed.

i. Survey work should be done in accordance with the Responsible Offshore Science Alliance's (ROSA) Offshore Wind Project Monitoring Framework and Guidelines (https://www.rosascience.org/resources).

j. Data collected and its synthesis through all survey work should be made available to fishing industry and the public in an open-source format that is readily accessed.

k. At the developer's expense, an independent third party should analyze the survey data and present the results of those data to the appropriate fishery management body and NOAA Fisheries.

l. Ensure that monitoring programs are being adhered to. If it is determined that a project may be having negative impacts on the fish stocks, ecosystem, or environment, then further study should be required and remedial avoidance, minimization or mitigation measures taken. If subsequent research shows continued negative impact, then further remedial action should be undertaken at the developer's expense.

***Recommendation #5: The State will provide and actively seek out other funds to sustain necessary research and monitoring during the OSW development and implementation process.***

a. The State of Maine should continue to prioritize provision of General Fund support for at least the current amount of $2 million for monitoring and research in the Gulf of Maine in anticipation of offshore wind development for the foreseeable future.

b. The State should pursue additional funding, both independently and in partnership with states whose fishing vessels use the Gulf of Maine to increase the available pool of funding for monitoring and research.

c. The State should aggressively pursue funding from federal agencies such as BOEM and NOAA to ensure that the designation of wind energy areas and the subsequent EIS processes have sufficient data to make sound siting decisions that avoid or minimize impacts to commercial fishing.

## Recommendations pertinent to the BOEM Siting of Wind Energy and Lease Areas

***Recommendation #6: In the near term and ongoing, the State should engage with fishermen, scientists and other stakeholders with expertise in fisheries, wildlife and the environment to compile and map the areas of known concentration of priority species and habitat and fishing activity in order to appropriately cite wind energy lease areas in the Gulf of Maine.***

Areas of high use by the fishing industry should be identified through the following process:

a. First, using VMS and AIS data from the most current ten-year period available, identify all areas where commercial fishing has or is occurring.

b. Second, identify additional fishing areas by reviewing VTR and or available data sources, for those fisheries where VMS or AIS data is insufficient or lacking. Areas of historic fishing in the last twenty (20) years should be included, such as the cold-water shrimp fishery

c. Third, where such data in #2 is not available, utilize surveys with tested methodologies (such as that done for the Research Array), or other innovative

methods to identify current, recent, and historic areas of fishing. Any areas where there is medium to high fishing effort by one or more fisheries, or areas that would have a significant and unique impact on a particular port or region should be avoided for leasing to the greatest extent possible.

d. Recognizing fisheries are highly dynamic and may be affected by other influences, general stock assessments and surveys of potential exploitable resources should be taken into account even if those stocks are not currently being fished.

e. From this data, identify areas of high, medium, and low suitability from a fishing perspective for OSW development.

f. Identify habitats known to have higher levels of productivity including ledges, rotational areas, essential fish habitat, closed areas, spawning grounds, and other areas.

***Recommendation #7: As wind energy areas are being identified, Maine should request that the U.S. Coast Guard conduct a port access study to determine necessary formal and informal transit to fishing grounds and how such potential wind energy areas may adversely affect transit. If such impediments are identified, the State should work closely with BOEM to ensure wind energy areas are appropriately based and if needed, "no build" informal transit lanes are identified within the final wind energy areas.***

***Recommendation #8: As wind energy areas are identified, Maine should request a port impact assessment by the appropriate state or federal agency(ies) to determine if the vessels fishing in those proposed areas would be concentrated in certain ports and any implications for the port's local economy and shoreside businesses. This assessment may require collection of new information and/or use of local ecological knowledge to supplement available data. Cost of completing the assessment should be at the developer's expense.***

***Recommendation #9: The Fisheries Working Group strongly encourages the State to advocate for BOEM and the Gulf of Maine Interagency Task Force to prohibit the construction of offshore wind turbines within (XX) nautical miles or less from the Maine coast [to be defined] to avoid and minimize OSW development and fisheries conflict.*** [*Note: This approach is something the working group is considering, but is still evaluating available data for rationale and appropriate distance determination. We do not have a proposed distance at this time.]*

