Portland Audubon · American Bird Conservancy · Oceana · Surfrider Foundation
Kalmiopsis Audubon Society · Cape Arago Audubon Society · Audubon Society of Lincoln City
Lane County Audubon Society · Umpqua Valley Audubon Society · Salem Audubon Society
Audubon Society of Corvallis · Rogue Valley Audubon Society · Klamath Basin Audubon Society
East Cascades Audubon Society · Redwood Region Audubon Society · Native Fish Society
Oregon Wild · Oregon Chapter of the American Cetacean Society · Coast Range Forest Watch
Oregon Shores Conservation Coalition · Friends of Haystack Rock · Rogue Climate

October 30, 2023

Jean Thurston-Keller
U.S. Bureau of Ocean Energy Management
Pacific Regional Office, Renewable Energy Section, Project Coordinator
760 Paseo Camarillo, Suite 102 (CM 102), CA 90101

Submitted via the Federal eRulemaking Portal: http://www.regulations.gov

Re: Comments on Draft Wind Energy Areas, Commercial Leasing for Wind Power Development on Oregon Outer Continental Shelf. BOEM-2023-033

Dear Ms. Thurston-Keller:

On behalf of our hundreds of thousands of members, our organizations—national, regional, and local—advocate for the conservation and sustainable management of our marine resources. Our members watch marine wildlife, recreate in coastal and ocean environments, and value healthy ocean ecosystems. We appreciate the opportunity to provide comments regarding the BOEM (Bureau of Ocean Energy Management) Draft Wind Energy Areas (WEAs) for future wind energy development off Oregon's coast. Collectively, our organizations have local, place-based knowledge as well as specific expertise and decades of experience in marine conservation and management—perspectives that inform our comments. As conservation groups, we have a strong interest in the BOEM process for siting and planning wind energy installations and appreciate the opportunity to provide our comments and input.

Floating offshore wind (FOSW) energy presents Oregon with an option in the transition away from polluting fossil fuels. It represents an opportunity to address the immense and urgent challenges posed by our climate crisis, which is already impacting marine life. However, the West Coast's renowned California Current Large Marine Ecosystem (CCLME), with its rich upwelling waters, is a crucially important natural resource with significant cultural, ecological, and economic values that must be carefully considered through all phases of siting, design, operation, and eventual decommissioning of any industrial energy development projects. Because of the exceptionally high ecological values of the CCLME, the non-industrialized nature of Oregon's marine environments and coast, the notoriously tempestuous conditions on the Pacific Ocean's outer continental shelf, and

the fact that offshore floating turbines are a brand-new technology, the highest level of analysis and a holistic, precautionary approach are needed. The WEAs and subsequent wind leases in Oregon must be considered in the context of the proposals BOEM is considering in the rest of the states that share the CCMLE. Although impacts from any one offshore wind project may be considered minimal, installation of a string of offshore wind projects off the West Coast is likely to interfere with the ecological connectivity that currently exists both along the length of the coast and, in some cases, across the Pacific.

As interested and affected parties, we submitted a letter to BOEM in October 2021 raising preliminary concerns regarding prospective Call Areas for wind energy development off Oregon's Coast. We then submitted substantial comments to BOEM in June, 2022 with specific and substantial comments on the Call Areas.

We appreciate that BOEM has created an additional opportunity to provide public comments on the Draft WEAs in response to our and many others' requests for greater public engagement. We also appreciate that BOEM was responsive to calls for spatial analysis and, in collaboration with the National Center for Coastal Ocean Science (NCCOS), has conducted a spatial planning analysis to determine areas of least conflict within the Oregon Call Areas, as many commenters and expert organizations, such as the National Marine Fisheries Service (NMFS) and Oregon Department of Fish and Wildlife (ODFW), had recommended.

However, opportunities for public engagement and analysis are still grossly inadequate for a project of this magnitude. As recent BOEM "open-house" meetings in Oregon revealed, the public has many questions, concerns, and opinions about how projects ultimately to be planned for the proposed WEAs will impact local communities and ecosystems. BOEM's response that analysis and answers will come later is not sufficient and does not build public confidence.

Moreover, we are disappointed that BOEM has roundly rejected the calls from many interested and affected parties to conduct a Programmatic Environmental Impact Statement (PEIS) for the West Coast earlier in the siting process, including a Cumulative Effects Analysis that would encompass the broader geography of the CCLME that BOEM will consider for wind energy development in the future. BOEM has justified decisions made during the current spatial planning process by the presence of additional habitat areas located outside the draft WEAs, and yet we expect that some of these additional areas will be proposed for wind energy development in the future, which could lead to an incremental whittling down of critical habitat for endangered species and other marine life. The tools used in the NCCOS analysis could be readily used in a broader geography to provide important insights on how current and proposed WEAs will function in the larger context of the CCLME. We urge BOEM to draft a PEIS, incorporating a broader geography of the West Coast's CCLME to allow for more comprehensive planning in the region (See Appendix).

In this letter, we provide comments on the BOEM-NCCOS analysis including specific recommendations regarding the analysis and draft WEAs. We have included an appendix to cover concerns that remain unaddressed, with specific recommendations to BOEM for improving its siting process, such as developing a compensatory mitigation process for fish and wildlife.

RECOMMENDATIONS TO MODIFY PROPOSED DRAFT OREGON WEAs

We appreciate that BOEM, in its designing of the draft WEAs, has reduced the Call Areas through a spatial analysis that considered areas of high potential conflict for seabirds and some highly sensitive wildlife species, such as Southern Resident Killer Whales, as well as habitat types that have high importance for wildlife.

However, areas with potential for conflict remain. These include areas specifically recommended for exclusion from consideration by NMFS to protect the critical habitat for marine protected species including endangered Leatherback Sea Turtles, Humpback Whales, and Blue Whales, as well as high value habitat areas for deep sea corals that provide essential habitat for a range of fish species. We urge BOEM to revisit the NMFS recommendations and to make the following adjustments to reduce impacts to protected species, birds, fish, and wildlife:

Draft WEA A (Coos)

Remove the northwestern portion of the WEA that overlaps the NMFS-recommended protected species leatherback turtle exclusion area. This corresponds with the NMFS' recommended exclusion areas for habitats and NMFS's recommended scenario. (See Draft WEA Siting Analysis, p. 71 (Fig. 3.27) and Appendix B, p. 130) [1]

Draft WEA B (Brookings)

Remove NMFS-recommended protected species (Blue/Humpback) foraging exclusion area, which will also reduce incursions into high value coral habitats and minimize potential Short-tailed Albatross conflicts (See Fig. 2). This corresponds with the NMFS-recommended scenario (See Draft WEA Siting Analysis, p. 71 (Fig. 3.27) Appendix B, p. 130).[2]

General for both WEAs

Add mapping layers to the NCCOS model for sponge habitat, meso-eddies, and areas that may serve as upwelling refugia before designating WEAs to ensure that the most productive areas in the ecosystem are buffered from impacts from future wind-industry development.

Add additional species to the Protected Species submodel within the Natural Resources submodel to ensure there is sufficient and meaningful consideration of wildlife conflicts. Currently only 5 of 26 protected species are included.

BOEM-NCCOS SPATIAL PLANNING ANALYSIS—COMMENTS

We appreciate BOEM's collaboration with NCCOS to conduct a spatial analysis for the Oregon Call Areas to find areas of least conflict. However, we have concerns about some aspects of the analysis and what was not included.

[1] BOEM-NCCOS, Draft: A Wind Energy Area Siting Analysis for the Oregon Call Areas (Aug. 2023), 71, and Appendix B, 130.
[2] Ibid.

In general, we are concerned that cultural and community values are notably absent from the planning matrix. In its letters to BOEM, the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw has identified the need to consider cultural values of viewsheds and marine life. The socioeconomic values of commercial fishing, recreational fishing, tourism based on wildlife viewing (including bird watching and whale watching) and scenic beauty of local state parks, plus housing capacity, are some examples of community values that should also be considered (See p. 17 for more details).

In addition, we are concerned that the range for the projected Levelized Cost of Energy (LCOE) for 2027 considered in the Wind submodel, $48-$80 per MWH, (Fig. 3.13)[3] is based on values that do not comport with recent press reports that inflation has already increased LCOE to the range of $72-$142 per MWH—almost double—in other regions.[4] Because inaccurate values may have the effect of distorting the entire model and may affect public perception about the economic viability of potential future projects and trust in the modeling process, we urge clarification on this matter.

NATURAL RESOURCES SUBMODEL

Our areas of highest concern pertain to the Natural Resources submodel. Overall, we are concerned that the BOEM analysis did not follow NMFS's recommendations for exclusions that would most reduce conflicts with species protected under the Endangered Species Act (ESA) and valuable habitats. We urge BOEM to reconsider the NMFS recommendations for sea turtles, whales, and corals and to add mapping and consideration for sponge habitat, special areas of upwelling, and important avian species left out of the NCCOS analysis.

PROTECTED SPECIES

We appreciate that the NCCOS-BOEM WEA Draft Siting Analysis considered "Protected Species" in its Natural Resources submodel. This is a crucial step for identifying areas of conflict/ least conflict. However, we are concerned that only 5 species were included due to "data and time limitations." A total of 26 protected species (marine mammals and turtles, fish, birds) are known to likely occur in the proposed WEAs. We urge NCCOS-BOEM to provide its rationale for how the 5 chosen species are representative for all the protected species that use the areas. Considering distribution data for additional species would create a more robust and useful spatial analysis. Because proper siting is the single most important factor in reducing impacts of wind energy development, we urge BOEM to take the time needed to conduct the necessary spatial analysis for protected species at the siting phase of the planning process.

<u>Additional Protected Species layers needed</u>

To provide for a more robust, realistic and meaningful analysis and reduce conflicts with threatened and endangered wildlife, we urge BOEM to include layers representing more of the 26 protected

[3] BOEM-NCCOS Draft Siting Analysis, 51.

[4] Reuters, "US offshore wind projects facing headwinds," (based on Department of Energy Offshore Wind Market Report 2023): https://www.reuters.com/sustainability/climate-energy/us-offshore-wind-projects-facing-inflation-headwinds-2023-09-11/

species known to use the proposed WEAs in the Protected Species submodel before WEAs are designated.

Endangered Whales

We appreciate that BOEM has eliminated critical habitat for Southern Resident Killer Whales in the draft WEAs. Only 74 individual Southern Residents remain in this unique population made up of three different pods, or closely related family groups. Areas off the central and southern Oregon coast are part of an important migratory corridor for two of the three Southern Resident pods (K and L), especially in winter and spring months when they travel between foraging hotspots off the Columbia River mouth and in Northern California. We also appreciate that this same removed area overlaps with critical habitat for Humpback Whales in the Coos Bay WEA and at the northern tip of the Brookings WEA.

However, proposed WEAs still overlap critical habitat for Humpback Whales and foraging habitat for Blue Whales, plus important feeding areas and migratory routes for several threatened and endangered cetaceans. NOAA species distribution models show that proposed WEAs are used by endangered Blue Whales, Fin Whales, and Humpback Whales—both the endangered Central American demographically independent population (DIP) and the threatened Mexico DIP—for foraging grounds.[5] The Coos Bay Call Area is of high conservation value for the Mexico DIP and the Brookings Call Area is of high conservation value to both the Mexico and Central American DIPs.[6] In addition, the endangered western Pacific Gray Whale also migrates in water along the U.S. West Coast.[7] Further, any site assessment, vessel traffic, construction, and cabling activities from the WEAs to shore will pass through critical habitat for Southern Resident Killer Whales, Humpback Whales and Leatherback Sea Turtles. So, while the draft WEAs have been reduced in size, wind energy development activities may still put these species and their habitats at risk. These impacts should be analyzed in a comprehensive look at impacts to species from offshore wind projects prior to leasing.

