# TSBBIG* Newsletter

*Volume 4, Number 2 (July 2007)*

**IN THIS NUMBER:**



### A Word from the Editor

For most of us, summer is the busiest time of the year, with field work, vacation, or simply all those things just waiting to be done. Hopefully you'll have at least a bit of time to read this July issue of the TSBBIG Newsletter!

This issue's feature article, by a team of scientists from a German consulting company, describes the work carried out through Danish-German collaboration to study bird collision risk at offshore wind plants. You'll find a short article on work carried out by the Canadian Wildlife Service to study migration, as well as an update on the bird monitoring programme conducted at the two Danish offshore wind energy facilities (see March 2007 issue). There's also a little piece on the term "wind farm": I put it in knowing that I might get some comments! Lastly, don't forget to check out the documents and events sections for things you might have missed...

*Mélanie*

*Environmental Assessment*

## Collision Risk at Sea: which Species, how Likely? Investigations at Existing Danish Offshore Wind Plants

This study investigates the collision risk of birds with offshore wind turbines. It considers all bird species present in the vicinity of the wind plants, their altitudinal distribution and their behaviour. The project was carried out jointly by BioConsult SH and the University of Hamburg in the two Danish offshore wind plants Horns Rev (North Sea) and Nysted (Baltic Sea) through Danish-German cooperation. It was financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

Like many other countries, Germany aims to lower its $CO_2$ emissions to 80% of its 1990 level. Consequently, plans and permissions are in place for installing approximately 5 gigawatts of offshore wind energy, which will be provided by 15 wind plants in the North Sea and 3 in the Baltic Sea. Previously, the opportunity to conduct investiga-

*(Continued on page 4)*

*Migration Research*

## Using Weather Radars to Characterise Spring Nocturnal Migration in Eastern Québec, Canada

Preliminary work using archived data from the Val d'Irène weather radar (located 40 km south of Matane, Québec, Canada) suggests that during the spring migration, birds concentrate along the southern bank of the St. Lawrence River at night. This work, led by the Environment Canada's Canadian Wildlife Service in collaboration with the Meteorological Service of Canada (Environment Canada), is in the preliminary stages but is of special interest because of the considerable development of the wind industry on the Gaspé Peninsula and in eastern Québec in general, and because of concerns about the harmful effects that this industry may have on migrant avian populations. The results described here are derived from a summary visual examination of radar data; a more exhaustive validation is currently in progress.


The Canadian Wildlife Service's mobile laboratory for the study of avian migrations.

### Nocturnal Bird Migration and Wind Plant Siting

A total of 48 nights in spring 2004

*(Continued on page 2)*

*Tall Structures and Birds/Bats Information Group

*Migration Research*

# Weather Radars and Spring Migration...Continued

(April 26 to June 14) were examined. During 34 of these nights, nocturnal migration movement attributable to passerines was identified. Of these 34 nights, 11 nights (between April 28 and May 29) saw a concentration of birds along the southern bank moving in a northeasterly direction.

The daily movements of birds in this area occured as follows: birds taking flight after sundown from the southern bank do not hesitate to cross the St. Lawrence river. However, in certain wind conditions, crossing occurs only at the beginning of the night. Birds begin to follow the coast on average two hours and 30 minutes (± 80 minutes [standard deviation]) after sundown (for the 11 nights during which this phenomenon was observed). They then concentrate in an area approximately 5 km-long on either side of the river and continue to migrate in this fashion until on average two hours and 40 minutes (± 130 minutes) before sunrise. Thus the migration corridor running along the coast would be present for approximately three hours and 50 minutes (± 120 minutes). This corridor was observed between Rimouski and Matane, but in all likelihood occurs in a similar fashion all along the southern bank of the St. Lawrence estuary (the middle and maritime estuaries) and the Gulf of St. Lawrence.

Because this migration "corridor" is located within the boundaries of several large wind plants, the results can be used to evaluate the potential impact of these facilities. The weather radar image data show flight altitudes situated between 100 and 800 m above sea level (exact altitudes remain to be determined). Because the land on which the wind turbines are installed reaches an altitude of up to 150 m above sea level, the migration corridor could be partly within the blade-swept area of the turbines. This region thus shows great potential to help us understand more about the possible consequences of wind plants on migrating birds in this area.

