

**Sensitive Grassland Bird Species Habitat Assessment
Arkwright Summit Wind Project, LLC
Chautauqua County, New York**

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EXECUTIVE SUMMARY

Arkwright Summit Wind Farm, LLC is proposing to develop a wind-energy facility, the Arkwright Summit Wind Farm, in Chautauqua County, New York. As part of overall wildlife investigations, a habitat assessment was conducted for five (5) sensitive grassland bird species: Henslow's sparrow (*Ammodramus henslowii*), grasshopper sparrow (*Ammodramus savannarum*), upland sandpiper (*Bartramia longicauda*), short-eared owl (*Asio flammeus*) and northern harrier (*Circus cyaneus*). The proposed project area lies within a mixed agricultural and forested landscape and has the potential to contain grassland habitat to support these state listed bird species, as indicated by the New York State Department of Conservation.

The objectives of the habitat assessment were: (1) identify and characterize grassland habitat within the project boundary and the area within a 1.5 mile buffer around the project as optimal or sub-optimal for suitability and utilization by the target species, and; (2) ground-truth potential habitat to provide information regarding sensitive species for use in project planning and design. Optimal habitat was defined based on current scientific literature. With the exception of the Northern Harrier, optimal habitat for the targeted species is defined as older (>10yrs) hay fields or livestock pastures greater than 30ha in size with <50% woody invasion. The Northern Harrier prefers marshy meadows, riparian zones or fallow fields greater than 10ha in size with thick woody vegetation (.5-1m tall) occurring at >50%.

Initially, land use/land cover maps, topographic maps, and aerial imagery maps were used to delineate areas with vegetation features potentially suitable for use by the target species, with specific focus on areas of proposed construction of permanent infrastructure (wind turbines). A field survey was conducted from June 22-June 24, 2009.

Much of the potential grassland bird species habitat within the project area is found along road corridors where active management of the land has kept the area from becoming reforested. Classifications of grassland types were active agriculture (hay fields, cultivated row crops or orchards) and abandoned old field (successional land reverting to forest). Optimal habitat is further defined by size, shape and presence/absence of habitat components; forbs, perches, water or bare ground.

As currently designed, five wind turbine locations are proposed adjacent to or within areas considered optimal grassland habitat for sensitive grassland bird species. An additional three sites outside of the project boundary (within the 1.5 mile buffer zone) were also identified as optimal habitat areas. Minimizing the size of construction areas around turbines and roads within the areas of optimal habitat will reduce the overall loss of potential habitat for the target species.

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INTRODUCTION AND BACKGROUND

Arkwright Summit Wind Farm, LLC is proposing to develop a wind-energy facility, *Arkwright Summit Wind Farm* (ASWF), in Chautauqua County, New York. The Project area was defined as the area under consideration for the proposed facility (Figure 1). Construction will begin after all permits are secured.

Horizon Wind Energy, LLC contracted Western EcoSystems Technology, Inc. (WEST) to develop and implement site specific studies of wildlife resources that could be affected by the proposed project. As part of the overall study, New York State Department of Conservation (NYSDEC) requested that habitat within the project area be assessed for suitability to special status species (i.e., threatened, endangered, sensitive species). During agency comments on the project, the NYSDEC indicated that grasslands within or immediately adjacent to the project area have the potential to support state-listed grassland bird species (Appendix A). The NYSDEC specifically identified five sensitive species of concern: Henslow's sparrow (*Ammodramus henslowii*), grasshopper sparrow (*Ammodramus savannarum*), upland sandpiper (*Bartramia longicauda*), short-eared owl (*Asio flammeus*), and northern harrier (*Cirus cyaneus*). Of the five, only northern harrier was observed during previous wildlife surveys conducted at the ASWF (Kerns et al 2007).

Horizon Wind Energy, LLC requested that WEST conduct a desktop and field assessment of the study area to characterize habitat availability for these five sensitive bird species within and adjacent to the project area. The following report describes results of the grassland sensitive bird species habitat assessment. The purpose of the report is to disseminate important information related to the investigation to the project owner and NYSDEC.

The objectives of the habitat assessment were to:

1. Identify and characterize grassland habitat areas within the project and surrounding area as optimal or sub-optimal for suitability and utilization by the target species, and;
2. Ground-truth potential habitat to provide information regarding sensitive species and current land management for use in project planning and design.

STUDY AREA

The ASWF lies in the northcentral part of Chautauqua County, approximately 6 miles southeast of Fredonia, New York and 7 miles from Lake Erie at the closest point (Figure 1). The Project Area falls within central Arkwright and the easternmost edge of the Town of Pomfret. State highways 77 and 79 bisect the Project Area from north to south and State highway 83 runs east-west roughly parallel to Canadaway Creek. Cassadaga Lake is approximately 5 miles west of the southern portion of the project. Elevation within the ASWF reaches approximately 510 meters at its highest point in the northern portion of the project. There are numerous existing communication (radio, microwave) towers in this portion as well.

The Project Area is located in the far western portion of the Appalachian Plateau ecozone along the northern edge of the Cattaraugus Highlands sub-zone of New York (Andrle and Carroll 1988). The Appalachian Plateau is mainly hilly country dissected by somewhat deep valleys. The region has plateau characteristics with generally broad flat-topped hills and relatively little change in the elevation of the hilltops. The predominant vegetation type was historically northern hardwood forest, but agricultural clearing has left the region approximately 30% wooded, though the project is more wooded than the general region. Vegetation of the project is a mosaic of open grass/hay fields, cultivated agriculture (e.g., corn), pasture for livestock, and scattered deciduous woodlots (Figure 2 and 3). In general, the land within the project is privately owned and primary land uses include agriculture and dairy cow production. There are scattered houses and farms in the Project Area, particularly adjacent to the roads. There are a few small wetlands scattered within the project with larger wetland complexes outside of the proposed development area.

Historically, Chautauqua County was heavily forested, but has periodically and semi-permanently lost much of the forest over the last 200 years due to timber management and conversion of forest lands to crop and pasture. Based on the 2001 National Land Cover Database (NLCD), approximately 68% of the project is comprised of deciduous forest and approximately 29% is comprised of mixed forest (USGS 2001). A few patches of evergreen forest can also be found scattered throughout the project, comprising about 2.5% of its area (Figure 2 and 3). Current land use within the project includes rural homes, forestry, and recreation. Fallow fields or scrub/shrub fields and wetland areas are also present. Remaining areas tend toward deciduous forest of mixed stages of succession or residential (Figures 3 and 3.1).