***Recommendation #10: The State will encourage and assist BOEM in providing active and direct engagement with Maine's fishing industry in the development of wind energy areas through workshops, meetings, dockside conversations, and other engagement, working closely with Maine DMR and fishing industry and community organizations to do so in a robust and meaningful way.***

***Recommendation #11: The Fisheries Working Group recommends that the State assess existing State statutory and regulatory authorities related to the permitting for offshore wind turbines and transmission cables through an equity lens related to fisheries impacts and take action to implement corrective actions identified in the assessment as appropriate.***

This assessment should evaluate the following issues:

a. Efficacy of existing State authorities in addressing fisheries impacts anticipated from offshore wind.
b. Ability and cost of fishing industry members and communities to participate effectively in the regulatory processes that evaluate impact on fishing activity and the marine environment.
c. Mechanisms available to provide support or capacity for improved participation.
d. Ways to improve fishing industry access, equity, and capacity in State permitting.

## Environment and Wildlife Working Group

**Draft Initial Recommendations – January 2022**

***Overview***

The following ideas have emerged from the discussions to date of the Environment and Wildlife Working Group. The recommendations below represent a set of immediate needs to address critical data gaps and mapping of critical areas to inform siting of offshore wind in the Gulf of Maine (GOM). We are also recommending the State take action to investigate regulatory options under the federal consistency provisions of the Maine Coastal Program (CZMA, Recommendation 5). The Working Group will be developing further recommendations that cover additional topics in the coming months, including pre- and post-construction monitoring, transmission cable and landing considerations, and mechanisms to avoid, minimize and mitigate potential impacts.

It is important to recognize the unique opportunity Maine has to lead in developing well-sited and operated floating offshore wind development with the least impact to wildlife and the environment. This is only possible if the State vehemently pursues gathering the critical data needs now to better inform the decision-making process. Data collection should begin as soon as possible to advise environmentally sound siting, and to create a baseline for evaluating effects of offshore wind through time, which will ultimately put Maine in the best position to lead the nation in low-impact floating offshore wind development.

Finally, we are aware of the ongoing concerns of Maine's commercial fishing industry which are being addressed by the Fisheries Working Group. In some cases, the data and mapping needs for both Working Groups overlap which further emphasizes the critical gaps that need to be addressed immediately. Where they do not overlap, recommendations specific to each Working Group will need to be considered in the context of the environmental, economic, and social-cultural significance of the Gulf of Maine as a whole.

**Acknowledging Climate Change**

Based on the most recent models, climate change is predicted to cause ecological shifts in the Gulf of Maine. The historical and current data used to evaluate both appropriate locations for offshore wind development and potential impacts should be considered within this context and should consider potential regime shifts. Robust modeling within a range of possible futures can be used to guide the future of offshore wind development as long as these are done with clear definitions of uncertainty or confidence on which to base recommendations and decisions.

*Initial Recommendations for Immediate Consideration*

***Recommendation #1 - Map existing data [35]: We recommend the State of Maine conduct a mapping exercise in early 2022 that collates existing data available in the Gulf of Maine to identify where areas of greatest conflict between offshore wind energy development and wildlife may currently exist in Gulf of Maine federal waters and identify data gaps that need to be filled to inform offshore wind leasing.***

This exercise should include the following process:

1. Aggregate relevant data layers from the Northeast Ocean Data Portal for the Gulf of Maine into an interactive product to identify existing data gaps.
2. Identify and map areas of high use by the fishing industry through the process outlined by the Fisheries Working Group.
3. Hold a series of workshops comprised of Gulf of Maine science experts and commercial fishermen, including Environment and Wildlife and Fisheries Working Group members, to jointly inform the mapping process and identify any information that may have not been identified but is readily available and accessible.
4. Maintain an iterative mapping process to integrate new data and stakeholder information as it becomes available.

