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Avian Risk Assessment

**Avian and Bat Risk Assessment
Clinton County Windparks
Clinton, Ellenburg, and Altona,
Clinton County, New York**

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List of Abbreviations and Acronyms

ABR	ABR, Inc.
amsl	above mean sea level
BBS	breeding bird survey
BCA	Bird Conservation Area
BCI	Bat Conservation International
CBC	Christmas bird count
EIS	Environmental Impact Statement
GAO	Government Accountability Office
IBA	Important Bird Area
km	kilometers
kV	kilovolt
kW	kilowatt
MHz	megahertz
MW	megawatt
NHP	National Heritage Program
NWCC	National Wind Coordinating Committee
NYSDEC	New York State Department of Environmental Conservation
NYSOA	New York State Ornithological Association
ROW	right of way

List of Abbreviations and Acronyms (cont.)

SOC	species of concern
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wetland Management Area

1

Introduction

1.1 Project Description

Noble Environmental Power, LLC (Noble) is proposing to install and operate three separate wind energy facilities in Clinton County, New York. The three projects include the Noble Clinton Windpark, Noble Ellenburg Windpark, and Noble Altona Windpark.

Due to project similarities, proximity, and the potential for cumulative impacts this draft avian and bat risk assessment addresses the potential impacts of all three Clinton County projects individually and collectively.

1.1.1 Clinton Project Area

The Noble Clinton Windpark, will be an approximately 102 megawatt (MW) wind energy facility (the project) in the town of Clinton, Clinton County, located in northeastern New York State (see Figure 1-1).

The Clinton project will consist of the following:

- Sixty-eight wind turbines within a 4,487-acre area;
- Approximately 16 miles of access roads that will connect to each wind turbine to allow vehicles access for construction and maintenance of the facilities. Access roads will be constructed to a temporary 35-foot in width during the construction period and will then be reduced to a 16-foot permanent width;
- A buried electrical collection system that will allow delivery of electricity to a new substation. Where practicable, the electrical collection system will be installed along the same ROW corridor as the access roads and/or existing overhead transmission lines; and
- A substation on a 7.14-acre parcel that will tie into an existing 230 kilovolt (kV) line.

1.1.2 Ellenburg Project Area

The Noble Ellenburg Windpark, will be an approximately 81 MW wind energy facility (the project) in the town of Ellenburg, Clinton County, located in northeastern New York State. The Ellenburg project site is adjacent to and immediately south of the Clinton project site (see Figure 1-1).

The Ellenburg project will consist of the following:

- Fifty-four wind turbines within a 3,300-acre area in the town of Ellenburg.
- Approximately 11 miles of access roads within a 35-foot ROW that will connect to each wind turbine to allow vehicles access for construction and maintenance of the facilities;
- A buried electrical collection system that will allow delivery of electricity to a new substation. Where practicable, the electrical collection system will be installed along the same ROW corridor as the access roads and/or existing overhead transmission lines; and
- A modular expansion of the substation that will support the Clinton Windpark.

1.1.3 Altona Project Area

The Noble Altona Windpark will be an approximately 102 MW wind energy facility (the project) in the town of Altona, Clinton County, located in northeastern New York State. The Altona project site is approximately 15 miles east and south of the Clinton project site (see Figure 1-1).

The project will consist of the following:

1. Installation and operation of the 68 wind turbines within a 5,233-acre area in the town of Altona;
2. Approximately 15 miles of access roads within a 35-foot ROW that will connect to each wind turbine to allow vehicles access for construction and maintenance of the facilities;
3. Construction and use of an electrical collection system that will allow delivery of electricity to a new substation. The electrical collection system will be partially buried and partially aboveground. Where practicable, the electrical collection system will be installed along the same ROW corridor as the access roads; and
4. Construction of a substation that will tie into an existing 230 kV line that will provide access to the grid.