Sensitive Grassland Bird Species Habitat Assessment
Arkwright Summit Wind Farm

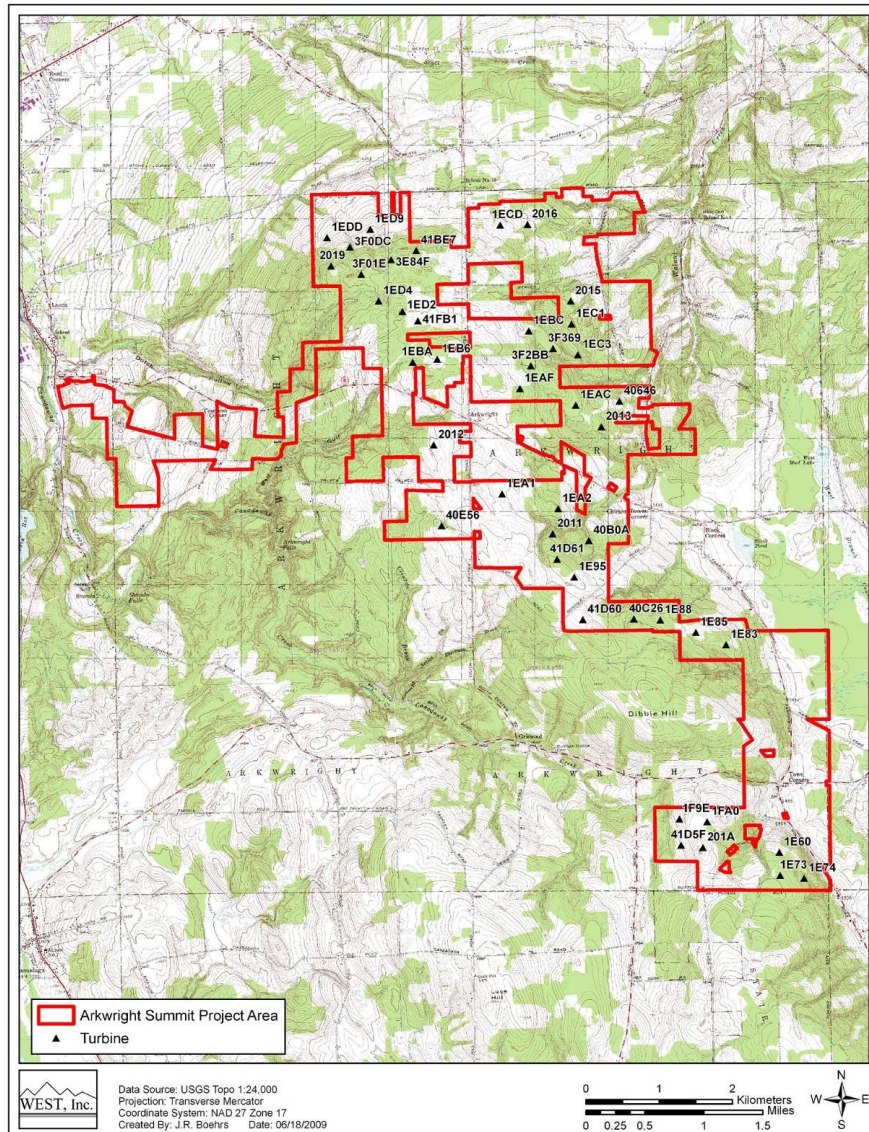


Figure 1. Proposed Arkwright Summit Wind Farm Map.

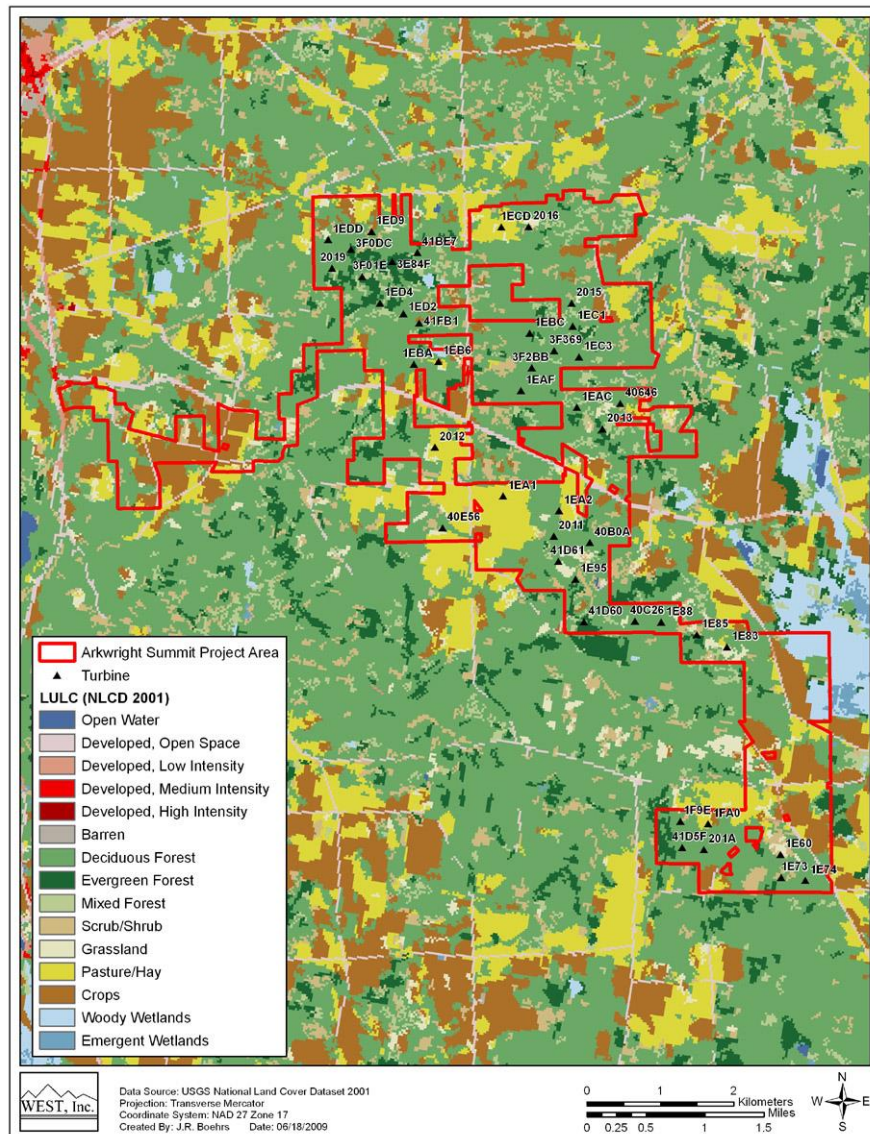


Figure 2. NLCD land use / land cover data for the Arkwright Summit Wind Farm.