Current Biologically Important Area (BIAs) for these threatened and endangered marine mammals are based on assessments that are nearly ten years old, and new ones are due to be published soon. The new BIAs will be based on the most current and best available science for these marine mammals that use the WEAs for crucial parts of their life histories. We echo NMFS recommendation and urge BOEM to wait for updated BIAs to ensure that proposed WEAs are informed by the best available science.

Specifically, we urge BOEM to reconsider NMFS's recommended exclusion of the southern part of the Brookings WEA to avoid and minimize impacts for the threatened and endangered Humpback

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[5] 86 *Fed Reg*. 21082 (April 21, 2021).

[6] NOAA, NMFS, 2020. "Biological Report for the Designation of Critical Habitat for the Central America, Mexico, and Western North Pacific Distinct Population Segments of Humpback Whales (*Megaptera novaeangliae*)." Available: https://media.fisheries.noaa.gov/2021-04/Biological%20Report_HWCH_081420_updated_508.pdf?null=

[7] Mate BR, Ilyashenko VY, Bradford AL, Vertyankin VV, Tsidulko GA, Rozhnov VV, Irvine LM. 2015. "Critically endangered western gray whales migrate to the eastern North Pacific." *Biology Letters* 11: 20150071. http://dx.doi.org/10.1098/rsbl.2015.0071

Whales populations and for Blue Whales (See NCCOS Draft WEA Siting Analysis, Appendix B -NMFS Protected Species Data, 129-130).

We strongly urge BOEM to modify its draft by eliminating the southern portion of the Brookings WEA to reduce overlap with Humpback Whale critical habitat and Blue Whale foraging habitat.

Endangered Sea Turtles

We appreciate that BOEM has reduced overlap with habitat for critically endangered Pacific Leatherback Sea Turtles in the draft Coos Bay WEA. However, the northwestern corner of this WEA (essentially the southwest corner of the widely recognized biological hotspot Heceta Bank) still overlaps with leatherback critical habitat. BOEM staff has indicated that the portion of leatherback critical habitat in the WEA will likely not cause an adverse impact to the population because there remains significant critical habitat elsewhere. However, with the current siting process, the public has no assurance that BOEM will avoid locating future Call Areas and WEAs in those other critical habitat areas.

Adult Pacific leatherbacks migrate to and forage off the coast of Oregon from nesting beaches in the western Pacific. Leatherbacks are drawn to the Oregon portion of the CCLME—one of the most productive marine ecosystems of the world—to feed because the wind-driven upwelling and cool nutrient-rich waters create ideal foraging conditions with persistent concentrations of their preferred jellyfish prey.

In January 2012, NMFS designated ocean waters off Oregon north of Cape Blanco as critical habitat for Pacific Leatherback Sea Turtles.[8] Critical habitat extends from shore to 2,000 meters encompassing 25,004 square miles of ocean between Cape Blanco, OR and Cape Flattery, WA. Because leatherback populations have declined 95% over the last thirty years and recent studies show they are continuing to diminish, conserving access to critical habitat for foraging is essential to their survival, conservation, and recovery.[9]

Given the overlap of proposed Coos Bay WEA with leatherback critical habitat, we are concerned that any offshore wind leasing activities, development or operations in this turtle foraging area would adversely modify critical habitat and impact leatherbacks by impeding their migration, disturbing foraging behavior, or impacting their ability to access adequate prey resources.

This concern echoes those of NMFS, which specifically recommended exclusion of this area from the Coos Bay WEA in both their first- and second-choice recommended scenarios.[10]

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[8] 77 *Fed Reg*. 4,170 (January 26, 2012).

[9] Benson SR, Forney KA, Moore JE, LaCasella EL, Harvey JT, Carretta JV, 2020. "A long-term decline in the abundance of endangered leatherback turtles, *Dermochelys coriacea*, at a foraging ground in the California Current Ecosystem." *Global Ecology and Conservation*. Vol 24 https://doi.org/10.1016/j.gecco.2020.e01371; NOAA National Marine Fisheries Service, Office of Protected Resources and U.S. Fish and Wildlife Service, 2020 "Endangered Species Act status review of the leatherback turtle (*Dermochelys coriacea).*"

[10] BOEM-NCCOS Draft WEA Siting Analysis, Appendix B-NMFS Protected Species Data, 130.

It is important to note that in its critical habitat designation, NMFS identified wind energy projects in this area as an activity that may impact leatherback prey, which is, of course, crucial for the survival and recovery of this unique creature.[11]

BOEM maintains that concerns about wildlife, such as endangered leatherbacks, can and will be addressed later in the leasing process. At that time, in accordance with ESA section 7(a)(2), BOEM must consult with NMFS to ensure offshore wind development and operations do not directly impact leatherback sea turtles and are not likely to adversely modify their critical habitat.

However, we remain concerned that–later in the process—such concerns will be diminished or sidelined and BOEM will not be able to address cumulative impacts across a wider region. To avoid and minimize impacts to endangered Pacific Leatherback Sea Turtles, BOEM and industry would need to develop meaningful strategies to avoid and reduce impacts to these animals in their critical habitat. But what might those strategies to reduce "take" be? Are they feasible? We maintain that it is better to consider critical habitat in the siting process and urge BOEM to reconsider the NMFS recommendation regarding leatherback habitat and to exclude the northwest corner of the draft Coos Bay WEA.

HABITATS

We appreciate that BOEM excluded most known Rocky Reef Habitat Areas of Particular Concern (HAPCs) and most Essential Fish Habitat and Conservation Areas (EFHCA) from WEA consideration, as many commenters and NMFS subject-area experts recommended. We appreciate too that the BOEM-NCCOS analysis included specific consideration of shelf break and methane vents, which form carbonate habitats. We also appreciate that BOEM modeled the likely habitat for deep sea corals as part of its analysis, as many commenters requested.

However, we were disappointed to see that, owing to timing constraints, sponge habitats were not included in the NCCOS analysis. We urge BOEM to add a layer to the Habitats Natural Resources submodel to properly analyze and consider these important structure-forming habitats that contribute to the productivity of life in the larger marine ecosystem.[12]

In addition, we are concerned that BOEM located the Brookings WEA in high value areas for deep sea coral and sponge ecosystems. In particular, the WEA includes a high value Bamboo Coral Forest that we identified in our Call Area comments as well as areas with high suitability for bubblegum corals and areas that NMFS specifically recommended for exclusion.[13]

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[11] NOAA National Marine Fisheries Service, 2012. "Final Biological Report, Final Rule to Revise Critical Habitat Designation for Leatherback Sea Turtles," 23. Available: https://media.fisheries.noaa.gov/dam-migration/leatherback_criticalhabitat_biological-508.pdf/

[12] BOEM-NCCOS, Draft WEA Siting Analysis, Appendix C—NMFS Habitat, 134.

[13] Poti M, Henkel SK, Bizzarro JJ, Hourigan TF, Clarke ME, Whitmire CE, Powell A, Yoklavich MM, Bauer L, Winship, AJ, Coyne M, et al. 2020. "Cross-Shelf Habitat Suitability Modeling: Characterizing Potential Distributions of Deep- Sea Corals, Sponges, and Macrofauna Offshore of the US West Coast." Camarillo, CA: US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2020-021. 267 pp.

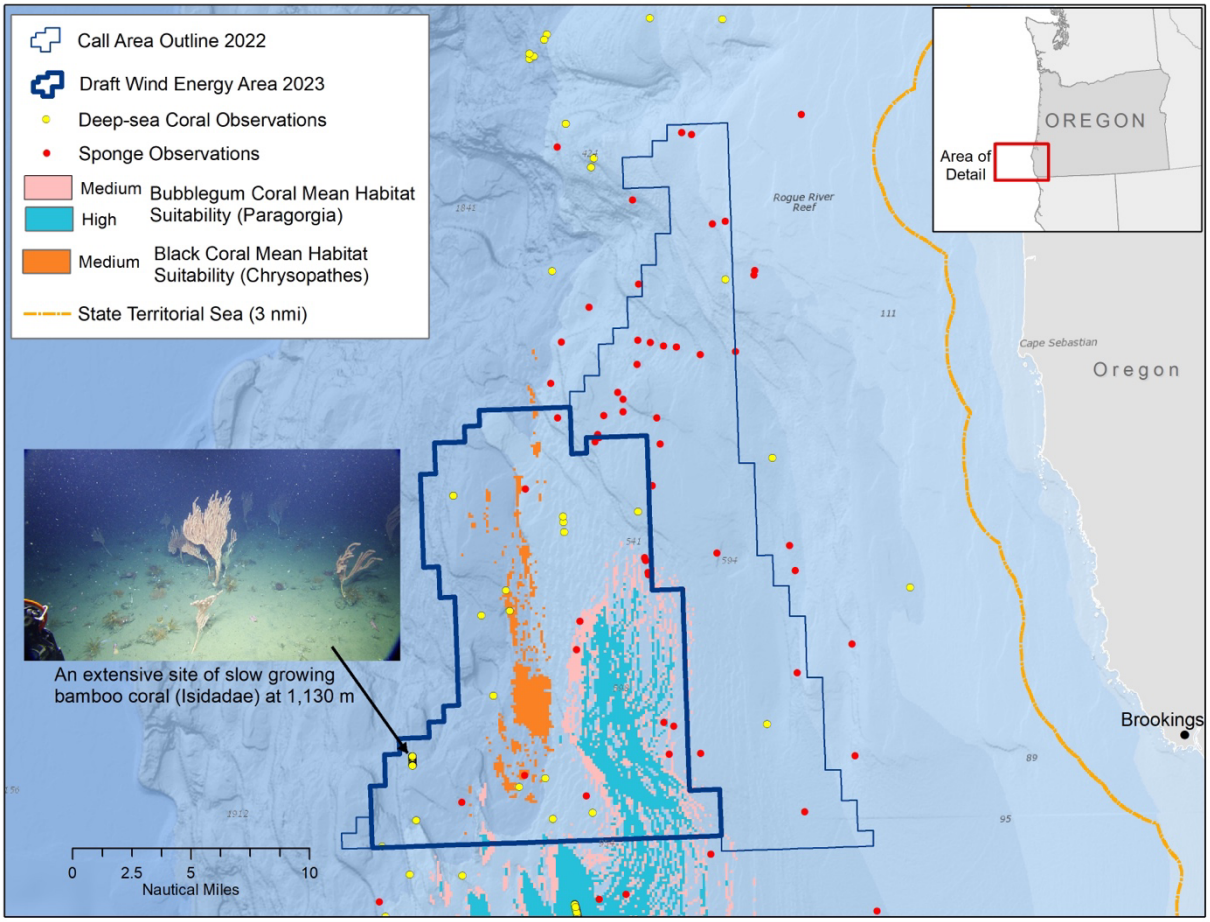

Figure 1. NOAA deep-sea coral and sponge observations and areas of medium and high habitat suitability for black corals and bubble gum corals (Poti et al. 2020). In 2016, scientists using a remotely operated vehicle discovered an extensive forest of over 900 coral colonies, including many large bamboo corals, at 1,130 meters depth inside the draft Brookings Wind Energy Area.

Deep-sea coral and sponge ecosystems are not only important to the biodiversity of our Oregon marine ecosystems, they also create a living seafloor community with three dimensional structures that form crucial habitat for groundfish, shellfish, and other marine life. These living habitats act as a refuge from predators, nursery grounds, and feeding areas. Corals and sponges have slow growth rates on the order of millimeters per year and are known to be extremely long lived from hundreds to even thousands of years old.[14]

For these reasons, any future offshore wind energy construction or operations activities must avoid areas that are known to contain or likely to contain sensitive and ecologically important coral and sponge communities. Corals and sponges are highly sensitive to physical disturbance and the

[14] Lumsden SE, Hourigan TF, Bruckner AW, Dorr G (eds.) 2007. "The State of Deep Coral Ecosystems of the United States." NOAA Technical Memorandum CRCP-3. Silver Spring, MD.

anchors and submarine cables used in wind energy operations would likely significantly damage these habitats. Given their slow growth rates, recovery could take hundreds of years, if at all.

