



A Sound Strategy?

Underwater surveys, and the subsequent building and operation of offshore energy facilities, would create an earful for marine mammals. But some wonder: Is the cacophony safe — and is it worth the potential cost to habitats?

BY LAURA DATTARO

The waters off the East Coast today, much like the land itself two centuries ago, are poised for industrialization. In January, the U.S.

Department of the Interior proposed opening up areas from Virginia to Georgia for new oil and gas production, a move that could affect ecosystems and economies up and down the Eastern Seaboard. At the same time, the Obama administration is pushing for offshore wind farms from Maine to Georgia, with areas off Delaware, Rhode Island, Massachusetts, Maryland, and Virginia already leased to wind companies.

With all of that development comes many environmental risks, including one that's easy for humans to miss: sound. As on land, construction underwater is a noisy process, and that noise can present problems for the marine mammals, fish, and turtles that use sound to navigate through their watery world.

In order to find areas suitable for drilling, energy companies use a technique known as seismic surveying, which involves ships trailing air guns behind them that shoot sound wave blasts capa-

ble of penetrating the seafloor. That din, along with the eventual noise of the drilling rigs and vessels transporting the oil and gas, can pose risks for marine ecosystems and the coastal communities that depend on them.

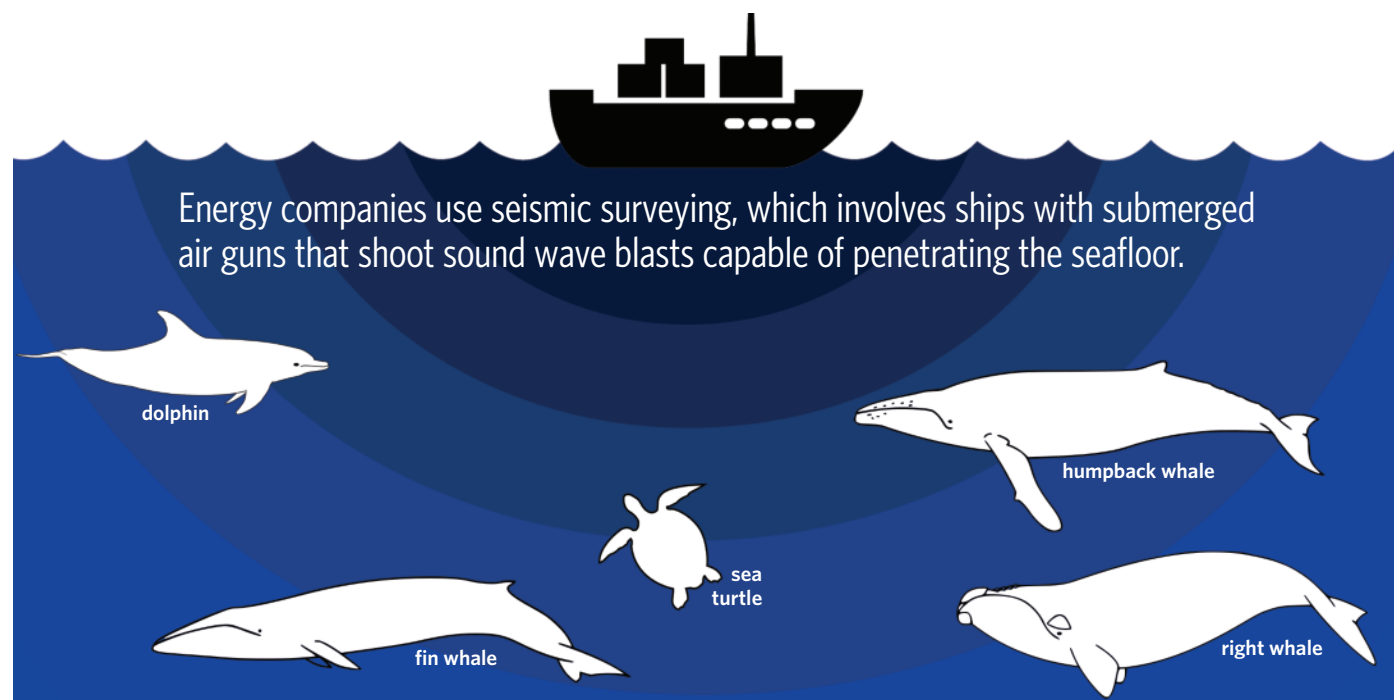
But industrializing the East Coast could be a potential boon for domestic energy production. Recent estimates cite 4.7 billion barrels of oil waiting to be recovered from the Atlantic continental shelf, with about half of that in the mid-Atlantic section. That means weighing the benefits of new energy against the potential dangers of extracting it.

