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Effective Stakeholder Engagement for Offshore Wind Energy Development: The State of New York's Fisheries and Environmental Technical Working Groups

Morgan Brunbauer and Kate McClellan Press

New York State Energy Research and Development Authority, 17 Columbia Circle, Albany, New York 12203, USA

Kathryn A. Williams

Biodiversity Research Institute, 276 Canco Road, Portland, Maine 04103, USA

Brian K. Dresser*

Tetra Tech, Inc., 10 Post Office Square, Boston, Massachusetts 02109, USA

Julia Gulka

Biodiversity Research Institute, 276 Canco Road, Portland, Maine 04103, USA

Greg Lampman

New York State Energy Research and Development Authority, 17 Columbia Circle, Albany, New York 12203, USA

Abstract

The offshore wind (OSW) energy industry is rapidly developing in the United States. New federal mandates require at least 30 GW of OSW by 2030. With the largest goal in the eastern United States, the state of New York seeks to advance OSW in a way that is both environmentally and socially responsible as well as cost-effective. To achieve this, New York developed technical working groups (TWGs) in 2017 focused on critical topics relating to OSW energy development, including the Fisheries Technical Working Group and Environment Technical Working Group (F-TWG and E-TWG; collectively, “the TWGs”). The TWGs are composed of OSW developers, fishing industry (F-TWG) or environmental nongovernmental organizations (E-TWG), federal agency representatives, and state representatives from Maine to North Carolina. These groups advise the state of New York on OSW issues by emphasizing the use of science and technical expertise to inform decision making. The effectiveness of TWG collaborations is due to a variety of reasons, including the regional scale of stakeholder involvement, which allows the groups to develop guidance at an appropriate geographic scale relative to OSW and fishing activities and wildlife populations. The regional collaboration and communication fostered by the TWGs are essential for building trust among stakeholder groups and working collectively to minimize fisheries and environmental impacts as the OSW industry progresses. This paper highlights the OSW stakeholder engagement process and approach implemented by New York through the development of TWGs, as a means of identifying needs for environmental and fisheries resources to

*Corresponding author: brian.dresser@tetrattech.com

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inform responsible OSW development within New York and regionally across the eastern United States. The lessons learned from the TWG process can be used to inform stakeholder engagement efforts in other locations.

Offshore wind (OSW) energy is a rapidly developing marine industry in the United States, with substantial implications for a wide range of stakeholders (U.S. Department of Energy 2021). In 2021, Executive Order 14008 (U.S. Office of the Federal Register 2021) set a goal of 30 GW of new OSW development in the United States by 2030. Many East Coast states have also established goals for OSW development, as well as establishing direct energy procurement contracts (power purchase agreements) in order to connect the power produced from OSW projects directly into the electrical grid. For example, the state of New York plans to achieve a 40% reduction in greenhouse gas emissions by 2030, with OSW as a key component (State of New York 2019), and also has specific renewable energy goals of 9 GW of OSW generating capacity by 2035, with over 4.3 GW currently procured (NYSERDA 2021b).

These federal and state-driven initiatives and procurement processes for power purchase agreements are currently driving development of OSW energy in the United States, in combination with leasing activity managed by the Bureau of Ocean Energy Management (BOEM). In February 2022, BOEM's auction of the six New York Bight (NYB) lease areas generated US\$4.37 billion, the highest-grossing competitive offshore energy lease sale in U.S. history, including oil and gas lease sales (BOEM 2022b). The BOEM has also recently conducted other lease sales in federal waters and has published call areas for potential new lease areas in multiple locations along the Atlantic and Pacific coasts.

As with any large-scale energy and infrastructure project, there are federal and state permitting requirements and recommendations for government entities and OSW energy developers to inform stakeholders about OSW projects from early siting decisions to project-scale layouts, routing, and siting constraints (New York State Public Service Commission 2017; Federal Permitting Improvement Steering Council 2022). In fact, to improve communication and transparency within the NYB lease areas (auctioned in February 2022), BOEM has included a new lease stipulation that lessees must identify potentially impacted stakeholders and submit semi-annual reports on engagement activities, challenges, impacts, and project changes (BOEM 2022a). However, guidance is limited on how this stakeholder outreach should be conducted, and it is up to each individual developer to establish lines of communication to provide project-level information to stakeholders and permitting agencies as part of the

National Environmental Policy Act process (Council on Environmental Quality 2021). In advance of the National Environmental Policy Act process, project developers typically facilitate some level of public/stakeholder outreach activities, such as open houses, listening sessions, or workshops; however, studies suggest that such approaches alone are inadequate for effectively engaging stakeholders or improving outcomes (Campbell and Marshall 2000; Glicken 2000; Innes and Booher 2004).

The complexity of balancing different interests, the rapid pace of OSW development, and the current uncertainty associated with resulting effects to the environment all indicate the importance of stakeholder engagement in effective decision making (Reed 2008; Osmond et al. 2010; Hooper et al. 2015). If done well, environmental stakeholder processes can improve public support for development projects, conservation outcomes, and decision making (Glicken 2000; Pomeroy and Douvere 2008; deReynier et al. 2010; Feeney et al. 2010; Gopnik et al. 2012; Klain et al. 2017). A successful stakeholder engagement process typically incorporates the following elements:

- Collaborative dialogue that includes interest groups, developers, nongovernmental organizations (NGOs), and government agencies operating within a common framework that facilitates collaboration, focused on anticipating and defining future actions (Innes and Booher 2004; Pomeroy and Douvere 2008; Buchan and Yates 2019).
- Integration of science and local knowledge to develop shared priorities among managers, scientists, and stakeholders within the process (Berghöfer et al. 2008; Reed 2008; deReynier et al. 2010; Cooke et al. 2021).
- Clear identification and communication of stakeholder roles and an understanding of (1) the needs and challenges faced by participating groups and (2) the purpose of soliciting their input (Glicken 2000; Hall and Lazarus 2015; Hooper et al. 2015).
- Utilization of appropriate information elicitation tools, application of those tools, and appropriate techniques for analyzing the resulting data (Glicken 2000; Reed 2008).
- Documentation and transparency throughout the process, including methodologies (Glicken 2000; Yates and Schoeman 2015; Firestone et al. 2020).
- Funding to support and facilitate the activities of stakeholder groups (Wellstead and Biesbroek 2022).