### Building a Research Group

This preliminary work on avian migrations in Québec is part of a collective effort by several partners in the province to improve present-day knowledge of the migration of bats and birds, with the aim of evaluating the risk that human activities, such as the construction and operation of wind plants, represent for bird and bat populations.

This *Groupe de recherche sur les migrations de la faune ailée* ("Avifauna Migration Research Group") includes organisations such as Environment Canada (the Canadian Wildlife Service, Wildlife & Landscape Science, and the Meteorological Service of Canada) [www.ec.gc.ca]), the Ministère des Ressources naturelles et de la Faune (www.mrnf.gouv.qc.ca), the Université du Québec à Chicoutimi (www.uqac.uquebec.ca), and the Observatoire d'oiseaux de Tadoussac ("Tadoussac Bird Observatory" [www.explos-nature.qc.ca/oot]). The group's goal is to:

1. Define the main avian migration "corridors" along the St. Lawrence. Related activities include:
   - developing expertise in the use of Canadian weather radars and marine radars for the study of migrations
   - setting up a network of bird observatories along the St. Lawrence (e.g. in the Godbout region), and comparing bird counts in order to evaluate migratory behaviour along the St. Lawrence , as well as migration chronology, and synchronicity
   - studying the migratory behaviour of three species of birds of prey using satellite transmitters
2. Develop tools for predicting the risk that wind plants present to birds and

*(Continued on page 3)*

The newsletter of the Tall Structures and Birds/Bats Information Group (TSBBIG) is published by the Canadian Wildlife Service of Environment Canada.

The TSBBIG is an informal networking and information-sharing group that brings together persons and organisations concerned with the issue of the impacts of tall structures on wildlife.

The newsletter is intended as an informal information-sharing tool. The information or facts contained in this newsletter do not necessarily reflect the opinions of Environment Canada or of participants in the working group.

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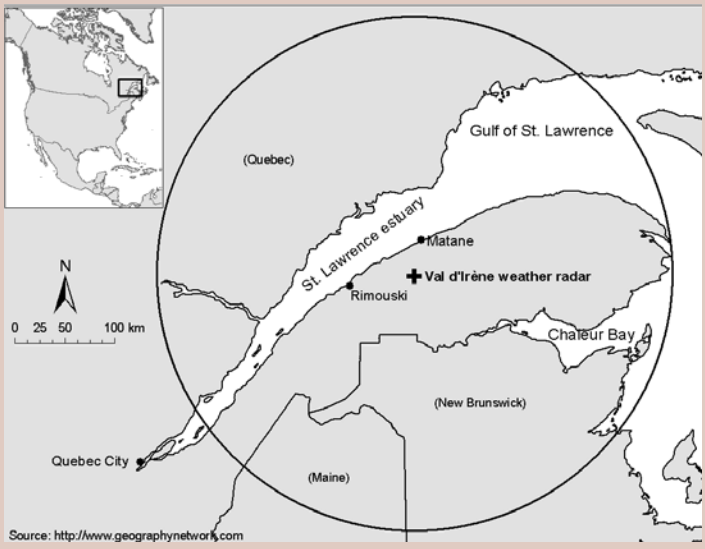
*(Ce bulletin est aussi offert en français)*

## Weather Radars and Spring Migration...Continued

*(Continued from page 2)*

bats. Related activities include:

- developing a nocturnal migration prediction tool (based on geographical and meteorological factors, migration phenology, and flight altitude)
- studying the behaviour of birds of prey around and inside an operating wind plant located in an important migration corridor
- evaluating the activity level of bats in an operating wind plant
- evaluating the core range of three species of birds of prey using satellite transmitters



Project study area

Other related projects include:

- comparing the effectiveness of different migration monitoring techniques (visual monitoring, bird banding, Canadian meteorological radars, marine surveillance radar)
- developing a site sensitivity map of birds and bats in connection with the development of wind energy in Québec

For more information about the activities of the Research Group, please contact Mélanie Cousineau (contact information below). ♦

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*Monitoring*

## Danish Offshore Bird Monitoring Programme - an Update

"Black Scoters thrive among offshore wind turbines". This is the surprising – and very positive – conclusion of a recently-published survey of Black Scoters wintering in and around the Horns Rev offshore wind farm, in the North Sea. The survey was conducted during the winter of 2006/2007 (the fifth winter following the construction of the wind farm), as a follow-up to the environmental monitoring programme carried out as part of the Danish offshore wind farm demonstration programme (reported in the TSBBIG March 2007 issue).

