POTENTIAL ENVIRONMENTAL IMPACTS OF FLOATING OFFSHORE WIND IN CALIFORNIA'S FEDERAL LEASE AREAS

Understanding Potential Environmental Impacts with Existing Research

CALIFORNIA OCEAN SCIENCE TRUST

THE DEVELOPMENT of floating offshore wind farms in the Humboldt and Morro Bay federal lease areas presents an opportunity for California to develop new renewable energy sources and contribute to the mitigation of climate change. However, questions remain about what this implies for California's unique ocean ecosystem. This series of seven fact sheets summarizes existing science on the environmental effects of offshore wind farms to address common concerns raised in California's communities.

Credit: Illustration by Joshua Bauer, NREL. Floating offshore wind turbines require unique mooring systems to hold them in place, which can increase the space needed for wind power plant development. Classic floating platform concepts can include spar (left), semisubmersible (center), and tension leg platforms (right).

Research Shows

- **Development of floating offshore wind technology in California will include not only offshore turbine arrays, but also transmission lines to shore, changes to port development and operations, and changes to onshore transmission infrastructure.**[1]
- **Given that floating offshore wind energy represents a new industrial use of the West Coast's unique ocean environment, the complete scope of potential negative or positive impacts will be uncertain until the technology is deployed and the effects on priority species and local marine ecosystems are studied.**[2] This uncertainty is in part due to floating offshore wind energy's limited deployment globally, while fixed-bottom offshore wind operates at a significantly larger scale, including off the U.S. East Coast.[2,3] Additionally, the proposed development includes turbines that are very tall ~500 feet–and located far from shore (~20-60 miles)[4] in deep water (~half a mile).[5]
- However, **researchers can use data from similar industrial activities in the marine environment to anticipate likely impacts and potential mitigations, and to identify key areas needing additional research,** such as from fixed-bottom and floating offshore wind farms in other parts of the world, floating oil and gas development, and wave and tidal energy installations.[3]
- **Potential stressors on marine life and habitats from deepwater, floating offshore wind facilities operation include,** electromagnetic fields from transmission cables, seafloor disturbances, noise, water quality, changes to local wind and oceanographic patterns, and

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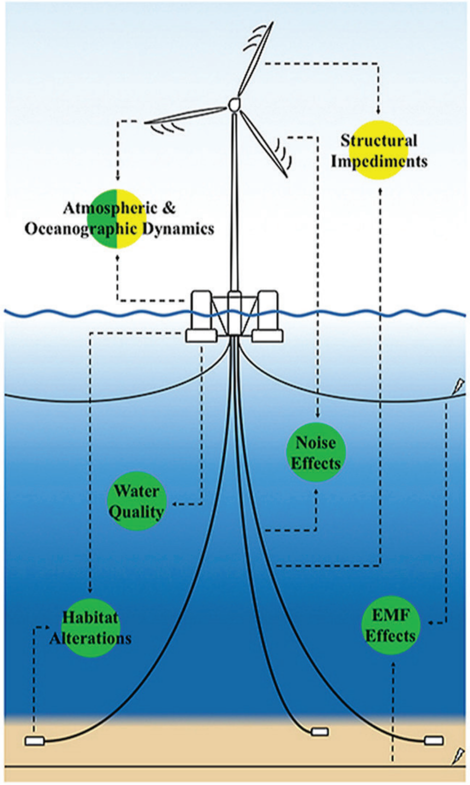
the risk of species' interactions with, attraction to, and avoidance of the physical structures themselves (for example, bird or bat collisions with turbines) (See Figure).[3] **Bay species and ecosystems may be affected by port redevelopment and related activities.**[6] **This is especially true for Humboldt Bay,** where significant changes to the port are proposed.[7]

- **Research on the effects of similar ocean-based energy technologies is encouraging; it suggests that many potential impacts could be avoided, minimized, or mitigated** with the implementation of best practices that have been used and tested in other parts of the world (e.g., temporal mitigation, or timing disruptive activities outside of biologically sensitive periods like breeding, optimizing surveys to reduce disturbance, maintaining a small seafloor footprint, and comprehensively monitoring for changes to the environment).[3,8,9]
- In assessing potential effects, **researchers suggest considering not only individual stressors on individual species in isolation, but also the long-term, cumulative, and population-level impacts** across the lifecycle of the technology (pre-construction, construction, operation, decommissioning).[8,10] In other words, it is important to consider whether the layering of multiple stressors from offshore wind and other ecosystem changes results in problematic combined impacts at the population or ecosystem level.[11]



Credit: Figure Adapted from Farr et al. 2021.[2]

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