It's enough of a concern for Delawareans that last July, while the administration considered the future of U.S. oil drilling, U.S. Rep. John Carney sent a letter to President Obama opposing the use of seismic surveys in the Atlantic. The Democratic congressman noted that such surveys could threaten the \$16 million generated by commercial fisheries in Delaware, as well as the \$600 million ocean-based tourism industry here. "Why are we heading off in this direction that poses such an incredible economic risk to

our state and to the environment of southern Delaware?" Carney says about the proposal. "It just doesn't make sense. It's not worth the risk."

What lies beneath

The ocean is a world of sound, and the waters off Delaware's coast are packed with animals that rely on it. There are 36 species of marine mammals and sea turtles that live in or frequent Delaware waters, according to Suzanne Thurman, executive director of the Marine Education, Research, and Rehabilitation Institute in Lewes. Among them is the highly endangered North Atlantic right whale, which follows a migration route that hugs the coast from the Northeast to Georgia and Florida. Fewer than 400 remain in the world, and in the fall, some are usually spotted in the Indian River Inlet, sometimes spending time in and around Delaware Bay on their way to warmer waters. Little improvement has been seen in their numbers in recent decades, and the National Oceanic and Atmospheric Administration identifies industrial noise as one of the threats to the species' survival.



Right whales, like humpbacks, fin whales, and numerous dolphin species that swim and feed in Delaware waters throughout the year, use their own complex sounds for echolocation (a sort of marine animal “sonar”) while listening in on other creatures and noises in their environment. “These animals rely on underwater sound to communicate with each other, to navigate, to find food, to breed, to do everything that they do,” Thurman explains.

It is into this environment that humans are proposing to create an underwater cacophony in the quest to create new energy sources. While there isn’t much data on how such sounds can affect ecosystems in the Atlantic — no seismic surveys have been done here since the 1980s — there’s growing evidence from around the world that loud sounds can interrupt feeding behaviors, separate mothers from their calves, and cause temporary or permanent hearing loss and other injuries, some of which are fatal.

For example, in the Gulf of Mexico — where the oil industry has thrived since the 1940s — researchers found that sperm whales decreased their foraging activity by about 20 percent after being exposed to sound from seismic arrays. And in Europe’s Barents Sea, the cornerstone of the Norwegian fishing industry, seismic surveys were shown to reduce catch rates of cod and haddock by an average of 50 percent, with effects seen as far as 20 miles from the sound source.

Those effects are more than Carney, at least, is willing to risk for Delaware’s multimillion-dollar commercial fishing industry. In his letter to President Obama, he wrote, “Simply put, the cost of the proposed action to Delawareans and the marine life off our coasts is far too great to risk for oil and gas exploration.”

But it’s not as though this intrusive survey technique is used without consideration for the environment, or with no government oversight. The Bureau of Ocean Energy Management, which operates within the Interior Department, is in charge of evaluating proposals for any use of the outer continental shelf, drafting lengthy

environmental impact statements and approving permits that require anyone working in the water to adopt certain strategies (known as mitigation measures) to minimize harm. Many of the animals in Delaware’s waters are protected by either the Marine Mammal Protection Act or the Endangered Species Act — or both.

One of the top strategies is to avoid the animals altogether.