*Rationale*

The Bureau of Ocean Energy Management (BOEM) has announced its intention to plan for leasing of commercial scale offshore wind in the Gulf of Maine by mid-2025. This will require the identification of wind energy areas (WEAs) by BOEM in consultation with the Gulf of Maine Intergovernmental Task Force. Maine's representatives on the Task Force need to be prepared to fully engage in these conversations and represent the interests of Maine's citizens in the appropriate siting of wind energy lease areas. An immediate first step for Maine is to seek data and input from scientists, commercial fishermen, and other stakeholders with expertise in wildlife, fisheries, and the offshore environment to compile and map the areas of known concentration of priority species, habitats, and commercial fishing activity. This mapping exercise and subsequent engagement process with stakeholders would be of great benefit to the State of Maine and the BOEM process overall by identifying and prioritizing high conflict areas early on, as well as identifying gaps in the current data for future research opportunities.

*Action Items*

The working group envisions the mapping exercise could be supported through the following:

[35] It is important to note that while summarizing the existing data is very valuable, data for the Gulf of Maine is currently extremely limited. Projections of areas with fewer conflicts and assessments of impacts to a given species are less certain than those for elsewhere (e.g., south of Cape Cod). See Recommendations #2-#4.

- Collate and analyze existing data from publicly available datasets for seabirds, marine mammals, turtles, pelagic and benthic fish, and invertebrate species.
- Conduct an interdisciplinary desktop analysis with oceanographers, benthic habitat experts, marine mammal experts, marine fish experts, and marine bird and bat experts.
- Use fisheries data to identify areas of high marine productivity and potential marine bird and mammal foraging areas.
- Conduct a literature review to identify the key criteria that drive primary productivity which contribute to areas of high biodiversity of fishes, invertebrates, marine mammals, and seabirds in the GOM.

The following critical areas for wildlife and fishes should be mapped as part the GOM mapping exercise:

1. Important foraging habitat areas for marine birds, throughout the annual cycle, that have greater vulnerability to collision and displacement from offshore wind development, and for Species of Greatest Conservation Need (SGCN).

   *Data available to map these areas*:

   - Physical and biological oceanographic data, including but not limited to bathymetry, sea-surface temperature, primary productivity (chlorophyll) and secondary productivity (zooplankton), ocean currents, frontal features, and upwelling indices.
   - Most of these data are already available and organized at various spatial scales and resolutions.
   - Tracking data already available: tern nanotag data, Common Tern satellite tagging data, Arctic Tern and Common Tern GPS tagging data, Leach's Storm-Petrel GPS data, Herring Gull GPS data, Great Shearwater sat tags, Atlantic Puffin GPS tagging, RAZO satellite tagging, Northern Saw-Whet owl nannotagging.

   *Uncertainty/data need*:

   - On a GOM scale, environmental data are available at larger spatial scales, which are not always at appropriate resolution for project scale analyses.
   - Substantial uncertainty and variability between species and between years in foraging habitat. However, there are basic constraints on foraging depth for benthic feeding birds (e.g., sea ducks) that could be used to identify likely foraging areas, and surface and midwater features for pelagic birds that could be used to identify key habitat.
   - Some species, such as terns, can forage close to colonies if food is available, but can also commute longer distances. Other species, such as storm petrels, can

conduct multi-day foraging flights that can take them to the continental shelf edge and beyond.

- Lacking tracking data on migratory seabirds and waterfowl.

2. Areas between coastal islands where migratory pathways for bird and bat species vulnerable to collision and displacement often occur.

   Data available to map these areas:

   - Motus tracking efforts, GPS and Argos tracking efforts, geographic features, radar data, and island banding data.
   - Passerine banding data from islands available
   - 10 years of Northern Saw-whet Owl old banding data on Petit Manan Point - research conducted by Dave Brinker

   *Uncertainty/data need:*

   - Migratory movement patterns for most species are uncertain.
   - Must identify how migrants are using airspace farther offshore, especially in and around the array.