The more complex, contentious, and uncertain the situation, the more rewarding it can be for institutions tasked with decision making to innovate and develop new inter-organizational connections and behaviors (Safford et al. 2009). However, such factors may also be detrimental to the stakeholder engagement process if they are not recognized or managed appropriately (Portman 2009). Given the recognized importance of early, transparent stakeholder engagement by government agencies in marine spatial planning (Pomeroy and Douvere 2008; Gopnik et al. 2012; Hooper et al. 2015) and coastal planning (Safford et al. 2009), this must be integrated within impact assessments for offshore renewable energy (Portman 2009).

The stakeholder engagement process implemented as part of the Rhode Island Ocean Special Area Management Plan was the first such robust engagement on U.S. OSW development within a marine spatial planning context. It provided a model of effective stakeholder engagement within the overarching framework of federal, state, and local regulatory and permitting requirements (Nutters and Pinto da Silva 2012; Blau and Green 2015; Klain et al. 2017; Firestone et al. 2020; Pol and Ford 2020). While the Rhode Island Ocean Special Area Management Plan process has generally been viewed as a success, there are lessons to be implemented as the industry advances into the environmental impact assessment process of larger-scale projects than the five-turbine Block Island Wind Farm in Rhode Island, lessons to be learned from the European OSW experience, as well as other examples of collaborative engagement of the fishing community (Feeney et al. 2010; Nutters and Pinto da Silva 2012; Blau and Green 2015; Klain et al. 2017; Rigano and Delle Fave 2017; ten Brink and Dalton 2018; Firestone et al. 2020; Pol and Ford 2020).

To reduce uncertainty for the OSW industry and advance the industry in a way that is both environmentally and socially responsible as well as cost-effective, New York identified effective stakeholder engagement as a crucial aspect of OSW development in the state's OSW Master Plan and the subsequent Climate Leadership and Community Protection Act (NYSERDA 2018; State of New York 2019). New York's stakeholder process is designed to engage stakeholders in an early, transparent way to inform decision making related to OSW energy development.

In this paper, we aim to describe (1) the stakeholder engagement process implemented by New York related to OSW development; (2) New York's approach, through the development of technical working groups (TWGs), to identify needs for environmental and fisheries resources within the framework of the OSW Master Plan; (3) contributions of the TWGs as case studies to inform responsible OSW development within New York and regionally across

the eastern United States; and (4) lessons learned from the TWG process that could inform stakeholder engagement efforts in other locations and industries.

BACKGROUND

In 2016, New York launched a comprehensive state planning process (the OSW Master Plan) to minimize the potential for negative impacts of OSW development on the marine environment and important activities like fishing, boating, and shipping that contribute to the marine economy. The OSW Master Plan included explicit next steps that New York would take to advance development of OSW energy, which included establishing TWGs concerning the key subjects of fishing, maritime commerce, the environment, jobs, and the supply chain (NYSERDA 2018). The TWGs were designed to foster ongoing collaboration with individuals and entities who have “technical knowledge, practical experience, and professional interest” in topics related to the OSW industry (NYSERDA 2018). The present discussion focuses on two of these groups: the Fisheries Technical Working Group (F-TWG) and the Environmental Technical Working Group (E-TWG), collectively termed “the TWGs,” as they are well established and share structural components as well as a focus on marine and environmental resources.

The goals of the TWGs include improving the understanding of and the ability to manage for potential impacts to the environment and fisheries; developing transparent, collaborative processes for identifying priority research needs and mitigation methods; and reducing permitting risk and uncertainty for developers by improving clarity and transparency in expectations and processes. The TWGs inject diverse views and information into decision making with the following objectives: (1) to develop best management practices (BMPs) for wildlife and fisheries monitoring and mitigation at OSW energy projects; (2) to help New York identify research needs and support the coordination of research activities among stakeholder groups; (3) to recommend a funding and administrative framework, to be paid into by developers, that contributes to regionally prioritized research, technology development, and conservation efforts; and (4) to encourage coordination and dialogue among regional planning bodies, state and federal managers, scientists, and other stakeholders.

The mission of the TWGs is to serve as long-term advisory bodies to New York, providing advice and guidance to help steer efforts and advance OSW development in an environmentally responsible way. The scope of the F-TWG also includes protecting and sustaining the fisheries and fishing communities of New York as well as those of the region. Improving engagement directly with energy developers and stakeholders that may be impacted by OSW projects is one of the key elements of the mission,

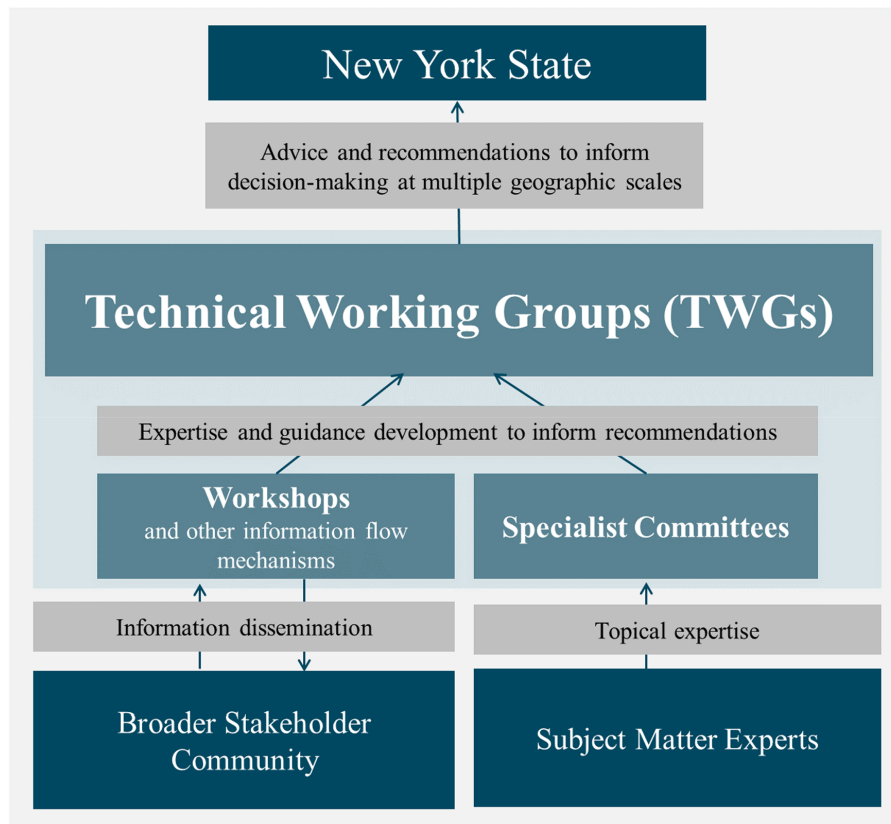


FIGURE 1. Environmental and Fisheries technical working groups' (TWGs) mechanisms for developing and providing recommendations to the state of New York, as well as interacting with the broader stakeholder community.

