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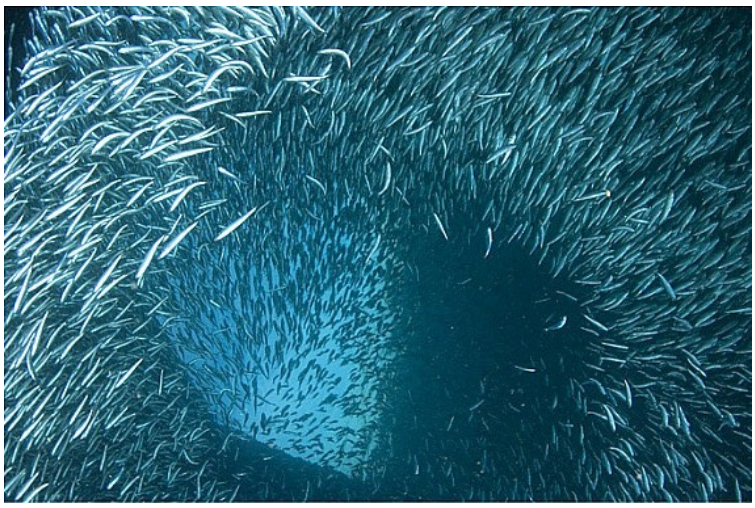
Submission into the public record re. DRI 688 Vineyard Wind Undersea Cable

"To stand at the edge of the sea, to sense the ebb and flow of the tides, to feel the breath of a mist moving over a great salt marsh, to watch the flight of shore birds that have swept up and down the surf lines of the continents for untold thousands of years, to see the running of the old eels and the young shad to the sea, is to have knowledge of things that are as nearly eternal as any earthly life can be" —Rachel Carson



"Thousands of schooling fish form a rip curl-like structure at Samurai Pier in Milne Bay, Papua New Guinea during the filming of 'Under the Sea 3D'" (© Jeff Wildermuth and used with appreciation)

Wind turbines produce low-frequency noise (LFN) and seismic vibrations—on this there is no longer any question or worthwhile debate.[1] We should all be alarmed by the implications for sea and aquatic life.

[1] van den Berg, GP. 2004. Do wind turbines produce significant low frequency sound levels? 11th International Meeting on Low Frequency Noise and Vibration and Its Control, Maastricht, Netherlands, August 30 to September 1, 8 pp.; Styles P, Stimpson I, Toon S, England R, and Wright M. 2005. Microseismic and infrasound monitoring of low frequency noise and vibrations from wind farms: recommendations on the siting of wind farms in the vicinity of Eskdalemuir, Scotland. 125 pp. Click here.

Fish, it is well known, have acute sensitivity to extremely low-frequency linear acceleration, or infrasound, even below 1 Hz.[2] This sensitivity is mediated through the fishes' otolith organs, the same organs that humans and other mammals use for detection of linear acceleration and gravity.

Studies of Atlantic cod, for instance, have shown that sensitivity to infrasound at 0.1 Hz (one compression wave every 10 seconds) is about 10,000 times greater than a human's sensitivity to linear acceleration.[3]

Infrasound sensitivity appears to be common to all fish, whereas sensitivity to higher frequencies, above 1 kHz, is a more specialized hearing function evolved only in certain fish, such as those with swim bladders coupled to their hearing organs.[4]

Fish use infrasound detection for a variety of critical social and survival functions. The movement of nearby swimming fish generates infrasound. Fish avoid predators by infrasound detection.[5] Intense infrasound makes an effective acoustic barrier for descending Atlantic salmon and European silver eels.[6] Predatory bluegills detect the presence of prey in absolute darkness by the presence of infrasound.[7] In large bodies of water such as oceans, migratory fishes appear to use their acute infrasound/linear acceleration sensitivity to detect changes in water movement patterns relative to depth, wave patterns, and nearby shores, thus aiding in navigation.

One could pile up solid scientific fact after fact, but the point has been made.

All these functions are at high risk for being unraveled or hijacked by the presence of infrasound generators—wind turbines—with their bases anchored into the bottom. For example, infrasound generation near shore may repel fish from shallow breeding areas. The presence of aberrant, anomalous and continuous infrasound may disrupt prey detection, social functions, and migrations—matters about which the wind developers have not the slightest clue. This is unacceptable to a moral and scientifically informed society.

Sensitivity to infrasound has also been reported in crustaceans and in other oceanic organisms such as whales and cephalopods (squid, octopi). It has been reported anecdotally that a land-based wind

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[2] Sand O, Karlsen HE. 2000. Detection of infrasound and linear acceleration in fishes. Phil Trans R Soc Lond B 355: 1295-98.
[3] Sand and Karlsen 2000; Sand O, Karlsen HE. 1986. Detection of infrasound by the Atlantic cod. J Exp Biol 125: 197-204.
[4] Ladich F. 2000. Acoustic communication and the evolution of hearing in fishes. Phil Trans R Soc Lond B 355: 1283-88.
[5] Sand and Karlsen 2000; Karlsen HE, Piddington RW, Enger PS, Sand O. 2004. Infrasound initiates directional fast-start escape responses in juvenile roach Rutilus rutilus. J Exp Biol 207(Pt 24): 4185-93.
[6] Sand and Karlsen 2000.
[7] Sand and Karlsen 2000.

farm on a spit of land in Nova Scotia is associated with failure of the inshore lobster fishery, requiring lobstermen to go farther out to sea to find lobsters since erection of the turbines.[8]

And so on. This is merely a sample of the published and easily accessible scientific literature on LFN and marine & aquatic life. Let it be a wakeup call that we're wreaking marine & aquatic havoc. What it says is that willy nilly erecting wind factories in the Great Lakes, Nantucket Sound, Long Island Sound, and other coastal waters is prima facie a feckless act.

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*My PhD degree is in population biology/evolutionary biology/ecology from Princeton University. I have, as well, a MA degree from Princeton in the same field, and a BA degree (with Honors) from Yale in biology. My MD degree is from the Johns Hopkins University School of Medicine.

[8] Pierpont, N. 2009. Wind Turbine Syndrome: A Report on a Natural Experiment. K-Selected Books, Santa Fe, NM, 294 pp., p. 139.

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