3. Areas used by species under both the Endangered Species Act (ESA) and Maine Endangered Species Act (MESA), including Roseate Tern, North Atlantic right whale, leatherback sea turtle migratory routes and foraging areas, and migratory paths of Red Knot, Piping Plover, Atlantic Salmon, and Atlantic and shortnose sturgeons.

   *Data available to map these areas:*

   - Colonial nesting data: tracking studies conducted in Massachusetts and New York (while these studies do not cover the GOM, they can support understanding of term movement in general) and some data from Maine
   - MDIFW/USFWS mid-winter waterfowl aerial survey data
   - Gull and cormorant data aerial surveys completed in 2019 and colony based info (1960-2021)
   - Results from some limited tracking studies on North Atlantic right whales and leatherback sea turtles are available.
   - Passive acoustic detections of North Atlantic right whales.
   - Aerial survey data for North Atlantic right whales, humpback whales, and leatherback sea turtles, as well as some opportunistic sightings from ships.

   *Uncertainty/data need (not inclusive):*

   - High uncertainty on Roseate Tern movement and habitat in GOM.
   - Little (some shorebird survey data from seabird restoration islands) to no data available on the Red Knot and Piping Plover movements during migration.

- While much data exists on shorebird migration along the immediate coast of Maine, little to no movement data is available in the GOM waters. Extrapolation of the little existing data (two Semipalmated nanotag efforts; one in Downeast and one in southern ME/MA) and what is generally known about shorebird migration in the GOM would need to be applied.
- Changes in habitat use in the Gulf of Maine by right whales since 2010.
- Limited data on leatherback sea turtles.
- Limited data on GOM use by Atlantic and Shortnose Sturgeon. Some modeling data available for Atlantic Salmon migratory corridors in the GOM. Additional tagging and tracking would be needed to better characterize GOM use of all three endangered fish species.
- Some limited data (e.g. Stantec) on migratory bats in the GOM (nanotag tracking of bat migration from a PhD project).

4. Areas with deep-sea corals.

   *Data available to map these areas:*

   - Identified in the New England Fisheries Management Council Coral Omnibus Amendment.

   *Uncertainty/data need:*

   - As not all deep-sea corals have been accurately mapped, additional benthic habitat mapping is necessary.

5. Areas of known spawning and feeding aggregations of high priority managed and other protected species (e.g., groundfish, lobster, herring, scallop, marine mammals, etc.) in coordination with the Fisheries Working Group. Several species of marine birds are dependent on these areas.

   *Data available to map these areas:*

   - Trawl and longline surveys
   - Tagging
   - Herring fleet sampling
   - Scallop surveys
   - Sea sampling and ventless trap surveys, lobster tagging
   - Halibut tagging work

   *Uncertainty/data need:*

   - Many datasets are limited spatially
   - Herring data is fishery dependent
   - Trawl and longline survey data are limited spatially in the federal survey

6. Areas of aggregation and/or diapausing late stage Calanus copepods as an indicator of highly productive areas of importance to other species of fish and marine mammals

*Data available to map these areas:*

- Zooplankton monitoring stations
- CPR and ECOMON data
- Physical and biological oceanographic as listed above in #1

***Recommendation #2 – Collect Gulf of Maine habitat data: We recommend the State of Maine lead the effort to conduct benthic habitat surveys in areas of the Gulf of Maine with no or poor bathymetry data or benthic habitat information, specifically through the collection of high resolution multibeam mapping and ground truthing of the data through sediment sampling and benthic fauna characterization. This information should be used to create detailed sediment and habitat maps of the Gulf of Maine.***

*Rationale*

The Gulf of Maine has limited bathymetric data of complex habitats which drives species habitat use and distribution. Complex habitats are important for a number of species in the Gulf of Maine and are critically important for vulnerable species such as Atlantic cod and American lobster. This information will provide the most comprehensive, multi-species information and is critical to informing offshore wind siting considerations at both the lease level and the project level.