The survey documents that Black Scoters occurred in high densities in the wind farm: a total of no fewer than 4 600 were recorded in the farm area during a single count. The survey also shows that the number of Black Scoters in the wind farm area did not differ significantly from the number found in surrounding areas. In other words, the turbines could not be demonstrated to have any negative impact on the species' choice of habitat.

This result is surprising because Black Scoters are thought to be particularly sensitive to human activities; it was expected that wind farms would drive them out of suitable habitats. Previous monitoring activities conducted at Horns Rev suggested that the scoters avoided the wind farm, as few birds were observed in the wind farm despite the presence of large numbers in the general Horns Rev area.

Whether the recent results regarding Black Scoter numbers in the Horns Rev wind farm area constitute an example of habituation, or a result of changes in food abundance, remains an open question, however, as food availability was not studied in the programme.

The potential conflict between wind turbines and Black Scoters has had – and continues to have – major significance for the planning and implementation of offshore wind farm projects in a number of north-western European countries.

The complete report can be found on the Website of the Danish Energy Authority (www.ens.dk/sw42149.asp), and Vattenfall (www.vattenfall.com – search for "Horns Rev"), or obtained by contacting Jesper Kyed Larsen (see contact details below). ♦

*- Jesper Kyed Larsen is an Environmental Coordinator with the energy company Vattenfall, in Denmark. He can be reached at jesperkyed.larsen@vattenfall.com.*

# Collision Risk at Sea...Continued

(Continued from page 1)

tions in offshore wind plants existed only in Denmark, where two large wind plants are in operation since 2002/2003 (80 turbines in the North Sea, 72 turbines in the Baltic, see Fig. 1). Plans to build new facilities raise the concern that migrating birds will be affected by these. Potential effects on birds fall in three categories: 1) barrier effects – birds will avoid the wind plant area and potentially adjacent areas as well; 2) direct habitat loss caused by the wind plant structures; 3) collisions – additive mortality caused by bird collisions with the turbines.


**Figure 1:** The Danish-German North Sea and Baltic Sea. The locations of the two studied Danish wind plants, Horns Rev and Nysted, are indicated by the (pink) squares.

It is well known that several millions of songbirds, as well as larger birds, such as raptors and waterbirds, cross both the North and the Baltic Sea during migration. Thus there is a need to increase understanding of the behaviour of these birds, and of the collision risk at sea. Currently, collision risk is being assessed at onshore wind plants. Accurate risk calculations require both technical and biometric data. To date, however, risk has been evaluated simply by modeling bird behaviour toward a wind plant: risk is calculated based on the proportion of birds that do not take evasive action at the approach of the structures, on the premise that birds flying directly toward a wind plant do not *see* the structures. However, this does not provide for an accurate assessment of risk. For example, it has been shown that Eiders adjust their flight paths some 3-4 km away from the wind turbines. Collision risk calculations frequently incorporate a 95% avoidance rate, but it has been shown that a 10% decrease in avoidance rate increases collision risk 20-fold[1]: avoidance behaviour is thus of primary interest.


Radar setup at the Nysted wind plant

The results of studies conducted by the Danish using the BACI design (before-after-control-impact) were used to determine the optimal parameters of the wind plant (with regard to location, construction and operation) to minimise impacts on birds. These studies have focussed on barrier effects and habitat loss, as well as on collision risk, with an emphasis on seabirds and diving ducks, which migrate and/or stage and feed at both locations in considerable numbers.

**What we did**

Working in offshore environment presents many difficulties: 1) birds are rarer, and so more time must be invested to collect sufficient data; 2) small birds at distances and altitudes greater than 100 m are difficult to see; beyond 200 m they become almost invisible; 3) most songbirds, as well as many waterbirds, migrate at night. This implies that visual observations are not sufficient: radars, which can operate continuously, cover distances of 500 to 1 500 m (horizontally or vertically), as well as collect data in darkness, thus offer clear advantages.

From 2005 to 2006, we spent a total of 180 days on a ship, which was always positioned at distances of 150 to 250 m from the facilities, facing the direction from which it was expected that the season-specific bird migration would originate. Birds flying towards the wind plant could thus be observed easily (Fig. 2).