Specifically, we urge BOEM to remove the extensive Bamboo Coral Forest at 1,130 meters in the Brookings Call area as identified by researchers with the Ocean Exploration Trust[15] from the draft Brookings WEA and to reduce areas known or likely to contain deep-sea coral and sponge ecosystems from the WEAs, as identified by NMFS in their recommendations (See NCCOS Draft WEA Siting Analysis, Appendix C—NMFS Habitat, 134, 140-141, 143), and including those identified by Poti et al. 2020[16] that have high suitability for bubble gum corals. BOEM should require detailed mapping and visual surveys (e.g. remotely operated vehicles) to confirm the absence of coral and sponge communities before any construction and operation activities commence.

Additional habitat layers needed

Beyond the habitat layers included in the NCCOS spatial analysis, NMFS has identified the importance of meso-eddies as locations of high productivity for all marine life. These were not included in the NCCOS spatial analysis owing to time constraints. It would be best to take the time to also map and add layers for these high-value areas as early as possible in the siting process– certainly before leasing.

In addition, we are concerned that the NCCOS modeling did not include maps or any consideration of the impacts of turbine-induced changes to upwelling on marine food webs. In our June 2022 letter, we identified the need for more information regarding the effects of wind turbine placement on the ocean process of upwelling. The expert state and federal wildlife agencies, including NMFS, ODFW, and PFMC also asked for modeling of turbine-array induced effects to upwelling and of how that might impact biological productivity in order to better characterize the nature of potential impacts on ecosystems before selecting WEAs. We understand this modeling is now underway, but it will not be completed for another 2 years and so BOEM has declined to include it in this WEA siting process.

Understanding this issue is important because there is growing concern and peer-reviewed research indicating large wind farms may affect ocean circulation and upwelling. Concerns have been raised about the impacts of wind reduction in the wake of offshore turbine arrays to wind-driven upwelling and how that might affect the biota that form the basis for ocean food webs.[17] Most research about how wind energy arrays affect ocean hydrodynamics and marine biota has thus far focused on

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[15] See Nautilus Live Ocean Exploration Trust. "Bamboo Corals off the Oregon Coast," at: https://nautiluslive.org/album/2016/06/17/bamboo-corals-oregon-coast

[16] Poti et al., 2020.

[17] Broström G. 2011. On the influence of large wind farms on the upper ocean circulation. Journal of Marine Systems 74: 585-591; Raghukumar K, Chartrand C, Chang G, Cheung L, Roberts J. 2022. "Effects of floating offshore wind turbines on atmospheric circulation in California." *Frontiers in Energy Research*, 1 June 2022. https://doi.org/10.3389/fenrg.2022.863995; Daewel U, Akhtar N, Christiansen N, Schrum C, 2022, "Offshore wind farms are projected to impact primary production and bottom water deoxygenation in the North Sea," *Nature Communications Earth & Environment* 3:292: https://doi.org/10.1038/s43247-022-00625-0

European fixed-bottom facilities located in shallower waters,[18] conditions very different than the CCLME. Upwelling underlies the productivity of the entire CCLME, but areas of upwelling are particularly pronounced and reliable south of Cape Blanco, including in the Brookings WEA, due to an oceanographic jet created by the interaction of winds with the large headland there. Wind stress curl is a major force causing the wide upwelling zone in southern Oregon,[19] and large-scale offshore wind farms have been found to reduce wind stress and cause longitudinal shifts in the location of upwelling.

This could have wide-ranging effects on Oregon's marine ecosystems from primary productivity through apex predators. For example, Black et al. (2011) identified a seasonal component to the dependency of various species on upwelling and found that salmon growth and Cassin's Auklet fledging success could be particularly sensitive to changes in seasonal upwelling off Oregon.[20]

In addition, new research on federal threatened / state endangered Marbled Murrelets captured along the central coast of Oregon indicates that while these seabirds typically use local upwelling areas created by known submarine features and "fronts," such as those identified through the NCCOS spatial planning process, the birds also transit long distances away from breeding grounds when ocean conditions are poor. The southern coast of Oregon is one area that was consistently used by Marbled Murrelets in years when conditions along the central coast were still recovering from a marine heatwave (Garcia-Heras et al., in review).[21] In other words, the high wind areas of the Brookings WEA may well act as an upwelling refugium providing food for seabirds and marine mammals when productivity in other areas flags.

Because the frequency of anomalous ocean conditions is expected to increase in the future, the importance of southern Oregon offshore areas in sustaining the biological communities of the CCMLE may increase as well, resulting in greater potential for fish and wildlife interactions with wind turbines.

Given the fundamental importance of upwelling to the productivity of Oregon's offshore waters (and to the entire CCLME) and the uncertainty about wind turbine impacts on this productivity, we

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[18] NOAA NMFS, 2023, "Fisheries and Offshore Wind Interactions: Synthesis of Science," 50-55.

[19] Castelao, RM, Hao L, 2018. "Upwelling jet separation in the California Current System," *Scientific Reports* 8: 16004, https://doi.org/10/1038/s41598-018-34401-y

[20] Black BA, Schroeder ID, Sydeman WJ, Bogard SJ, Wells BK, and Schwing FB. 2011. "Winter and summer upwelling modes and their biological importance in the California Current Ecosystem," *Global Change Biology* 17: 2536-2545; See also: Ballance LT, Pitman RL, Fiedler PC. 2006, "Oceanographic influences on seabirds and cetaceans of the eastern tropical Pacific: a review," *Progress in Oceanography* 69:360–390; Ware DM, Thomson RE, 2005, "Ecology: bottom–up ecosystem trophic dynamics determine fish production in the Northeast Pacific," *Science* 308:1280–1284; Burger AE, 2003, "Effects of the Juan de Fuca Eddy and upwelling on densities and distributions of seabirds off southwest Vancouver Island, British Columbia," *Marine Ornithology* 31:113–122; Peery MZ, Newman SH, Storlazzi CD, Beissinger SR, 2009, "Meeting reproductive demands in a dynamic upwelling system: foraging strategies of a pursuit-diving seabird, the marbled murrelet," *Condor* 111:120–134.

[21] Garcia-Heras M., Wolf C., Bailey Guerrero JA, Adrean LJ, Nelson SK, Roby DD, Betts MG, Rivers JW. "Marine habitat use and movement in response to ocean warming by a threatened forest-nesting seabird," *Global Ecology and Conservation* (in review).

strongly urge BOEM to complete modeling of turbine-induced effects on upwelling in the CCLME as soon as possible so findings can inform project siting and consideration.

We also strongly urge BOEM to complete modeling of interannual and seasonal trends in upwelling along the Oregon coast in order to identify areas that may serve as crucial upwelling refugia that could be impacted by future turbine installation. Areas likely to serve as upwelling refugia should be excluded from the WEAs until better information is secured.

MARINE BIRDS/ SEABIRDS

We appreciate that the BOEM-NCCOS Draft WEA Siting Analysis included a robust seabird submodel within the Natural Resources submodel. The Marine Bird submodel integrates data from Lierness et al., 2021[22] with findings from the 2017 and 2018 vulnerability and displacement analyses conducted by USGS.[23] We were glad to see that results of this analysis matched with findings from the analysis that we conducted independently (with the same data sets and input from Oregon's Department of Land, Conservation, and Development (DLCD), and several technical experts) and submitted as part of our June 2022 comments regarding the Call Areas.

However, we remain concerned that some avian species—not well represented in the meta-analysis—are vulnerable and need special consideration in the siting phase of project development, given either their status as protected species and/ or the specific nature of their biology and life histories:

Short-tailed Albatross

The federally endangered Short-tailed Albatross, which nests on several small islands off the coast of Japan but forages in CCLME waters including off the Oregon coast, was not included in the seabird submodel because of low sample size and so did not meet the model requirements. However, satellite-tagged juvenile Short-tailed Albatross documented off southern Oregon indicate that birds spend time in the continental shelf area during the winter months. Although existing data is limited and detections are scattered, there is a cluster of detections in the northwest section of the draft Coos Bay WEA and generally more detections in the eastern half of both WEAs, especially along the eastern portion of the Brookings WEA. [24] (See Fig. 2) These detection clusters overlap with

[22] Leirness JB, Adams J, Ballance LT, Coyne M, Felis JJ, Joyce T, Pereksta DM, Winship AJ, Jeffrey CFG, Ainley D, Croll D, Evenson J, Jahncke J, McIver W, Miller PI, Pearson S, Strong C, Sydeman W, Waddell JE, Zamon JE, Christensen J. 2021. "Modeling at-sea density of marine birds to support renewable energy planning on the Pacific Outer Continental Shelf of the contiguous United States." Camarillo, CA: US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2021-014. 385 pp.

[23] Adams J, Kelsey EC, Felis JJ, and Pereksta DM. 2017. "Collision and displacement vulnerability among marine birds of the California Current System associated with offshore wind energy infrastructure" (ver. 1.1, July 2017). U.S. Geological Survey Open-File Report 2016-1154, 116 pp, https://doi.org/10.3133/ofr20161154.; Kelsey EC, Felis JJ, Czapanskiy M, Pereksta DM, Adams J. 2018. "Collision and displacement vulnerability to offshore wind energy infrastructure among marine birds of the Pacific Outer Continental Shelf." *Journal of Environmental Management*, 227: 229-247.

[24] Orben, RA., O'Conner AJ, Suryan, RM, Ozaki K, Sato F, Deguchi T. 2018, "Ontogenetic changes in at-sea distribution of immature short tailed albatrosses *Phoebastria albatrus*," *Endangered Species Research* 35: 23-37. https://doi.org/10.3354/esr00864

the Blue and Humpback Whale foraging/ exclusion area and further support our recommendation to remove that area from the Brookings WEA.

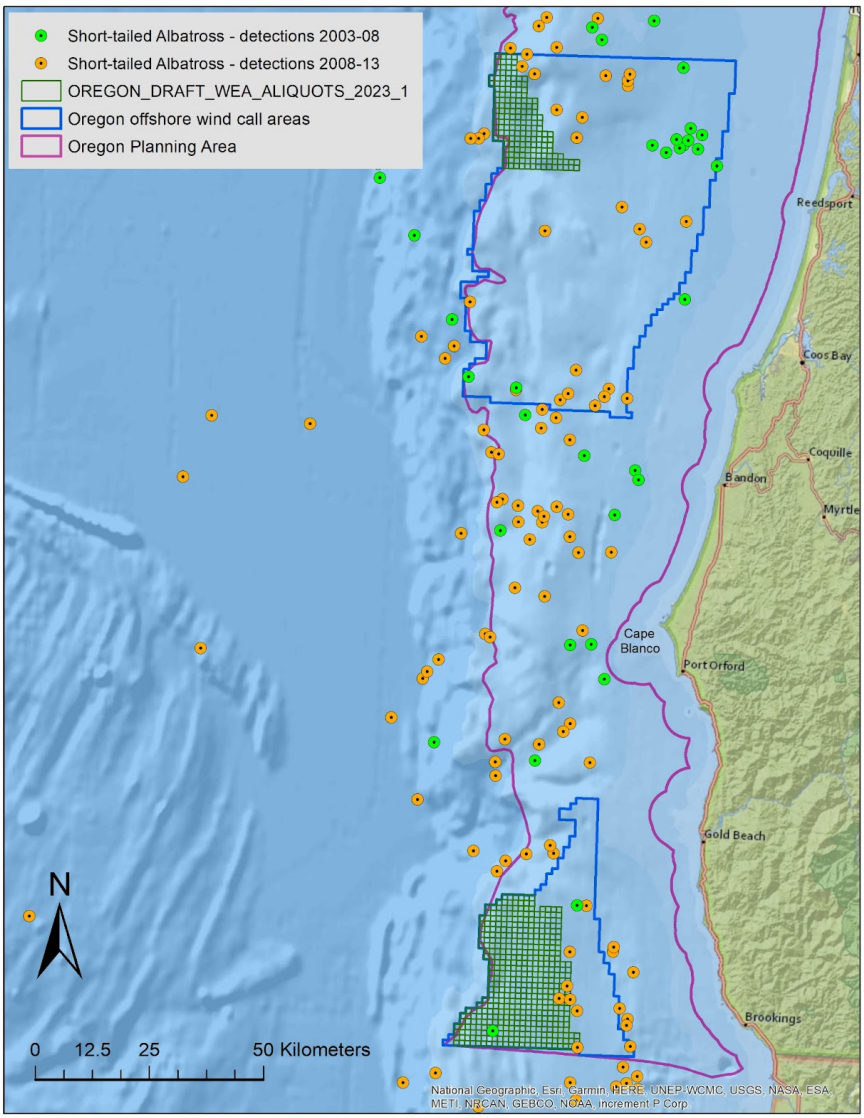

Figure 2. Locations of satellite-tagged juvenile Short-Tailed Albatross that forage in Oregon's offshore waters indicate foraging in proposed Wind Energy Areas (Orben et al., 2018)

As recovery efforts for this species continue with some success, these birds may become more common in the draft Oregon WEAs, increasing the chance of impacts.[25] More telemetry studies would provide more data and likely show more detections of Short-tailed Albatross throughout the proposed WEAs.

