

**BREEDING BIRD SURVEY FOR THE FLAT ROCK WIND POWER
PROJECT, LEWIS COUNTY, NEW YORK**

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**Breeding Bird Study for the Flat Rock Wind Power Project,
Lewis County, New York**

Executive Summary

A breeding bird study was conducted at the proposed Flat Rock Wind Power Project in Lewis County, New York. The study was conducted after a project-specific avian risk assessment recommended that such studies be conducted to determine whether federal or New York State listed species or New York State species of special concern were present. The study also focused on determining whether there were likely to be impacts to listed or common species resulting from construction of the wind power project. The object of the study was to identify the species, numbers of individuals, and distribution of those birds in the areas where turbines are being proposed. A total of 49 point counts were established and a GPS location recorded for each point. All point count locations were surveyed three times between June 26 and July 1, 2003, for a period of 5 minutes during which all birds seen or heard were recorded. Also recorded were the distance and direction of each bird from the observer. Surveys were commenced at around 04:45 hours and continued until about 10:00 hours. In addition, a species list was assembled of all birds observed incidental to the point counts. This was done to insure that all species that might nest within the project boundary were found. These incidental surveys were done on the same days as the point counts as well as on three additional days (June 20-22, 2003) while the habitat was assessed and point count locations were established.

A total of 78 species were detected at the point count locations and an additional 24 species were detected incidental to the point count survey. No federal or New York State endangered species were detected, although 2 New York State threatened species were found. Eighteen observations of Northern Harriers (threatened) were made during point count surveys and 2 observations of Pied-billed Grebes were observed within the project boundary, but not at any of the point count locations. The former species probably nests in fields within the project boundary and the latter may nest at one of the small ponds on the site. The latter is not likely to nest near any of the turbines because these birds are highly wetland dependent. Two New York State species of special concern, Horned Lark (8 observations) and Vesper Sparrow (8 observations) and it is likely that both species have, at least, 4 nests at the point count locations. These birds are grassland adapted species and are may nest near turbines.

The species observed at the point count sites were a mixture of forest (interior and edge), brushland, old field, and grassland birds, as well as a few species that are adapted to farm fields and residential areas. Grassland and forest edge/brushland birds dominated the avifauna. Grassland and old field birds accounted for one-quarter (25.6 %) of all sightings during the study. Bobolinks and Savannah Sparrows accounted for most of these birds (23.1% of all sightings). Mowing of hay was observed at the peak of nesting season and probably eliminates many, if not most, of the active nests during this period. The ten most numerous species are

grassland and forest-edge/brushland species, accounting for 61.4% of all birds sightings. The remaining species are primarily forest edge/brushland species. A small proportion of birds found were forest and forest interior species.

It is unlikely that nesting birds will collide with turbines because few spend much time at the altitude of rotors. However, a few species, such as Horned Lark, Vesper Sparrow, and Bobolink, are known to fly high enough at times during aerial displays to potentially collide with turbines and are common among fatality lists at western wind power sites where these birds are very common. It is possible that very small numbers of Northern Harriers and, possibly, American Kestrels may collide with turbines, based on very small numbers of collisions at a few other wind power projects.

The avian community found along Rowsom Road (point counts #91-96) is comprised largely of forest interior species, including several that are thought to be sensitive to fragmentation. Many of these birds were seldom found at other locations within the project site. Impacts resulting from clearing and fragmentation of the Rowsom Road forests may jeopardize the integrity of this forest nesting community. It is possible that turbine construction would extirpate some of the interior forest species and open the forest for edge nesting species, thereby changing the avian community in this area.

Overall, collision impacts are not likely to be biologically significant because the numbers of birds involved is likely to be minimal. Habitat disturbance/displacement impacts to nesting birds will be varied with little impact likely to those nesting in brushland and forest edge and potentially greater disturbance to forest interior nesting birds. With respect to grassland nesting birds, impacts will be localized to the areas within 50-100 m around turbines, as demonstrated in other studies. Although these impacts are not likely to be biologically significant from a regional or global perspective, post-construction studies may be needed quantify these impacts to local populations following construction of the project.

The following recommendations were made:

- The interior forest habitat along Rowsom Road should be excluded from the project because the birds and habitat there may be severely impacted via forest fragmentation
- All permanent meteorology towers should be free-standing, without guy-wires. This will virtually eliminate the potential for collisions with locally nesting birds.
- A long-term monitoring study may be initiated that would determine the disturbance/displacement impacts to locally nesting birds. Such a study would examine the abundance and use of grassland nesting songbirds (Bobolinks, Savannah Sparrows, and others) beneath and near turbines to determine the actual area of impact one year following construction, 5 years following construction, and 10 years following construction.