makeup, and structure of the TWGs, with a focus on coordination, communication, research, and scientific inquiry. The TWGs facilitate a process for informing state and regional decision making related to OSW development that includes engagement and discussion at the TWG level and multiple mechanisms for external expert input, product development, and information exchange with the broader stakeholder community. These mechanisms include conferences and workshops and the formation of specialist committees that include both TWG members and topical subject matter experts (Figure 1). In addition, the TWGs have professional technical support to help develop work products, conduct research, and facilitate group activities and meetings. Identification of criteria for the selection of participants from among a broad range of stakeholders is an important component of a cooperative stakeholder engagement process (Safford et al. 2009) to ensure transparent feedback from a range of viewpoints (Haddaway et al. 2017). The selection criteria for the TWGs focused on key stakeholder types related to environmental and fisheries issues and a regional, rather than state-specific, geographic scope. As such, the TWGs are composed of the following: “core”

members, which include OSW energy developers that currently hold a lease area; commercial and recreational fishermen (or their representatives) on the F-TWG; and, specific to the E-TWG, technical environmental nongovernmental organizations (NGOs) with wildlife and OSW expertise as well as a nonpartisan NGO with a shared perspective. Both TWGs also include the participation of state and federal agencies (Figure 2). There is a strong regional membership, with representation of states from Maine to North Carolina.

RESULTS

Since their formation in 2017, the TWGs have maintained a balanced approach to direct stakeholder engagement, which has been key to producing workstreams that have informed and improved New York's development of OSW energy (Figure 2). The TWGs have also sustained consistent representation, with consideration given to balance stakeholder sectors such that no single stakeholder sector is dominating discussions, thus creating a structure that provides advice in a manner that considers multiple priorities and perspectives. Membership in the F-TWG



FIGURE 2. Components of the Environmental and Fisheries technical working groups (E-TWG and F-TWG, respectively), including “core” members (dark blue), other members (light blue), and workgroup support (gray).

includes representatives from 13 different commercial fishing organizations, 11 OSW developers or joint venture agreements, and 17 federal and state regulatory agencies. Membership in the E-TWG includes 5 environmental NGOs, 1 nonpartisan NGO, 10 OSW developers and joint ventures, and 15 federal and state regulatory agencies. The TWGs have provided input into New York’s OSW-related decisions as well as regional and national discussions and decisions in three general categories: (1) improving communication and coordination among stakeholders, (2) providing guidance/input to the state of New York, and (3) supporting scientific research to understand impacts. Some TWG efforts contribute to more than one of these categories, as summarized in Table 1. Several specific examples are further described as case studies below.

Improving Communication and Coordination among Stakeholders

One of the hallmarks of the TWGs is that they provide a forum in which stakeholders can speak freely on a number of relevant topics or concerns. Meetings are limited to members, but meeting notes and presentations are made publicly available and archived on the TWG websites (nyetwg.com and nyftwg.com), allowing the broader stakeholder community to stay informed on the discussions, actions, and resolutions that emerge from

each meeting, with full transparency. Importantly, the discussion points within meeting notes are not attributed to specific members, which allows for a free-flowing exchange of ideas, personal interactions, differing opinions, and recommendations for controversial topics without fear of reprisal or intimidation bias by stakeholders outside of the TWGs. Meetings themselves also facilitate the development of cross-sector personal relationships among TWG members, and the TWG websites serve as centralized forums for relevant news and resources (e.g., announcements, an OSW lease mapper tool, OSW project information, and information on upcoming meetings and workshops). These features are important for fostering improved communication and coordination of ongoing research, development, and policy.

Providing Guidance and Input to the State of New York and Regional Decision Making

The mechanisms used by the TWGs to provide input and guidance to the state include TWG-level discussions, products developed via specialist committees, and stakeholder workshops, among other approaches. For example, the maps and input resulting from the F-TWG’s Transit Lane Workshop were used by BOEM in its decision making for the final sale notice for the NYB (Figure 3), and recommendations for wildlife BMPs by E-TWG specialist committees were incorporated into New York’s direct energy procurement contracts (power purchase agreements) as requirements for OSW projects selling power to New York. The effectiveness of these collaborations is due in part to the regional, rather than state-specific, scale of interest, which creates the ability to develop guidance at an appropriate geographic scale and promote regional collaboration and communication. The TWG efforts also allow for engagement and input from the broader stakeholder community, including topical experts, which results in broader acceptance of products and outcomes.

Supporting Scientific Research to Understand Impacts

The need for ongoing scientific research to characterize the baseline conditions of the marine environment and changes associated with OSW development was identified early on in the development of the TWGs. The TWGs have been leaders in advocating for programs aimed at developing these types of research and monitoring programs on a regional scale rather than just at the project level. This has included support of East Coast-wide State of the Science Workshops, providing input to the research plan of the National OSW Research and Development Consortium, and reviewing the New York State Energy Research and Development Authority’s (NYSERDA) own environmental research plans to reduce risk to wildlife and fisheries and inform the OSW development process (NYSERDA 2019).

TABLE 1. Topic areas addressed by the Environmental and Fisheries technical working groups (E-TWG and F-TWG, respectively); BOEM = Bureau of Ocean Energy Management; BMPs = best management practices; RFP = request for proposals; NYSERDA = New York State Energy Research and Development Authority; RWSC = Regional Wildlife Science Collaborative; OSW = offshore wind). Topics are organized by source (F-TWG activities, E-TWG activities, or activities pursued by both groups).