[25] U.S. Fish and Wildlife Service. 2020. "Short-tailed Albatross (*Phoebastria albatrus*), 5-year review: Summary and evaluation. Anchorage, Alaska." Available at: https://www.st.nmfs.noaa.gov/Assets/nationalseabirdprogram/doc4445.pdf

Because albatross are long-lived species, with limited annual reproductive capacity, their populations may be especially vulnerable to collision or displacement given their regular use of Oregon's offshore areas for foraging.[26] Also, because these dynamic soaring seabirds rely on wind currents for their gliding flight and have less control during high wind conditions, albatross may be uniquely vulnerable to collision with wind energy infrastructure.

More information is needed regarding the behavior and location of these birds. We urge BOEM to support tagging studies for Short-tailed Albatross and to develop meaningful strategies to avoid and reduce impacts for this important protected species if there is overlap with WEAs. BOEM should take a precautionary approach that considers these vulnerabilities in identifying and selecting development sites that minimize environmental impacts.

Leach's Storm Petrel

Though not currently endangered, the Leach's Storm Petrel is an Oregon sensitive species that has experienced a 30% population decline globally over the past 50 years.[27] Oregon hosts an estimated 482,000 nesting Leach's Storm Petrels that breed in colonies on islands off the coast.[28] Almost all of the Oregon breeding population nests on islands off the south coast between Bandon and Brookings, and this is the largest breeding congregation on the West Coast. Predicted densities of Leach's Storm Petrels off the Oregon Coast indicate spring and summer densities are highest to the west of the draft Brookings WEA where they are known to forage.[29]

In our letter regarding the Brookings Call Area, we indicated that Leach's Storm Petrels nesting in southern Oregon would very likely need to regularly transit the very area slated for wind energy development as they fly from their breeding grounds to foraging areas in deeper waters to the West. We recommended a satellite tagging study to determine the movements of Leach's Storm Petrels to inform the refinement of WEAs and to develop mitigation measures to minimize impacts.

Brand new telemetry data documenting Storm Petrel foraging behavior was collected in summer 2023 by Oregon State University researchers in conjunction with the Oregon Islands National Wildlife Refuge (birds breed on nearshore rocks that are part of the refuge). While the map of telemetry data (see Fig. 3) is preliminary, based on the research of OSU PhD candidate Keenan Yakola, it provides more concrete evidence that Leach's Storm Petrels do indeed transit the proposed Brookings WEA—from nesting areas to foraging areas.

Leach's Storm Petrels nest in burrows so their breeding habitat is constrained to offshore islands that have enough soil to accommodate these burrows. Oregon's south coast has a higher density of suitable soil-topped islands compared to other areas. In other words, these birds are obligate burrow nesters that cannot easily go somewhere else to nest.

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[26] Kelsey et al., 2018.

[27] http://datazone.birdlife.org/species/factsheet/leachs-storm-petrel-hydrobates-leucorhous/text

[28] Naughton M, Pitkin D, Lowe R, So, K. 2007. "Catalog of Oregon Seabird Colonies," Biological Technical Publication (Report No. BTP-R1009-2007). Report by US Fish and Wildlife Service (USFWS).

[29] Lierness et al., 2021.

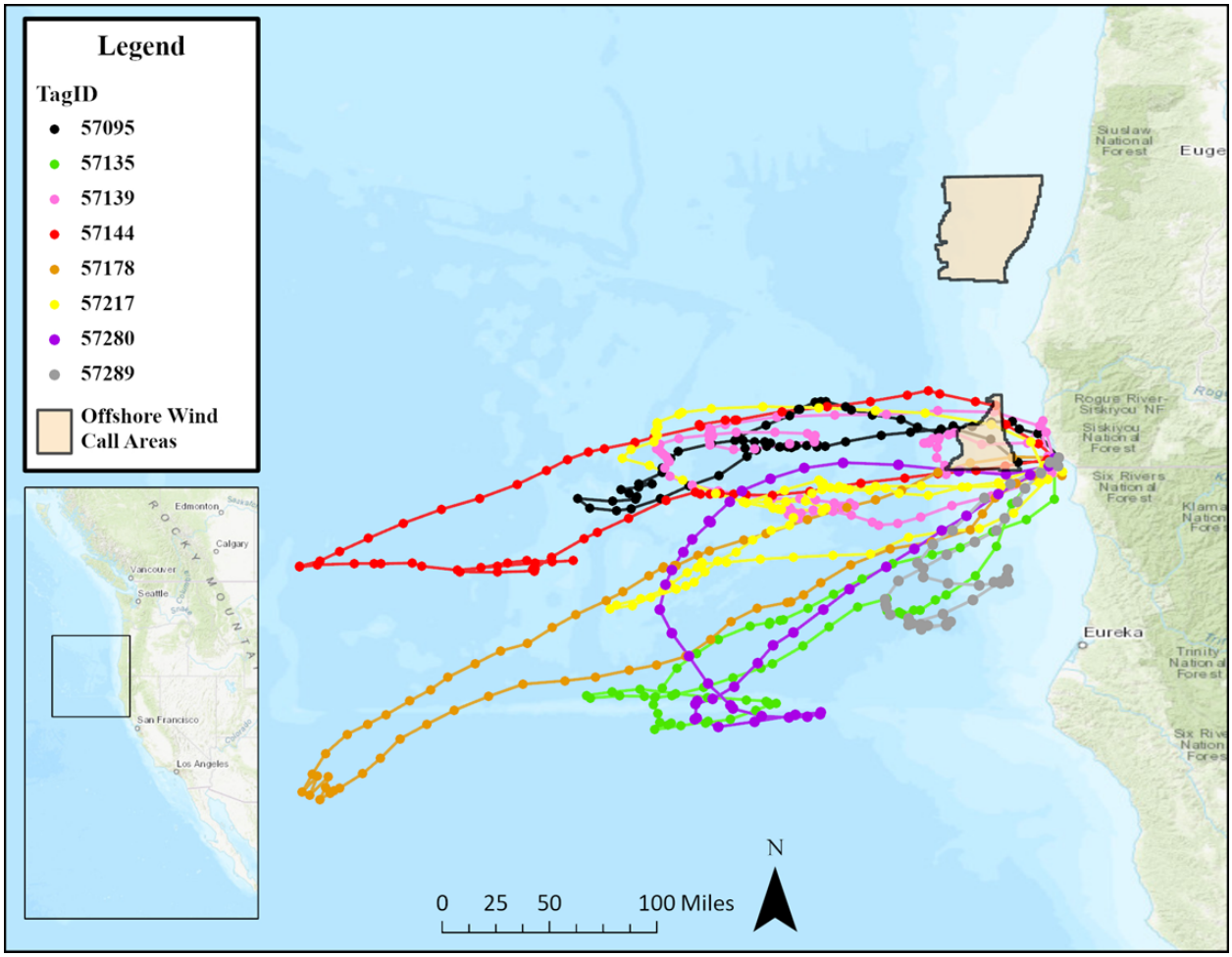

Figure 3. Preliminary data from OSU PhD student Keenan Yakola and provided by Don Lyons (Director of Conservation Science, National Audubon Society)

Leach's Storm Petrels are also known to be particularly vulnerable to impacts from artificial lighting and have been known to "fall out" in large numbers on lighted oil platforms in the Atlantic Ocean, apparently attracted by artificial lighting.[30] They have also been documented to "fall out" on fishing boats apparently attracted by the lights. Adams et al. 2017[31] ranks this species as "medium" vulnerability to offshore wind collision.[32] Fledgling petrels (and other Procellarids) are most likely to be impacted by light pollution[33] making the proximity of the Brookings WEA to Oregon colonies particularly concerning.

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[30] Collins SM, Hedd A, Fifield DA, Wilson DR, Montevecchi WA. 2022. "Foraging Paths of Breeding Leach's Storm-Petrels in Relation to Offshore Oil Platforms, Breeding Stage, and Year." *Frontiers in Marine Science*, 9:816659. https://doi.org/10.3389/fmars.2022.816659

[31] Adams et al., 2017

[32] Ibid.

[33] Rodríguez A, Rodríguez B. 2002. "Attraction of petrels to artificial lights in the Canary Islands: effects of the moon phase and age class." *Ibis*, 151: 299-310.

Given the location of the draft Brookings WEA in relation to known high concentrations of nesting and foraging Leach's Storm Petrels, we think this issue merits more consideration earlier in the BOEM process. We urge BOEM to support continued research on the Leach's Storm Petrel transits with satellite tagging and, most importantly, to consult with subject matter experts to discern possible approaches to minimize impacts to these birds –including evaluation in the WEA siting process whether reducing or shifting the footprint of the Brookings WEA should be considered at this time. If not, we request that BOEM explain the path forward for addressing this concern.

Marbled Murrelet

At-sea densities for the Marbled Murrelet in Oregon are highest along the central and south coasts, with particularly high densities inshore of the Coos Bay Call Area.[34] Marbled Murrelets are known to forage primarily in areas close to the coast in spring and summer when they are nesting onshore, but there is little data available regarding the non-breeding season distribution and behavior of this Federally-threatened and State-endangered bird, as acknowledged in BOEM's draft EA for the Humboldt WEA. If birds move offshore during this time period, they may be susceptible to displacement from foraging grounds by wind installations, as has been documented for other members of the alcid family.[35]

In addition, as indicated above, recent research suggests that Marbled Murrelets may transit long distances to forage in upwelling refugia when conditions in local feeding areas are poor.[36] These birds also experience a flightless period during the pre-basic molt, which may last up to two months during the late summer and fall. This may heighten their dependency upon certain areas of the ocean and increase their vulnerability to displacement and disturbance at this time. Ship disturbance has been documented at high rates for the Marbled Murrelet and may increase energetic demands and decrease overall fitness of individuals.[37] This makes increased ship traffic related to offshore wind installations a concern for Marbled Murrelets.

We recommend BOEM support research examining Marbled Murrelet fall and winter distribution and behavior in areas expected to be impacted by floating offshore wind development. There is also a need to better identify nearshore foraging hot spots during the breeding season to allow for minimization of ship disturbance. Both of these items could be accomplished with murrelet tracking studies. In addition, as indicated above in the Habitats submodel section, we recommend that BOEM map areas of critical prey abundance and likely upwelling refugia and include them as layers in the spatial analysis to avoid locating FOSW infrastructure in potential Marbled Murrelet foraging areas.