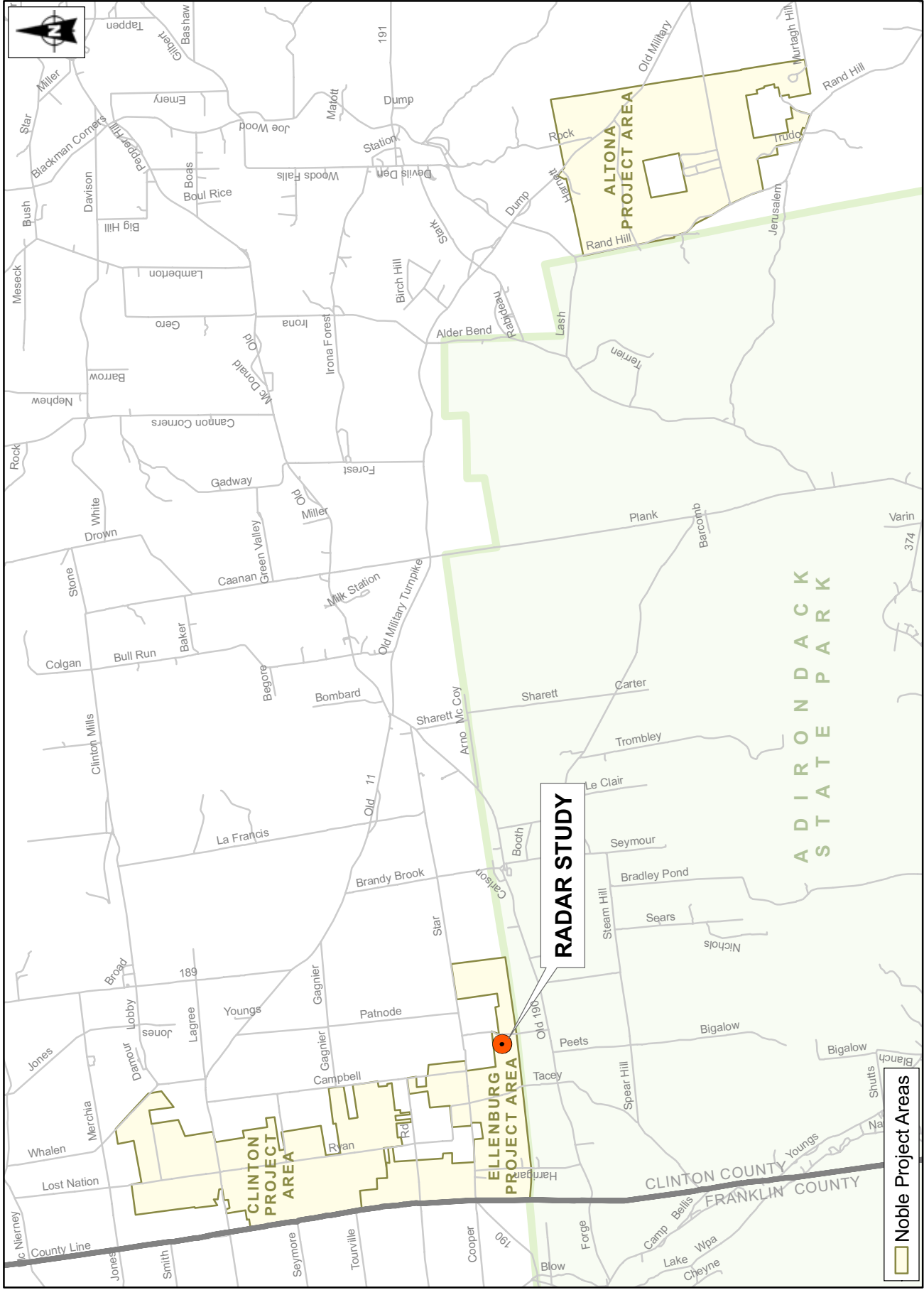


Figure 1-1 Project Locations and Radar Study Location

1.1.4 Turbine Description

The wind turbines that will be installed at the Clinton Windpark will be General Electric 1.5 MW, SLE, 80 Meter, MTS, T-Flange wind turbine generators¹. The turbine is a three bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 77 meters. The nacelle is located at the top each tower and contains the electrical generating equipment. The turbine rotor and the nacelle are mounted on top of a tubular tower, which makes the rotor hub height 80 meters (see Figure 1-2). The maximum height for the turbine is 118.5 meters and results when a rotor blade is at the top of its rotation. Once installed, each wind turbine will have an 18 by 18-foot exposed base. Each wind turbine will have a maximum generating capacity of approximately 1.5 MW.

Section 1.3 of the separate Clinton, Ellenburg and Altona Windpark Draft Environmental Impact Statements describes the process used to select turbine site locations. A number of factors, including proximity to wetlands were evaluated in determining where to locate turbines. A specific discussion of impacts to wetlands is found in Section 2.8 of each DEIS. The proposed turbine sites represent a balancing of the site selection criteria.

1.2 Project Background

After discussions with the New York State Department of Environmental Conservation (NYSDEC), Noble has undertaken this study to assess the potential for impacts to birds and bats associated with the projects. The study had the following objectives:

1. Collect baseline information on flight directions, passage rates, and flight altitudes of nocturnal targets (migratory birds and bats).
2. Collect information on the occurrence and distribution of avian species in the Project Areas during migratory and breeding seasons.
3. Collect information on the occurrence of bat species in the Project Areas during migratory seasons.
4. Analyze the baseline data and other available studies and data to evaluate the potential impacts from the projects.