Issue or topic area of concern	Lead TWG	Mechanism to address	Output	Category		
				Communication/coordination	Guidance	Scientific research
Fishing vessel access	F-TWG	Transit Lane Workshop, in which fishermen indicated frequent transits to fishing grounds from major ports	Transit lane maps. The BOEM incorporated transit lanes into the New York Bight leasing process.	✓	✓	✓
Cable burial	F-TWG	Utilize subject matter experts to compile current information on submarine cable installation, burial, and risks	White paper summarizing the various tools used for burial, constraints, and impacts to fishing (and to the cable); additional agency utilization of this document to help develop guidance and BMPs.			✓
Spatial data for each lease area	F-TWG	Consolidate information in a single location	Web-based up-to-date information on lease areas, developer contact information, constraints, etc.; expandable as the industry grows and more information is requested by fishermen.	✓		
Compensatory mitigation	F-TWG	Input from stakeholders, and incorporate examples from other countries/industries	Preliminary draft white paper summarizing the state of compensatory mitigation. The BOEM is currently developing a mitigation framework to include compensation.	✓		✓
Funding for research and development	E-TWG	TWG member agreement on wildlife monitoring needs	Letter to the National OSW Research and Development Consortium. The consortium included wildlife technology development needs in the 2021 RFP.	✓		✓

TABLE I. Continued.

Issue or topic area of concern	Lead TWG	Mechanism to address	Output	Category		
				Communication/coordination	Guidance	Scientific research
Best available science and understanding of cumulative biological impacts	E-TWG	Biennial State of the Science Workshops, State of the Science Workgroups	Workshop proceedings, seven topic-area white papers, and one peer-reviewed publication (see R results, case study 5, for references); engaged and informed interested stakeholders while promoting regional coordination and collaboration through expert information exchange and discussion; identified research priorities that were adopted and/or further developed by multiple entities, including NYSERDA, other states, and the RWSC.	✓		✓
Research framework to guide the long-term study of potential effects to birds and bats from OSW	E-TWG	Stakeholder workshop and continued expert support for framework development	Workshop report and bird and bat research framework (in progress); informed State of the Science Workgroup efforts.	✓		✓
Review and synthesis of data to inform stakeholders	E-TWG	Collation of existing webinars as a stakeholder resource; solicitation of E-TWG input on topics for new webinars	Learning from the Experts Webinar series and the Webinar Library on the E-TWG website.	✓		

TABLE 1. Continued.

Issue or topic area of concern	Lead TWG	Mechanism to address	Output	Category		
				Communication/coordination	Guidance	Scientific research
Need for a regional coordinating body for wildlife and OSW issues	E-TWG	Identified as priority topic by TWG; discussed at the first State of the Science Workshop, followed by stakeholder meetings to explore options for formation of regional funding entity	Improvements to interstate and interagency coordination, including regular coordination calls between neighboring states. Stakeholder-driven governance structures for proposed RWSC, followed by the formation of the RWSC.	✓	✓	✓
Guidance for research and monitoring at lease area-specific and regional scales	E-TWG	Formation of E-TWG specialist committees	Guidance documents (in progress) and collated database of research priorities (Regional Synthesis Workgroup of the Offshore Wind Environmental Technical Working Group 2022).	✓	✓	✓
Project-level environmental and fisheries mitigation	Joint E-TWG and F-TWG	Environmental Mitigation Plan and Fisheries Mitigation Plan consultations between E-TWG and F-TWG members and projects with New York power purchase agreements	Evolution of environmental mitigation plans based on feedback from the E-TWG and F-TWG. Ongoing discussions inform state of New York development and future RFPs.	✓	✓	✓
Mitigation plans and recommended management practices	Joint E-TWG and F-TWG	Identify stressors and which resources are impacted, along with mitigations that would have the potential to benefit multiple resources; includes formation of specialist committees (marine mammals, birds/bats)	Mitigation and Monitoring Practices Tool; white papers; E-TWG memorandum to the New York Public Service Commission; subset of recommended practices incorporated into New York and other state procurements; also informed other efforts to develop BMPs (e.g., in other geographic regions, by other groups).	✓	✓	✓

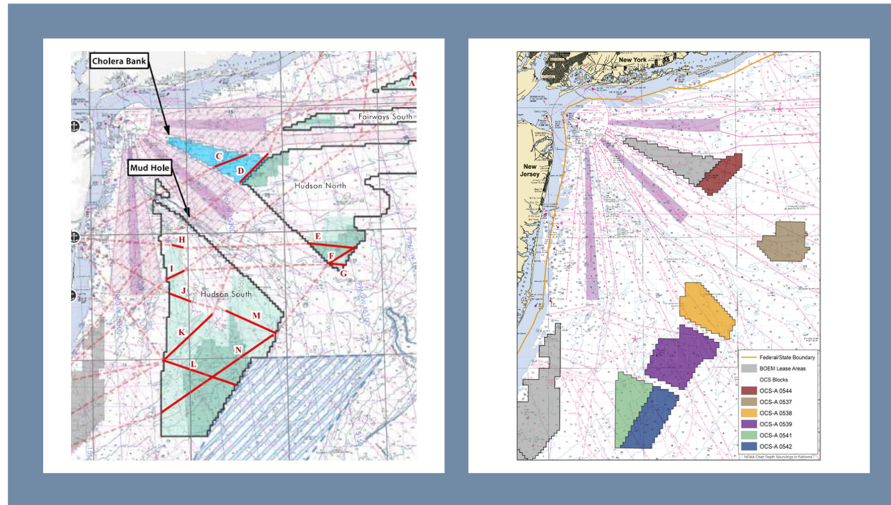


FIGURE 3. Example of how the Fisheries Technical Working Group's input from the Transit Lane Workshop (see Results, case study 2) informed the federal leasing process; output from the Transit Lane Workshop is shown on the left, and the resulting New York Bight lease areas are depicted on the right.

Case Studies

The case studies detailed below reflect key outcomes and actionable results of the TWGs within the above stakeholder engagement categories. These and other TWG activities (Table 1) have informed the development of regional research and funding entities and have identified scientific research frameworks and topics for OSW-related research and other associated efforts.

