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Penobscot Bay Watch

POB 1871,Rockland ME 04841

TO: Vice Admiral Robert C. Parker
Commander, Atlantic Area – U.S. Coast Guard

RE: **Docket no. USCG-2011-0351, Port Access Route Study from Maine to Florida**

Dear Vice Admiral Parker:

I am writing you as executive director of Penobscot Bay Watch, a citizens' association first organized in 1993, dedicated to the protection and stewardship of the living marine resources of Penobscot Bay and the Gulf of Maine.

Penobscot Bay Watch as an organization have been part of the discussion on ocean wind energy research and development since state and federal governments and academia first began considering it within the Gulf of Maine region. In Huber v. Maine Bureau of Parks and Lands, 2011, our executive director as a private citizen was granted standing in Maine Superior Court to challenge the adequacy of the information used by the state of Maine when it approved designation of the DeepCwind prototype project two miles off Monhegan Island.

We have participated in initiatives by BOEM's and its predecessor's renewable energy offices, and all three branches of government of the State of Maine, (via advocacy, legislation and litigation) concerning Gulf of Maine-area renewable ocean energy proposals, statutes, and policies on siting and evaluation, as they emerge.

Penobscot Bay Watch supports development and deployment of offshore deepwater floating ocean wind turbines, provided that reasonably foreseeable direct, indirect and cumulative impacts on navigation, on local and regional hydrology and meteorology, on marine and coastal living marine resources, on scenic resources and on other important resources of our region's marine and coastal regions, are given the requisite 'hard look', and those unavoidable impacts minimized to the greatest extent practicable.

AT ISSUE. USCG is tasked here with *"reconciling the paramount right of navigation within designated port access routes with other reasonable waterway uses such as the leasing of outer continental shelf blocks for the construction and operation of offshore renewable energy facilities."*

The Coast Guard seeks to identify potential future conflicts between permitted activities in the Wind Energy Areas (WEAs) along the Atlantic Seaboard, and vessels calling and departing Atlantic coast ports.

We here are urging the Coast Guard to examine an issue that has received little review to date: **the tendency, under certain conditions, of some ocean windfarm operations to *generate fog banks as an unavoidable unintended byproduct. We believe the USCG***

As exemplified in the attached photographs from the Scroby Sands and Horns Rev 2 offshore windpower operations, wind energy extraction by ocean windmills may generate significant localized turbulence or upwellings of seawater beneath them, *"sufficiently enough that the local ecosystem will most likely be strongly influenced by the presence of a wind farm"*. [Source: "**On the influence of large wind farms on the upper ocean circulation**." *(Göran Broström, 2008 Norwegian Meteorological Institute). (Attached)]*

What Brostrom and other oceanographers (see below) have determined is that as air flow passes through the spinning blades of ocean wind turbines, the continuous diversion of incoming kinetic wind energy **away from the water surface** within the "wind shadow" footprint of an ocean windfarm, **reduces the Ekman transfer of energy into the water column there, inducing** deeper waters to rise to the surface. See Brostrom's report, attached.

The result: turbulence in shallow water windfarms, and localized destratification under deepwater windfarms.

Because the shallow waters of the continental shelf are frequently mixed by storms, the effect is less significant among them. However, windfarms in the Gulf of Maine are proposed for deepwater locations, where the water column is seasonally stratified. Stratified waters have different temperatures, chemical compositions and other differences at different depths.

According to Peter Jumars, head of University of Maine School of Ocean Sciences, deep water windfarms of the size proposed by Statoil are likely to create upwellings that pierce the seasonal stratification, bringing winter water to the summer sea surface and vice versa. (personal communication)

We understand that in such a forced local destratification situation, the temperature variation between the surface air and the upwelled water will stimulate production of fog that may extend the length of the deepwater windpark's "wind shadow", which can vary anywhere from five miles in length for 2 to 4 megawatt turbines, to up to 20 miles or more with the newly proposed 20 mega watt ocean wind turbines being promoted by the European Wind Energy Association.

Because the ocean windfarms proposed off of Maine are all deepwater windfarms, it is important that the Coast Guard determine how much fog these would create and in what directions the produced fog is likely to move. For example, could the proposed Statoil windfarm 12 miles off Brunswick Maine generate fog banks that extended into port access routes off Portland

For even though most vessels have radar capable of piercing fog, the combination of radar “hash” created by ocean windmill operations and the reduced visibility engendered by windmill produced fog, may create unsafe conditions.

For this reason we call on the Coast Guard to require deepwater ocean windfarms to be at least 20 miles from port access routes, to minimize the possible of the routes being chronically beset by fog.

PHOTOGRAPHS OF OCEAN WINDMILL-GENERATED FOGBANKS

Two existing offshore wind developments, Scroby Sands windfarm off the United Kingdom, and Horns Rev 1 off Denmark, offer examples of incidental fogbank creation.

Figure 1a Scroby Sands Windfarm, UK

Continued next page

Figure 2B Scroby Sands windfarm

HORNS REV 1 WINDFARM

Image source: Aeolus, a Denmark research consortium
http://www.ict-aeolus.eu/about.html

HORNS REV 1 WINDFARM Photographer Christian Steiness

REFERENCES

Dong Energy Wake effects at Horns Rev and their influence on energy production

On the influence of large wind farms on the upper ocean circulation. *(Göran Broström, 2008 Norwegian Meteorological Institute) 2008.*
*Excerpt: "*We find that the size of the wind wake is an important factor for the oceanic response to the wind farm. We show through simple analytical models and idealized numerical experiments that a wind speed of 5–10 m/s may generate upwelling/ downwelling velocities exceeding 1 m/day if the characteristic width of the wind wake is of the same size or larger than the internal radius of deformation."

Simulating impacts of wind farms on local hydrometeorology. 17 *January 2011. http://www.atmos.illinois.edu/~sbroy/publ/jweia2011.pdf*
Somnath Baidya Roy, Department of Atmospheric Sciences, University of Illinois, "[W]ind farms significantly affect near-surface air temperature and humidity as well as surface sensible and latent heat fluxes. The signs of the impacts, i.e., increase or decrease, depend on the static stability and total water mixing ratio lapse rates of the atmosphere."

Wake effects of large offshore wind farms identified from satellite SAR
http://www.isprs.org/publications/related/ISRSE/html/papers/272.pdf
"*Impacts of a large offshore wind farm on the local wind climate are described."*

NOAA Earth System Research Lab; In the wake of a wind turbine. 4/26/11
Excerpt “The wind wake study, dubbed the Turbine Wake and Inflow Characterization Study, fits under a Memorandum of Understanding on “Weather-dependent and Oceanic Renewable Energy Resources” signed by NOAA and the Department of Energy (DOE) in January 2011. The agreement sets up a framework for NOAA and DOE to work together on enhancing the accuracy and completeness of resource information for the effective and sustainable deployment, operation and maintenance, and the efficient use of weather-dependent and oceanic renewable energy technologies and infrastructure.”

END

Ron Huber for Penobscot bay Watch