This is attempted by creating an off-limits area around a ship — when using seismic air guns, that limit is generally at least 500 meters (about 1,600 feet) from the source of the sound — and assigning a lookout or two to stand on deck, keeping an eye out for mammals and turtles. Ships also use underwater microphones to listen for the presence of vulnerable wildlife, a strategy known as passive acoustic monitoring. If

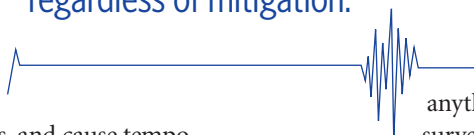
anything swims within the zone, it’s a no-go for surveys until the area’s clear. (This strategy is only to protect marine mammals and turtles. The

Bureau of Ocean Energy Management limits air gun use around sensitive seafloor habitats, but believes the effects on fish habitats would be “minor to moderate.”)

The BOEM can also establish seasonal limits to avoid air gun blasts during particularly sensitive migration times. “At the end of the day, that’s what we have to make sure happens — protection of marine mammals,” says John Filostrat, a public affairs officer with the bureau’s Gulf Office, which for now is overseeing development in the Atlantic. “It’s a high priority for BOEM and our federal partners, and we have to follow laws that are put in place to protect the environment.”

Still, some say the mitigation measures aren’t enough. In addition to its proposed five-year plan to sell leases for oil development from Virginia to Georgia starting in 2017, last July the bureau approved the use of sound-based surveys to hunt for oil and gas from the Delaware Bay to Cape Canaveral, Fla., through 2020. It’s currently considering nine permit applications for seafloor exploration in the mid- and south Atlantic areas, seven of which are for air gun use. Many of the application areas overlap,

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which could intensify the impacts of any one survey, says Michael Jasny, director of the Natural Resources Defense Council’s marine mammal protection program. Reducing that overlap could help reduce impacts on marine mammals, as could investments in better, quieter air guns that are being developed.

And there’s one question that still looms large in the background: What effect will all this noise have not just on individual animals but on populations as a whole. The Interior Department’s own estimates found that the use of air guns in the Atlantic could injure thousands of individual animals, while affecting the behavior of millions more. “We’ve built in a number of mitigation measures, and we’re considering whether more things should be done,” says Bill Brown, the Bureau of Ocean Energy Management’s chief environmental officer. “But the biggest numbers from that study are for the bottlenose dolphins, and the dolphins [overall in the Gulf] seem to be sustaining themselves reasonably well.”

But no one, including officials at the BOEM, has studied the long-term impacts of all this sound on populations as a whole. And that means no one’s really sure how seismic surveys in the Atlantic will affect, say, fisheries in Delaware. “Until the agency has done a real cumulative impact analysis, it’s irresponsible for it to approve anything off the Atlantic [coast] regardless of mitigation,” Jasny says. “It just stands environmental assessment on its head. It turns the Atlantic into one big experiment.”

Though the answer to the larger question of impact remains unclear, an even greater problem is how to weigh whatever those impacts are against the promise of new, domestic energy sources.

Something in the wind ... and water

Offshore wind farms are a different story. They’ve never been built in the United States, and just what sorts of sounds they’ll make once operating — and how much wildlife will be affected — is still a guessing game. This technology also carries the hope of cleaner energy that doesn’t emit greenhouse gases, which makes the risk-benefit analysis an entirely different equation.

Regardless, elemental concerns remain. “The more that we utilize the ocean, with all our boats and all our shipping activities, it just puts a lot of noise in the ocean,” says T. Aran Mooney, a marine scientist at