Case study 1: mitigation and monitoring practices tool.—One of the first products that emerged from the TWGs was the Mitigation and Monitoring Practices (MMP) Tool, a database that includes a wide range of MMPs relating to OSW energy development, wildlife, and fisheries and that allows users to sort and filter MMPs for evaluation at both broad and project-specific scales (NYSERDA 2020b). The TWGs expressed the need for more information to assess the availability and effectiveness of existing mitigation measures to avoid, minimize, or compensate for the effects of OSW energy development on fisheries and ecosystems. After this need was identified, NYSERDA used TWG technical support staff to review a range of literature sources (including agency reports, environmental assessments, scientific literature, technical guidance documents, and others) and aggregate existing practices into a database that could serve as a resource to the TWGs as well as to other stakeholders. The TWG-level discussions helped to shape the design and focus of the database, and members provided significant feedback on beta versions of the MMP Tool prior to public release. The MMP Tool is searchable by various categories, including the relevance of each MMP to specific marine resources, stressors, potential effects, and development phases as well as each MMP's implementation/validation

status. These and other details about each MMP support stakeholder evaluations of how best to further assess and incorporate mitigation and monitoring into planned OSW energy development. Due to the TWGs' recognition of a data gap in the collective knowledge base of the OSW stakeholder community, the resulting MMP Tool can help to inform New York and regional decision making as well as stakeholder communications around proposed mitigation approaches at individual lease areas.

Case study 2: New York Bight Transit Lane Workshop.—Transit lanes were identified by the F-TWG as a key issue of potential conflict between OSW development and the fishing industry. This led to a workshop in 2019 during which input was solicited from over 200 fishermen to help determine potential conflict areas in the proposed NYB wind energy areas. New York Bight transit lane maps were developed with feedback from surveys/questionnaires, the in-person workshop, and direct input from fishermen, indicating where they typically transit (NYSERDA 2020c). The intent of these maps was to capture the data collected, identify the preferred options for transit lanes, and inform stakeholder comments on future proceedings, such as BOEM wind energy lease designations, specific wind energy project proposals, and U.S. Coast Guard Port Access Route Studies. The outcomes from these efforts were used to help guide BOEM's final designation of lease areas in the NYB to inform individual developers about the transit uses and needs of commercial fishermen. When the NYB lease areas were finalized by BOEM in 2021, changes from the previously proposed wind energy areas included consideration of the transit lane maps in the final layout (Figure 3)—a direct outcome of the F-TWG's Transit Lane Workshop (BOEM 2021).

The F-TWG's identification of a topic of concern and convening as a group to offer direct input to the issue resulted in actionable input that informed regional decision making.

Case study 3: cable burial constraints.—One of the concerns of OSW development raised by fishermen is the potential for gear interaction with submarine export and inter-array cables. The F-TWG identified a need to help stakeholders better understand the nature of subsea cables, including dimensions, burial techniques and tools, seabed constraints, and risks to fisheries interactions. Understanding the fundamentals of OSW submarine power cable types and construction methods is important in determining the potential impacts that the cables might have on the commercial fishing industry as well as how commercial fishing practices might impact the cables once installed. Given the importance of this issue, NYSERDA commissioned a report on the topic, with F-TWG members providing input throughout development to shape the content and structure of the final report (NYSERDA 2021c). The resulting evaluation presents a comprehensive understanding of cable burial that is being used by stakeholders as well as state and federal permitting agencies to better understand constraints, impacts, and potential mitigations.

Case study 4: development and implementation of recommended management practices.—Both TWGs have recognized the importance of developing BMPs, or recommendations for ways to avoid, minimize, or compensate for the effects of OSW energy development on wildlife and fisheries. The E-TWG initiated two specialist committees that developed recommended management practices to avoid and minimize effects of OSW energy development on key taxa of interest: birds and bats, and marine mammals (NYSERDA 2020e, 2020f). In parallel, the F-TWG pursued discussions around fisheries compensation, resulting in the development of a preliminary report in 2021 (NYSERDA 2021a). These discussions and products informed the mitigation requirements identified in the state of New York's requests for proposals (RFPs) for direct energy procurement contracts in 2020 and 2022, including (1) the requirement for OSW developers to contribute \$10,000 per megawatt to regional-scale research and monitoring of wildlife and commercial fish stocks, (2) specific wildlife mitigation requirements related to lighting and noise-generating activities, and (3) development of a fisheries compensation plan (NYSERDA 2020d). These outcomes have also informed other state and federal efforts on this topic (Joint Governors 2021). Indeed, BOEM is currently evaluating a fisheries compensation framework that would supersede the initial efforts advanced by the F-TWG (BOEM 2022c). These state and federal outcomes are a direct result of discussions, interactions, and reports that emanated from the TWGs.

Case study 5: State of the Science Workshops on Wildlife and Offshore Wind.—At the inception of the E-TWG, stakeholders identified a gap in public opportunities to discuss the current state of knowledge on OSW and wildlife in the United States. The State of the Science Workshops on Wildlife and OSW Energy Development, hosted by NYSERDA on behalf of the E-TWG, were created to help fill this gap. The first State of the Science Workshop was held in November 2018, the second was held (virtually) in November 2020, and the third took place in July 2022, with planning and organizational capacity from E-TWG technical and facilitation support staff. The first workshop focused on presenting the current state of knowledge of wildlife impacts from OSW development, focusing heavily on European perspectives and baseline information on wildlife in the eastern United States. One of the major themes that emerged from the workshop was a need for regional coordination of research. This led to initial discussions among stakeholders around the need to form an entity that could facilitate regional-scale research, which later formed as the Regional Wildlife Science Collaborative (RWSC; RWSC 2020; Williams and Gulka 2020).

Following the success of the initial workshop with over 180 attendees, NYSERDA and the E-TWG recognized the value of continuing to pursue approximately biennial public workshops. The 2020 workshop, during which the E-TWG focused on the topic of cumulative impacts, included over 430 (virtual) attendees from 21 states and 20 countries. Following plenary sessions, seven workgroups formed to identify key studies that could be conducted in the next 3–5 years to improve understanding of cumulative biological impacts as the OSW industry develops in the United States. These efforts resulted in seven workgroup reports (Carpenter et al. 2021; Cook et al. 2021; Degraer et al. 2021; Gitschlag et al. 2021; Hein et al. 2021; Popper et al. 2021; Southall et al. 2021) and a scientific publication (Popper et al. 2022). The workshops have also produced written proceedings (Williams and Gulka 2020, 2022) to help foster wider public information sharing beyond workshop attendees. These outcomes represent a major contribution to regional discussions by NYSERDA, the RWSC, and others around the funding and implementation of research priorities. State of the Science Workshops encourage collaboration and information exchange to help meet the goals of the E-TWG and NYSERDA and contribute to a broader understanding of the potential effects on wildlife from OSW development.