Two radars on each ship were used to complement visual observations (species, number of birds, direction of flight, altitude, avoidance behavior). One radar was oriented vertically to determine bird numbers and altitudes, this at ranges of 500 and 1 500 m. The other radar was used in the normal horizontal position to determine flight direction and behaviour, this at a range of 3 000 m. Radar data were analysed with regard to altitudinal distribution inside and outside the wind plants; avoidance behaviour was assessed using target tracks. Only preliminary results are presented here, as analyses have not been finalized.

(Continued on page 5)

# Collision Risk at Sea...Continued

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**What can we see with our own eyes?**

A total of 120 bird species were recorded at offshore sites; approximately 65% of these species were also observed within the limits of the wind plants. It is apparent that some species show a marked avoidance of the wind plants (e.g., Common Scoter [*Melanitta nigra*], as well as several goose species [*Anser spec., Branta spp.]*) - Fig. 3).

Other species, such as most of the gull species (Herring Gull, *Larus argentatus;* Mew Gull, *Larus canus*) and the Great Cormorant (*Phalacrocorax carbo sinensis)* show less obvious avoidance behaviour towards the wind plants. These species were present over longer time periods at the sites. Raptors also occur at offshore sites (185 individuals from 14 species were observed). The species most frequently observed, the European Sparrowhawk (*Accipiter nisus*), normally flies below 100 m more or less in a straight line, but adapts its flight path when approaching the wind plant.

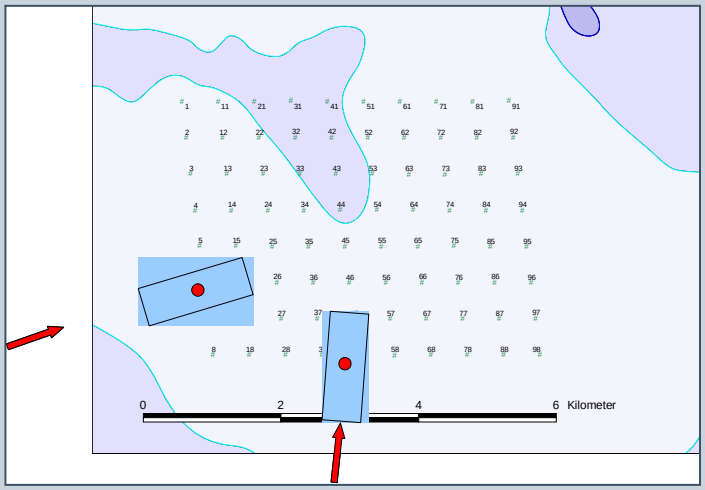


**Figure 2:** Examples of possible ship positions (red dots) and observation range (blue rectangles) for visual and radar observations (in the vertical position) at Horns Rev during the spring; migrating birds were expected to arrive from the south or south-west (red arrows).

**When can radar help?**

Songbird migration is concentrated in a few days only and is closely dependent upon weather conditions, both short- and long-term. We compare data from the 5 days/nights with the most intense migration to data from the remainder of the observation period. The data clearly show that during nights of intense migration, birds fly at higher altitudes: during periods of high migration intensity, only 13-14% of birds fly below 100 m (wind turbine height: 110 m) while this proportion is of 23% at other times (Fig. 4).

From the altitudinal distribution data at a range of 1 500 m, it is evident that a large proportion of the birds is recorded well above 500 m, especially during intense migration.

**What do we know now?**

Migrating birds appear to avoid the wind plant area, while resident birds, as well as non-breeding, staging and over-wintering birds are found more frequently within the wind plant area. The data suggest the presence of a barrier effect for low-flying species (especially ducks, seaducks, divers), which avoid wind plants on a large scale, and that collision risk is greater for species using the wind plant area. In addition, radar results suggest that the majority of migrating birds fly well above the wind turbines. Low visibility (rain, fog), however, may increase collision risk.

The studies discussed here have already provided a wealth of valuable data to complement current collision risk models for a variety of bird taxa. Currently, we are analysing flight tracks recorded with a vertically-oriented radar to assess altitude changes – thus avoidance - of birds flying towards the wind plants. Assessing avoidance behaviour near the wind turbines (at a finer scale) will require further research.

