

# Whales and Offshore Wind

Synthesizing existing information on topics of concern

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## Introduction

With increasing offshore wind development across the United States, various stakeholders have raised concerns over the ways in which development may impact whales, including the [endangered North Atlantic right whale \(NARW\)](#). This resource synthesizes existing science-based research on key concerns that we are aware of, ensuring stakeholders have access to the best available information to understand and engage with this topic. Significant information in this resource is sourced from the U.S. Offshore Wind Synthesis of Environmental Effects Research (SEER). Their [database](#) offers additional exceptional insights on this topic.

## Stakeholder Concern: Offshore wind development may contribute to increased whale mortalities.

Beginning in 2017, elevated mortalities in NARW were documented in Canada and the United States, resulting in an "unusual mortality event" (UME).<sup>1</sup> While small-scale offshore wind development in Southern New England coincides with this period, and roughly one out of three NARW deaths is ever observed, researchers find no evidence that offshore wind development contributed to strandings or mortalities for large whales during this period.<sup>2,3</sup>

Vessel strikes and entanglement with fishing gear are major drivers of large whale mortalities. Increased vessel traffic in new foraging areas used by juvenile large whales was identified as a primary driver of recent increases in strandings along the Atlantic coast of the United States.<sup>2</sup> While most of the increased vessel traffic is along shipping routes, offshore wind development also requires [several different vessels](#) throughout the duration of a project. This increases the presence of vessels in the ocean, and may potentially introduce risks of vessel strikes with large whales.<sup>4</sup> To mitigate risks posed by traffic from various vessels, [vessel speed restrictions](#) were implemented on the U.S. Atlantic Coast in 2008 by the National Oceanic and Atmospheric Administration (NOAA). An assessment of the rule concluded that during the 10 years after speed restrictions were implemented, the number of documented right whale vessel collision mortalities and serious injuries decreased by 33% within seasonal management areas.<sup>4</sup>

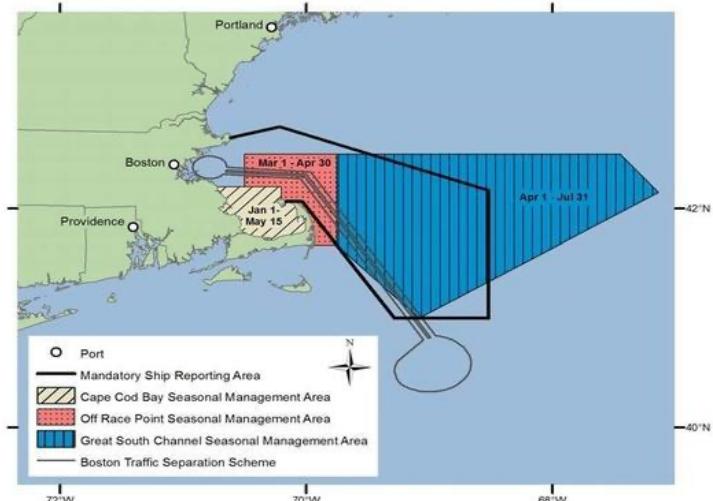
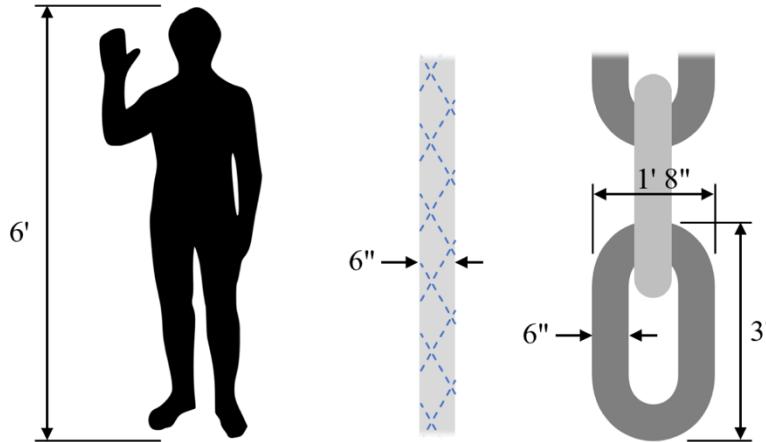