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[34] Strong CS, 2020. "Marbled Murrelet population monitoring in Conservation Zone 3, Oregon, during 2020," Annual Report to the U.S. Fish and Wildlife Service. Crescent Coastal Research, Crescent City, California. 27 p.

[35] Adams et al., 2017.

[36] Garcia-Heras et al., in review.

[37] Marcella TK, Gende SM, Roby DD, and Allignol A, 2017. "Disturbance of a rare seabird by ship-based tourism in a marine protected area," *PLOS ONE*, 12(5), e0176176. https://doi.org/10.1371/journal.pone.0176176

Tufted Puffin

The Tufted Puffin, an Oregon sensitive species,[38] is another alcid known to occur in the vicinity of the WEAs that has been precipitously declining in Oregon.[39] These birds forage in offshore waters of the continental shelf, are obligate burrow nesters, and have a poorly-understood winter range. Tufted Puffins have also been identified as having high vulnerability to displacement owing to wind energy arrays, and displacement vulnerability is well documented for alcids at European windfarms.[40] Tufted Puffins are known to nest on several offshore seastacks east of the Brookings WEA,[41] but offshore foraging hotspots and commuting routes have not yet been identified. We recommend BOEM support research examining the year-round distribution and behavior of Tufted Puffins in areas expected to be impacted by floating offshore wind development.

FISHERIES SUBMODEL

We appreciate that the BOEM-NCCOS analysis of commercially and recreationally valuable juvenile and larval fish distribution for 3 species was considered in the FISHERIES submodel. This is important because modeling from other areas suggests that turbine arrays can have significant cumulative impacts on dispersal and transport of larval-phase organisms.[42]

We strongly urge BOEM to also more thoroughly consider the spatial distribution of additional species including euphausiids (krill) and those often called "forage fish" (e.g. anchovies, smelt, herring) because they form the base of the food web for all bird, fish, and wildlife in the CCLME. This recommendation aligns with that of NMFS.[43] BOEM should identify trends in seasonal distribution and abundance and map areas known to host an abundance of critical prey resources—especially krill and forage fish—for seabirds, fish, and marine mammals.

Additional layers needed

We recommend that BOEM map areas of critical prey abundance and include them as layers in the spatial analysis to avoid locating FOSW infrastructure in foraging hotspots.

CONCERNS ABOUT ONSHORING FROM PROPOSED WEAs

BOEM's notice regarding the draft WEAs asked specifically for information related to how future offshore wind energy facilities in the proposed WEAs will come ashore. We appreciate BOEM's effort to be forward-thinking on this complex set of issues. Given that there is no specific onshoring proposal at this time, we want to provide information and reiterate general concerns with the aim of identifying potential areas of future conflict.

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[38] Oregon Conservation Strategy. 2016. Oregon Department of Fish and Wildlife, Salem, Oregon.

[39] Pearson SF, Keren I., Hodum PJ, Drummond BA, Hipfner JM, Rojek NA, Renner HM, and Thomas SM, 2023, "Range-wide changes in the North American Tufted Puffin *Fratercula cirrhata* breeding population over 115 years," *Bird Conservation International*, 33, e24. https://doi.org/10.1017/S0959270922000193.

[40] Kelsey et al., 2018; Welker J and Nehls G., 2016 "Displacement of seabirds by an offshore wind farm in the North Sea," *Marine Ecology Progress Series*, 554: 173-182.

[41] Naughton et al. 2007.

[42] NOAA NMFS, 2023, "Fisheries and Offshore Wind, Synthesis of Science," 60-61.

[43] BOEM-NCCOS, Draft WEA Siting Analysis, Appendix F, 173.

Oregon's nearshore marine environment and coastal zone are extremely important to the economy, ecology, and citizens of our state. According to the National Ocean Economics Program, Oregon's ocean economy is worth $3.1 billion annually and supports more than 43,000 jobs.[44] More than 25,000 of those jobs are in tourism, recreation, and fishing—the sectors that may be most impacted by siting of offshore wind farms and related infrastructure. The coast also has high conservation values, with a high percentage of the coastline in state parks and recreation areas plus the Oregon Islands National Wildlife Refuge, which contains critical habitat for over 1 million nesting seabirds and thousands of marine mammals.

A 2015 survey by DHM Research found that "the coast" is one of the things Oregonians value most about our state. More than 80% of Oregonians report visiting the coast each year for tourism, representing over $2.4 billion in expenditures from ocean recreation alone.[45] Wildlife viewing—including bird and whale watching—as well as fishing, provides important economic value–as well as enjoyment and quality of life for residents and visitors.[46] More than half of the Oregon State Park system's greater than 50 million visits occur on the coast, creating $618 million in annual state park visitor spending. In Coos Bay, Sunset Bay State Park alone provides $24 million annually, generating 382 jobs.[47]

Among the cherished shoreline resources that could be impacted by cable installation and maintenance and substation facilities to bring energy ashore are State Parks, rocky habitat areas protected under Oregon's Rocky Habitat Management Strategy, beaches that are popular sites for recreation, and vulnerable fish and wildlife habitat areas, such as estuaries, including those used by threatened coastal coho.

To ensure that crucial economic, social, and ecological values of Oregon's Coast are effectively evaluated and conserved in the FOSW siting process, BOEM must carefully consider applicable enforceable policies of Oregon's Coastal Management Program early in the planning process to determine whether WEAs and subsequent lease areas will be feasible in terms of their onshore components.

Impacts to birds, fish, wildlife, and other ocean users associated with FOSW will occur within state waters (Oregon's Territorial Sea), along our coastal zones, and on land as well, with substantial construction of infrastructure to bring energy to shore, including cables, substations, onshoring facilities, and facilities to connect FOSW energy with transmission lines. In addition, upgrades to

[44] National Ocean Economics Program, 2019 data for all ocean sectors in coastal counties: https://www.oceaneconomics.org/Market/ocean/oceanEconResults.asp?IC=N&dataSource=E&selState=41&selCounty=41000&selYears=All&selSector=8&selIndust=AL00&selValue=All&selOut=display&noepID=unknown

[45] La Franchi C, Daughtery C. 2011. "Non-Consumptive Ocean Recreation in Oregon: Human Uses, Economic Impacts, and Spatial Data." Prepared for Oregon Dept. Land Conservation and Development and Oregon's Territorial Sea Plan.

[46] Dean Runyan Associates. 2009. "Fishing, Hunting, Wildlife Viewing and Shellfishing in Oregon, 2008 State and County Expenditure Estimates." Prepared for the Oregon Department of Fish and Wildlife and Travel Oregon, p. 18.

[47] Dean Runyan Associates, "Oregon Travel Impacts 2003-2020," Prepared for Travel Oregon. Available at: https://industry.traveloregon.com/research/category/economic-impact/

port facilities and significant dredging of harbors and estuaries may also be needed to support installation and maintenance of FOSW projects.

Oregon's Territorial Sea Plan establishes guiding principles to protect and coordinate management of these critical nearshore ocean interests including: enforceable policies, state and federal coordination, extended protections and coordination authority for Oregon's seafloor and rocky habitats, and includes a chapter on renewable energy. The state has further established a "Marine Renewable Energy Geographic Location Descriptor" (GLD) that extends federal consistency requirements to the 500-fathom contour (914 meters) in recognition of the nearshore impacts of siting offshore renewable energy.[48] It should be noted that significant portions of the proposed WEAs fall within Oregon's Marine Renewable Energy GLD. As such, any future lease sale, site assessment, and construction and operations phases will be subject to Oregon's federal consistency review authority under the Coastal Zone Management Act.

We appreciate that BOEM has collaborated with the State of Oregon. However, the siting process should include more robust, up-front consideration of the compatibility of proposed WEAs with Oregon's laws and policies related to Coastal Zone Management, State and Local Land Use Planning, and the Territorial Sea Plan, especially for the onshoring portion of wind energy development including laying cable, building landings, and constructing transmission lines.

We urge careful consideration of the sequencing of the federal and state processes so that projects can be evaluated in their entirety—including ocean, coastal, and terrestrial components—rather than in a piecemeal manner, which would preclude effective consideration of whole-project and cumulative impacts. This is particularly important given the existing constraints, values and uses of Oregon's ports and estuaries adjacent to the WEAs that will need significant modifications to accommodate FOSW onshore facilities. Early engagement and strong community process is necessary to avoid and minimize impacts to nearshore coastal and estuarine resources, to protect human uses and values, and to support appropriate identification of WEAs and associated onshoring.

If BOEM proceeds with decisions about WEAs without sufficient consideration of onshoring aspects of wind energy development—and how they will or will not be compatible with the enforceable policies of Oregon's Territorial Sea Plan, Coastal Management Program and State Land use laws—serious obstacles may arise later in the process, after a great deal of time and money has been invested and at a point when it will be far more difficult to make adjustments to avoid and minimize impacts.

For example, seafloor habitat areas, nearshore resources, and human uses protected under Oregon's Territorial Sea Plan and State Land Use Law (Goal 19) will need to be considered in a State

[48] Oregon Department of Land Conservation and Development Coastal Management Program, "State of Oregon Geographic Location Description: Analysis of Reasonably Foreseeable Effects of Federal Actions Related to Marine Renewable Energy Projects on Resources and Uses Occurring within the Federal Waters of the Oregon Ocean Stewardship Area." n.d. https://www.oregon.gov/lcd/OCMP/Documents/OCMP_MarineRenewable_GLD_final.pdf

Land Use Law context. Impacts to wildlife, such as marine mammals, seabird nesting and foraging areas—including those used by the state and federally threatened Marbled Murrelet, found inland from the Coos Bay WEA—will also have to be considered in a State Land Use Law context (Goal 5), as well as a federal context. Activity in Oregon ports and estuaries must also comply with the enforceable policies of Oregon's Coastal Management Program, key coastal Statewide Land Use Goals (Goals 16, 17, 18, and 19), Section 401 of the Clean Water Act (implemented by Oregon), and the Oregon Conservation Strategy, among other state laws.

Leasing in federal waters will trigger an extensive and complex federal consistency process that will demand significant time, resources, and capacity from the State of Oregon. We urge BOEM to allow ample time to ensure meaningful coordination, consistent with 43 U.S.C. 1337(p)(8), between the Bureau and the State of Oregon. This will ensure that the State has time to expand capacity to adequately manage the State's process and public engagement in this process.

In delineating the WEAs, BOEM must ensure that onshoring facilities are sited to avoid impacting extremely valuable coastal wildlife habitat, recreational areas, and viewsheds in Oregon's coastal zone. Because we are concerned about conserving extremely valuable wildlife habitat and recreational areas in our coastal zone, we urge BOEM to consider specifically how infrastructure and activities associated with onshoring energy from proposed WEAs will affect these important values early in the siting process.

For the proposed Brookings WEA, these include but are not limited to:

- the estuaries of the Winchuck, Chetco, Pistol and Rogue Rivers, plus Myers and Hunter Creeks, some of which are state-designated as "natural" and which provide rearing and spawning habitat for threatened Southern Oregon-Northern California Coast Coho[49] and for the Green Sturgeon, northern DPS, a NMFS Species of Concern
- Oregon State Parks and Recreation Areas, including Crissey Field, Winchuck State Recreation Area, McVay Rock, Harris Beach State Park, Samuel H. Boardman Scenic Corridor and State Park units within it, Pistol River State Park, and Cape Sebastian State Park, Otter Point State Park
- Viewsheds of these State Parks, which include areas identified as both "Territorial Sea Plan (TSP) Special Area Viewsheds" and "TSP Scenic Class viewsheds," as mapped by OROWIND (TSP VISUAL RESOURCE MANAGEMENT maps)
- the Oregon Coast National Wildlife Refuge Complex, including dozens of offshore islands, as well as some important headlands, with sensitive seabird breeding and roosting habitat as well as haul out and breeding habitat for marine mammals, including critical habitat for Steller Sea Lions[50] and wilderness
- State designated Rocky Intertidal Areas, including Lone Ranch Beach, Harris Beach Recreation Area, Winchuck Beach, as well as popular beaches used for recreation

[49] NOAA NMFS, 2014. "Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (*Oncorhynchus kisutch*)."