Case study 6: contributions to regional science entities.—In addition to the State of the Science Workshops, the TWGs have also been integral to providing support for regional research and coordination. The E-TWG initiated a specialist committee to further evaluate

this topic in early 2019, which was advanced through a stakeholder group with facilitation support and resulted in a vision document that outlined the mission, objectives, and proposed structure for the RWSC (RWSC 2020). In 2021, NYSERDA and the Massachusetts Clean Energy Center funded the Northeast Regional Ocean Council, Mid-Atlantic Regional Council on the Ocean, and Coastal States Stewardship Foundation to administer and direct the RWSC. As the RWSC and its fisheries- and OSW-focused equivalent (Responsible Offshore Science Alliance [ROSA]) have initiated support for research and monitoring for wildlife/fisheries and OSW energy, the TWGs have continued to support these regional entities in a variety of ways. The TWG chairs and some members are also members of the governance and science structures for the RWSC and ROSA, and E-TWG specialist committees actively coordinate with the RWSC and ROSA to support and complement efforts among these regional stakeholder groups. In this manner, the collective knowledge and experience of the TWGs are leveraged to facilitate the success of these regional science entities and ensure that regional OSW, fisheries, and environmental research in the eastern United States can effectively inform the understanding and mitigation of effects as the OSW industry progresses.

DISCUSSION

The TWGs have emerged as an effective forum for stakeholder engagement and discussions to inform responsible OSW development in the United States and, in turn, are becoming models for other states. As demonstrated by the requirement that OSW developers who are awarded power purchase agreements with the state of New York continue their participation in the TWGs, there is continued benefit to the environmentally and socially responsible development of OSW through direct interaction among developers, stakeholders, and government agencies, as facilitated by the TWG process. The types of guidance and input that the TWGs provide are essential for minimizing impacts to key stakeholder groups while also building trust as the OSW industry progresses.

The success of the TWGs can be directly attributed to the input and diversity of their goal-oriented stakeholders within a framework that allows for flexibility within appropriate geographic scales. The TWG structures accommodate stakeholder involvement in a variety of ways, providing the flexibility for appropriate technical expertise to be incorporated into discussions where it is most effective. The variety of sectors represented by the TWGs encourages cooperative dialogue and the identification of effective, economically viable approaches for understanding and minimizing impacts from development activities. Technical working group members are routinely solicited for direct feedback on group structure,

participants, and goals, which has helped to maintain group dynamics and keep the groups focused. Furthermore, the ability to develop guidance at appropriate geographic scales and to promote regional collaboration and communication is essential for minimizing impacts to the environment and fisheries as the industry progresses, since wildlife populations, commercial fisheries, and OSW energy development activities cross multiple jurisdictions. During the COVID-19 pandemic, the flexible nature of the TWGs allowed for meetings to continue in a virtual setting during a time period that was exceptionally fast paced for the industry. In some cases, the virtual nature of the TWG meetings allowed for greater participation from membership without the need for travel and the associated time and financial constraints typically required to attend meetings. This allowed stakeholders to identify and address new tasks as needed and to address different issues in adaptive ways. Lastly, the TWGs provide an avenue for meaningful involvement in environmental decision-making processes, defined by Gregory (2000) to include a structured forum for participation and input as well as a mechanism for incorporating the results of technical analyses. The TWGs have a strong basis in science, including technical support to help inform their recommendations, and substantial influence to inform and guide decisions on a range of topics and spatial scales.

Despite the successes of the TWGs outlined in this paper, several challenges have also emerged that present potential barriers to the successful implementation and ongoing coordination of this type of stakeholder engagement process. One such challenge is that TWG members are volunteers, many of which may only work on OSW part time in addition to their other duties and commitments. This has been mitigated to some extent by the funding of administrative, technical, and facilitation support from NYSERDA, which results in less of a time commitment for TWG members, but it remains a challenge that requires additional consideration.

Another challenge is that the membership of the TWGs is not always aligned in terms of end goals, particularly within the larger permitting framework at the federal, state, and local levels. This situation can make it challenging to develop or address shared priorities (Berghöfer et al. 2008; Reed 2008; deReynier et al. 2010). This challenge is one that has required adaptation in the TWG process. In some instances, TWG members may have conflicting interests or viewpoints and have provided individual contributions via existing forums where their input is formally solicited and incorporated into permitting processes (e.g., public comment periods and public meetings). In other cases, the TWG memberships acknowledge when and where consensus or agreement cannot be reached and must be willing to work on other topics or issues where progress may be more attainable. For example, some topics

did not lend themselves to productive discussions for recommended management practices (E-TWG) or research/monitoring prioritization (F-TWG), with little room for consensus based on the established positions or constraints of different sectors represented in conversations. In these cases, the TWGs or their specialist committees refocused the discussion onto topics for which there was room for constructive dialogue. In addition, differentiating the end uses of products helped to promote productive discussion—for example, differentiating recommended management practices that are appropriate to incorporate into RFPs for direct energy procurements versus those that are better suited to project-specific mitigation plans or other approaches. Even with this adaptability, some topics are simply too controversial or polarizing for the TWGs to effectively solve, but recognizing the need to start the conversation and develop an initial work product (NYSERDA 2021a) may be enough to spur conversation to address the topic through a more appropriate or effective avenue (Joint Governors 2021; BOEM 2022c).

There is also a need to strike the right balance of opportunities for stakeholder engagement without introducing stakeholder fatigue. The TWG structure allows for inherent flexibility in participation and engagement, with some members involved in specialist committees, while others only review documents or simply observe or help to communicate information. However, recognizing the already full workloads of TWG members reinforces the importance of coordination among TWGs and other regional groups. Such coordination can help to identify and avoid redundancies and to direct focus on the geographic or topical “gaps” where other groups may not be fulfilling stakeholder- and state-identified needs.