SENSITIVE GRASSLAND BIRD SPECIES IN NEW YORK

Grasslands are important to the target sensitive species due to their nesting requirements. These species typically build nests on the ground and require a certain amount of cover and minimum of disturbance for nesting success. Additionally, the height and size of the vegetation and area is important to support territorial displays or feeding requirements. Henslow’s sparrow, grasshopper sparrow, short-eared owl and upland sandpiper breeding/nesting habitat is typified by older (>10yrs) hay fields or livestock pastures greater than 30ha in size with <50% woody invasion (McGowin and Crowin 2008, Herkert et al 2003, Dechant et al 2003, NatureServe 2005). The preferred breeding/nesting habitat of Northern harrier is also grassland but with a different vegetative composition and minimum size. Northern harriers prefer

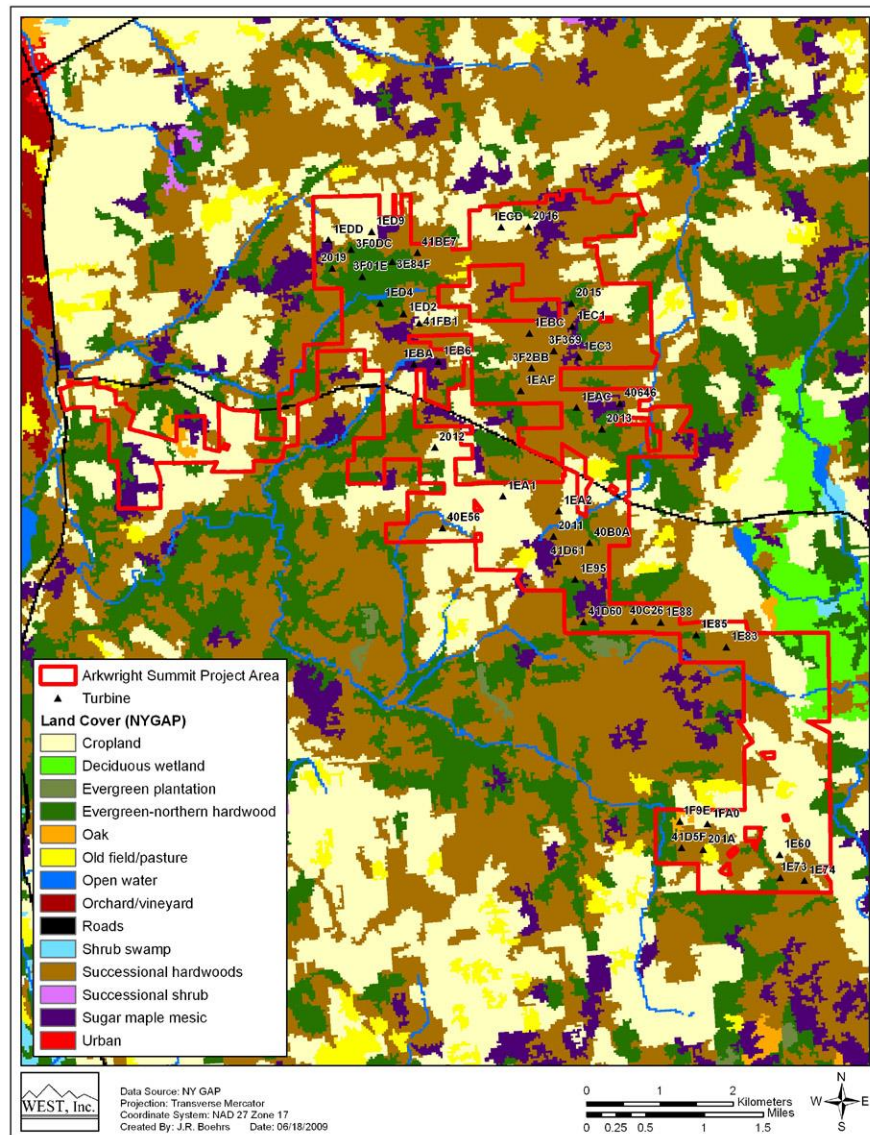


Figure 3 NY Gap land use / land cover data for the Arkwright Summit Wind Farm.

marshy meadows, riparian zones or fallow fields greater than 10ha in size with thick woody vegetation (.5-1m tall) occurring at >50% (Dechant et al 2003).

Henslow's Sparrow

Henslow's sparrows utilize grasslands that have well-developed litter, relatively high cover of standing dead residual vegetation, tall, dense vegetation and generally low woody stem densities (Herkert et al 2003). Henslow's sparrow habitat is characterized by a high percentage of grass cover and scattered forbs for song perches. Henslow's sparrows may use idle hay fields or wet meadows (Herkert et al 2003), and

may tolerate lightly to moderately grazed pastures (NatureServe 2005). Field size has been identified as an important component of Henslow's sparrow habitat. Area was found to be the best predictor of occurrence in grasslands in New York, with observations of the species primarily occurring in fields with ≥ 30 ha of contiguous grassland (Herkert et al 2003).

Henslow's sparrow populations occur in central and western New York and in a few locations in the Hudson River Valley. The Henslow's sparrow is a state-threatened species in New York (NYSDEC 2009). Populations have been significantly declining within the state. Breeding Bird Survey data from New York indicates that the population may have declined by as much as 18.7% per year between 1980 and 2006 (NYNHP 2009, McGowin and Crowin 2008). The most significant threat to Henslow's sparrows is the loss of suitable grassland habitat. Many farmers have intensified their farming practices, converted hay fields to row crops, or abandoned farming altogether. Remaining hay fields are often mowed earlier and more frequently to increase production. As a result, the mortality rate of nests and young in those fields is high, and sometimes adults are killed during mowing (Herkert et al 2003). As farms are abandoned they are lost to development or the land reverts to shrub lands and forests. Within the New York range of the species, grasslands are becoming more scattered and isolated, reducing habitat connectivity, while wetland loss is also a detrimental factor because nests are sometimes located nearby damp or wet meadows (NYNHP 2009).