[50] NOAA NMFS, Steller Sea Lion Critical Habitat: https://media.fisheries.noaa.gov/dam-migration/stellersealion_ch_or_ca.pdf

including Sport Haven Beach, Myers Creek Beach, the beach at Gold Beach and at Otter Rock State Recreation Area[51]

- Important Bird Areas: Goat Island, Whalehead Island and Mack Reef[52]
- Designated Rocky Habitat Management sites, including Brookings Research Reserve, Harris Beach Marine Garden, and the Pyramid Rock no-take area[53]
- Proposed critical habitat for threatened Marbled Murrelets[54]
- Critical habitat for threatened Silvery Phacelia[55]
- Critical habitat for threatened Green Sturgeon, southern DPS[56]
- Oregon Redwoods, Rogue River-Siskiyou National Forest

For the proposed Coos Bay WEA, these include but are not limited to:

- the estuaries of Coos Bay, the Umpqua River, Siltcoos River, and Tenmile, Tahkenitch, and Eel Creeks, some of which includes critical habitat for threatened southern DPS of Pacific Eulachon[57], for the southern DPS of Green Sturgeon[58] and for Oregon Coast Coho[59]
- Oregon State Parks and Recreation Areas, including Seven Devils State Recreation Area, Cape Arago State Park, Shore Acres State Park, Sunset Bay State Park, Yoachim Point State Park
- Viewsheds of these parks, which include areas identified as both "Territorial Sea Plan (TSP) Special Area Viewsheds" and "TSP Scenic Class viewsheds," as mapped by OROWIND (TSP VISUAL RESOURCE MANAGEMENT maps)
- the Oregon Coast National Wildlife Refuge complex, including dozens of offshore islands, as well as some important headlands, with sensitive seabird breeding and roosting habitat as well as haul out and breeding habitat for marine mammals and wilderness
- the Oregon Dunes National Recreation Area including its viewsheds

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[51] Oregon Parks and Recreation Department, Rocky Intertidal Areas: https://stateparks.oregon.gov/index.cfm?do=main.loadFile&load=_siteFiles/publications/43485 Oregons Rocky Intertidal Areas.pdf

[52] https://www.audubon.org/important-bird-areas/state/oregon

[53] Oregon, Management Designations for Marine Areas: https://www.eregulations.com/oregon/fishing/management-designations-for-marine-areas

[54] US F&WS, Proposed Marbled Murrelet Critical Habitat: https://ecos.fws.gov/ecp/species/4467

[55] Endangered and Threatened Wildlife and Plants; Threatened Species Status with Section 4(d) Rule for Sand Dune Phacelia and Designation of Critical Habitat, *Federal Register*, August 22, 2023.

[56] NOAA NMFS, Green Sturgeon, Southern DPS, Critical Habitat: https://media.fisheries.noaa.gov/2022-05/ch_2021mapseries_SturgeonGreen_SouthernDPS.jpg

[57] NOAA NMFS, Eulachon, Southern DPS, Critical Habitat: https://media.fisheries.noaa.gov/2022-05/ch_2021mapseries_Eulachon_SouthernDPS.jpg

[58] NOAA NMFS, Green Sturgeon, Southern DPS, Critical Habitat.

[59] NOAA NMFS, Oregon Coast Coho: https://media.fisheries.noaa.gov/2022-05/ch_2021mapseries_SalmonCoho_OregonCoastESU.jpg

- Proposed Critical habitat for the threatened Marbled Murrelet[60], the threatened Western Snowy Plover[61], and the threatened Pacific Marten, Coastal DPS[62]
- Critical habitat for threatened Green Sturgeon, southern DPS, waters[63]
- Western Snowy Plover State HCP Designated Management Areas: Coos Bay North Spit, Tenmile, North Jetty Umpqua River, Tahkenitch South[64]
- Important Bird Areas: Coos Estuary, Umpqua River Estuary, Tahkenitch Creek Estuary, Siltcoos Lake (and estuary), and Siuslaw River Estuary. These areas host tens of thousands of migratory shorebirds, waterfowl, and other bird species in the spring and fall.[65]
- State designated Rocky Intertidal Areas including Five Mile Point, Cape Arago State Park, Sunset Bay State Park, as well as popular beaches used for recreation, including Merchant's Beach, Lighthouse Beach, and Bastendorff Beach County Park[66]
- Designated Rocky Habitat Management sites, including Cape Arago Research Reserve and Gregory Point Research Reserve[67]

These widely recognized valuable coastal resources are located onshore latitudinally due east from the proposed WEAs. Depending on where onshoring facilities will ultimately be proposed, there may be fewer or additional valuable coastal resources that will need consideration. Also, we are aware that coastal Tribes have raised concerns about potential visual impacts on cultural resources. We strongly support early consultation with the Tribes.

In addition, local communities have identified questions and concerns about onshoring and transmission infrastructure that would ideally be considered earlier in the siting process. BOEM should collaborate with the State of Oregon's Department of Energy to identify likely onshoring scenarios early in order to consider siting concerns in the spatial planning process, certainly before leasing.

Beyond these coastal resources, it's important to underscore that ocean-based recreation makes a significant economic contribution to the State of Oregon and rural coastal economies and must be

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[60] US F&WS, Proposed Marbled Murrelet Critical Habitat: https://ecos.fws.gov/ecp/species/4467
[61] US F&WS, Snowy Plover Critical Habitat: https://databasin.org/maps/new/#datasets=f2b697689453493297c81c5765bf0999
[62] US F&WS, Proposed Pacific Marten, Coastal DPS, Critical Habitat: https://www.federalregister.gov/documents/2021/10/25/2021-22994/endangered-and-threatened-wildlife-and-plants-designation-of-critical-habitat-for-the-coastal
[63] NOAA NMFS, Green Sturgeon, Southern DPS, Critical Habitat: https://media.fisheries.noaa.gov/2022-05/ch_2021mapseries_SturgeonGreen_SouthernDPS.jpg
[64] Oregon Parks & Recreation Department, 2019 Annual Compliance Report of The Habitat Conservation Plan For The Western Snowy Plover, 4: https://www.oregon.gov/oprd/PCB/Documents/OPRD_WSP_HCP_2019_AnnualReportFinal_red_web.pdf
[65] https://www.audubon.org/important-bird-areas/state/oregon
[66] Oregon Parks and Recreation Department, Rocky Intertidal Areas: https://stateparks.oregon.gov/index.cfm?do=main.loadFile&load=_siteFiles/publications/43485 Oregons Rocky Intertidal Areas.pdf
[67] Oregon, Management Designations for Marine Areas: https://www.eregulations.com/oregon/fishing/management-designations-for-marine-areas

evaluated to effectively inform spatial planning for FOSW projects. We appreciate that BOEM has conducted a preliminary visual analysis and provided visualizations for development from specific sites on Oregon's coast. Visualizations for the Brookings WEA, which is closer to shore, demonstrate visual impacts to some viewpoints with high use by tourists, such as Cape Ferrelo.

To better inform siting of onshoring facilities, we also request that BOEM conduct an ocean recreational use study to analyze the spatial and economic interests of the recreational and coastal tourism industry with respect to wind energy. The data currently being used is from a study conducted by Surfrider Foundation in conjunction with the State of Oregon as part of the State's Territorial Sea planning process more than 10 years ago. Since that time, there has been a major boom in recreation and tourism along Oregon's coast and within our ocean.

In addition, we urge BOEM to model impacts to Oregon's nearshore beaches and ocean recreation. Because studies modeling full-scale buildout of wind farms have demonstrated atmospheric and oceanic circulation impacts in the wake of these farms,[68] the physical impacts of full-scale buildout—including wind and wave shadowing and sedimentation and beach profiling—should be modeled to understand impacts to nearshore circulation and the shoreline as it relates not only to ecology but also to recreation. These human recreational uses have not been identified nor considered in any the NCCOS model. Modeling these impacts early is critical to avoiding unintended consequences to existing nearshore uses that have cultural and economic values.

In identifying potential spatial issues with onshoring of energy generated by future turbine arrays within draft WEAs, we also urge BOEM to map hazards in areas where energy is mostly likely to be brought ashore. Hazards to consider include:

- Known landslide zones associated with the geology of the Franciscan Complex (available through the Oregon's Department of Geology and Mineral Industries (DOGAMI) SLIDO Database: https://www.oregon.gov/dogami/slido/pages/index.aspx
- Fault areas associated with the Cascadia Subduction Zone
- Wildfire hazard zones (available through the Oregon Wildfire Risk Explorer: https://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfire)

Finally, we strongly urge BOEM to limit the number of onshoring locations to minimize the proliferation of industrial infrastructure and help assure that Oregon's valued coastal scenic and recreational resources are not degraded.

SITING PROCESS RECOMMENDATIONS

We recognize that BOEM must integrate and respond to a wide array of public concerns in its complex wind energy siting process. It is our understanding—based on public presentations and dialogue with BOEM staff—that some concerns we have will be addressed later in the leasing, permitting or constructions and operations phase of the process. However, because siting is the most important part of the wind energy development process to minimize impacts to birds, fish,

[68] Raghukumar et al., 2022.

and wildlife, we maintain that some of these matters need to be addressed far earlier than in the "construction and operations" phase of the siting process.

Beyond providing specific input regarding the draft Oregon WEAs, we want to reiterate outstanding concerns and recommendations about BOEM's FOSW siting process. Please see the Appendix for our recommendations.

CONCLUSION

Oregon has exceptional marine natural resources with tremendous ecological, economic, and cultural values. These cherished values demand a thoughtful and rigorous approach to siting offshore wind facilities. We hope you will consider our specific recommendations and input regarding the proposed WEAs and about how to improve the siting process moving forward. We thank you for considering our comments and request that BOEM include them as part of the public record.

Sincerely,

Ann Vileisis, President
Kalmiopsis Audubon Society

Joe Liebezeit,
Assistant Director of Statewide Conservation
Portland Audubon

Lewis Grove,
Director of Wind and Energy Policy
American Bird Conservancy

Ben Enticknap,
Pacific Campaign Manager & Senior Scientist
Oceana

Phillip Johnson, Conservation Director
Oregon Shores Conservation Coalition

Charlie Plybon, Oregon Policy Manager
Surfrider Foundation

Joy Primrose, Oregon Chapter President
American Cetacean Society

Paul Engelmeyer,
Tenmile Creek Sanctuary Manager
Portland Audubon

Harv Schubothe, President
Cape Arago Audubon Society

Dawn Villaescusa, President
Steve Griffiths, Conservation Chair
Audubon Society of Lincoln City

Diana Wales, President
Umpqua Valley Audubon Society

David Harrison, Conservation Chair
Salem Audubon Society
Jim Fairchild, Conservation Chair
Audubon Society of Corvallis

Debbie Schlenoff, Conservation Chair
Lane County Audubon

Erin Ulrich, President
Rogue Valley Audubon Society

Kevin Spencer, President
Klamath Basin Audubon Society

Gail Kenny, President
Redwood Region Audubon Society

Mary Shivell, President
East Cascades Audubon Society

Mark Sherwood, Executive Director
Native Fish Society

Danielle Moser, Wildlife Coordinator
Oregon Wild

Max Beeken, Co-Director
Coast Range Forest Watch

Ashley Audycki
South Coast Regional Coordinator
Rogue Climate

Angela Benton, Board Chair
Friends of Haystack Rock

APPENDIX: SITING PROCESS RECOMMENDATIONS

Draft a Programmatic Environmental Impact Statement (PEIS), including a Cumulative Impacts Analysis

Over the past 2 years, BOEM has advanced consideration of multiple offshore wind projects off the West Coast, any one of which may have significant impacts on the California Current Large Marine Ecosystem (CCLME). While we appreciate the urgency to proceed with planning, we maintain that a PEIS including a cumulative impacts analysis should be completed as soon as possible in the siting process to ensure sufficient analysis and consideration is given to the many complex issues and data that should inform siting offshore renewable energy facilities.

