Wind Turbines and Birds

The Erie Shores Wind Farm Experience: Nesting Birds

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Introduction

The Erie Shores Wind Farm (ESWF) extends along the north shore of Lake Erie for about 29 km to the east and west of the town on Port Burwell, in eastern Elgin County and western Norfolk County. During the first two years of operation (2006-2007) it consisted of 66 turbines placed in agricultural fields. A gravel laneway led to each turbine, but otherwise crops were planted close around the turbines and the laneways. Crops were mainly corn and soybeans or grain, less often squash, cucumbers, asparagus, or peppers, and a few were in cherry orchards where grass was mowed regularly. Turbines were located about 150 m to 2.5 km inland from the high bluffs of the Lake Erie shores. Some were located near wooded areas, or there were trees and shrubs along fence rows passing at various distances from the turbines. Except for a few in orchards, almost all were at least 40 m (to the base of the tower) away from any number of trees or shrubs, and some were well out in fields more than 100 m from the nearest tree or bush.

The turbines are on tubular towers, with no guy wires, that rise 80 m at the centre height of the hub of the blades. Blades span 77 m. At the lowest part of the sweep the blades are thus well above tree height, at more than 41 m in the air. At lighter wind speeds blades rotate at about 13-15 rpm, rising to a maximum of 22 rpm in stronger winds. Other than a relatively quiet swish as the blades rotate, turbines are fairly quiet. One can easily carry on a conversation at the base of a tower without raising one's voice. It can be more difficult to talk over the sound of the wind than the sound of a turbine.

The turbines are spaced at least 300 m apart, where grouped at all, to reduce wind interference in variable winds. Although some are grouped where land was available, because of various set-back restrictions, turbines were often much farther apart, even several kilometres.

This paper presents information on some nesting birds in proximity to wind turbines. There was seldom time to devote specifically to nest finding. These were nesting/breeding observations made during the course of other activities. Most nests were located in 2007. There was construction activity into May of 2006, with considerable traffic on laneways into June, probably limiting bird activity that year, and I was present more days in 2007. All distances are from the base of the towers unless otherwise indicated. Any distance less than about 37 m will be below the reach of the turbine blades. Observations for small birds are generally limited to those closer than 100 m. Some nests were not followed to completion as I was not present through the nesting season. Additional details of nests are on ONRS cards at the Royal Ontario Museum. Breeding bird population studies will be considered separately.

Observations

Canada Goose (*Branta canadensis*). A pair nested in a swampy woodland within 300 m of a turbine in 2006. They had small flightless goslings in the area in late May. Geese were frequently seen flying past a turbine within 200 m to visit a farm pond near this nest.

Mallard (*Anas platyrhynchos*). A nest was found 23 May 2007 just <100 m from a turbine, but there were only broken eggs remaining. As second nest was about 130 m from a turbine; it had 5 eggs on 11 June and 8 eggs on 14 June 2007.

Wild Turkey (*Meleagris gallopavo*). Two broods of young were seen in 2007, one about 200 m and one about 400 m from turbines. However, since turkey tracks were noted <50 m from turbines on 75 occasions, these broods were not particularly close.

Bald Eagle (*Haliaeetus leucocephalus*). A pair that traditionally nested in a tree about 400 m from the site of a turbine installed in late winter 2006, left that site during construction, and moved to another nest about 600 m away, about 900 m from the turbine. At this new nest, just north of the wind farm, this pair successfully raised two young during 2006. The adults flew through and over the wind farm much of the year. The two young flew about the nest area, and into the wind farm area, for several weeks, and two immatures together, probably these same two, were along the Lake Erie shores south of the nest in the autumn. Here they would have flown past a turbine many times at distances within 150 m of a turbine there. Both adults and young were seen perching within 200 m of active turbines, and at times flying past as close as 100 m from rotating blades.

In 2007, a pair returned to the same nest north of the wind farm used in 2006. An adult was observed settling on the nest over several weeks in March, indicating the nest was active again. But, by May the nest

had obviously failed for unknown reasons not related to turbines. Both adult and immature eagles were seen in the area of and at this nest several times through 2007, indicating they were still active in the wind farm area through the year.