The National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey has recently updated a bathymetry model that can be used to show areas with no/poor quality data. This could be used to prioritize areas that need collection. Up to now, the data has been collected by NOAA, the Maine Department of Marine resources (DMR) through commercial fishermen, or through the DMR-Maine Coastal Program (MCP). This effort should be expanded through coordination with all relevant state and federal partners. Finally, we recognize that to map the entire Gulf of Maine is a daunting effort; therefore, the State should collaborate with scientists, commercial fishermen, and other partners to identify critical areas in the GOM most at-risk Action Item #1).

*Action Items*

The working group envisions this could include the following:

- Establish a Gulf of Maine marine mapping initiative with NOAA, DMR-MCP, NH, MA and other academic and non-profit partners and commercial fishermen to prioritize mapping areas, explore potential funding needs and sources, and determine how best to coordinate mapping products for the GOM. Funding could include:
    - Pursue federal funding to support regional mapping efforts and sediment core sampling
    - Seek State funding to increase State of Maine mapping efforts

- Request NOAA mapping efforts in identified areas within the GOM

***Recommendation #3 – Collect Gulf of Maine baseline information: Initiate a coordinated below and above water ecological baseline monitoring study in identified areas of the Gulf of Maine. In order to provide a baseline for meaningful assessment of the impacts of offshore wind development on the ecosystem, wildlife, and fishes of the Gulf of Maine, monitoring should be initiated at the earliest possible opportunity. These surveys should focus as best as possible on potential wind energy development areas (as/when they are made available) and surrounding waters to refine the mapping exercise described above.***

*Rationale*

Baseline information is needed on the distribution and abundance of bird, bat, marine mammal, turtle, and fish species to assist in the siting and environmental review of areas in the Gulf of Maine for potential offshore wind development. Despite previous efforts in the Gulf of Maine (e.g., Atlantic Marine Assessment Program for Protected Species [AMAPPS]) baseline ecological data of wildlife species in the Gulf of Maine remains limited. Given the variability in marine wildlife distributions, a comprehensive regional baseline survey similar to those conducted in the South Atlantic (South Atlantic Baseline) and Gulf of Mexico Mid-Atlantic (GoMMAPS) that is focused on the Gulf of Maine area is a critical immediate need to inform BOEM's planning process, National Environmental Policy Act (NEPA) analysis (including Gulf of Maine and regional cumulative effects), regional-specific environmental assessments, and future review of applications for permits and necessary ESA consultations.

*Action Items*

The working group envisions this could include the following:

- Continue to prioritize provision of General Fund support for at least the current amount of $2 million for monitoring and research in the Gulf of Maine in anticipation of offshore wind development for the foreseeable future, and to seek additional State resources and funding opportunities.
- Research nocturnal use of offshore airspace by songbird and shorebird migrants potentially through the use of nanotag technology and expanded Motus network, ideally with birds trapped, tagged, and released from a coastal island site(s) in GoM.
- Pursue partnerships with New Hampshire and Massachusetts to increase the available pool of funding for monitoring and research needs.
- Aggressively pursue funding from federal agencies such as BOEM and NOAA
- Develop a below water/above water integrated survey design to determine the exposure risk of organisms to offshore wind development and ensure that the designation of wind energy areas and the subsequent EIS processes have sufficient data

to make sound siting decisions that avoid or minimize impacts. This may include the following potential methods:

- Broad scale digital aerial surveys with higher intensity in the Research Array and other areas where offshore wind development is most likely to occur.
- Boat-based wildlife surveys
- Broad scale plankton monitoring and surveys
- Broad scale trawl survey in coordination with NOAA/NMFS and designed cooperatively with the fishing industry. ESA-listed species should be the focus of the survey efforts, followed by SGCN and managed species.
- Passive acoustic monitoring of marine mammals
- Acoustic telemetry for endangered fish species
- Document the underwater soundscape in areas where offshore wind development is most likely to occur
- Collaborate with current regional surveys in the GOM focused on oceanography and nutrient availability, plankton diversity and abundance, benthic fish and invertebrate species at both adult and juvenile stages, marine mammals, and marine birds to increase sampling and potentially align the spatial and temporal scales.
- Active acoustic surveys for pelagic communities (to identify potential feeding hotspots and important trophic interactions; biological surveys using active acoustics can also provide information on bottom habitat).