Introduction

Wind power is the fastest growing mode of electric generation in the United States and in the world (www.awea.org). New wind power projects are being proposed and built at an increasing rate across the United States. Impacts to birds have been documented at several wind power plants, but those impacts have not been believed or demonstrated to be biologically significant in terms of causing population declines of individual species. Most studies conducted in the United States have focused on collision fatalities, whereas studies in Europe have also focused on disturbance and displacement impacts. Of the studies conducted in the U.S., a few have assessed the disturbance and displacement impacts of wind power development on birds that nest in grasslands (Leddy et al. 1999, Erickson Johnson) and forests (Kerlinger 2000, 2002a). Because so few wind power projects have examined these types of impacts in the United States, it is important that potential and realized impacts to birds be examined.

A Phase I Avian Risk Assessment was conducted for the Flat Rock Wind Power Project in 2001-2002 (Kerlinger 2002b) and an addendum to that study was conducted during 2003 after the project was expanded into new areas (Kerlinger 2003a, 2003b). That report suggested that collision impacts to birds were not likely to be ecologically significant and that disturbance/displacement impacts were likely to be minimal. However, that study identified the potential for New York State listed species and species of special concern to be nesting within the project boundaries. That conclusion was based on examination of habitat that is within the project area (Kerlinger 2003a, 2003b). This study was proposed and designed to determine if those New York State listed species and species of special concern were present on the Flat Rock project site and to provide baseline data on the type and number of birds nesting on the project site. The study was contracted by Atlantic Renewable Energy Corporation.

Specific objectives of the present study were:

- Determine whether federal or New York State endangered or threatened species, or New York State species of special concern;
- Provide baseline data on the species of birds that nest on the site in an effort to determine the degree and magnitude of impacts, if any, that may result from the project;
- Provide baseline data from which post-construction monitoring can determine the degree and magnitude of impacts, if any, that result from the construction of the project.

Methods

To provide quantitative information on the species of birds that nest within the Flat Rock Wind Power Project site, 49 point counts were established throughout the project site (Figure 1, Figure 2). The point counts were established to sample the types of habitats that are present within the project boundary. Those habitats include: grassland-hayfield, brushy old fields, forest edge and discontinuous forest, and interior forest. Point counts were not situated near residential areas that are interspersed with the probable turbine locations because turbines would not be located near such residences. All point counts were situated along roads for ease of access and minimizing disturbance.

Surveys were conducted on six mornings (June 26, 27, 28, 29, 30, and July 1, 2003) during the peak of the nesting season. Additional observations were made on June 20, 21, 22, and 25, although those days were primarily spent identifying point count locations, examining habitat, and establishing the study plan. The surveys started at dawn (about 05:00 hours Eastern Daylight Time), as soon as there was enough light for the observer to see. A total of 5 minutes was spent at each point count location. Point count locations were spaced by a minimum of about 200-250 m. Each was flagged and located using a Garmin Legend GPS device (Table 1, Figure 2). The distance between point count locations was about 170 m. Most species could easily be heard at distances out to 150 m. Each point count location was sampled three times, each on a different day. A total of 24 or 25 point counts, or about one-half of all point count locations, was surveyed each morning. Data recorded included the species, number of individuals, the distance from the point count location, and the direction (8 cardinal directions; N, NE, E ...) from the point count location. All birds observed or heard incidental to making observations (e.g., while traversing the site to point count locations) were also recorded, but were not used in the analyses that follow.

The field technician, James Dowdell, is a highly experienced field biologist who has more than 2 decades of experience observing and listening to forest nesting birds in the northeastern United States. He is very knowledgeable regarding the songs of all species that are likely to be encountered in northeastern forests and has experience identifying vocalizations of all forest nesting species in New York and other northeastern states, as well as Canada. Dowdell conducts avian surveys (endangered and threatened species as well as more common species) for the New Jersey Department of Environmental Protection (Fish, Game, and Wildlife – Endangered and Nongame Species Program), the Nature Conservancy, Izaak Walton League, New Jersey Conservation Foundation, New Jersey Audubon, and other nonprofit environmental organizations.

Results and Discussion

A total of 102 species was observed during 6 days of observations at the Flat Rock Wind Power Project. Seventy-eight species were observed during the point count surveys and another 24 species were observed during incidental observations at the Flat Rock Wind Power Project site (Tables 2 and 3). Of these species, it is likely that all but about 2 species (Common Loon and Ring-billed Gull) nest on or immediately adjacent to the project site. These species generally nest on larger bodies of water or on islands, neither of which is present nearby. It is also possible that a few other species do not nest on or immediately adjacent to the site, but for the purposes of this report, all but the two species listed above are considered nesting birds at or immediately adjacent to the project site.