In 2008, a pair again returned, but this time they reoccupied the original nest about 400 m from a turbine. They were incubating in March when they were seen several times there. On 18 June 2008, two fairly large young were seen in the nest with the adult female.

Cooper's Hawk (*Accipiter cooperii)*. An adult was on a nest 110 m from a turbine on 3 May 2007, and scolding loudly nearby on 9 May. A second nest was found on 10 May 2007, and the adult was seen on this nest 170 m from a turbine on 17 May. A Cooper's Hawk was also seen in this same woodland in 2006.

Red-tailed Hawk (*Buteo jamaicensis*). In 2006, a pair began nesting in a dead tree 135 m from a turbine under construction. Before the turbine was in operation, an adult from this nest was seen several times flying past <75 m from the tower, and a couple times <50 m away. Once one was seen flying through the blades. The turbine began operating in mid May, and the pair continued to live and raise one young over the next month. In 2007, a pair returned, and nested in a live tree 265 m away from the same turbine, but in the middle of a quadrangle of turbines. They hunted in fields near all four turbines and again raised one young in this nest.

Killdeer (*Charadrius vociferus*). Killdeer were quite willing to use the newly-constructed laneways as a place to nest. Few were seen in 2006 when vehicle traffic was still frequent in early spring. Many moved in during 2007. It was easily one of the most frequently encountered species near turbines. In 2006, two broods were noted, both <100 m from turbines, one on 8 May and one 31 May. In 2007, there were 17 nests located on the laneways and no doubt some were missed. Empty nest scrapes were noted at at least 10 other places along laneways, all under the extent of the blades, indicating at least courtship activity in close proximity to turbines.

A nest with 4 eggs on 1 May was only 3 m from a turbine; it was destroyed by a cultivator. A nest with 4 eggs on 28 May was 8 m from a turbine, in the middle of a laneway. It lost a couple eggs, but the adult was still incubating after 2.5 weeks when last checked. A nest with 4 eggs from 23 May to 6 June was 12 m from a turbine in a corn field; it was run over by a tractor. Six other nests were on the edges of laneways all under the extent of the blades, and a seventh was just beyond at 40 m from a tower. Few nests survived the raccoons, skunks and human activity.

On 28 May 2007, a pair was watched in courtship flights, going around and around an operating turbine, at blade height, passing across the face of the blades and around past the tips <10 m away much of the time. Many pairs probably made similar flights, all without any recorded mortality.

Red-headed Woodpecker (*Melanerpes erythrocephalus*). A pair spent the summer of 2006 in a small woodland that extended 75-200 m from a turbine, and a pair returned to this woodland in 2007. At another turbine a family group was in trees <50 m from the tower in late summer 2006. They were noted in these trees on 5 occasions, and on another 7 occasions <100 m away.

Northern Flicker (*Colaptes auratus*). A nest was being excavated 29 May 2007, only 35 m from a turbine, and one of the birds was incubating in the nest on 7 June when last checked. A second nest was being excavated 22 May 2007 just <50 m from a turbine, but apparently was never occupied.

American Crow (*Corvus brachyrhynchos*). An adult and noisy young were in a woodland within 100 m of a turbine in 2006. Another pair regularly flew into a woodland, and out into a field to forage, passing usually 100-200 m from a turbine. They were probably nesting in the woodland within 200 m of the turbine.

Warbling Vireo (*Vireo gilvus*). A pair spent the summer in trees largely within 100 m of a turbine, and in October a nest was found in the tree closest to the turbine, on the side of the tree closest to the turbine, about 24 m from the tower. At five other places birds were present in summer long enough to suggest they nested within 100 m of a turbine.

Horned Lark (*Eremophila alpestris*). A nest with 4 eggs was found 7 May 2007 at 37 m from a turbine; later destroyed by seeding operations. A second nest with 4 eggs was found 23 May 2007 at 21 m from a turbine; later depredated. A nest at 40 m from a turbine, found 1 June 2007, had only the remains of one of the adults killed on the nest. A fourth nest, only 15 m from a turbine, had 3 young on 13 June 2007, close to fledging age.

Bank Swallow (*Riparia riparia)*. Thousands nested along the Lake Erie shore bluffs each year, but because of the height and steepness of the cliffs, it was usually not possible to tell just where they had burrows. At one location, however, a small eroded ravine cut back into a field, and there were at least 28 burrows there in 2007, all <150 m from a turbine.