Grasshopper Sparrow

Grasshopper sparrows prefer grasslands of intermediate height and are often associated with clumped vegetation interspersed with patches of bare ground evenly spaced (foraging occurs exclusively on the ground). Other habitat requirements include moderately deep litter and sparse coverage of woody vegetation. Grasshopper sparrows breed in native prairie, pasture, hay-land, airports, and reclaimed areas. They prefer large grassland areas over small areas, with studies demonstrating the minimum area on which grasshopper sparrows breed is 10-30 ha, and the minimum area needed to support a breeding population may be ≥ 30 ha (Dechant et al 2003). Light to moderate grazing has proven beneficial to populations in upper New York (Smith and Smith 1992).

Although the grasshopper sparrow appears to have a wide distribution across much of temperate North America, it is often locally distributed and is reported as uncommon to rare throughout parts of its range (NatureServe 2005). Many North American populations have experienced long-term declines since the early part of this century, owing mostly to loss and conversion of prairies and agricultural grasslands. Also, early-season mowing of hay fields and other agricultural lands is generally responsible for major nest failure of grassland birds, including grasshopper sparrows (Vickery 1996). Since 1966, the species has shown a 9.0 % percent annual decline in New York (McGowin and Crowin 2008). Currently, the grasshopper sparrow is considered a state species of concern in New York (NYSDEC 2009).

Upland Sandpiper

Upland Sandpipers use native and tame grasslands, wet meadows, hayland, pastures, planted cover, cropland, highway and railroad rights-of-way, and grassy areas of airports. Primarily, this bird requires large pastures and older fields that have been in hay production for at least 10 years (Dechant et al 2003, Bollinger 1995). Habitat characteristics in New York include field size > 30 ha, $< 1\%$ shrub cover, 10-

15% forb cover, very low litter depth, mixed vegetation height (<15 cm & 40 cm+), sparse overall vegetation density, with available perches (Bollinger 1995). In Jefferson County, Lazazzero and Norment (2005) found that upland sandpipers favored large pastures with small perimeter/area ratios (fewer edges), that are homogenous in floristic structure (few plant species), with nearby barns and fenceposts for perching. Occurrence continued to increase even at the largest field size (> 500 ha), indicating that smaller fields, even with the appropriate mosaic of vegetation elements, will unlikely be used for breeding by this species (NYNHP, 2009).

The Upland sandpiper is a state-threatened species in New York. This species has declined dramatically both in distribution and abundance since the mid 1980s. The overall statewide distribution has decreased 65%, while abundance (based on BBS data) has declined by about 16% per year York (McGowin and Crowin 2008). The primary threats of agricultural conversion, fragmentation, and intensification are ongoing and expected to increase. Upland Sandpipers are highly sensitive to habitat fragmentation. Currently, the loss and fragmentation of agricultural grasslands due to increased urbanization, changes in farming practices (earlier and more frequent mowing, increased cultivation of row crops), and natural forest succession of abandoned farmlands pose the most serious threats to this species.

Short-eared Owl

One of the most widely distributed owls in North America; the short-eared owl is an open country, ground-nesting species that inhabits marshes, grasslands, and tundra throughout much of North America. Short-eared owls require large, open grassland or wetland areas, such as native prairie, hayland, retired cropland, small-grain stubble, shrubsteppe, and wet-meadow zones of wetlands. The species tends to prefer habitats with some water which may be due to the habitat preference of voles, its primary prey. During the winter months, short-eared owls use habitats similar to those of the breeding season. They also can be found at old dumps and airports where rodent populations may be high. They may move further south during winters with deep snow cover (NYNHP, 2009). Local occurrence is unpredictable, as populations fluctuate yearly due to variation in small-mammal populations. Given sufficient habitat and food supply, short-eared owls are able to colonize new areas (Dechant et al 2003). Studies in North Dakota populations indicate they are seldom observed in habitat blocks <100 ha (Johnson, *unpublished data*). In Illinois, nests were found in blocks of managed grassland as small as 28 ha (Herkert et al 1999). However, the authors suggested that they may be responding more to the total amount of grassland available in the surrounding landscape than to the sizes of individual grassland fragments; small fragments may be used if located close to larger blocks of contiguous grassland. In the northeast, breeding territory size has been found to generally decrease with increasing vole density (Dechant et al 2003).

New York is the southern edge of the breeding range in the eastern U.S., with the exception of some scattered breeding records as far south as Virginia (NYDECS, 2003). The breeding range in the state is generally limited to the St. Lawrence and Lake Champlain valleys, the Great Lakes Plains, and marshes along the south shore of Long Island. Between the fall and spring, the number of short-eared owl observations increases as northern populations migrate south, possibly in search of food. Significant numbers of wintering owls are in the Finger Lakes and the Lake Ontario plains, especially in Jefferson County, at scattered locations in the Hudson Valley, and the south shore of Long Island (NYNHP, 2009).

The most significant threat to short-eared owls is habitat loss due to development, reforestation, wetland loss, and changes in farming practices such as conversion of hay fields to row crops or more frequent mowing of hay fields. As a ground-nesting bird, eggs and unfledged young are at risk of depredation by mammalian predators such as foxes, raccoons, and skunks. There is also increased risk of depredation by domestic and feral cats and dogs in areas with some development. A limiting factor for short-eared owls is their dependency on rodent populations (NYNHP, 2009). The short-eared owl is state-listed endangered in New York.

Northern Harrier

Northern harriers prefer relatively open habitats characterized by tall, dense vegetation, and abundant residual vegetation. They use native or tame vegetation in wet or dry grasslands, fresh to alkali wetlands, lightly grazed pastures, croplands, fallow fields, old fields and brushy areas. Although cropland and fallow fields are used for nesting, most nests are found in undisturbed wetlands or grasslands dominated by thick vegetation (Dechant et al 2003). Size of nesting habitat area seems to be variable as indicated by different studies. However, it is suggested that the total amount of grassland available in the surrounding landscape rather than the sizes of individual grassland fragments may be a factor; small fragments may be used if located close to larger blocks of contiguous grassland (Herkert et al 2003). Studies in Conservation Reserve Program fields in North Dakota indicated that northern harriers were uncommon in blocks of contiguous grassland <100 ha (Johnson, *unpublished data*). In Illinois, grassland size did not influence nest placement and they nested in grassland fragments ranging from 8 to 120 ha. One nest per 11-54 ha was typical in a North Dakota study. In the tallgrass prairie of southwestern Missouri, nesting density was 121 ha/pair, whereas, in Manitoba, males defended 28 ha, centered on the nest (Dechant et al. 2003).