Once collision risk has been calculated, field studies would need to measure actual collision rates.

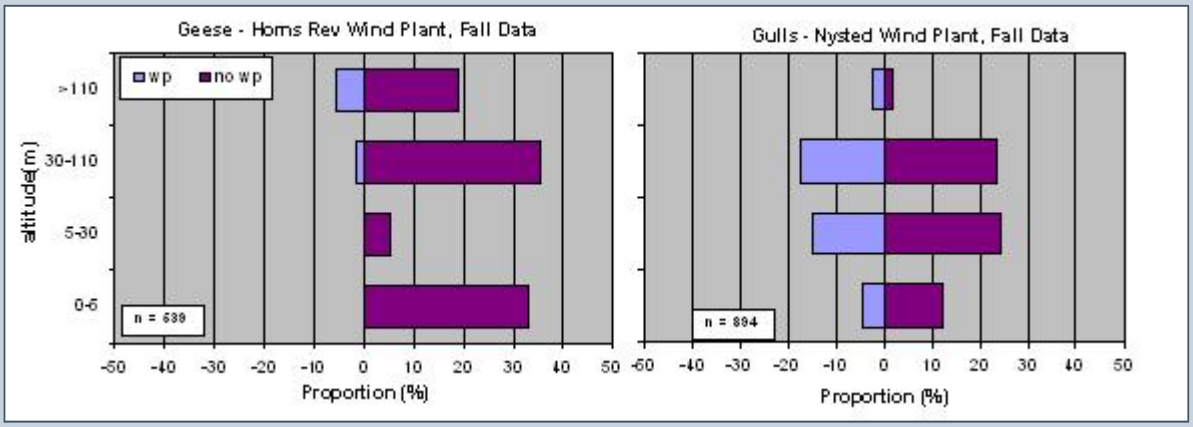


**Figure 3**: Example of altitudinal distribution (from visual observations) at the Horns Rev and Nysted wind plants in the absence (no wp) or presence (wp) of wind plant. Altitude classes are: 0-5 m – very low over the water; 5-30 m – below rotor blades; 30-110 m – within the blade-swept area; >110 m – above the wind turbine.

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# Collision Risk at Sea...Continued

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Such studies have been conducted for onshore installations[2], but to date, almost all attempts to quantify collision rates at offshore installations have failed. Continued cooperation between research groups working on these topics in Europe and worldwide will help to better integrate and understand the issue of bird collision risk at sea.♦

*- Jan Blew, Malte Hoffmann and Georg Nehls are with BioConsult SH, Germany (www.bioconsult-sh.de), an environmental consulting company located in Northern Germany. BioConsult SH has conducted work on environmental topics related to offshore wind plants since 2001, and has conducted several environmental impact assessments for wind plant proposals. Besides carrying out the research project described here, it is also involved in the offshore topics of noise reduction with regard to marine mammals. For more information on this study and others from the authors, or to obtain a complete reference list, please contact Jan Blew at j.blew@bioconsult-sh.de.*

*1. Chamberlain, D. E., M. R. Rehfisch, A. D. Fox, M., Desholm, S. Anthony (2006): The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. Ibis, 148: 198-202.*

*2. Grünkorn, T., A. Diederichs, B. Stahl, D. Poszig, G. Nehls (2005). Entwicklung einer Methode zur Abschätzung des Kollisionsrisikos von Vögeln an Windenergieanlagen. Gutachten im Auftrag des Landesamtes für Natur und Umwelt Schleswig-Holstein, Flintbek. 109 pages.*