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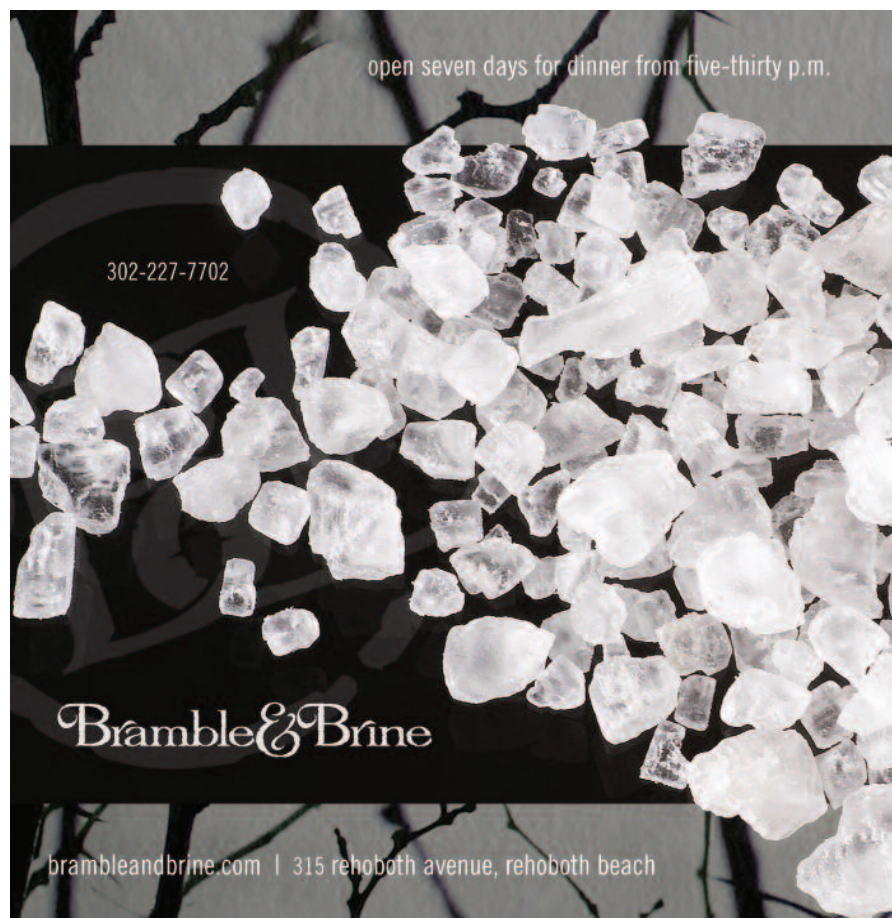
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“Renewable energies are a great thing, but we have to realize we’re putting a lot of noise in the ocean as well.”

Woods Hole Oceanographic Institution in Massachusetts. “Renewable energies are a great thing, but we have to realize we’re putting a lot of noise out there as well.”

Mooney is currently working on what’s known as a baseline study for the waters off of Massachusetts — gathering data on the types and activities of marine species in the area wind companies are eyeing for development. That way, scientists will be able to compare what’s happening in the water after the turbines are operating to what was there before, to help understand the impacts of new wind farms in places like Delaware.

At the moment, the First State’s future in offshore wind lies with Bluewater Wind Delaware, which in 2012 leased a 96,430-acre plot that sits between the incoming and outgoing shipping routes of Delaware Bay. At its closest to land, the plot sits about 11 miles east of Rehoboth Beach. (The BOEM says the turbines might be visible from shore in clear conditions.) No baseline studies have been done in these waters, which MERR’s Thurman sees as a problem.

Data from elsewhere is troubling. In Germany’s North Sea, where a wind farm was created in 2008, construction noise displaced as much as 39 percent of the harbor porpoise population in the area. But even knowing that required year-round aerial surveys for four years prior to construction to understand how and where the porpoises moved. “We are hopeful that there won’t be this rush to do something that has not been well researched that will end up having a horrific negative impact on an already over-taxed ecosystem,” Thurman says. “It would be remiss to install this wind farm to satisfy our energy demands, without first identifying what that would mean to the species that reside in the oceans.”

Companies building wind farms also employ sound-based surveys to explore the seafloor for potential construction hazards and find the best spots to plant the turbines. But the surveys don’t involve air guns, instead utilizing sonar and other strategies. They’re also conducted only in shallow waters near shore, leading the BOEM to estimate that such surveys would have minimal