Northern harrier populations vary with rodent populations, peaking about every five years (Dechant et al. 2003). Nesting has been confirmed in the western Great Lakes plain, open habitats of the Adirondacks, western Finger Lakes, Long Island, and the Hudson, Saint Lawrence, and Lake Champlain valleys (NYNHP 2009). Declines in breeding populations have been noted in the Adirondacks, Coastal Lowlands, St. Lawrence Plains, and Tug Hill Plateau, while there have been increases in the number of confirmed nest sites in the Champlain Valley to the northern Hudson Valley, Mohawk Valley, and Appalachian Plateau (McGowan and Corwin 2008). Overall, Breeding Bird Survey data show a possible decline of 3.8% per year between 1980 and 2006, although, these findings were not found to be statistically significant. Non-breeding populations appear to be their highest during spring and fall migration. Wintering populations fluctuate with prey abundance and snow cover, but appear to be fairly stable (NYNHP, 2009).

One of the most significant threats to northern harrier populations in New York is the loss of suitable grassland habitat as many farmers have intensified their farming practices, converted hay fields to row crops, or abandoned farming altogether. Reforestation of abandoned farmland decreases habitat suitability. Another significant threat is the loss of wetland habitat by draining, dredging, and filling marshes. Remaining habitat is often degraded by fragmentation, exotic plants, and nutrient enrichment (NYNHP, 2009). The species is state-listed threatened in New York.

METHODS

A detailed habitat mapping for the targeted sensitive species was performed for the project out to 1.5 miles of the project footprint in accordance with NYSDEC agency comments (Appendix A). Potential for use by the target sensitive species of available grasslands within the study area¹ was evaluated through a desktop review and field survey conducted between June 22-24, 2009. Special attention was requested by the NYSDEC consultation (Appendix A) to grasslands near the following proposed ASWF infrastructure:

- Turbines 19, 21, and 22 (Turbines: 1EA1, 40E56 and 2012 as of June 2009)
- Turbines 4, 5R and 90R (Turbines: 1E60, 1FA0 and 1F9E as of June 2009)
- Turbines 39 and 39A (Turbines: 1ECD and 2016 as of June 2009)
- Turbines 49 and 52AR (Turbines: 1ED9 and 1EDD as of June 2009)
- Proposed transmission line leading to substation.

NY Gap (Figure 3) and National Land Cover Database (NLCD; Figure 2) maps and the project infrastructure layout were initially evaluated to identify areas of high probability where suitable habitat may occur within the study area, and/or where potential conflict areas may occur. Characterization of land cover classes that may contain potential grassland bird habitat include classifications in Table 1.

Potential habitat for target species was characterized as optimal or sub-optimal. Optimal habitat for the targeted species was based on Morgan and Burger (2008; Table 2). In addition to grassland vegetation characteristics associated with breeding habitats for the target species, differentiation of potential habitat as optimal or sub-optimal included, the area² of available habitats, and the surrounding landscape³. Notes on vegetation height and vegetation density, proportion of shrubs (if not classified as a shrub land), forb component, litter depth and presence/absence of perches were recorded for surveyed areas.

The field survey involved driving, and at times, walking surveys. All of the roads within the study area were driven and all potential habitats were characterized as optimal or sub-optimal as described above. Detailed maps with habitat descriptions and locations were drawn in the field and photographs of all grassland areas, particularly optimal areas were taken (Appendix B).

¹ The Study area is defined as the project area as well as a 1.5 mile buffer

² Habitat models indicate that the perimeter to-area ratio of habitat patches accounts for more of the variation in grassland bird abundance and species richness than area alone (Lazazzero and Norment 2006). This relationship between perimeter-to-area and bird response is inverse, with abundance and species richness increasing with a decrease in the perimeter-to-area ratio. Therefore, optimal habitat patches will be both large and of a shape that minimizes the perimeter (e.g. circular or square rather than elongated).

³ The amount of potential habitat in the vicinity of the patch also contributes to the likelihood that the patch will be occupied (Herkert et al 2003). Connectivity between patches may increase reproductive success/productivity within patches for many species.

Table 1. Land cover/land use areas with the potential to provide habitat for target grassland sensitive bird species at the ASWF. Classifications from NLCD (2001).

Classification	Description
Developed, Open Space	Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for <20% of total cover. These areas most commonly include large-lot housing units, parks, golf courses, and vegetation planted in developed settings for recreation or other purposes.
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically > 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Grassland/Herbaceous	Areas dominated by graminoid or herbaceous vegetation, generally > 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. >20% of total vegetation.
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. >20% of total vegetation. This class also includes all land being actively tilled.
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for >80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

RESULTS

The results of the habitat assessment are divided into three categories. The first section (*Non-Conflict Areas*) addresses the specific turbines of concern that have been identified as being located within non-conflict areas. These areas are characterized as not being located within optimal habitat for state-listed breeding grassland birds. Proposed turbines are not anticipated to have an impact on potential habitat for target species within non-conflict areas. The second section (*Potential Conflict Areas*) provides results for specific turbines that have been assessed as potential conflict areas, or areas where construction of turbines could impact optimal habitat for target species, or areas where target species have more potential to occur than other locations within the project. The third section (*Other Optimal Habitat within Study Area*) provides additional information of other areas within the project boundaries or within the 1.5 mile buffer zone that have been surveyed as potential optimal habitat areas.

Table 2. Breeding habitat characteristics preferred by target grassland bird species at the ASWF (Morgan & Burger 2008).

	Henslow's sparrow	Grasshopper sparrow	Upland sandpiper	Short-eared owl	Northern harrier
Minimal field size (ha)	30+ preferably larger	30+but higher occurrence at 50 - 100+	30+But bigger is better	Large (exact sizes not available)	30+
Shrub tolerance	Low	Low	Low	Not indicated	Medium-High
Forb component	High	Medium	Low	Medium	Low
Litter Depth	High	High	Low	No preference	Medium-High
Vegetation height	Tall	Medium	Mixed	Medium	Tall
Vegetation density	High	Low	Low	High	High
Perches Important	Forbs for singing	Unknown	Yes	Possible	Unknown
Notes	Requires undisturbed fields (often >10 years), with some standing dead vegetation.	Prefers little or no litter and >20% bare soil (evenly distributed, not patchy).	Requires low, sparse vegetation for loafing, feeding, and brood rearing. Maintenance of perches beneficial.	Shares sites with Northern Harrier, but avoids wetter areas.	Nest success may be higher in wetter sites. Variable in vegetation preferences.