No federally listed species were observed during the study. One New York State threatened species, Northern Harrier, was observed on 18 occasions while doing point count surveys and the species likely nests within the project boundary (also reported by Kerlinger 2001). Two New York State species of special concern, Horned Lark and Vesper Sparrow. All three of these species are grassland or open country nesting birds, although Northern Harriers will nest at the edges of marshes, in brushy fields near wetlands, and along the edges or rough areas in farm fields. Horned Larks and Vesper Sparrows prefer short to mixed grass prairie habitats. These species have declined as farming has become reduced in New York State and Historically, these species are more Midwestern and western where true prairies occur, and they are very common in those areas. A threatened species, Pied-billed Grebe, was seen on two days incidental to conducting point count observations. That species may nest on one of the marshes or ponds within or near the project boundary. It is not likely to be nesting within hundreds of meters of wind turbine locations, whereas the other species may nest near wind turbine sites.

Species observed at the point count locations were a diverse mix of grassland, brushland, and forest nesting birds, including some that are forest edge and brushland species and a few that are forest interior nesting species. Habitat associations of all species are provided in Tables 2 and 3. Six species accounted for about one-half of all bird observations. Bobolinks were the most common species, followed by Savannah Sparrow, Red-winged Blackbird, Song Sparrow, Common Grackle, and Common Yellowthroat, in descending order of abundance. Together these six species accounted for 50.4% of the 3,551 sightings at point counts. The three most common species accounted for nearly one-third (31.3%) of all observations. The ten most numerous species (those listed above plus American Crow, Yellow Warbler, American Robin, and American Goldfinch) accounted for 61.4% of all sightings at the point counts.

The majority of birds observed at point count locations are species of grassland, farm-field, brush, and forest edge (Table 2). Obligate grassland birds such as Bobolink, Savannah Sparrow, and a few other species accounted for one-quarter (25.6%) of all sightings. Other grassland species observed at the Flat Rock project site included Eastern Meadowlark, Vesper Sparrow, Horned Lark, Eastern Kingbird, and Northern Harrier. (Some of these birds are adapted to grasslands that have small isolated bushes or trees, as is the case with many tall-grass prairies in the Midwestern United States.) Grassland bird communities have declined in recent

years, especially in the areas where farms have reverted to brush and forest or have been converted into housing developments.

Of the 10 most numerous species found at the point counts, none were obligate forest or forest interior nesting birds. A majority of the forest nesting birds that were found on the point counts are adapted to edge situations or brushy-forest type locations. These include American Robin, American Crow, Chestnut-sided Warbler, Gray Catbird, House Wren, Mourning Dove, Song Sparrow, Yellow Warbler, and some others. Some of these brushland and forest edge species have actually increased in many parts of the United States and Canada in recent years. This is a result of forests and farms being eliminated or fragmented. These and other edge and brush nesting species are among the hardiest of species in the North American avifauna and have rarely been impacted by fragmentation and habitat modification.

There were 4 raptor species detected on the point count survey and a fifth was detected incidental to these surveys. All could be nesting within the project boundary, although Broad-winged Hawks, seen on only one occasion, may not. This fairly common species is an interior forest species that almost surely nests to the southwest of the project site within the larger forests located there. It could, possibly, be nesting in the forests along Rowsom Road near point counts # 91-96. Northern Harriers were most common among the raptors followed by American Kestrels, Northern Goshawk, Red-tailed Hawks, and Turkey Vultures. The latter are represented by only a single individual. The Northern Goshawk was sighted two times (Point counts #120 and 123) at point counts that were near each other. This suggests a single territory in that location. Northern Harriers were spread throughout the project area, suggesting these birds forage in most of the open fields and brushy areas within the project boundary.

Almost no waterbirds were detected at the point count locations. Two Common Snipe observations were made. These birds are adapted to small wetland/marsh type habitats. A single Belted Kingfisher was observed. That species nests on dirt banks overlooking large ponds or lakes. The bird may simply have been traversing the project site between nesting and feeding sites. Ring-billed Gulls were observed, but these birds likely nest near Lake Ontario, many miles away.

One area within the project boundary was characterized by a very different avifauna. The forests along Rowsom Road (point counts 91-96; 5 point counts) are relatively intact, mixed (deciduous and conifer; spruce, maple, etc.) forests. These forests are very different from the other habitats within the Flat Rock project boundary and they have a very different avifauna. Birds found to be nesting at the 5 point counts along Rowsom Road are mostly forest birds, including forest interior and forest edge species. There were no grassland birds and few brush or edges species. Eleven species that are believed to be obligate forest or forest interior birds were found along Rowsom Road. These birds were rarely found in other parts of the Flat Rock project area. A majority of sightings of these eleven species (Table 4) are from the 5 forested point counts along Rowsom Road. For example, 100% of all Blue-headed Vireos, Black-throated Blue Warblers, Black-throated Green Warblers, Canada Warblers, Magnolia Warblers, and Swainson's Thrushes were found at the Rowsom Road point counts. Between 50 and 86% of Blackburnian Warblers, Hermit Thrushes, Northern Waterthrushes, Ovenbirds, and Wood Thrushes were found at these point counts. This means these species are not as tolerant of forest

fragmentation than the species found at point counts where there was forest edge and brushland. These species are less likely to be found in areas where there are significant amounts of edge habitat that result when forests are cleared or “opened up” for farmland, residential development, roads, or wind turbines.