The findings in this report are based on information obtained from the literature and site surveys, comparing data collected at the project site with data collected at operating wind facilities at other locations, and by reviewing site features and ge-

¹ 1.5MW refers to the production capacity of the turbine which is 1.5 mega watts. SLE is used to designate that the diameter size of the turbine rotor is 77 meters. 80 Meter refers to the height of the tower. MTS designates the type of tower configuration and T-Flange designates the type of flange used to connect the tower directly to the foundation.

ography with local bird and bat distribution and use (see Section 2 for Methodology).

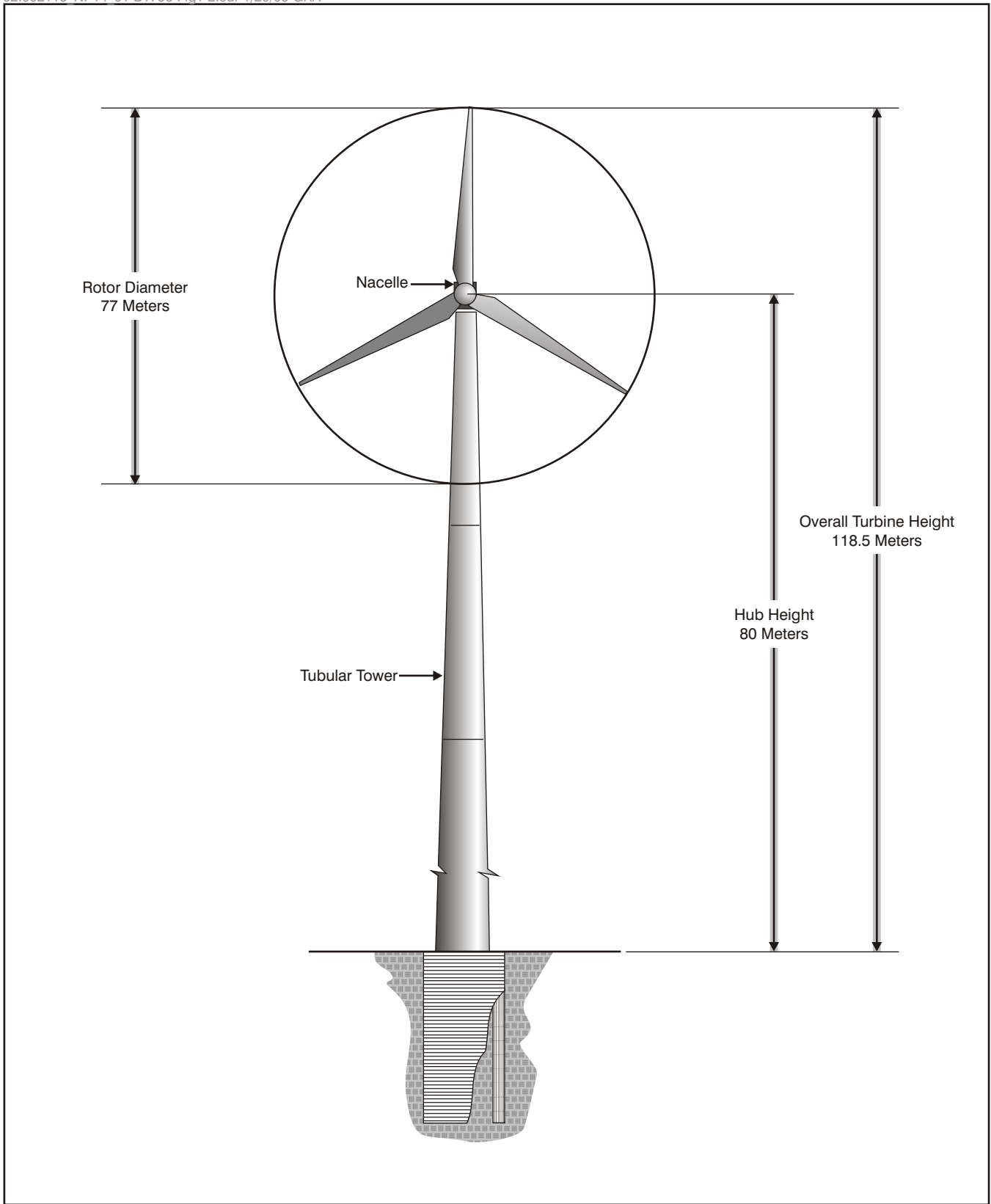


Figure 1-2 Generalized Wind Turbine Layout

2

Methodology

The methodology for this avian and bat risk assessment includes the following components:

- Conducting a literature review and contacting agencies to gather historical background data for birds and bats in the Project Areas;
- Performing a habitat assessment;
- Conducting field studies to determine site specific information; and
- Evaluating the potential impacts to birds and bats from the Projects.