CONCLUSIONS

This paper highlights the OSW stakeholder engagement process and approach implemented by New York through the development of TWGs as a means of identifying needs for environmental and fisheries resources to inform responsible OSW development within New York and regionally across the eastern United States. The lessons learned from the TWG process can be used to inform stakeholder engagement efforts in other locations.

The state of New York is transparently engaging key stakeholders to inform responsible development of OSW energy. The TWGs have successfully informed a range of decisions in New York and the broader region and have been instrumental in facilitating cross-sector communication. Although the TWGs have been active since 2017, the stakeholder engagement process remains in its early stages as the industry continues to evolve, with a need to maintain momentum and institutionalize stakeholder participation in the process. With this evolution,

stakeholder engagement in planning will continue to be essential as the industry develops in New York and throughout the United States. Offshore wind energy is a regional resource with regional stakeholders, and cross-sector collaboration and communication will be essential as the industry progresses. The TWG process has demonstrated that stakeholder engagement groups can provide an essential avenue for maintaining this type of effective communication.

Through this process, the TWGs have accomplished the following goals: improved communication and coordination among stakeholders, provided guidance and input to the state of New York, and supported scientific research to understand impacts. The case studies described in this paper demonstrate that stakeholder advisory groups such as the TWGs can help to inform environmental decision making and improve outcomes. The TWGs can—and have—informed the structure of other governmental planning processes around offshore wind energy development (NYSERDA 2020a). To be effective, such groups must share several key characteristics, and they must overcome common barriers and challenges to be successful. Groups such as the TWGs must be selective in their priorities, focusing efforts where they can have the most impact; have dedicated support; bring together the right combination of stakeholders to ensure interstakeholder communications and effectively advance their goals; and provide an avenue for meaningful input on decision-making processes.

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REFERENCES

- Berghöfer, A., H. Wittmer, and F. Rauschmayer. 2008. Stakeholder participation in ecosystem-based approaches to fisheries management: a synthesis from European research projects. *Marine Policy* 32:243–253.
- Blau, J., and L. Green. 2015. Assessing the impact of a new approach to ocean management: evidence to date from five ocean plans. *Marine Policy* 56:1–8.
- BOEM (Bureau of Ocean Energy Management). 2021. Atlantic Wind Lease Sale 8 (ATLW-8) for commercial leasing for wind power on the outer continental shelf in the New York Bight—proposed sale notice. *Federal Register* 112:31524–31536.

- BOEM (Bureau of Ocean Energy Management). 2022a. New York Bight planning and analysis: how did we get here? BOEM, Washington, D.C.
- BOEM (Bureau of Ocean Energy Management). 2022b. New York Bight; provisional winners of the New York Bight lease areas. BOEM, Washington, D.C.
- BOEM (Bureau of Ocean Energy Management). 2022c. Reducing or avoiding impacts of offshore wind energy on fisheries. BOEM, Washington, D.C.
- Buchan, P. M., and K. L. Yates. 2019. Stakeholder dynamics, perceptions and representation in a regional coastal partnership. *Marine Policy* 101:125–136.
- Campbell, H., and R. Marshall. 2000. Public involvement and planning: looking beyond the one to the many. *International Planning Studies* 5:321–344.
- Carpenter, J., K. Williams, and E. Jenkins. 2021. Environmental Stratification Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Cook, A., K. Williams, E. Jenkins, J. Gulka, and J. Liner. 2021. Bird Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Cooke, S. J., V. M. Nguyen, J. M. Chapman, A. J. Reid, S. J. Landsman, N. Young, S. G. Hinch, S. Schott, N. E. Mandrak, and C. A. D. Semeniuk. 2021. Knowledge co-production: a pathway to effective fisheries management, conservation, and governance. *Fisheries* 46:89–97.
- Council on Environmental Quality. 2021. A citizen's guide to NEPA. Council on Environmental Quality, Washington, D.C.
- deReynier, Y. L., P. S. Levin, and N. L. Shoji. 2010. Bringing stakeholders, scientists, and managers together through an integrated ecosystem assessment process. *Marine Policy* 34:534–540.
- Degraer, S., Z. L. Hutchison, C. LoBue, K. Williams, J. Gulka, and E. Jenkins. 2021. Benthos Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Federal Permitting Improvement Steering Council. 2022. Federal infrastructure projects permitting dashboard. Federal Permitting Improvement Steering Council, Washington, D.C. Available: <https://www.permits.performance.gov/>.
- Feeney, R. G., K. J. La Valley, and M. Hall-Arber. 2010. Assessing stakeholder perspectives on the impacts of a decade of collaborative fisheries research in the Gulf of Maine and Georges Bank. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 2:205–216.
- Firestone, J., C. Hirt, D. Bidwell, M. Gardner, and J. Dwyer. 2020. Faring well in offshore wind power siting? Trust, engagement and process fairness in the United States. *Energy Research and Social Science* 62:101393.
- Gitschlag, G., R. Perry, K. Williams, and E. Jenkins. 2021. Sea Turtle Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Glicken, J. 2000. Getting stakeholder participation 'right': a discussion of participatory processes and possible pitfalls. *Environmental Science and Policy* 3:305–310.
- Gopnik, M., C. Fieseler, L. Cantral, K. McClellan, L. Pendleton, and L. Crowder. 2012. Coming to the table: early stakeholder engagement in marine spatial planning. *Marine Policy* 36:1139–1149.
- Gregory, R. 2000. Using stakeholder values to make smarter environmental decisions. *Environment: Science and Policy for Sustainable Development* 42:34–44.
- Haddaway, N. R., C. Kohl, N. Rebelo da Silva, J. Schiemann, A. Spök, R. Stewart, J. B. Sweet, and R. Wilhelm. 2017. A framework for stakeholder engagement during systematic reviews and maps in environmental management. *Environmental Evidence* 6:article 11.
- Hall, D. M., and E. D. Lazarus. 2015. Deep waters: lessons from community meetings about offshore wind resource development in the U.S. *Marine Policy* 57:9–17.
- Hein, C., K. Williams, and E. Jenkins. 2021. Bat Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Hooper, T., M. Ashley, and M. Austen. 2015. Perceptions of fishers and developers on the co-location of offshore wind farms and decapod fisheries in the UK. *Marine Policy* 61:16–22.
- Innes, J. E., and D. E. Booher. 2004. Reframing public participation: strategies for the 21st century. *Planning Theory and Practice* 5:419–436.
- Joint Governors. 2021. Joint Governors' letter to the Biden Administration on prioritization of offshore wind development (June 4, 2021).
- Klain, S. C., T. Satterfield, S. MacDonald, N. Battista, and K. M. A. Chan. 2017. Will communities "open-up" to offshore wind? Lessons learned from New England islands in the United States. *Energy Research and Social Science* 34:13–26.
- New York State Public Service Commission. 2017. The certification review process for major electric and fuel gas transmission facilities, under Article VII of the New York Public Service Law. New York State Public Service Commission, Albany.
- Nutters, H. M., and P. Pinto da Silva. 2012. Fishery stakeholder engagement and marine spatial planning: lessons from the Rhode Island Ocean SAMP and the Massachusetts Ocean Management Plan. *Ocean and Coastal Management* 67:9–18.
- NYSERDA (New York State Energy Research and Development Authority). 2018. New York State Offshore Wind Master Plan: charting a course to 2,400 megawatts of offshore wind energy. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2019. Environmental and fisheries research for offshore wind energy development. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020a. Guiding principles for offshore wind stakeholder engagement. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020b. Mitigation and monitoring practices tool (MMP tool). NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020c. New York Bight Transit Lane Workshop and outreach summary. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020d. Purchase of Offshore Wind Renewable Energy Certificates, request for proposals ORECRFP20-1. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020e. Summary of discussions from the Bird and Bat Specialist Committee of the Environmental Technical Working Group (E-TWG). NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2020f. Summary of discussions from the Marine Mammal Specialist Committee of the Environmental Technical Working Group (E-TWG). NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2021a. Fisheries compensation overview—preliminary draft, revision 1. NYSERDA, Albany.
- NYSERDA (New York State Energy Research and Development Authority). 2021b. Offshore wind projects. NYSERDA, Albany.