American Robin (*Turdus migratorius*). A nest with 3 eggs was found 8 June 2006 on the breaker hardware of a hydro pole, about 45 m from a turbine. At another turbine a bird was carrying nest material into a tree about 75 m from a tower on 23 May 2006. On 10 May 2007, a raccoon was on a robin nest eating the contents, about 40 m from a turbine. A nest being built <100 m from a turbine on 21 May 2007 had 3 eggs at month's end. Another nest was being built about 40 m from a turbine, but was either not used or very quickly depredated.

Northern Mockingbird (*Mimus polyglottus*). A pair spent the summer of 2006 in trees and shrubbery within 150 m of a turbine. One was seen several times perching on plants in the field within 50 - 75 m of the turbine as it searched for food items that were carried back to the shrubbery. A male was singing in the same area in the spring of 2007.

European Starling (*Sturnus vulgaris*). During 2006, adults were noted feeding young in nests about 25 m, 40 m, 50 m and 75 m from operating turbines. The only pair given any attention in 2007 was about 100 m from a turbine, building a nest on 8 May, and the young depredated by the end of May. Birds were also carrying food into trees at two other locations within 50 m or turbines in 2007.

Yellow Warbler (*Dendroica petechia*). Although birds were commonly seen in shrubbery in close proximity to turbines, the thorny vegetation made searching for nests uninviting. The only nest found, on 24 May 2007, was about 100 m from a turbine. It contained 3 Brown-headed Cowbird (*Molothrus ater*) eggs partially buried in the nest bottom.

Vesper Sparrow (*Pooecetes gramineus*). A nest in an orchard had 4 eggs on 29 May 2007, at 30 m from a turbine. The young hatched but were depredated between 11 and 15 June. This was grassland habitat newly created in 2006.

Savannah Sparrow (*Passerculus sandwichensis*). A nest with 2 eggs was found 29 May 2007, at 20 m from a turbine. Four eggs were laid, but the nest was abandoned when the grass was cut short, removing all cover. Another nest with 4 eggs was found 5 June 2007 only 16 m from a turbine. The eggs were hatching when last checked 13 June. Both these nests were in habitat not available in 2006.

Rose-breasted Grosbeak (*Pheucticus ludovicianus*). Recently fledged young were in a woodland <100 m from a turbine on 5 July 2006.

Red-winged Blackbird (*Agelaius phoeniceus*). The only nest found was just <100 m from a turbine, with 4 eggs by 30 May 2007.

Common Grackle (*Quiscalus quiscula*). Several pairs were carrying nest material into a row of spruce trees <50 m from a turbine recently under construction in 2006. Young fledged from these nests before the turbine began operation. Another pair nested <50 m from a turbine in 2006, and adults were regularly seen carrying fecal sacs past the tower of an operating turbine, dropping them in puddles at the base of the tower. In May 2007, 9 nests were located in a windbreak extending past two turbines. Three nests with eggs were found on 3 May at 52 m, 54 m and 60 m from a turbine. A fourth nest, on 9 May, was nearly 100 m away. The rest were at greater distances.

Baltimore Oriole (*Icterus galbula*). A pair was building a nest <100 m from a turbine on 22 May 2006. A nest was under construction 40 m from a turbine on 23 May 2007. It was in the nearest branch of the nearest tree to the turbine. The nest was completed and the birds were incubating on 6 June. Another pair in 2007 spent the spring near a different turbine and a nest was found in October <50 m from the turbine.

Discussion

In the agricultural setting of the Erie Shores Wind Farm, with surrounding fields under cultivation, relatively few

bird species would find suitable habitat close to the turbines. However, apart from those listed above, species that were regularly seen in the trees or shrubbery within 100 m of operating turbines often enough to indicate they were likely nesting there included: Red-eyed Vireo (*Vireo olivaceus*) in 2 places, Carolina Wren (*Thryothorus ludovicianus*) in 1 place, House Wren (*Troglodytes aedon*) in at least 8 places, Wood Thrush (*Hylocichla mustelina*) in 1 place, Gray Catbird (*Dumetella carolinensis)* in 1 place, Pine Warbler (*Dendroica pinus*) in 1 place, Mourning Warbler *(Oporornis philadelphia)* in 2 places, Common Yellowthroat (*Geothlypis trichas*) in 1 place, Eastern Towhee (*Pipilo erythrophthalmus)* in 1 place, Northern Cardinal (*Cardinalis cardinalis)* in 8 places and Rose-breasted Grosbeak (*Pheucticus ludovicianus*) in 5 places.