***Recommendation #4 - Conduct tracking studies on ESA-listed birds in the Gulf of Maine, as well as marine and non-marine birds, marine mammals, and fish species especially vulnerable to impacts from offshore wind energy development.***

*Rationale*

Due to their inherently low or declining populations, ESA-listed birds and other species may be especially at risk from offshore wind development in the GOM from the possibility of collision, displacement, and changes in habitat conditions. While costly, tracking studies via GPS, radiotelemetry, or similar technique are a proven monitoring methodology to accurately and specifically determine movements, migration timing and specific flight paths, feeding and loafing habitat areas of priority, and other life history activities (e.g. reproduction) for Endangered, Threatened, and SGCN species. Very limited tracking data exists for certain species (e.g. peregrine falcons) and is completely absent for most species.

*Action Items*

Potential actions could include the following:

- Support coastal/offshore Motus network for radiotelemetry of birds and bats and significant tagging effort, with focus on ESA and SGCN species.
- Conduct GPS tracking of Red Knots.
- Conduct tracking studies on marine birds known to be vulnerable to offshore wind to identify important foraging and migration areas.
- Conduct tracking studies on non-marine birds likely to migrate offshore (e.g., songbirds, shorebirds, falcons).
- Use radar systems to support understanding of timing and intensity of bird and bat migrations.
- Conduct bat acoustics studies offshore and, if feasible, tracking studies using the Motus network. Stantec has bat acoustic data from offshore islands
- Explore and fund the expansion of the Motus network on remote coastal islands, and explore the feasibility of offshore Motus towers on buoys.
- Support tagging efforts for benthic and pelagic fishes, including those species that are ESA-listed and/or considered vulnerable to offshore wind, including EMF (e.g. sharks, salmon, eels).
- Increase marine mammal surveys to pair visual sightings from boat and aerial efforts with passive acoustic monitoring results.
- Use the whale catalog to understand areas of high use by known individuals.

***Recommendation #5 – Explore use of federal consistency:* We recommend the State of Maine investigate the potential benefits of and process by which the State of Maine may use its federal consistency review authority under the federal Coastal Zone Management Act to address issues of concern regarding offshore wind energy development in federal waters, including potential changes to state laws and rules.**

*Rationale*

The federal consistency provisions of the CZMA may offer an opportunity for Maine to have influence over how offshore wind is developed if applicable regulations are incorporated as part of Maine's enforceable policies. Rhode Island has been able to use its enforceable policies under the federal consistency review provisions to influence the process and request specific monitoring requirements for activities in federal waters affecting Rhode Island's coastal zone. Although the Rhode Island example is unique due to their Special Area Management Plan (SAMP) process, Maine should explore the possibility of federal consistency as a tool. The process for updating Maine's enforceable policies under CZMA is lengthy and complex, so an initial evaluation and plan should be initiated immediately to determine if and how this tool could be used to benefit Maine's interests.

*Action Items*

The working group envisions this could include the following:

- Maintain dialogue with neighboring states along the Atlantic coast regarding their efforts to review and implement the use of federal consistency provisions to influence offshore wind development in federal waters.
- Support efforts of the interagency staff tasked with reviewing whether changes are needed to Maine's regulations to effectively review offshore wind development under LD 1619.
- Consider what implications Maine's current State authorities have for review of the cable route, and explore if regulatory changes are necessary.
- Provide updates to the Environment and Wildlife Working Group on progress and recommended actions the State could take.

***Items for Future Working Group Discussions:***

- Transmission cable route and landing considerations
- Development of best management practices:
    - Pre- and post-construction monitoring
    - Potential mitigation requirements
- Procurement requirements and other ways to influence development (e.g. policy and regulatory changes)
- Research consortium research ideas