Based on the Land cover/ Land use maps and the list of turbines, sub-station and proposed transmission line provided by NSYDEC, 18 potential conflict areas were identified and targeted for ground surveys (Figure 4). Ground-truthing field surveys identified eight potential conflict areas with an additional three optimal habitat areas outside of the project boundary but within the 1.5 mile buffer zone surrounding the project.

Non-conflict Areas

Eight proposed turbines, the substation and the proposed transmission line, which were identified for surveys by NYSDEC (Appendix A), or were targeted for surveys based based on LULC maps of the area, are located in five non-conflict areas (NC1-NC5).

NC1 Sub-station: The sub-station is located off of Route 83, adjacent to a residential and commercial area, surrounded by deciduous forest, active hay fields and long-term grape plantations. The few open grassland areas are active hay fields. This overall environment is considered sub-optimal

habitat with little potential to support the targeted grassland bird species. The Proposed transmission line runs primarily through a forested ecosystem. It occasionally follows along established road systems (Route 83) and passes through active hayfields or grape farms; neither of which provide optimal habitat for the targeted species.

- NC2 Turbines 1F9E and 1FAO:** These two turbines, located in the southern area of the project, are surrounded by cultivated row crops, active hay fields or forest (Appendix B). Row crops are extensive (>150ha) in this area, which is classified as sub-optimal habitat for all species. Northern harrier has been shown to construct nests within cropland, however the species will show preference for other more suitable habitat if available (Dechant et al. 2003). With more suitable nesting habitat (wetland systems) found within the study area and the surrounding landscape, it is deemed unlikely that the landcover in which these turbines will be located would constitute preferential nesting habitat for northern harriers.
- NC3 Turbine 1E60:** Located within an active hay field, this turbine site is considered to have low potential for supporting the grassland bird species. The hay field is enclosed by a mix of young and mature deciduous forests with other hay fields and cultivated row crops nearby (Appendix B). A cow pasture is also located within the vicinity. The impact of this turbine will be negligible to grassland bird species due to the lack of connectivity of the hay field to surrounding open grassland areas.
- NC4 Turbine 1E83:** The vegetation composition near this turbine would be considered optimal for northern harrier breeding if larger. It is classified as shrub/scrub, suitable for nesting purposes (Appendix B). However, it is an elongated area encompassing only ~12ha; an area with a high perimeter to area ratio and low potential for breeding for most of the target species. As noted above, optimal habitat patches will be both large and a shape that minimizes perimeter. Additionally, the Turbine is set back beyond the shrub/scrub edge line within the surrounding wooded area and the access road to it comes from another direction and will not impact this area. Given the current construction design and the relative small size of the shrubby plot, this area has been considered to lack optimal habitat for target species.
- NC5 Turbine 41D60:** This turbine is located within habitat dominated by early growth mixed forest interspersed with small openings of fallow fields or shrub/scrub areas (Appendix B). Hay fields are located along the Meadows Road on either side of the turbine location. Land cover closer to the intersection of Center Road and Meadows Road (located 800m from the nearest turbine [Turbine 41D60]), includes a more open landscape with fallow fields and wetter areas, and is considered optimal habitat. The turbine location is not situated directly within optimal grassland habitat and construction is not likely to directly result in the loss of potential breeding habitat. This area has been considered to lack optimal habitat for target species.
- NC6 Turbine 1EA1, Turbine 40E56 and Turbine 2012:** These three turbines are situated near Turbine 1EA2 (PC1) described below. They are located within the contiguous landscape of active hay fields along the Center Road corridor of working farms. It is 1.25 miles from Route 83

to Meadows Road, between which hay fields predominate and extend further to the south. The depth of the corridor is ~.5miles with some variability. This equates to ~1610ha of open grassland habitat, encompassing all three turbine locations. Within this area are some micro-habitats of fallow fields or cow pastures, some early successional forest growth and residential development. Turbine 2012 has more early successional deciduous forest growth, whereas Turbines 40E56 and 1EA1 are surrounded by active hay fields. Turbine 1EA1 is surrounded by hay field with its location set upon what appears to be a farmer's access road (Appendix B). Although the large contiguous nature of the grassland corridor is considered optimal for all of the targeted species, the specific locations of each turbine do not include optimal vegetation or landcover structure for all target species.

Potential conflict Areas

Five turbines are located within three potential conflict areas (PC1-PC3).

PC1 Turbine 1EA2: This turbine is located along the edge of a pasture and deciduous woodland. The proposed access road does not pass through the pasture. However, the pasture provides optimal potential habitat for all of the target bird species, with the possible exception of the Grasshopper sparrow. It encompasses a minimum of ~40ha, which includes an active hay field, cow pasture, forest edge and road edge (Route 83; Appendix B). The diversity of vegetation communities increases the potential for the area to be used by one or more species of grassland bird. There are fence post perches, a variety of vegetation heights and litter depths. There is a strip of tree/shrubs along the middle of the area providing additional diversity. The grazing appears to be minimal with forbs present. Additionally, this area is near other active hay fields along the Route 83 corridor; which constitutes a relatively large contiguous landscape of grassland habitats.

PC2 Turbines 1ECD and Turbine 2016: These two turbines are located within optimal habitat for all of the targeted bird species. The area is approximately 64ha and is comprised primarily of hay fields and cow pastures with forested edges surrounding three sides. Straight Road (north edge) bisects two distinct forest types with a mature mixed forest dominated by maple and hemlock to the north and a more hydrophilic composite of willow and cottonwood along the south side. The south side (north of proposed turbine location) transitions from taller to shorter shrubs, followed again by hay field and cow pasture; within which the turbines are proposed. Given the relatively large size of available potential habitats the potential to support all target species is elevated. Additionally, the grazing practices within this area appear minimal, but are sufficient to prevent shrub encroachment and may contain bare areas for foraging sites. In addition, hay fields and cultivated cropland interspersed with fallow field, shrub/scrub land and a couple of apple orchards are located to the north and east. Mezzio Road contains similar habitat including an area near and behind a home ~35ha in size of fallow field and horse pasture. The presence of additional high quality habitats further north increases the potential for target species to occur within the immediate landscape.