The 24 species observed incidental to making the point count observations included a greater representation by waterbirds than were found on the point counts. At least eight of these 24 species (33.3%) are associated with lakes, ponds, marshes, or swamps either for foraging, nesting, or both. The other species are a mix of forest, forest edge, residential, brushland habitats. As noted earlier, one of those species, the Pied-billed Grebe, is threatened in New York State. This list also includes three species that are alien and not protected. Most of these species are likely to nest locally and probably many nest within the project boundaries. They are, however, not as likely to nest where turbines would be located. The rationale for this statement is that the point counts were located in habitats and closer to where turbines would likely be located.

Risk Assessment: Impacts to Nesting Birds

This risk assessment addresses two primary issues: risk attributable to collision with rotors and turbine towers, and risk attributable to habitat disturbance and subsequent displacement of nesting species. This assessment begins with an examination of the presence of listed species and species of special concern that were observed during field work at Flat Rock. After establishing the presence, status, and approximate abundance of these listed species and species of concern, separate sections address the collision and disturbance issues separately.

Endangered and Threatened Species and Species of Special Concern. Based on both focused surveys at point count locations and incidental observations by the Curry & Kerlinger, LLC field biologist who conducted the point counts at the Flat Rock site, no federally listed endangered or threatened avian species are likely to be at risk from project construction and operation. This corresponds with two letters received from the U. S. Fish and Wildlife Service during the past two years regarding the presence of listed species at or near the Flat Rock site. No federally listed species were observed at the project site and the habitat at the site is not suitable for these species. It is likely that Bald Eagles, listed as threatened (but proposed for delisting in 2000) will fly through the site at times, but they do not nest at the site and there is almost no foraging habitat at or near the site.

No New York State endangered species were observed during the nesting surveys, although several Northern Harriers, a threatened species, were observed (18 sightings). In all probability, these birds nest within the project boundaries. It is not known if these birds nest within hundreds of meters of the turbine locations. Their nesting habitat preference is primarily the brush edges of fields and marshes, or the sometimes nest in grassy fields. From these nesting sites, harriers generally forage over several square miles, which certainly includes the areas where turbines would be located. Risk of collision for harriers is minimal. These birds have been demonstrated to collide with wind turbines on rare occasions (Erickson et al. 2001). A single collision was reported from a Wyoming facility with 69 turbines, 2 were reported killed in

the Altamont where there are thousands of wind turbines. At other sites, no fatalities have been reported, despite rigorous searches and known presence of the species (Erickson et al. 2001, 2002, 2003).

With respect to habitat disturbance and displacement of nesting harriers, it is difficult to say with certainty if these birds will be displaced by the presence of turbines. The final locations of the turbines in relation to habitat should be examined carefully to determine whether turbines are placed at sites where harriers currently nest. These birds seem to habituate to wind turbines, but it is not known how long this process takes. They may be displaced from a nesting site in the year following construction of the turbines, then nest closer to the turbines in subsequent years. The numbers of nesting pairs that would be impacted is likely to be small, perhaps 3 nesting pairs. This would not seem to constitute a biologically significant impact to this species on a state or regional basis. It is simply not known if these birds will habituate to the presence of turbines.

Incidental to the point count surveys, Pied-billed Grebe, a New York State threatened species, were observed. It was observed on two days during the surveys. Because this species nests in marshes or swamps, often adjacent to open water, it is unlikely to be nesting near a turbine location. For this reason, impacts to nesting grebes, either via collision or habitat disturbance, is unlikely to result from the wind power project.

Horned Larks and Vesper Sparrows, both species of special concern in New York State, were found on the point counts in small numbers. A total of 8 Horned Lark and 8 Vesper Sparrow observations were made and it is likely that there were, at least, 4 territories of each of these species present. It is possible that small numbers of Horned Larks and Vesper Sparrows will collide with wind turbine rotors. These species appear to be struck by turbine rotors at a higher rate than other species (Erickson et al. 2001), perhaps because of their aerial displays during the nesting season. With respect to habitat disturbance and displacement, both species may experience some, perhaps temporary impacts after turbine construction. They are known to inhabit fields where turbines have been erected, but it is not known if they avoid the turbines to any great degree. Risk to these birds at the Flat Rock site should be considered potentially significant, based on the fact that there are so few of these birds in the area and that they are listed as of special concern by the State.

Biologically, Horned Larks and Vesper Sparrows are not likely to be impacted significantly because these species are very common where there has historically been suitable habitat. These species are of special concern in New York State because farms and meadows have either reverted to forests or have been subdivided into housing developments. They are extremely common in the Midwest and western United States because those areas are native grasslands, unlike New York State which is historically forested (including the Tug Hill Plateau at the Flat Rock site).