- Available: <https://www.nyscrda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/NY-Offshore-Wind-Projects>. (March 2023).
- NYSERDA (New York State Energy Research and Development Authority). 2021c. Offshore wind submarine cabling overview. NYSERDA, Albany.
- Osmond, M., S. Airame, M. Caldwell, and J. Day. 2010. Lessons for marine conservation planning: a comparison of three marine protected area planning processes. *Ocean and Coastal Management* 53:41–51.
- Pol, M. V., and K. H. Ford. 2020. Offshore wind energy and the fishing industry in the northeastern USA. Pages 115–124 in S. A. Bortone and S. Otake, editors. *Modern fisheries engineering: realizing a healthy and sustainable marine ecosystem*. CRC Press, London.
- Pomeroy, R., and F. Douvère. 2008. The engagement of stakeholders in the marine spatial planning process. *Marine Policy* 32:816–822.
- Popper, A. N., L. Hice-Dunton, K. Williams, and E. Jenkins. 2021. Workgroup report on sound and vibration effects on fishes and aquatic invertebrates: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- Popper, A. N., L. Hice-Dunton, E. Jenkins, D. M. Higgs, J. Krebs, A. Mooney, A. Rice, L. Roberts, F. Thomsen, K. Vigness-Raposa, D. Zeddies, and K. A. Williams. 2022. Offshore wind energy development: research priorities for sound and vibration effects on fishes and aquatic invertebrates. *Journal of the Acoustical Society of America* 151:205–215.
- Portman, M. 2009. Involving the public in the impact assessment of offshore renewable energy facilities. *Marine Policy* 33:332–338.
- Reed, M. S. 2008. Stakeholder participation for environmental management: a literature review. *Biological Conservation* 141:2417–2431.
- Regional Synthesis Workgroup of the Offshore Wind Environmental Technical Working Group. 2022. U.S. Atlantic Offshore Wind Environmental Research Recommendations [online database]. Developed with technical support from the Biodiversity Research Institute and the U.S. Offshore Wind Synthesis of Environmental Effects Research group. Available: <https://tethys.pnnl.gov/atlantic-offshore-wind-environmental-research-recommendations>. (March 2023).
- Rigano, J. P., and A. Delle Fave. 2017. Offshore wind: government control and the regulatory landscape. *Environmental Claims Journal* 29:80–85.
- RWSC (Regional Wildlife Science Collaborative). 2020. Regional Wildlife Science Entity for Atlantic offshore wind: a stakeholder driven vision. Available: https://neoceanplanning.org/wp-content/uploads/2021/08/RWSE_Vision_2020.pdf. (March 2023).
- Safford, T. G., M. L. Carlson, and Z. H. Hart. 2009. Stakeholder collaboration and organizational innovation in the planning of the Deschutes Estuary Feasibility Study. *Coastal Management* 37: 514–528.
- Southall, B., L. Morse, K. Williams, and E. Jenkins. 2021. Marine Mammals Workgroup report: State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: cumulative impacts. Report to New York State Energy Research and Development Authority, Albany.
- State of New York. 2019. Our climate act; climate leadership and community protection act. State of New York, Albany. Available: <https://climate.ny.gov/Our-Climature-Act>.
- ten Brink, T. S., and T. Dalton. 2018. Perceptions of commercial and recreational fishers on the potential ecological impacts of the Block Island Wind Farm (US). *Frontiers in Marine Science* 5:439.
- U.S. Department of Energy. 2021. Offshore wind market report, 2021st edition. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Washington, D.C.
- U.S. Office of the Federal Register. 2021. Executive Order 14008 of January 27, 2021: tackling the climate crisis at home and abroad. *Federal Register* 86:7619–7633.
- Wellstead, A. M., and R. Biesbroek. 2022. Finding the sweet spot in climate policy: balancing stakeholder engagement with bureaucratic autonomy. *Current Opinion in Environmental Sustainability* 54:101155.
- Williams, K., and J. Gulka. 2020. The 2018 state of the science on wildlife and offshore wind energy development: workshop proceedings. Biodiversity Research Institute, Portland, Maine.
- Williams, K., and J. Gulka. 2022. The 2020 state of the science on wildlife and offshore wind energy development: workshop proceedings. Biodiversity Research Institute, Portland, Maine.
- Yates, K. L., and D. S. Schoeman. 2015. Incorporating the spatial access priorities of fishers into strategic conservation planning and marine protected area design: reducing cost and increasing transparency. *ICES (International Council for the Exploration of the Sea) Journal of Marine Science* 72:587–594.