In response to delineation of the Oregon Call Areas, a broad constituency of interested and affected parties from communities up and down the West Coast—plus state and federal agencies—requested a cumulative impacts analysis in the form of a PEIS. We are disappointed that BOEM has roundly rejected that request, but the need for cumulative impacts analysis remains. The NCCOS spatial modeling provides a useful framework for evaluation, and it is our understanding that a similar analysis was completed across a larger geography in the Gulf of Mexico. We continue to urge BOEM to conduct a PEIS, including a cumulative impacts analysis, across the broader geography of the CCLME.

As recognized by Council on Environmental Quality (CEQ) guidance, programmatic NEPA review is appropriate when there is a "decision to proceed with multiple projects that are temporally or spatially connected and that will have a series of associated concurrent or subsequent decisions."[69] The multiple floating offshore wind projects (six projects or Call Areas now proposed off the three West Coast states, *See Fig. 4*) are "spatially connected" because they are all located within the CCLME, and multiple migratory marine species depend on different high productivity areas within this ecosystem for different phases of their lives, including several threatened and endangered species such as Blue Whales, Humpback Whales, Southern Resident Killer Whales, and Green Sturgeon, as well as the Short-tailed Albatross.

One of the key reasons we urge preparation of a PEIS before designating WEAs is to ensure that there will be a full cumulative impacts analysis. Migratory species that travel north-south through the CCLME may encounter the impacts of several wind-energy projects, and the cumulative impacts of multiple encounters must be considered. There is also concern that turbine areas will displace fishers from fishing grounds while wildlife will be displaced from foraging grounds, creating a situation where both fishers and wildlife will be crowded into smaller areas, potentially creating a new set of conflicts that need to be fully considered in the siting process.

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[69] Council for Environmental Quality (CEQ), Memorandum for Heads of Federal Departments and Agencies: Effective Use of Programmatic NEPA Reviews, 14 (Dec. 18, 2014). Available at: https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Effective_Use_of_Programmatic_NEPA_Reviews_Final_Dec2014_searchable.pdf. *See also* CEQ, *Notice of Availability, Final Guidance for Effective Use of Programmatic NEPA Reviews*, 79 *Fed. Reg*. 76986, 76986 (Dec. 23, 2014), 14, Available at: https://www.govinfo.gov/content/pkg/FR-2014-12-23/pdf/2014-30034.pdf

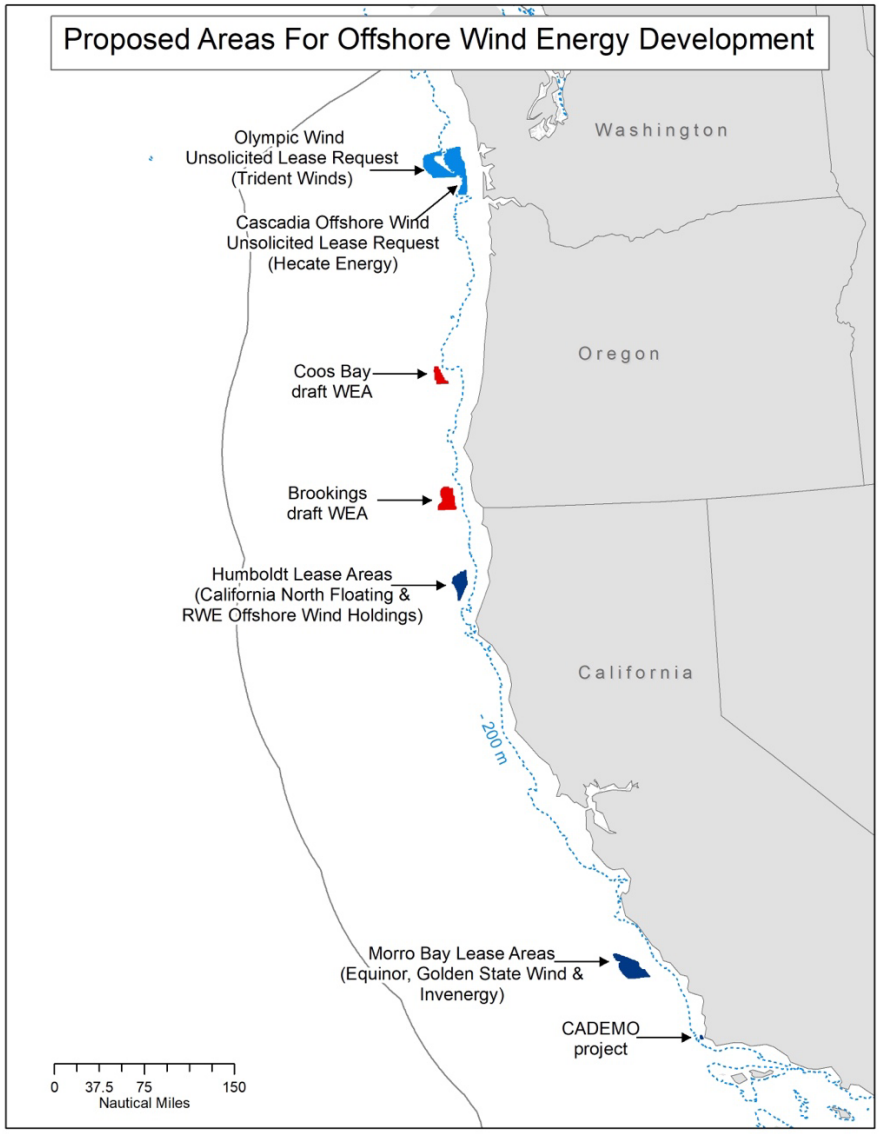

Figure 4. West Coast offshore areas currently under consideration for wind energy development

Moreover, BOEM has indicated there will likely be additional, yet to be determined, Call Areas in the future. This makes considering the "big picture" of potential impacts throughout the CCLME essential to avoid, minimize, and mitigate harmful impacts. Already, the leased Humboldt Wind Energy Area is located just 60 miles south of the Brookings Call Area, and the National Renewable Energy Lab (NREL) has identified the area between the Brookings Call Area and the Humboldt Wind Energy Area as an Area of Interest (Del Norte) for future development. If all potential areas off California plus additional areas off Oregon and Washington are developed, impacts on wildlife throughout the CCLME could be extensive and irrevocable.

BOEM recognizes the importance of this broad look in other contexts and regions. Although each stage of offshore energy development requires environmental reviews under NEPA, BOEM recognizes the value of a high-level focus on the potential effects of multiple projects under a leasing program. Taking a broad look at the CCLME in terms of the total number of potential offshore wind leases, as BOEM proposed to do in the New York Bight, would allow interested and affected parties to better understand the scope and scale of a West Coast offshore wind energy program and help determine which areas have the potential to be developed with the least impact.

While a PEIS and cumulative impacts analysis cannot replace site-specific analyses that will come later in the process (specifically during the construction and operations phase), there can be many benefits to a broader spatial look at offshore renewable energy earlier in the planning process for the West Coast. Time invested early to develop strategies to effectively avoid and minimize impacts could save time and costs later in the project permitting phase and ensure consistency and certainty for both communities and energy developers. Such analysis can also help BOEM to provide greater transparency and better communication, helping the public to better understand how tradeoffs have been evaluated. If BOEM continues to reject calls to conduct a PEIS, we urge BOEM to at the very least conduct a cumulative impacts analysis across the broader geography of the CCLME to better inform energy planning and development on the West Coast.

Identify and Address Data Gaps

We are concerned that significant data gaps remain that make it difficult to make informed decisions about siting of West Coast WEAs and energy projects. Existing data for birds, fish, and wildlife are often quite limited. Existing studies regarding impacts of offshore wind energy development on seabird, fish, and marine mammal populations in the North Sea and Atlantic Ocean may not be directly transferable to species and conditions in the CCLME, and very little information is available regarding the effects of floating infrastructure on marine habitat and species.

To better address data gaps, we encourage BOEM to continue to consult with other federal and state agencies that have expertise and responsibilities for birds, fish, wildlife and other considerations, such as oil spills and shipping, in the marine environment. There is a need for a regional approach to address broader issues that span the entire CCLME, including impacts to species that migrate through the ecosystem, and shifts in oceanographic processes and distributions of species related to climate change.

Marine Mammals: BOEM must consider that baseline data for many cetacean species off the Oregon Coast is extremely limited, particularly for small whale species and in the winter and spring seasons. We caution that currently identified Biologically Important Areas (BIAs) for Oregon cetaceans need to be supplemented with additional data and information. NMFS is currently updating this information, and the revised data should be used in this spatial planning process.[70] Moreover, much is still unknown about how large whales—particularly baleen whales—use Oregon waters and how their distribution changes in response to changing ocean conditions. Preliminary

[70] West Coast BIAs are currently undergoing revision and are expected to be updated this year: See https://oceannoise.noaa.gov/biologically-important-areas

density models have been developed for some whale species, and a new analysis of distribution and oceanographic conditions has described some high-use areas for Humpback Whales, Blue Whales, and Fin Whales.[71] However, habitat-based density models need sustained input from field data to ensure validation and robust predictive power. In addition, habitat models are difficult to create for rare or highly endangered species that use state and federal waters off Oregon's coast, including North Pacific Right Whales and Southern Resident Killer Whales. We urge BOEM to support continuing research on marine mammal use of the proposed Oregon WEAs to better inform wind energy planning.

Seabirds: We are also concerned that insufficient data is available to adequately consider avian use of the WEAs or to assess impacts associated with development and operation of offshore wind facilities. Modeling does not include sufficient raw data to adequately consider avian use of offshore areas in winter or to determine important foraging grounds. Knowledge of foraging grounds will be especially important for dynamic soaring seabirds (albatrosses and shearwaters) as well as for breeding birds that generally remain close to breeding colonies during the breeding season, but that may be compelled to travel farther afield to deeper waters if marine heat waves impact nearshore foraging opportunities.

In addition, we are concerned that the aerial survey results from the Pacific Continental Shelf Environmental Assessment (PaCSEA) are not adequate to draw conclusions about less abundant species or to identify pattern shifts in response to anomalous ocean conditions. Tracking and radar studies are needed to develop better understanding of species of greater abundance as well as migratory pathways and habitat used by less-studied, smaller and rare marine birds in the area, such as murrelets.

In addition, a study should be conducted to better understand avian species for which displacement effects are already known to be a risk. Existing studies have indicated locations where some species may congregate during migration and in winter, but because these studies include data from infrequent field surveys, it is critical to develop more granular and robust location data. A tracking study should be conducted for one or more species that are vulnerable to displacement and found in the WEAs in substantial numbers.

Trans-Pacific migrants also warrant more attention. Nearly 100 species of birds migrate across the Pacific to forage in Oregon waters. Studies should be conducted to better understand the prevalence, magnitude, and patterns of trans-Pacific bird migration, and how this may intersect with the Oregon WEAs. We suggest that this include multiple components: (1) a weather radar study to broadly assess bird migration in the vicinity of the coast, like studies conducted for Atlantic

[71] Becker EA, Forney KA, Miller DL, Fiedler PC, Barlow J, Moore JE. 2020. "Habitat-based density estimates for cetaceans in the California Current Ecosystem based on 1991–2018 survey data." US Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-638; Derville S, Barlow DR, Hayslip C, Torres LG. 2022. "Seasonal, Annual, and Decadal Distribution of Three Rorqual Whale Species Relative to Dynamic Ocean Conditions Off Oregon, USA." *Frontiers in Marine Science*, 9:868566.https://doi.org/10.3389/fmars.2022.868566; U.S. Department of the Navy. 2018. "U.S. Navy Marine Species Density Database Phase III for the Northwest Training and Testing Study Area." NAVFAC Pacific Technical Report. Naval Facilities Engineering Command Pacific, Pearl Harbor, HI. 258 pp.

species,[72] and (2) a tracking study focused on one or more species representative of guilds likely to be vulnerable to impacts from offshore wind development. Once this information has been incorporated into offshore wind spatial planning, at-sea radar studies using portable units should be conducted to more fully evaluate the presence, movement patterns, and potential impacts to these species.