Habitat Disturbance and Risk of Displacement. Risk attributable to habitat disturbance and subsequent displacement of nesting territories among grassland birds has been demonstrated for some of the species that nest at the Flat Rock site. Larsen and Madsen (2000) using impact

gradient methods demonstrated that some species of open field birds will not forage near wind turbines are displaced by their presence. Most interesting in the Larsen and Madsen study was the fact that among closely related species there were differences in approach distance while foraging. For example, Pink-footed Geese would not forage within 100 meters of turbines, whereas Barnacle Geese would forage up to 25 meters from turbines. Leddy et al. (1999), studying grassland nesting birds in Conservation Reserve Program grassland habitats of southwestern Minnesota, found that some species were displaced short distances after construction of turbines. The study was done shortly after the construction of wind turbines and did not examine whether the birds habituated to the turbines as do raptors and some other species. It is not known if the grassland species studied by Leddy et al. habituated to turbines in subsequent years (that study was done in 1995), although observations (P. Kerlinger) at wind plants in California, Colorado, and Pennsylvania suggest that Horned Larks, Western Meadowlarks, and perhaps Bobolinks do habituate to the presence of turbines.

Collision mortality seems to be minimal among grassland nesting birds, with the exception of a very few species that have aerial displays. At the Flat Rock site, Bobolinks have aerial displays (see above for Horned Lark and Vesper Sparrow discussion) which, at times, may bring them into the height zone of the rotors. However, these birds have not been demonstrated to collide with turbines at the few eastern and Midwestern sites where they occur, so they may not fly high enough on a regular basis to be struck the turbine rotors. Other grassland species seldom fly at rotor height, so risk to those birds is not likely to be great. Collision risk to grassland nesting birds is not likely to be biologically significant.

Because grassland birds have been found to be displaced by wind turbines, it is likely that some displacement will occur at the Flat Rock site. Species such as Bobolink, Savannah Sparrow, and perhaps some others will be reduced in abundance in the areas at the turbines and immediately surrounding the turbines. Leddy et al. found that there were fewer nesting birds within 100-200 meters surrounding turbines in grasslands of southwestern Minnesota. Densities decreased by more than 50% in the area within about 50 m of turbines. The construction of turbines at Flat Rock will reduce the numbers of nesting grassland birds at the turbine sites. How much of a reduction is dependent on where the turbines are placed and existing densities of nesting grassland birds. Moreover, it is not known if the impacts of turbine presence on grassland nesting birds is reduced over time as birds habituate to these structures. This is the critical question to determining level of impacts at wind turbines in grassland habitats.

During the assessment of habitat in the wind project expansion area and nesting survey work, thousands of acres of hayfields were being systematically mowed. It was obvious that three species were being impacted heavily: Bobolink, Savannah Sparrow, and Red-winged Blackbird. It is also possible that Vesper Sparrow, Horned Lark, and Eastern Meadowlark were impacted as well. All species nest on the ground in hayfields or short grassy fields. Hundreds, perhaps thousands, of nests were probably mowed including young and eggs. Vesper Sparrow and Horned Lark are species of special concern in New York State. It was not unusual during the study to see several male Bobolinks sitting at the edges of mowed fields acting abnormally. Hay mowing occurs throughout the northeast and midwest on a regular basis. The fact that this impact seems to be sustained on a yearly basis suggests that these birds have adapted to high levels of disturbance.

It should also be recognized that the current trend in land-use is farmland subdivision and subsequent development. As farmland is developed, hay and grassland is lost forever. This trend is evident in the Tug Hill area with new homes, snowmobile campsites, and other structures becoming more abundant and farmland disappearing. If farming continues, grassland nesting birds would continue to nest in the area. The presence of turbines will, as it has in the midwest and elsewhere, prevent subdivision and development that will extirpate grassland nesting birds in areas where their continued existence is already tenuous.

With respect to brushland and edge species, less impact is expected. These species are not likely to fly at rotor height during the nesting season and they are not likely to collide with turbine rotors at rates that could be construed as biologically significant. They are among the most tolerant of nesting birds in eastern North America and few are declining. They seem to be adapted to deal with disturbance and with tall structures nearby, a result of being near trees.

Rarely have forest nesting birds been studied at wind plants. The only study that is available from North America is from the Searsburg, Vermont site (Kerlinger 2000, 2002). At that mixed conifer-hardwood forest site, disturbance from habitat modification and turbine presence was found to be low, although a few species seemed to avoid the clearings where the turbines were located. It is likely that the impacts at Flat Rock will be greater than those at Searsburg, especially at the habitats along Rowsom Road, which are similar to those at Searsburg. The reason the disturbance may be greater along Rowsom Road is because the area is closer to open farm fields and brushland habitats than was the case at Searsburg. The small degree of fragmentation in the forests along Rowsom Road may be disproportionately large because of the proximity to forest edges and the species that monopolize those habitats. Opening the forests along Rowsom Road would provide access for edge species, nest parasites, and nest predators to interior nesting forest birds. Nest parasites (Brown-headed Cowbirds) and nest predators (Blue Jays, Common Grackles, American Crows, as well as mammalian species), are located rather close to Rowsom Road, thereby increasing the probability and degree of impacts. Such source areas for these species were not present at Searsburg. Although the turbines themselves would not likely present a biologically significant impact, such impacts might occur for the reasons given above.