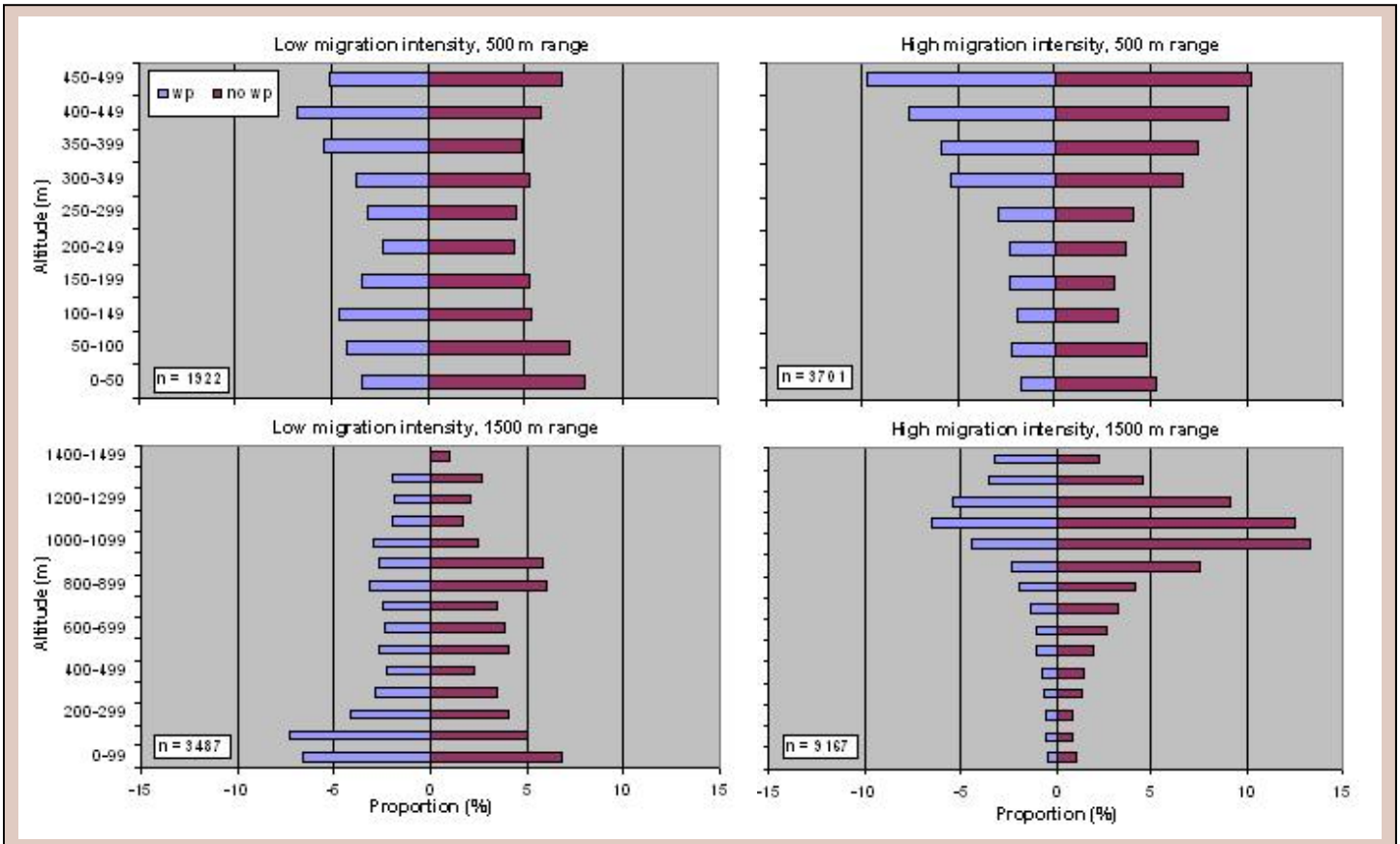


**Figure 4:** Altitudinal distributions at the Nysted wind plant, in the Baltic Sea, based on data from nocturnal radar observations. Figures on left: low migration intensity, right: high migration intensity. Top figures: range of 500 m, bottom figures: range of 1500 m. Left portionof figures: wind plant present ("wp"). Right: no wind plant ("no wp").

## Interesting Documents and Papers

- ◊ A 3-year study of the impacts of wind facilities on greater prairie-chicken populations was initiated in Kansas, U.S., in 2006 and preliminary results are expected to be available by late summer 2007. STAY TUNED.
- ◊ New York City Audubon has just published Bird-Safe Building Guidelines, a 55-page manual for architects, landscape designers, engineers, glass technicians, developers, building managers, city, state, and federal officials, and the general public. It reveals the magnitude of bird-collisions with glass and describes the conditions that cause these deadly collisions. Access the guidelines at: http://www.nycaudubon.org/home/BirdSafeBuildingGuidelines.pdf (from the New York City Audubon Website: www.nycaudubon.org)