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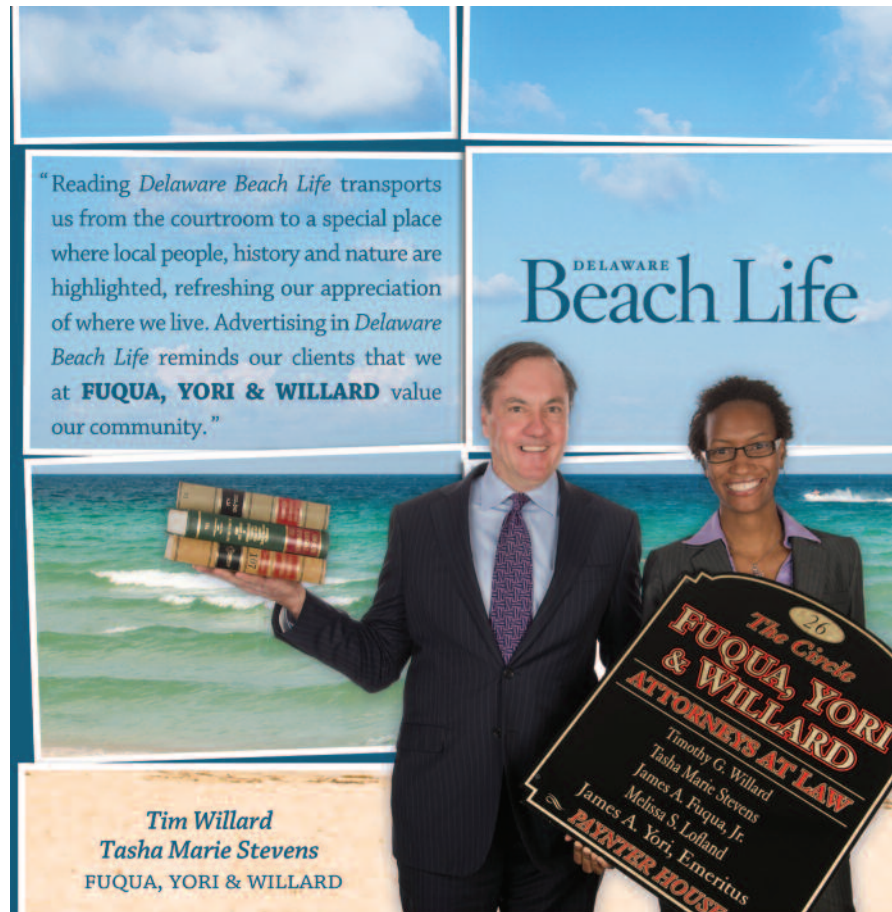
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behavioral effects on animals and cause almost no direct harm or injury. "It would have a smaller impact," Carney allows, but he stresses that "it's still an impact, and it's of concern, and so I would hope that they would do it in a way that was cognizant of the impact on marine mammals and other ocean wildlife."

The surveys may actually serve such a beneficial purpose, says bureau public affairs officer Tracey Moriarty, by mapping out sensitive habitats on the seafloor that need to be avoided.

There's likely plenty of time before Delaware sees any wind turbines off its shores. Bluewater Wind has until 2019 to submit its construction plan to the BOEM, and there would be another review process before construction could actually begin. In the meantime, countries such as Germany are developing new technology to significantly reduce sound during construction, techniques that could potentially be used here.

What happens once the farms are actually up and running is still just about anyone's guess. The turbines emit a low-frequency hum as they generate electricity, and with land-based wind farms, at least, it's produced mixed responses from the people who live close by: Some complain of headaches, insomnia and ringing in the ears, but others don't, and no one's really sure why. That could be the case with underwater residents too. But Bluewater Wind estimated that Delaware's farm would generate up to 450 megawatts of electricity at any given time, enough to power about 100,000 homes. And it's possible that it could end up helping some species too.

For example, the bases of the turbines, and the rocks piled around them, may create new habitat for fish, Mooney says. In fact, these may mimic coral reefs, which, when healthy, are one of the most biologically diverse and vibrant ecosystems around — and also one of the noisiest. "We know that the wind farm will create all this structure there that might bring in all this habitat for fish and other animals to live in," Mooney says. "There might be this noise, but lots of animals live in cities even though they're noisy, because there's this trade-off with benefits." ■

LAURA DATTARO is a freelance reporter in New York with a focus on the environment and an interest in all things science.

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