PC3 Turbines 1ED9 and Turbine 1EDD: These two turbines are located within a ~37ha cow pasture/hay field along a wooded edge. Straight Road bisects the pasture, creating a separate field also measuring ~35-40ha, doubling the overall size of the potential conflict area to ~70-80ha (Appendix B). A field to the north of Straight Road may contain a hay field or pasture (undetermined due to lack of access). The area has the potential to support all of the targeted grassland bird species. Additionally, the grazing practices within this area appear minimal, but enough to keep the area open of shrub encroachment and may provide bare areas for foraging and habitat diversity. Some forbs and fence posts provide perching options.

Other Optimal Habitat within Study Area

Three additional areas characterized as optimal habitat for target species are located within the study area (OH1 – OH3).

OH1 A 1.7 mile long area adjacent to both Putnam Road and Zahm Road contains a high proportion of emergent/herbaceous wetland areas associated with West Mud Lake. Open water, wet meadows, and shrub/scrub-fallow field areas are present (Appendix B). This area also has working farm land in production: hay, livestock pastures and cultivated row crops. This area contains potential optimal habitat for the targeted species. Additional fallow fields, grazing pastures and hay fields, offer the other grassland species potential habitat. OH1 is located outside of the proposed project boundary, but within the 1.5 mile study area buffer.

OH2 This area is located along ~0.5 miles of Route 83 and ~.7 miles along Route 85. Land cover within this area include open water, emergent herbaceous wetland, hay fields, fallow field, cultivated row cropland and forest (Appendix B). This area is located outside of the boundary of the project area but within the 1.5 mile study area buffer.

OH3 At the intersection of Lewis Road and Cook Road a male Northern Harrier was observed feeding on the ground and then taking flight, approximately 1.2 mile from the nearest proposed turbine location (Appendix B). The surrounding landscape includes a mixed mature forest, fallow fields and hay fields (Appendix B). This area is outside of the project boundary but within the 1.5 mile study area buffer.

DISCUSSION

The objective of the Sensitive Grassland Bird Species habitat assessment was to identify areas within the Arkwright Summit Wind Farm which could contain potential habitat for five state-listed grassland birds, and provide information for project planning purposes to minimize potential impacts to the species. Specific focus included habitat at wind turbine locations identified by NYSDEC as potential conflict areas, the sub-station location and the proposed transmission line. Additionally, the habitat survey included a 1.5 mile buffer area surrounding the project area.

The most probable direct impact to birds from wind-energy facilities is direct mortality or injury due to collisions with turbines or guy wires of meteorological (met) towers. Collisions may occur with residents foraging and flying within the project area or with migrants seasonally moving through the project area. Project construction could affect birds through loss of habitat, potential fatalities from collisions with construction equipment, and disturbance/displacement effects from construction activities. Potential mortality from construction equipment is expected to be low. Equipment used in wind-energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The risk of direct mortality to birds from construction is most likely potential destruction of a nest for ground- and shrub-nesting species during site clearing. Timing of construction outside of the nesting season for sensitive grassland birds would avoid potential impacts to nests.

The presence of wind turbines may alter the landscape so that wildlife use patterns are affected, displacing wildlife away from the project facilities and suitable habitat. Some studies from wind-energy facilities in Europe consider displacement effects to have a greater impact on birds than collision mortality (Gill et al. 2006). The greatest concern with displacement impacts for wind-energy facilities in the US has been where these facilities have been constructed in grassland or other native habitats where tall structures such as turbines do not normally occur (Leddy et al. 1999, Mabey and Paul 2007). Results from studies at the Stateline wind-energy facility in Washington and Oregon (Erickson et al. 2004) and the Buffalo Ridge wind-energy facility in Minnesota (Johnson et al. 2000a) suggest that breeding birds may be affected by wind-facility operations. Studies concerning displacement of non-raptor species have concentrated on grassland passerines and waterfowl/waterbirds (Larsen and Madsen 2000; Mabey and Paul 2007; Winkelman 1990). Wind-energy facility construction appears to cause small scale local displacement of grassland passerines and is likely due to the birds avoiding turbine noise and maintenance activities.

Project planning at the ASWF has included avoiding optimal habitat areas for sensitive grassland bird species. For instance, turbine NC5 was located along the edge of a grassland area during Project planning in an attempt to minimize impacts to hay meadows located along either side of Meadows Road.

Use of the ASWF by the targeted sensitive grassland species is low. Pre-construction avian use surveys carried out at the ASWF detected five northern harriers but none of the other target species identified as the focus for this study (Kerns et al 2007).

As currently planned, impacts to potential sensitive grassland bird species habitat are confined to five proposed wind turbine locations within three potential conflict areas (PC1 – PC3). An additional three areas were also classified as optimal habitats for target species within the 1.5 mile study area, though these areas are outside any project development area and are not anticipated to be directly impacted by construction or facility operation.

Micro-siting proposed turbines and access roads located within potential conflict areas and access road locations appears to be the best option for minimizing optimal grassland habitat loss. However, in the absence of the ability to change the facilities design, minimizing grassland habitat disturbance during construction will minimize destruction of potential habitat for grassland species. In addition, many of the

proposed turbines are presently located along edges in order to minimize loss to agricultural production and to avoid destruction of potentially important wildlife habitats such as woodlands and grasslands.

