Gulf of Maine windfarms' impact on lobster abundance and distribution could be sever.

Scientists have discovered that offshore Gulf of Maine wind farms of the size promoted by former governor Angus King and others wind industry executives could put a lasting significant crimp in Maine's famed lobster fishery.

The study has dire implications for Chesapeake Bay's beloved blue crabs as well.

Results of the study "**Chaotic behavior of coastal currents due to random wind forcing."** government research at the National Institute of Standards & Technology in Gaithersburg Maryland suggest that large offshore wind energy extraction "farms" will produce persistent reduced-energy zone "footprints" in the surface waters of the ocean in and around the wind turbine site.

According to the researchers, the disparity between the normal chaotic state of natural surface ocean waters, and the "harmonized" lower energy waters in and around a wind turbine site can result in a "chaotic excursion", in which prevailing surface currents nearby are diverted from their normal routes.

Though the diversion could be comparatively slight, if this occurs during the Maine Coastal Current's transporting of planktonic lobster larvae from downeast Maine south along the New England coast, a percentage of the larvae would be diverted away from the coast, resulting in reduced settlement and depressed lobster abundance down current for the life of the offshore windfarm operation.

Similar concerns have been raised in the midatlantic region that planned giant windfarms off the Maryland and Virginia coasts could cause the famous Chesapeake Bay blue crab to suffer a prolonged drop in abundance.

As that region's fishermen and scientists long ago discovered, the larvae of most of that bay's blue crabs wash out beyond the Virginia Capes into the Atlantic Ocean, to reappear months later as juvenile crabs that move upbay and replenish Chesapeake blue crab grounds.

A chaotic excursion set off by large scale windfarms operated off the mouth of Chesapeake Bay could divert crab larvae to north or south of that Bay, again reducing a prized crustacean's abundance for the life of those windfarm operations.

c

The

agencies recommended that surveys document the temporal and spatial distribution of wildlife in

3

the project airspace at all times of the day and night and over all seasons. Further, it was

recommended that in addition to the aerial and boat surveys, other survey techniques be

employed which document the movements of flying animals at night and during inclement

weather conditions. Specifically, it was recommended that radar technology be used to

determine migration characteristics such as flight directions, migration passage rates, and flight

altitudes. Critically important information such as the relative proportions of birds flying

through the proposed altitude of the turbine rotor swept area was requested.

Scientist have discovered that offshore Gulf of Maine wind farms of the size promoted by former governor Angus King and others wind industry executives could put a lasting significant crimp in Maine's famed lobster fishery.

The study has dire implications for Chesapeake Bay's beloved blue crabs as well.

Results of the study "**Chaotic behavior of coastal currents due to random wind forcing."** government research at the National Institute of Standards & Technology in Gaithersburg Maryland suggest that large offshore wind energy extraction "farms" will produce persistent reduced-energy zone "footprints" in the surface waters of the ocean in and around the wind turbine site.

According to the federal researchers, the disparity between the normal chaotic state of natural ocean surface waters, and the "harmonized" lower energy waters in and around a wind turbine site can result in a "chaotic excursion", in which prevailing surface currents are diverted slightly from their normal routes.

If this occurs during the Maine CoastalCurrent's transporting of planktonic lobster larvae from downeast Maine south along the New England coast, a certain percentage of the larvae will be diverted away from the coast, reducing lobster abundance downcurrent for the life of the offshore windfarm operation.

Concern has been raised that similar plans to construct giant wind farms off the Maryland and Virginia coasts could cause the famous Chesapeake Bay blue crab to suffer a similar prolonged drop in number from a "chaotic excursion".

As that region's fishermen and scientists long ago discovered, the larvae of most of that bay's blue crabs wash out beyond the Virginia Capes into the Atlantic Ocean, to reappear months later moving upbay and replenishing Chesapeake blue crab grounds.

A chaotic excursion set off by windfarms operated off the mouth of Chesapeake Bay could send crab larvae to waters off coasts to the north or south of that Bay, again reducing crustaceann populations for the life of the windfarm operation.

across the area of the offshore enterprise, and for a significant distance "downwind".

This "footprint" of energy loss

" Recent analyses revealed that chaotic behavior is possible in a model of currents induced by wind over topography that slopes offshore and varies approximately periodically alongshore.

These analyses were based on the assumption that the forcing by wind is harmonic.

In unobstructed air the wind field, and therefore the wind forcing, is random. Given a wind field with specified spectral density, and any specified parameters of the bottom topography, a generalized [Melnikov transform technique](http://fire.nist.gov/bfrlpubs/build96/PDF/b96089.pdf%22%20%5Ct%20%22_blank) is used to estimate upper bounds for probabilities that chaotic excursions will occur during a specified time interval

"

is induced by large wind farms can paradoxically, cause **coastal current chaos,** upsetting critical planktonic larval migrations.