Figure 1: Map of Seasonal Management Areas – Northeast. Most vessels 65 feet or longer must travel at 10 knots or less in these areas along the U.S. East Coast at certain times of the year. Map courtesy of NOAA Fisheries.<sup>5</sup>

Studies suggest that upwards of 85 percent of NARW have been entangled in fishing gear at least once,<sup>6</sup> and most that are severely injured in fishing gear entanglements die within three years.<sup>7</sup> Several measures are in place to limit these impacts, including implementing seasonal closures to certain fisheries where NARW are known to congregate, requiring weak inserts or weak rope in fixed gear fisheries, and limiting vertical buoy lines in trap pot fisheries in areas where NARW occur.<sup>8</sup>

**Stakeholder Concern: Floating offshore wind infrastructure, such as inter-array cables and mooring lines, may create harmful entanglement risks for whales.**

Existing research suggests that the risk of primary entanglement (direct entanglement with floating offshore wind mooring lines or suspended cables) for large whales is low because mooring lines and cables are heavy and large in diameter, preventing them from creating loops that entangle large whales.<sup>9</sup> However, very few floating offshore wind developments exist, and findings may evolve as floating arrays are developed.



*Figure 2: For scale, comparison of the size of a person next to representative sections of mooring rope and a mooring chain link for a floating offshore wind platform. Image created by Matt Hall, NREL.<sup>10</sup>*

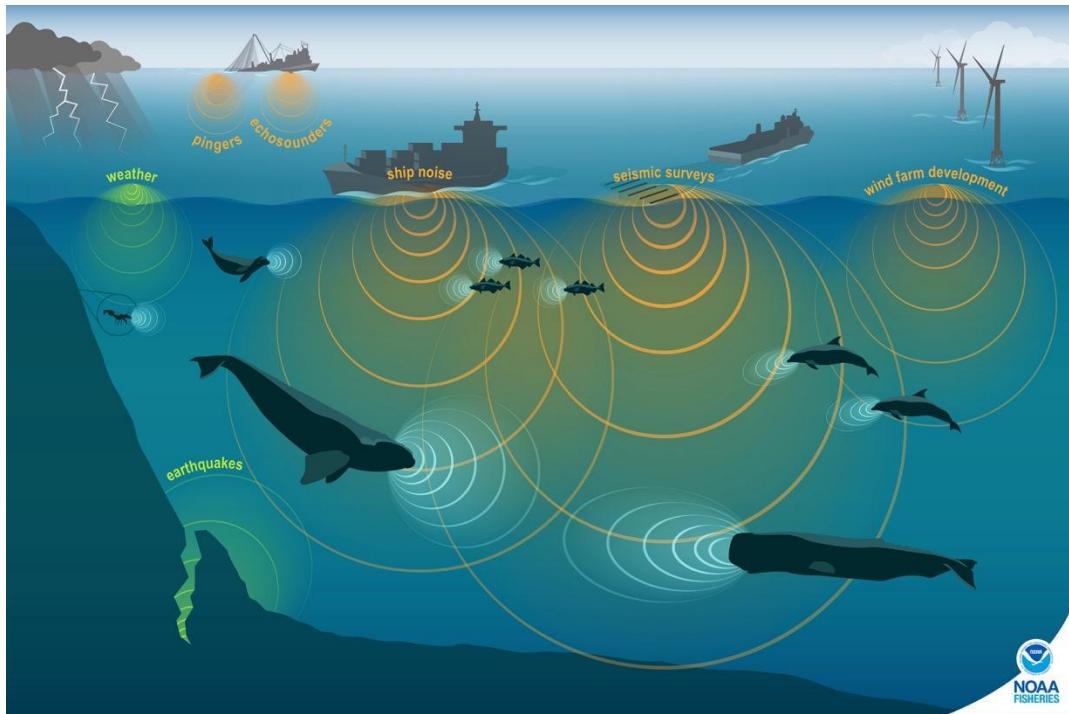


*Figure 3: Vineyard Wind LLC subsea power cable, illustrating the size of cables for offshore wind arrays.*

