

**Ocean Gazing: Episode 12**  
**A gust of energy**  
*Jim Miller: University of Rhode Island*

<begin music>

**Ari:** Has it been two weeks *already*? This is Ocean Gazing, the podcast where we dunk our ears underwater and have a listen. I'm Ari Daniel Shapiro. Jim Miller from the University of Rhode Island studies sounds and noise in the ocean.

**Miller:** Noise means interfering with something else. You could say that marine mammals are making noise because they're interfering with my measurements. Or, or the ships are making noise. Or the rain is making noise.

**Ari:** Miller's thinking about how all this underwater noise is being impacted by offshore wind power. He'll tell us about that connection, so stay tuned.

<fade music up; sustain until it ends>

**Ari:** Jim Miller thinks about the wind somewhat differently than he used to.

**Miller:** It was very windy yesterday. I don't know if you noticed. There were the storms coming through and everything like that. The trees were swaying back and forth. And all you think is you look at all that power going by and we're not tapping it. So yeah, you look at the wind and you go, I could use that. <fade up wind noise> In fact, I can hear the wind outside my, outside my window.

**Ari:** Miller opened his window to demonstrate.

**Miller:** I go, hey, there's power there! It's a very interesting way to think about it. And everybody, you know, with the energy situation in this country and in the world, lots of people are looking at solar and geothermal and wind. And it's a very exciting time to be in that field.

**Ari:** That field is alternative energy and it's soaring. Wind farms are playing a big part.

**Miller:** Wind farms are some number of wind turbines that generate electricity from wind spinning the turbine blades, provides power for free, except for the investment of course in the infrastructure.

**Ari:** Wind farms can generate lots of power and they've got a lot of support. Here's US Secretary of the Interior Ken Salazar at a gathering sponsored by Powershift '09.

**Salazar:** We can harness the energy of the winds on the reservations of North Dakota and South Dakota and the Great Plains. And that we can harness the energy of the wind in places like the Atlantic Coast. That the renewable energy world is upon us.

**Ari:** Salazar has made renewable energy and energy efficiency primary agenda items for the Department of the Interior. The US has a bunch of wind turbines on land but nothing offshore, or in the sea, yet. Rhode Island is slotted to get an offshore wind farm in 2 years or less. There's a lot of support for wind energy because it's clean.

**Miller:** It's clean except – this is very interesting – it's clean except for the noise pollution.

**Ari:** And you may be asking yourself, what's a little bit of noise?

**Miller:** What's a little bit of noise? If you'd raise the noise floor, you could significantly affect the way animals behave in the area. They might decide that this part of the east coast of the United States, this part of the Atlantic Ocean is now off limits. Human beings do that all the time. If there's a jackhammer in the street, you'll go across the street to get around this. People will change their behavior to get away from noise. These are very important impacts that you should take care to think about when you're doing this sort of industrialization of the ocean.

**Ari:** Noise pollution's a concern because it can cover up the ocean's natural symphony.

**Miller:** The fish are chorusing and the marine mammals are singing and the ships are drumming. You know, fish tend to be low frequency, marine mammals – the dolphins anyway – tend to be very high frequency, and the ships are low frequency, the rain is sort of everywhere, you know, the rain just takes over everything.

**Ari:** This symphony contains important signals from animals trying to communicate. When it comes to wind farms, there are two sources of noise pollution to worry about. The first is pile driving.

**Miller:** Pile driving is very loud.

**Ari:** Piles are metal beams that support the base of the wind turbines. They have to be driven into the seafloor. The banging that results can be quite loud. But it's short-lived and only lasts as long as the construction. Miller's planning ways to make sure the noise has the smallest impact.

**Miller:** One of the things that we're trying to understand is the times of year in the area that they're thinking that might be more important for some species, for some threatened species. Maybe there's a whale migration at a certain time of year that

we really shouldn't do the pile driving then, because it might disturb \$\$ and so we're looking at that.

**Ari:** Even after the pile driving, there's a second kind of noise that's produced over the entire lifetime of the turbines.

**Miller:** The main effect underwater and affecting marine mammals and fish and turtles and things like that and lobsters is due to the gear noise and vibration noise of the structure. The gears are vibrating, vibrate the structure, the structure goes into the water, and then that sound gets into the ocean and affects the environment. The first systems that were put in in Europe are pretty loud underwater. They're like a small ship. And if you have a hundred of them in a large wind farm, that's 100 boats. That's a lot of noise in the water.

**Ari:** Once the US version of these wind farms gets underway off the coast of Rhode Island, Miller's gonna keep track of this noise.

**Miller:** We're actually attaching our passive acoustic listening systems to meteorological buoys and we're deploying them in the Rhode Island waters where the wind turbines are gonna be planned. So that's gonna measure the atmospheric conditions, the oceanographic conditions, and the acoustic conditions underwater. When the construction starts, we're gonna be monitoring construction. And then when operation starts, we're gonna be monitoring the operation. So essentially it's ocean observation for the sake of making sure that we're as quiet as possible and minimizing the impact on the ocean.

**Ari:** Here's one of Miller's underwater recordings. The wind farm's not there yet so this is what it sounds like before construction.

<fade up underwater recording with dolphin whistle>

**Ari:** And that's a dolphin whistle. <fade down recording>

Miller will use his recordings to keep an ear on the wind turbines. And just like a car, the turbines will break down over time.

**Miller:** You get these bumps and clicks and groans, and your car starts, doesn't sound quite like it used to be. Then all of a sudden you hear something scratching. You know something's wrong. Right, you use your hearing to monitor the health of your car. So we would use acoustics to monitor the health of the wind turbines. We would like the ones that are put in to be as quiet as possible. And so engineers are very good at designing things when they know ahead of time that this is important. It's information, it's getting the information into the hands of the people that are doing the design.

**Ari:** Information that's blowin' in the wind.

<fade up end of Dylan's "Blowin' in the Wind">

**Ari:** Try out this sonic stumper.

<fade up new sonic stumper>

<cross-fade up outro music>

**Ari:** Have a guess? Or a question for Jim Miller? Let us know by visiting [www.coseenow.net](http://www.coseenow.net) and blowing over to the podcast link.

Ocean Gazing is a product of the Centers for Ocean Sciences Education Excellence, and we receive funding from the National Science Foundation. Special thanks to Rhonda Miller, Gail Scowcroft, Sam Broun, Jim Yoder and Janice McDonnell. That's all!

**Miller:** Great. I was really happy to talk to you.

**Ari:** Talk to you in 2 weeks!

<fade up outro music; sustain until it finishes>