Mourning Doves (*Zenaida macroura*) and Brown-headed Cowbirds were also regularly encountered foraging on the ground within 50 m of operating turbines and may have nested/laid eggs numerous times close to turbines. Chipping Sparrows (*Spizella passerina*) were noted many times on the ground and in shrubbery near turbines, sometimes pairs looking for nesting material; there were no doubt a few nests within 100 m of turbines. Song Sparrows (*Melospiza melodia*) were also regular at many places and no doubt nested many times <50 m from turbines.

Birds were limited in nesting more by a lack of available habitat than by the proximity of a turbine at Erie Shores. They seemed to be nesting as close as the habitat allowed.

Most studies at wind power installations that have been concerned with breeding birds have considered only census numbers; few have specifically mentioned nests. The few that do mention nests also indicate that birds had little difficulty adapting to wind turbines. In Denmark, "there are several examples of birds (falcons) nesting in cages mounted on wind turbine towers" (Krohn 2002). In Britain, Golden Plover has been found nesting within 30 m of a turbine at Ovenden Moor, and Peregrine Falcon within 250 m of one at Bryn Tytli (Percival 1998). Ravens (*Corvus corax)* and Barn Owls (*Tyto alba*) have nested in the turbine nacelles, and Red-tailed Hawks and ravens have nested on the turbine work platforms in California (Altamont Pass) (Kerlinger 2003). Mallards have been noted nesting about 35 m from turbine towers in Minnesota (Osborne *et al.* 1998) and at Pickering, Ontario (James 2003). A Swainson's Hawk (*Buteo swainsoni*) nested 400 m from a turbine in Oregon (Johnson *et al.* 2003).

In Belgium, despite significant mortality of Common Terns (*Sterna hirundo)* and Sandwich Terns (*Thalasseus maximus)* from a nearby colony, "the breeding terns were almost not disturbed by the wind turbines" (Everaert and Stienen 2007). Obviously poorly sited turbines near a port breakwall with a tern colony.

At a facility in Washington/Oregon, there were a similar number of active

Buteo nests from 2001 (before most construction occurred) through 2003 (2 years after construction) within 3 km of turbines. The largest number of active nests for all *Buteo* species (Red-tailed Hawk, Swainson's Hawk and Ferruginous Hawk (*Buteo regalis*)) was observed in 2003 (11 to 13 nests) (Erickson *et al.* 2004). At the same facility, Common Ravens were somewhat more abundant after construction than noted historically, and Burrowing Owls (*Speotyto cunicularia*) successfully nested in close proximity to turbines, with nesting activity continued at similar levels for at least 2 years after construction (Erickson *et al.* 2004).

At the Pickering wind turbine a Killdeer nested within 60 m, Red-winged Blackbirds within 30 m, Song Sparrows within 50 m, American Robins within 30 m and possibly several other species that were seen numerous times within 100m (Mourning Dove, Cedar Waxwing (*Bombycilla cedrorum*), Warbling Vireo, Gray Catbird); a small colony of Common Terns (*Sterna hirundo*) nested on a floating platform about 350 m away (James 2003).

A wind turbine, that remains in the same place, rotates in the same way and makes much the same noise each day for long periods of the day, but is not unduly noisy, is something that birds can quickly become familiar with and adapt to. For smaller birds that, apart from migratory movements, are living through the summer below the height of the tallest trees, a turbine does not represent any threat at all. Only if the noise from the turbine was loud enough to interfere with their song/call communication would it pose a problem. Generally wind noise is as loud or louder than that of the turbines. Small birds have no reason to avoid a turbine.

For larger birds, that may be flying above tree canopy height, it should be obvious that the turning blades are something to be avoided. But the hazard is always in a known specific location that could be readily avoided. They only become a hazard when birds become so adapted to the presence of a turbine that they no longer stay a safe distance away from the blades. The willingness of birds to approach turbine blades in flight, is the subject for another time.

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