Recommendations. Three recommendations are made regarding the development of the Flat Rock Wind Power Project. Two of these recommendations would certainly reduce risk to birds that nest on the project site and the other would provide a means of determining long-term risk at the Flat Rock site.

- Recommendation 1. The forested habitat along Rowsom Road should be excluded from the project because the birds and habitat there will likely be severely impacted. The forests along Rowsom Road support a significant diversity and number of interior forest nesting birds that are far more susceptible to habitat fragmentation than the birds found at most of the other point count locations.

- Recommendation 2. All permanent meteorology towers should be free-standing, without guy-wires. This will virtually eliminate the potential for collisions with locally nesting birds.
- Recommendation 3. A long-term monitoring study may be initiated that would determine the disturbance/displacement impacts to locally nesting birds. The particular birds of interest here would be those in the grassland/hay and old-field areas. Such a long-term monitoring study would specifically examine the abundance and use of grassland nesting songbirds (Bobolinks, Savannah Sparrows, and others) beneath and near turbines to determine the actual area of impact one year following construction, 5 years following construction, and 10 years following construction.

Literature Cited

- Erickson, W., G.D. Johnson, M.D. Strickland, K.J. Sernka, and R. Good. 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of collision mortality in the United States. White paper prepared for the National Wind Coordinating Committee, Avian Subcommittee, Washington, DC (www.nationalwind.org).
- Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting, and mortality information from proposed and existing wind developments. Report to Bonneville Power Administration, Portland, OR.
- Erickson, W. et al. 2003. Stateline Wind Project Wildlife Monitoring Annual Report. Report for FPL Energy, Stateline Technical Advisory Committee, and Oregon Office of Energy.
- Johnson, G.D., D.P. Young, Jr., W.P. Erickson, C.E. Derby, M.D. Strickland, R.E. Good. 2000. Wildlife monitoring studies at the at the SeaWest Windpower Project, Carbon County, Wyoming. 1995-1999. Prepared for SeaWest Energy Corporation and BLM by WEST, Cheyenne, WY.
- Kerlinger, P. 2000. An Assessment of the Impacts of Green Mountain Power Corporation's Wind Power Facility on Breeding and Migrating Birds in Searsburg, Vermont. Proceedings of the National Wind/Avian Planning Meeting III, San Diego, CA, May 1998.
- Kerlinger, P. 2002. An Assessment of the Impacts of Green Mountain Power Corporation's Wind Power Facility on Breeding and Migrating Birds in Searsburg, Vermont. Report to National Renewable Energy Laboratory, US Dept. of Energy, Golden, CO.
- Kerlinger, P. 2001. Phase I Avian Risk Assessment for the Flat Rock Wind Power Project, Lewis County, New York. Report prepared for Atlantic Renewable Energy Corporation.
- Kerlinger, P. 2003. Addendum to the Phase I Avian Risk Assessment for the Flat Rock Wind Power Project, Lewis County, New York. Report prepared for Atlantic Renewable Energy Corporation.
- Larsen, J.K., and J. Madsen. 2000. Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): A landscape perspective. *Landscape Ecology* 15:755-764.
- Leddy, K., K.F. Higgins, and D.E. Naugle. 1999. Effects of wind turbines on upland nesting birds in conservation reserve program grasslands. *Wilson Bulletin* 111:100-104.

Table 1. GPS locations for nesting bird study point counts at the Flat Rock Wind Power Project site, Lewis County, New York.