"Maine lobsters are as much as risk from the DeepCwind Consortium's plans of large offshore wind farms as Chesapeake Bay's blue crabs are from the immense wind plantations that Maryland's industry is proposing in their offshore waters."

Both species rely on precisely timed current flows to transport them from the

**Maryland and Virginia crabbers are not putting up with it. Maine lobstermen shouldn't either.**

**Chaotic behavior of coastal currents due to random wind forcing** *Simiu, E.  Building and Fire Res. Lab., Nat. Inst. of Stand. & Technol., Gaithersburg, MD;*

This paper appears in: OCEANS '94. 'Oceans Engineering'. Proceedings 16 Sep 1994. Abstract

Recent analyses revealed that chaotic behavior is possible in a model of currents induced by wind over topography that slopes offshore and varies approximately periodically alongshore.

These analyses were based on the assumption that the forcing by wind is harmonic.

The author examines the more realistic case where the wind field, and therefore the wind forcing, is random. Given a wind field with specified spectral density, and any specified parameters of the bottom topography, a generalized [Melnikov transform technique](http://fire.nist.gov/bfrlpubs/build96/PDF/b96089.pdf%22%20%5Ct%20%22_blank) is used to estimate upper bounds for probabilities that chaotic excursions will occur during a specified time interval

On Fri, Feb 12, 2010 at 12:37 AM, Ron Huber <coastwatch@gmail.com> wrote:

Short article summarizing work by  Goran Brostrom of the Norwegian Meteorological Institute in Oslo. Puts a very nice manna-from-hell spin on it. I think even he is wary of going all gung ho over mucking with the hydrology.  And who knows what has been learned in the last year...   Brostrom's study was  published in *Journal of Marine Systems*

[**Offshore wind power could alter ocean currents**](http://www.msnbc.msn.com/id/27681666/)**(MSNBC)**

Nov. 12, 2008  **Generating wind power at sea may disturb ocean currents and marine ecosystems, according to a new study.**

Offshore wind farms are common in Europe; Denmark, The Netherlands, and the United Kingdom all have several active installations. Wind power in the United States is currently confined to dry land, but three installations are planned off the coast of New Jersey, Rhode Island and Delaware, totaling about 1,500 megawatts of generating capacity.

Extracting energy from wind changes regional air currents, which can in turn affect how the nearby ocean circulates, according to Goran Brostrom of the Norwegian Meteorological Institute in Oslo.

In a paper published this month in Journal of Marine Systems, Brostrom shows in a model that **winds swirling at 11 to 22 miles per hour downwind of large farms are uneven. As they blow over the ocean they can roil the waters, causing upwelling**.

The change in currents seems small — a **nudge of just 3.3 feet per day** — and the wind farms have to be around 1.9 square miles. But Brostrom said the effect is enough to **bring nutrient-rich waters up from the depths**, which marine life can thrive on.

“I think you will see a large effect over time,” he said. “You will get more plankton blooming, and you will see more vibrant life overall at that place.”

Plankton blooms are infamous for causing toxic red tides and for sucking oxygen out of the water. But they can also be food sources for larger animals.

“Whether or not this is a good thing is a matter of debate,” Brostrom said. Though he stressed that the goal for any man-made object should be to minimize environmental impact, he added: “I’m an optimist; I think this could be beneficial to local fisheries.”

Such dreams of wind farms enriching ocean wildlife — or impacting it in any way — may be a bit premature, said Michael Dvorak of Stanford University. For one thing, all current farms are situated in water far shallower than the 98-foot depth assumed in Brostrom’s paper. Some deeper farms have been proposed, but maintenance costs skyrocket the further from shore windmills are.

And Brostrom’s study is a very general model — ocean currents and marine life could be affected in very different ways depending on the location of the farm.

“If you want to understand how ocean currents are really going to be affected, you’ll want to *include the bathymetry at the site*,” Dvorak said, referring to analysis of underwater depth, as well as do a detailed, specific study of the area’s ecosystem.  [NOTE: actually bathymetry is the physical geography of the underwater site, seamounts, canyons etc]

Still, Dvorak pointed out Brostrom’s study **raises a point no one in the wind power industry had yet considered.**

“People have looked at the climate effects of wind farms on land, but this is the first to bring up the question of ocean currents,” he said. “This is something we should be looking at.”

By Michael Reilly
Discovery Channel
Wed., Nov. 12, 2008

[msnbc.msn.com](http://www.msnbc.msn.com/id/27681666/)