We urge BOEM to support multi-species radar tracking studies, in conjunction with lidar technology attached to buoys, as soon as possible to provide useful baseline data for proper siting of wind farm arrays off Oregon. At a minimum, we recommend tracking studies for birds with likely vulnerabilities: Short-tailed albatross, Shearwaters, Marbled Murrelets, Leach's Storm Petrels, and Tufted Puffins.

For comparison, offshore wind energy planning on the Atlantic coast has been informed by a suite of studies funded by BOEM, conducted in collaboration with USFWS, universities, and other partners. These studies entailed relatively large samples and extensive efforts to understand the presence, abundance, and movements of key bird species and guilds in WEAs (e.g. ESA-listed species, diving birds vulnerable to displacement, shorebirds).[73] A similarly robust effort is needed on the Pacific coast to better inform FOSW planning.

Fish: BOEM should develop and assemble more robust baseline data on the distribution and annual variation of "forage fish" (e.g. anchovies, smelt, herring) that form the basis for food webs off Oregon and through the CCLME. BOEM should also start acoustic telemetry studies to develop baseline information about Pacific coast Green Sturgeon populations. Little is known about the life history and biology of these very large and long-lived fish that date from the time of the dinosaurs. However, it is known that they are sensitive to electromagnetic fields (EMFs), which could become a concern for siting of onshoring cables. The southern DPS is federally threatened, with critical habitat encompassing waters less than 60 fathoms where undersea transmission cables will need to pass. The northern DPS is a Species of Concern with migration routes to spawning grounds in the Rogue River located close to where undersea transmission cables from the Brookings WEA may come ashore.[74] Other species that are not specifically targeted by recreational and commercial fisheries but that have important roles in marine ecosystems, such as lamprey and sharks, may also merit greater consideration.

Develop a Comprehensive Coastwide Monitoring and Adaptive Management Plan

Additionally, we call for BOEM to commit to the development of a comprehensive coastwide monitoring and adaptive management plan.[75] With an adaptive management framework

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[72] Buler et al., 2017, "Validation of NEXRAD data and models of bird migration stopover sites in the Northeastern U.S." Submitted to U.S. Fish and Wildlife Service, Northeast Region: Hadley, MA; Northeast Conservation Planning Atlas. 2018. Northeast stopover sites for migratory landbirds. January 30, 2018 (last modified April 9, 2018). Available at: https://nalcc.databasin.org/galleries/f5cc97e920ec49dfb76bc039a53c3e0a/#expand=159202

[73] See Birds and Bats section at https://www.boem.gov/renewable-energy-research-completed-studies

[74] NOAA NMFS, Green Sturgeon, Southern DPS, Critical Habitat.

[75] Williams, BK. "Adaptive management of natural resources--framework and issues," 2011, *Journal of Environmental Management*, 92(5):1346-53.

incorporated into the permitting process, BOEM will be able to better account for the current uncertainty of bird and wildlife responses to offshore wind projects and to learn from management actions.

Undertaking a comprehensive adaptive management approach for offshore wind development in the Pacific will require BOEM, other federal agencies, State partners, and wind energy developers to dedicate sufficient time, resources, and flexibility in between installment of individual projects to monitor, analyze, and adapt new methods based on measured impacts. Ideally, this will allow for sharing of lessons learned in siting, mitigation, and post-construction monitoring. This would reduce uncertainty for subsequent projects and increase the likelihood of their success.

For agencies to adaptively manage turbine arrays into the future there needs to be a robust process to incorporate and integrate new scientific information. Post-construction collision and entanglement monitoring will be important to minimize impacts to birds, fish, and wildlife and to adaptively manage facilities. In addition, comprehensive monitoring of the changes in biological communities across a range of ocean conditions will be needed to contribute to adaptive management as offshore wind development advances.

However, evaluation of such data will depend on gathering sufficient and meaningful baseline data, as well as developing adequate methodologies and a monitoring plan for the turbine array's projected life cycle from the very start of project permitting and development. Oregon's vital marine resources demand an excellent and transparent system for monitoring and tracking so that agencies will be well prepared to manage wind energy facilities adaptively into the future. We urge BOEM to develop a comprehensive monitoring and tracking program for Pacific Coast FOSW projects to plan for effective adaptive management in the future.

Plan to Avoid and Minimize Impacts from FOSW Infrastructure Projects

It will be important for developers and regulators to design turbine arrays to minimize impacts to birds, fish and other animals that migrate to or through state and federal waters off Oregon on a regular basis. There is little data and knowledge on how marine mammals, particularly large whales, will respond to the permanent introduction of physical structures, such as mooring lines and cables resulting from floating offshore wind development. It is possible that construction of these facilities in the marine environment could result in permanent habitat displacement, keeping large marine mammals from important foraging, mating, rearing, or resting habitats, or from vital movement and migratory corridors. Additional potential impacts include disturbance and risk of collision from vessels; entanglement in floating infrastructure or marine debris snagged on FOSW infrastructure; increased noise from project-related operations and vessel traffic; changes to water quality; and unknown impacts from electro-magnetic fields (EMFs) generated by turbine arrays and cables.[76] BOEM should take a precautionary approach that considers all these potential impacts in identifying and selecting development sites that minimize environmental impacts.

[76] Farr et al., 2021, "Potential environmental effects of deepwater floating offshore wind energy facilities," *Ocean and Coastal Management*, 207: 105611.

Specifically, ship disturbance related to offshore wind installations demands precautionary planning. While species-specific responses are not well understood for all seabirds, documented responses to approaching vessels include flying or diving and increased alertness. These responses can result in increased energy expenditure, displacement, and habitat loss. For example, in the German North Sea, a joint effect of offshore wind installations and ship traffic together has been identified as causing a greater reduction in loon abundance than wind installations alone.[77] A primary reason for concern over these responses is that prey of many seabirds is unevenly distributed in marine habitats under even the best of conditions. Increased ship traffic in foraging areas during turbine transit, construction and maintenance could cause seabirds to use more energy during ship avoidance and also prevent them from accessing prey, leading to reductions in survival or reproductive success.

Off the coast of the Pacific Northwest, Marbled Murrelets are highly susceptible to ship disturbance.[78] This species forages in the nearshore, where they can be disturbed as ships come and go from port harbors. As areas are developed for FOSW, low disturbance and disturbance free zones could be created as mitigation for increased ship traffic in strategic areas. Spatial and temporal coordination of ship traffic should also occur when designating new ship traffic routes. Some seabird species may be able to habituate to ship traffic if routes are consistent and take seasonal changes in distribution into account.

Additionally, certain life history traits may increase the vulnerability of some species to ship traffic.[79] A ship traffic disturbance vulnerability index similar to one created for European seabirds can take into account species-specific traits and should be created for Oregon's marine birds to assist with mitigation and planning. BOEM should conduct a ship disturbance vulnerability for seabirds and other marine animals, as well.[80]

Attraction of seabirds to the artificial lights associated with offshore wind installations is another concern that demands more study and planning. Attraction and mortality of seabirds at various offshore lighting sources has been well documented.[81] Procellariforms that are nocturnal foragers, such as storm petrels, forage on bioluminescent prey and are naturally attracted to lights. Leach's Storm Petrels are particularly vulnerable to "falling out" when attracted to bright lights. For

[77] Mendel B, Schwemmer P, Peschko V, Müller S, Schwemmer H, Mercker M, Garthe S. 2019. "Operational offshore wind farms and associated ship traffic cause profound changes in distribution patterns of Loons (*Gavia spp*.)." *Journal of Environmental Management,* 231, 429–438. https://doi.org/10.1016/j.jenvman.2018.10.053

[78] Marcella et al., 2017.

[79] Thiel M, Nehls G, Bräger S, Meissner J. 1992. "The impact of boating on the distribution of seals and moulting ducks in the Wadden Sea of Schleswig-Holstein." Publication Series. Netherlands Institute for Sea Research (NIOZ). https://www.vliz.be/nl/imis?module=ref&refid=53568

[80] Fliessbach KL, Borkenhagen K, Guse N, Markones N, Schwemmer P, Garthe S. 2019. "A Ship Traffic Disturbance Vulnerability Index for Northwest European Seabirds as a Tool for Marine Spatial Planning." *Frontiers in Marine Science*, 6. https://www.frontiersin.org/article/10.3389/fmars.2019.00192

[81] Rich C, Longcore T. 2013. Ecological Consequences of Artificial Night Lighting. Island Press.

migrating birds, documented mortalities around offshore obstacles increase during periods of poor weather,[82] which are common off Oregon's coast.

Ecological light pollution is a concern well beyond seabirds. Light pollution impacts have been demonstrated in over 200 species, representative of every taxon. Most biological systems on earth evolved under regular light/dark cycles and have carefully tuned circadian rhythms that are driven by natural lighting regimes. Artificial light is unlike natural light in its spectral properties, intensity, and timing. Research on ecological light pollution in marine environments is showing that marine life is sensitive to artificial light, even at extremely low levels.[83] Ecological light pollution from coastal development, shipping, and offshore infrastructure could already be changing the composition of marine epifaunal communities.[84]

Some research has been done to investigate the response of seabirds and other wildlife to different types of lighting, but BOEM should prioritize more work to identify both species-specific and broader, ecosystem-based recommendations to minimize impacts from project lighting.[85]

Develop a Plan for Compensatory Mitigation

In planning for wind energy project siting and operations, BOEM should foremost avoid and then minimize harm to ocean and coastal wildlife, but ultimately, many marine species will be impacted by offshore wind energy facilities in Oregon through collisions with turbines, noise and activity associated with development and operation, destruction of habitat, and displacement from areas of use. Compensatory mitigation should be provided to offset these losses—particularly for species of conservation concern and for those impacted in greater numbers.

We recognize that the agencies are still in a very early stage of planning. However, given that a regulatory framework must be identified and a process developed to provide appropriate compensatory mitigation for wildlife, it's important for BOEM to recognize and start addressing this issue now. Developing meaningful compensatory mitigation for wildlife will take time from initial concept, through planning and implementation, to success—particularly for long-lived and slow-reproducing species such as seabirds. The costs of compensatory mitigation should be considered as part of project planning and feasibility. For these reasons, we urge the agencies to begin planning for the compensation portion of the mitigation hierarchy (avoid, minimize, compensate) now, as part of the full process of considering offshore wind development.

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[82] Wiese FK, Montevecchi WA, Davoren GK, Huettmann F, Diamond AW, Linke J. 2001. "Seabirds at Risk around Offshore Oil Platforms in the North-west Atlantic." *Marine Pollution Bulletin*, 42(12), 1285–1290. https://doi.org/10.1016/S0025-326X(01)00096-0

[83] Smyth, TJ, Wright, AE, McKee, D, Tidau S, Tamir R, Dubinsky Z, Iluz D, Davies TW. 2021. "A global atlas of artificial light at night under the sea." *Elementa: Science of the Anthropocene* 9(1). https://doi.org/10.1525/elementa.2021.00049

[84] Davies TW, Coleman M, Griffith KM, Jenkins SR. 2015. "Night-time lighting alters the composition of marine epifaunal communities." *Biology Letters*, 11: 20150080. http://doi.org/10.1098/rsbl.2015.0080

[85] Rodríguez A, Dann P, Chiaradia A. 2017. "Reducing light-induced mortality of seabirds: High pressure sodium lights decrease the fatal attraction of shearwaters." *Journal for Nature Conservation*, 39, 68–72. https://doi.org/10.1016/j.jnc.2017.07.001