# My personal beef with "wind farms"

For those who know me personally, the fact that certain things -- especially things having to do with language in general -- tend to, well, irk me, is likely already known. The term "wind farm" just happens to be one of these things! Despite its popularity in all English-speaking parts of the world, I have come to develop a certain aversion to it. Forgive me, if at all possible, but I have taken it upon myself to avoid the use of this term in my own documents. "Wind farm" is to me a term that seems linguistically incorrect in many ways. Perhaps my multilingual, non-anglophone background prods me to this viewpoint, but perhaps it also stems from having learnt English through formal schooling. I should also note that many other languages seem to agree with me in this: to a German a wind farm is a "Windpark", the French call it the same -- "parc éolien", and the Danes add their exotic letters to the mix: "vindmølleparker".

Certainly the energy from wind is, one could say, being "harvested" by the wind turbines, but where does "farming" come into play? Let me lend support to my view by providing all three possible definitions of the term "farm", as given by the Canadian Oxford Dictionary:

1. an area of land, and the buildings on it, used for growing crops, rearing animals, etc. (also attrib.: farm machinery; farm workers).
2. a place or establishment for breeding a particular type of animal, growing fruit, etc. (fish farm; mink farm).
3. a place for the storage of oil or oil products.

Well, the third one has me baffled – the oil doesn't seem a good fit, but at least the first two give the impression that something is being produced through husbandry of animals and management of the land. For those among you that do not think the standards of our Canadian Oxford meet that of the wider English world, I did check a few other sources. Merriam-Webster's Collegiate Dictionary, the American Heritage Dictionary for the English Language, as well as Harrap's Dictionary all agree: some husbandry is implied in the term "farm". I hasten to add that the good folks at Merriam-Webster offer, in seventh position in their definition list, the following: "an area containing a number of similar structures or objects". I concede that this could be applied to the concept discussed here, but I do believe a more appropriate term can be found.

"Wind Energy Production Facility" is, I think, for clarity's sake, by far the best choice (and it is accompanied by a reasonably pronounceable acronym: WEPF!) However, I do admit that, its technical and linguistic beauty notwithstanding, it is rather long and therefore likely to remain an unadopted orphan. "Wind energy installation" (analogous to the other German term "Windenergieanlage") or "wind power plant" are also appropriate, and any substitution of "energy" by "power", is equally acceptable. Perhaps a more "keyboard-friendly" term would achieve wider acceptance? A colleague once suggested "wind plant" (I have seen it since in print, too): perhaps a healthy compromise indeed. After all, there are "power plants", "hydro plants", and "coal plants". And, to bolster this argument, the Canadian Oxford Dictionary provides the following definitions for "plant":

1. machinery, fixtures, etc., used in industrial processes
2. a factory
3. (also physical plant) the premises, fittings, and equipment of a business or institution.

I hope my viewpoint has been made clear, perhaps even made acceptable, or at the very least, understandable. This being said, I will never force this pet peeve onto any of the persons who generously contribute to this newsletter: your choice of words is your own. I may, however, continue to object to the insertion of "windmill farms", as this is just too much for me to bear!

*Yours, Mélanie* ♦

*Events and Meetings*

**Past Events**

An **International Conference and Workshop on Radar Ornithology and Entomology was held in Helgoland**, Germany, from June 25 to 28. Conference proceedings are in preparation (see *www.radarconference.de*).

The **Centre for Wind Energy and the Environment** hosted a workshop in November 2006 at the University of Northern British Columbia, British Columbia, Canada, on "Wind Energy Development and Environmental Impact Assessment Scoping Process for British Columbia". The associated discussion document is now available at *http://cwee.unbc.ca/reports.htm*.

**Upcoming Events**

The **9th combined meeting of Bird Strike Committee USA and Bird Strike Committee Canada** will take place in Kingston, Ontario, Canada from September 7 to 13. More information available at *www.birdstrikecanada.com*.

The **Society of Canadian Ornithologists** will be holding its 26th annual meeting in Lake Opinicon, Ontario, from September 27 to 29 (see *www.sco-soc.ca*).

Don't miss the **Canadian Wind Energy Associations' 23rd Annual Conference and Trade Show**, to be held in beautiful Québec City, from September 23 to October 3. An excellent opportunity indeed to enjoy the fall colours in one of North America's oldest cities! More information at *www.canwea.ca*.