Floating windfarm risks to mysticetes

While the hydrocarbon industry has a lot of experience with floating, or “semi-submersible” operating platforms, this technology is new to the offshore wind industry, and as such, any potential impacts on marine habitat are largely unknown. This is particularly the case as it applies to baleen whales.

Floating drilling platforms are much larger, and due to the location stability requirements, are stabilized by propellors. These factors likely play into the types of interactions that baleen whales have with them – large and loud enough to avoid. The wind platforms, on the other hand – either floating spars, or semi-submersibles, will be smaller, and may pose an obstacle risk.

Bearing in mind that windfarms will be transforming what has been open ocean throughout the 30-million-year evolution of mysticetes, we can safely speculate that they don’t have the adaptive vocabulary to understand the risks posed by these structures. Whales that have been feeding in open ocean will be confronting and colliding with cables and floating structures as they feed, and migrate.

Putting this in perspective, rorquals (blue, fin, Sei, Brydes, and Minke whales) lunge feed on aggregations of small fish and marine invertebrates throughout the water column, down to 300m. This involves their acceleration up to 6m. sec\(^{-1}\) (~20km.hr\(^{-1}\)) opening their jaws up to 90 degrees from their body,\(^1\) capturing their body-weight in food-laden water, closing their jaws, and expelling the water through their baleen.\(^2\) A remarkable, but safe procedure in open water. But executing this maneuver in a forest of floating structures interconnected with cables, and tethered to the seafloor with more cables poses a number of potential threats. It can be said with some certainty that high-speed entanglements and collisions are likely to cause high mortalities in these whales, as well as humpbacks, which use a similar feeding strategy.

Grey whales, which are bottom-feeders, run the risk of snagging on anchoring hardware, and any seafloor-laid cables, although not at these high speeds.

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Another unknown is the potential noise impacts. The entire industrialization of the ocean will be accompanied by noise – from siting, to installation, through operations, and servicing, to decommissioning. We do know that increase in industrial noise, such as shipping, creates stress in whales, so we can assume that siting, installation, maintenance, and decommissioning will elevate the stress levels in whales.

What is not known is what affects the low-frequency pulsing from the turbine blades transiting the mast, or the tip vortices arching over the sea surface will have on whales. Even while the infrasonic frequencies are below what humans identify as “sound” (by definition), large pressure fluctuations in the realm of 0.2 Hz to 1Hz terrestrial wind farms has been attributed to sleep disturbance, induce nausea, depression, anxiety, and headaches in some humans. How will these noises be interpreted by animals that specialize in low-frequency hearing? Will they avoid an area they depend upon for foraging? Will these unusual noises disrupt their migration patterns?

We are about to find out…

- Michael Stocker

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