| Point Count | Latitude – Longitude | |
|-------------|----------------------|----------|
| 069 | 43.72665 | 75.51157 |
| 071 | 43.72359 | 75.51556 |
| 073 | 43.72306 | 75.51933 |
| 074 | 43.71783 | 75.51860 |
| 075 | 43.71544 | 75.50700 |
| 077 | 43.73493 | 75.55698 |
| 078 | 43.73555 | 75.54702 |
| 079 | 43.73597 | 75.54262 |
| 080 | 43.73623 | 75.53596 |
| 081 | 43.73661 | 75.53090 |
| 082 | 43.74039 | 75.53513 |
| 083 | 43.74445 | 75.53572 |
| 084 | 43.74799 | 75.53597 |
| 085 | 43.75185 | 75.53638 |
| 086 | 43.72042 | 75.56271 |
| 087 | 43.75507 | 75.53591 |
| 088 | 43.75458 | 75.54517 |
| 089 | 43.75370 | 75.56876 |
| 090 | 43.75326 | 75.57893 |
| 091 | 43.75117 | 75.59716 |
| 092 | 43.74885 | 75.59697 |
| 094 | 43.74514 | 75.59469 |
| 095 | 43.74211 | 75.59176 |
| 096 | 43.73869 | 75.59066 |
| 097 | 43.75684 | 75.56940 |
| 098 | 43.76094 | 75.57386 |
| 099 | 43.76670 | 75.57374 |
| 100 | 43.77710 | 75.56072 |
| 101 | 43.77859 | 75.58140 |
| 102 | 43.77799 | 75.58729 |
| 103 | 43.77652 | 75.61440 |
| 104 | 43.78143 | 75.57550 |
| 105 | 43.78879 | 75.57507 |
| 106 | 43.79079 | 75.61340 |
| 107 | 43.80348 | 75.60658 |
| 108 | 43.80890 | 75.60602 |
| 109 | 43.81184 | 75.60567 |
| 111 | 43.81266 | 75.61580 |
| 112 | 43.81548 | 75.60117 |
| 113 | 43.71737 | 75.59173 |
| 114 | 43.81598 | 75.60522 |
| 115 | 43.81912 | 75.60489 |
| 116 | 43.82325 | 75.60434 |
| 117 | 43.82447 | 75.59718 |
| 118 | 43.82509 | 75.61024 |
| 120 | 43.81900 | 75.63318 |
| 121 | 43.81387 | 75.63382 |
| 122 | 43.82642 | 75.63849 |
| 123 | 43.82391 | 75.63247 |

Table 2. List of species and numbers of sightings (from visual observations and vocalizations heard) detected at the point count locations at the Flat Rock Wind Power Project site, Lewis County, New York. * indicates the species is not likely to be nesting at the project site.

| Species | Number of Sightings | Habitat Preference |
|------------------------------|----------------------------|---------------------------------|
| Alder Flycatcher | 34 | Wet areas, swamp-marsh edge |
| American Crow | 169 | Edge, farm field |
| American Goldfinch | 98 | Edge, old field |
| American Kestrel | 8 | Edge, old field, farm field |
| American Redstart | 21 | Forest (interior) |
| American Robin | 147 | Edge, farm field |
| Baltimore Oriole | 3 | Edge, forest, residential |
| Barn Swallow | 37 | Edge, residential, fields |
| Black-and-white Warbler | 1 | Forest (interior) |
| Black-billed Cuckoo | 7 | Forest (interior?) |
| Black-capped Chickadee | 35 | Forest and edge |
| Belted Kingfisher | 1 | Water-edge |
| Brown-headed Cowbird | 19 | Edge, grassland, farm field |
| Blue-headed Vireo | 2 | Forest (interior) |
| Blackburnian Warbler | 5 | Forest (interior) |
| Blue Jay | 14 | Edge, forest, residential |
| Bobolink | 431 | Grassland, farm field |
| Brown Thrasher | 13 | Brush, forest edge |
| Black-throated Blue Warbler | 19 | Forest (interior) |
| Black-throated Green Warbler | 10 | Forest (interior) |
| Canada Warbler | 3 | Forest (interior) |
| Cedar Waxwing | 52 | Edge, forest, residential |
| Chipping Sparrow | 17 | Forest edge, residential |
| Cliff Swallow | 1 | Edge, residential, near water |
| Common Grackle | 216 | Edge |
| Common Raven | 4 | Forest and forest edge |
| Common Snipe | 2 | Wet meadow/marsh |
| Common Yellowthroat | 216 | Forest edge, brush |
| Chestnut-sided Warbler | 73 | Forest edge |
| Dark-eyed Junco | 8 | Forest and forest edge |
| Downy Woodpecker | 5 | Forest and forest edge |
| Eastern Bluebird | 1 | Farm field and edge |
| Eastern Kingbird | 38 | Grassland and old field |
| Eastern Meadowlark | 14 | Grassland and old field |
| Eastern Phoebe | 1 | Edge and forest (streams/ponds) |
| Eastern Wood-Pewee | 5 | Forest (interior) |
| Great-crested Flycatcher | 3 | Forest |
| Gray Catbird | 76 | Forest edge, brush |
| Hairy Woodpecker | 3 | Forest |
| Hermit Thrush | 7 | Forest (interior) |