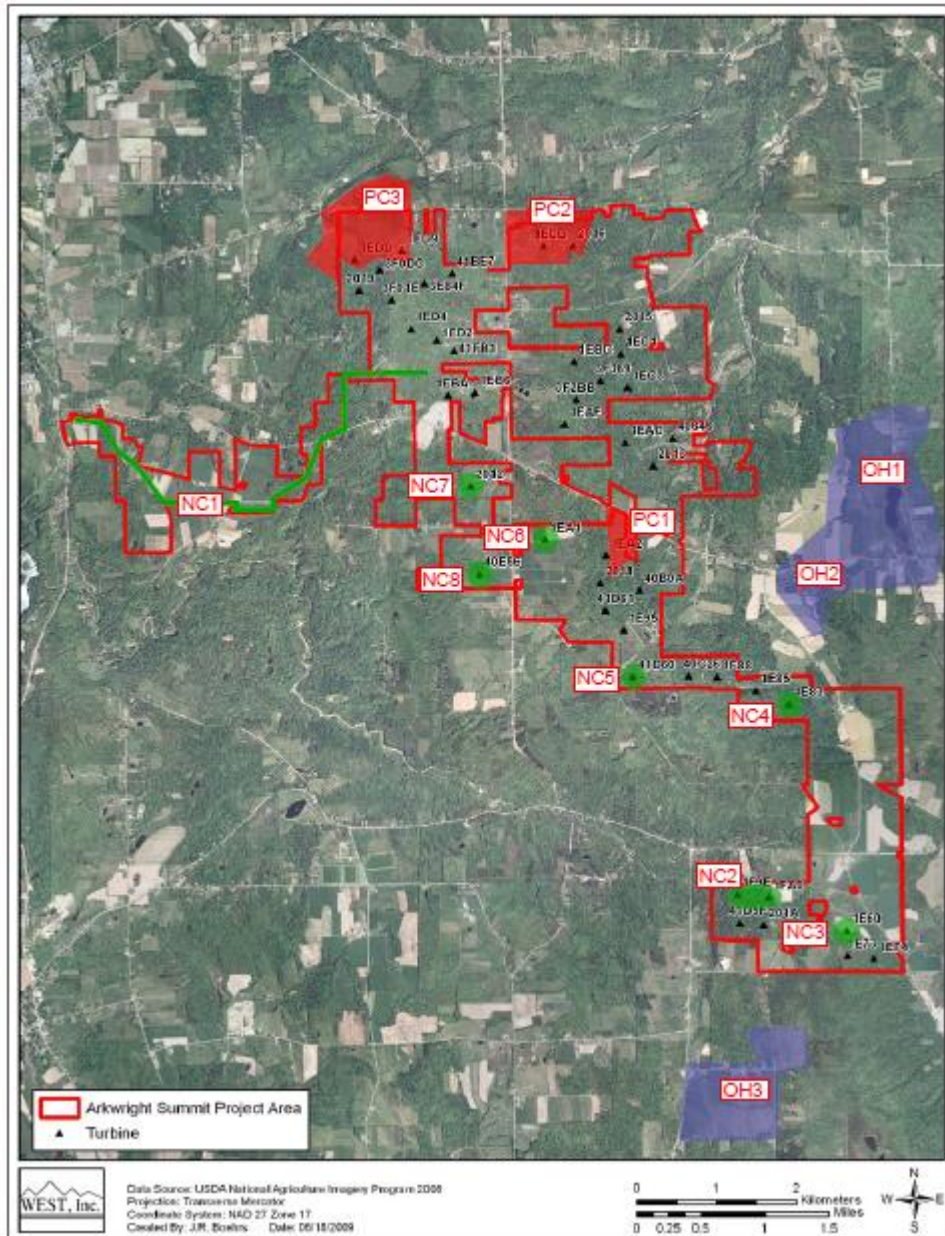


Figure 4. Locations of Non-Conflict Areas, Potential Conflict Areas and Other Available Habitat Areas for target sensitive grassland bird species, ASWF, June 2009. Green areas indicate non-conflict areas, red areas indicate conflict areas, and purple areas indicate other optimal habitat within study area.

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Appendix A

New York Department of Conservation

Agency Scoping Letter May 14, 2009.

Proposed Arkwright Summit Wind Farm, Chautauqua County, New York

From: Rudyard Edick [mailto:rgedick@gw.dec.state.ny.us]
Sent: Friday, March 27, 2009 3:52 PM
To: Tom Stebbins
Cc: Jack Nasca; Rene Braud; townofarkwright@hughes.net; 'dyoung@west-inc.com'
Subject: DEC Recommendations for State-Listed Bird Surveys for New Grange Wind Farm (modification to our 11 Mar 09 Email)

Good Day Mr. Stebbins,

In light of the lateness of the season, which may have resulted in short-eared owl dispersal as additional suitable habitats open up, and since some may have begun their return trip north to their nesting habitat (typically in the boreal areas of Canada), we are modifying our 11 March 2009 request for late winter/early Spring short-eared owl/northern harrier surveys. Our observations show that short-eared owl numbers are changing and/or declining now in traditional wintering areas and the likelihood of finding winter "residents" is questionable now at almost any location throughout the state. Be advised that, as discussed in paragraph 1 below, any state-listed bird species that may be present in the area should be included in analysis (such as Northern Harrier).

Rather than conduct these March 2009 studies, we now recommend the following:

- 1) The Final Environmental Impact Statement (FEIS) should include detailed habitat characterizations of the area in and near (up to 1.5 miles if a particularly desirable habitat exists) the project footprint. In the FEIS, describe what potential the grassland habitats might provide to any state-listed bird species, with a focus on short-eared owl, northern harrier, upland sandpiper and Henslow's sparrow. Provide any habitat descriptions that would discount the areas USED by listed species.

Photographs of these areas at representative locations would also be useful in assessing the habitat value. Our review of the DEIS indicates that special care

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should be paid to the following areas as they appear to support suitable grassland habitat:

- * Turbines 19, 21, and 22
- * Turbines 4, 5R and 90R
- * Turbines 39 and 39A
- * Turbines 49 and 52AR
- * Proposed transmission line leading to substation.

2) DEC would also like the opportunity to review these habitat areas first hand during a field visit later this spring or early summer; potentially in conjunction with our request to review potential wetland concerns within the project area.

3) Lastly, the DEC intends to use habitat characterization information gathered from the FEIS and our own surveys to determine whether or not additional species-specific surveys are necessary during the 2009-2010 overwintering season, which would be similar to what we initially described for the late winter/early Spring of this year but, if we thought necessary, extend throughout the winter season.

Please be advised that we will be amending our comments to the lead agency to include these recommendations. Also, be advised that the guidance provided in this email is not exhaustive and details, as appropriate, need to be worked out with DEC biologists.

If you have any further questions or concerns, please address them to me at 518.402.9150 or ngedick@gw.dec.state.ny.us.

Most Respectfully,

Rudyard G. Edick

Appendix B
Photographs of habitats near or at proposed turbine locations,
Arkwright Summit Wind Farm, Chautauqua, New York

Turbine 1F9E and Turbine 1FAO



Turbine 1E60



Turbine 1E83



Turbine 1EA2



Turbine 1EA1, Turbine 40E56 and Turbine 2012

Turbine 1EA1



Turbine 40E56



Turbine 2012



Turbine 1ECD and Turbine 2016



Turbine 1ED9 and Turbine 1EDD



Zahm Road-Mud Lake (South to North)



Putnam Road (South to North)



Route 83 and Route 85 Intersection-Black Pond Area



Lewis Road and Cook Road Intersection-Male Northern Harrier



Lewis Road and Cook Road Intersection-Habitat