Secondary entanglement – where fishing gear/marine debris ensnares itself on floating offshore wind mooring or cable lines, and marine life becomes entangled with this debris – may pose risks to large whales.<sup>9</sup> While there is currently insufficient information to evaluate secondary entanglement, particularly due to the lack of active floating offshore wind arrays, research is underway to better understand and characterize potential risks to marine mammals.<sup>11</sup> Preliminary recommendations to avoid or minimize the risks of secondary entanglement include, among others, designing infrastructure to facilitate visual or acoustic detection of ensnared marine debris and implementing robust monitoring protocols.<sup>12</sup>

## Stakeholder Concern: Offshore wind arrays may introduce noise pollution that is harmful to whales by affecting behavioral patterns.

Throughout the lifecycle of an offshore wind array, various noises are emitted underwater, potentially leading to physiological effects (e.g., hearing loss, behavioral disturbance, or [auditory masking](#)) on marine life, including large whales.<sup>13</sup>



*Figure 4: Illustration of the marine soundscape, including sound contributions from wind array development. Image courtesy of NOAA Fisheries.<sup>14</sup>*

During offshore wind site characterization surveys, a variety of sensors and platforms (e.g., [sonar and echosounders](#)) are used to investigate the seafloor. These technologies operate at a lower intensity than those used in the oil and gas industry but may have the potential to cause behavioral impacts on some marine life.<sup>13</sup> Notably, there is no scientific evidence that noise resulting from offshore wind site characterization surveys could potentially cause whale deaths.<sup>15</sup>

In the construction phase of fixed-bottom offshore wind arrays, [pile driving](#) emits high levels of underwater noise. Pile driving is typically not necessary for floating offshore wind platforms because they are installed with anchor systems and mooring lines. However, some floating offshore wind mooring systems may use [driven pile anchors](#), which emit underwater noise when installed. While the potential impacts of these activities depend on the technology configurations, environmental factors, and site-specific conditions, observed behavioral responses of marine life to pile driving noises range from small disturbances to significant avoidance of offshore wind array construction areas.

When operational, offshore wind arrays can emit [continuous underwater sound](#) that varies with wind speed and turbine size. These noise levels are not high enough to cause direct physical injury to marine species but may cause behavioral impacts to those in proximity to turbines.<sup>13</sup>

The potential impacts of noise associated with decommissioning activities for offshore wind arrays is currently being researched, but it is assumed that there may be potential impacts to some marine life.

### **Potential impacts of noise associated with offshore wind development can be minimized:**

- Developers are provided guidelines by the Bureau of Ocean Energy Management (BOEM) with suggested mitigation measures throughout the lifecycle of a project, including prioritizing low-noise foundation designs.<sup>16</sup>
- BOEM requires developers to use [Protected Species Observers](#) to detect large whales and avoid potential impacts during survey activities.<sup>17</sup>
- NOAA can require using sound attenuation technology such as [bubble curtains](#) and other technologies to limit the spread of noise due to pile driving activities.<sup>18</sup>
- Developers are required to avoid pile driving activities during the peak season of NARW occurrence on the Atlantic coast.<sup>19</sup>
- Developers can use passive acoustic monitoring listening systems to identify the presence of nearby large whales and temporarily pause construction activities.<sup>20</sup>

### **Additional Learning Resources:**

- [New England Aquarium: North Atlantic Right Whale](#)
- [NOAA Fisheries: Overview of the North Atlantic Right Whale](#)
- [BOEM/NOAA Fisheries: North Atlantic Right Whale and Offshore Wind Strategy](#)
- [U.S. Offshore Wind Synthesis of Environmental Effects Research \(SEER\): Research Briefs, Fact Sheets, and Projects](#)
- [Regional Wildlife Science Collaborative \(RWSC\): Ongoing Marine Mammal Offshore Wind Projects](#)

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