| Species | Number of Sightings | Habitat Preference |
|-----------------------------------|----------------------------|-------------------------------------|
| Horned Lark (NYS SSC) | 8 | Grassland, farm field |
| House Wren | 35 | Forest edge, residential |
| Indigo Bunting | 1 | Forest edge |
| Killdeer | 31 | Grassland, farm field |
| Least Flycatcher | 20 | Forest and edge |
| Magnolia Warbler | 20 | Forest |
| Mourning Dove | 34 | Grassland, edge, brush, residential |
| Mourning Warbler | 6 | Forest edge |
| Northern Goshawk | 2 | Forest (interior) |
| Northern Harrier (NYS Threatened) | 18 | Grassland, marsh edge, old field |
| Northern Waterthrush | 4 | Forest (interior) |
| Ovenbird | 32 | Forest (interior) |
| Pileated Woodpecker | 1 | Forest |
| Purple Finch | 26 | Forest (interior-edge) |
| Rose-breasted Grosbeak | 9 | Forest (interior) |
| Ring-billed Gull* | 4* | Farm field (foraging only) |
| Red-breasted Nuthatch | 1 | Forest |
| Red-eyed Vireo | 120 | Forest (interior and edge) |
| Red-tailed Hawk | 1 | Forest edge and farm field |
| Red-winged Blackbird | 291 | Forest edge, farm field, grassland |
| Savannah Sparrow | 392 | Grassland, farm field |
| Song Sparrow | 243 | Forest edge, brush |
| Swamp Sparrow | 48 | Wet brush, edge, meadow/marsh |
| Swainson's Thrush | 2 | Forest (interior) |
| Tree Swallow | 13 | Field, edge |
| Turkey Vulture | 1 | Forest, field, edge, etc. |
| Veery | 58 | Forest (interior and some edge) |
| Vesper Sparrow (NYS SSC) | 8 | Grassland |
| Warbling Vireo | 6 | Forest edge |
| Willow Flycatcher | 23 | Forest edge/wet or open field |
| Wild Turkey | 17 | Forest and edge/fields |
| Wood Thrush | 16 | Forest (interior) |
| White-throated Sparrow | 58 | Forest (interior and edge) |
| Yellow-billed Cuckoo | 1 | Forest, edge/brush |
| Yellow-bellied Sapsucker | 20 | Forest (interior) |
| Yellow Warbler | 148 | Forest edge, brush |
| Yellow-rumped Warbler | 7 | Forest (interior and edge) |
| Yellow-shafted Flicker | 7 | Forest edge-fields |
| 78 Species | Total | 3,551 |

Table 3 List of species detected (from visual observations and vocalizations heard) incidental to conducting point count observations for the nesting bird survey for the Flat Rock Wind Power Project site, Lewis County, New York. These species were not detected at point count locations during the regular observation periods. * indicates that the species is not likely to be nesting within the project boundary (based on absence of suitable habitat).

| Species | Number of Days Sighted | |
|-------------------------------|------------------------|------------------------------|
| American Bittern | 1 | Marsh/Swamp |
| American Woodcock | 1 | Forest edge |
| Barn Swallow | 5 | Fields, residential |
| Broad-winged Hawk | 1 | Forest (interior) |
| Canada Goose | 5 | Lake/pond edge, open fields |
| Chimney Swift | 1 | Forest, field, residential |
| Common Loon* | 2 | Lake |
| Eastern Towhee | 2 | Brush, forest edge |
| European Starling | 5 | Residential, edge, field |
| Field Sparrow | 1 | Field, brush |
| Great-blue Heron | 5 | Wetland, swamp |
| Green Heron | 2 | Wetland and forest (nesting) |
| House Sparrow | 5 | Residential, farm buildings |
| Mallard | 4 | Pond/Lake edge |
| Nashville Warbler | 3 | Forest edge/brush |
| Northern Rough-winged Swallow | 2 | Pond/Lake edge |
| Pied-billed Grebe | 2 | Pond/Lake edge |
| Rock Dove | 5 | Residential, farm buildings |
| Ruby-throated Hummingbird | 5 | Forest and edge |
| Ruffed Grouse | 2 | Forest |
| Scarlet Tanager | 3 | Forest, edge |
| Wild Turkey | 5 | Forest, edge, farm fields |
| Wood Duck | 1 | Forest/lakes |
| Yellow-billed Cuckoo | 1 | Brush, forest edge |

24 Species

Table 4. Interior and obligate forest nesting species at the 5 point counts on Rowsom Road. Provided are those interior forest nesting species, the number of sightings, and the percentage of all sightings of that species during the 2003 study period at all 49 point count locations.

| Species | Number of Sightings | Percentage |
|------------------------------|---------------------|------------|
| Blue-headed Vireo | 2 | 100% |
| Blackburnian Warbler | 4 | 80% |
| Black-throated Blue Warbler | 19 | 100% |
| Black-throated Green Warbler | 10 | 100% |
| Canada Warbler | 3 | 100% |
| Hermit Thrush | 6 | 86% |
| Magnolia Warbler | 20 | 100% |
| Northern Waterthrush | 3 | 75% |
| Ovenbird | 21 | 66% |
| Swainson's Thrush | 2 | 100% |
| Wood Thrush | 8 | 50% |

Figure 1. Map showing boundaries of the Flat Rock Wind Power Project, Lewis County, New York.

Figure 2. Location of point counts used to sample nesting bird species on the eastern and western portions of the Flat Rock Wind Power Project site, Lewis County, New York. GPS locations for point counts are provided in Table 1.