2.1 Habitat Assessment

The habitat and topography of the Project Areas were evaluated based on-site visits, interpretation of aerial photography, and through United States Geological Survey (USGS) land use and land cover figures. The general description developed is useful to understand the existing environment for birds and bats.

2.2 Literature Review

A literature review was conducted to obtain existing information about the occurrence and distribution of birds and bats in the Project Areas. Sources of bird information that were reviewed included the New York State Breeding Bird Atlas project, USGS breeding bird surveys, Audubon Society Christmas Bird Counts (CBCs), regional publications, and the Audubon New York Important Bird Areas program. Sources of bat information that were reviewed included publications of NYSDEC, the United States Fish and Wildlife Service (USFWS), and Bat Conservation International (BCI). In addition to conducting a literature review, requests were made to NYSDEC and USFWS for information on threatened and endangered species in the Project Areas.

2.3 Field Studies

2.3.1 Nocturnal Radar and Visual Study

Mobile marine radar and visual techniques were employed to assess migratory bird and bat activity. This integrated visual and radar study of bird and bat

movements provides site-specific information on passage rates, behavior, and flight altitudes for the Clinton County projects. ABR, Inc. (ABR) conducted the nocturnal radar and visual study.

One radar unit was used to conduct nocturnal radar at the survey site during the spring migration season between April 15, 2005, and May 29, 2005, and during the fall migration between August 15, 2005, and October 13, 2005. Radar sampling began approximately 45 minutes after sunset and concluded approximately 45 minutes before sunrise. Each of the 60-minute nocturnal radar sampling periods consisted of: one 10-minute session to collect weather data and adjust radar to surveillance mode, one 10-minute session with the radar in surveillance (i.e., horizontal) mode at 1.5-km-range collecting information on passage rates of nocturnal targets; one 15-minute session with the radar in surveillance mode at 1.5-km-range collecting information on ground speed and flight direction; one 10-minute session to collect weather information and adjust radar to vertical mode; and one 15-minute session in the vertical mode at 1.5-km-range to collect information on flight altitudes of nocturnal targets below 1,500 meters. The following weather data was collected at the beginning of each hour session: wind speed, wind direction, cloud cover, ceiling height, visibility, precipitation, and air temperature (degrees Celsius).

ABR also conducted nocturnal visual observations at the survey site each night during the spring migration season (between April 15, 2005, and May 29, 2005) and during the fall migration (between August 15, 2005, and September 30, 2005, as bat migration is not anticipated for this area beyond September). For four-to-five hourly sessions each night in the spring and five-to-seven hourly sessions each night in the fall, a second observer conducted 50 minutes of visual sampling with night-vision goggles and infrared spotlights to identify low-flying targets (i.e., birds and bats) and to help assess insect activity levels. During night-vision sampling, the observer was stationed near the radar sampling station and used night-vision equipment to make visual observations of birds, bats, and insects along two vertically oriented spotlights (fitted with infrared filters). For each session, the observer recorded the number, species group (to lowest possible taxonomic unit), altitude (if possible), and primary flight directions of any bats and birds that were observed flying through the beam (up to ~100 meters above ground level, beyond which small birds and bats cannot be effectively detected).

The mobile radar lab consisted of a marine radar mounted on a vehicle. The radar was X-band, transmitting at 9,410 megahertz (MHz) with peak power output of 12 kilowatts (kW). A similar radar lab is described in Cooper et al. (1991) and the vertical radar setup is described by Harmata et al. (1999). For night-vision equipment, 1x power Generation III night-vision goggles were used. Spotlights were 2 to 3 million candlepower lights.

After a consultation meeting with the NYSDEC on April 8, 2005, and a visit by NYSDEC staff to the Project Area the following week, a single location (see Fig-

ure 1-1), was selected as the optimum location for collecting representative data for the proposed windparks. For more complete information on the radar and visual study methodology, please see ABR's report in Appendix A.

2.3.2 Migratory Raptor Surveys

Migratory raptor surveys were conducted in both spring and fall at the Clinton/Ellenburg and Altona Project Areas. An avian assessment work plan was provided to then NYSDEC for review prior to the start of field studies. NYSDEC requested that 3 quality migration days of raptor surveys be undertaken. Three days of surveys were conducted in both spring and fall at each Project Area. Survey locations were selected in the field based on proximity to proposed turbines and having an unobstructed view (see Figures 2-1 and 2-2). Surveys were conducted between 9 a.m. and 4 p.m. Field data on migrating raptors were collected for species identification, number of individuals, and flight direction. Surveys were conducted on days of preferable raptor migration weather to the extent possible. Additional raptor survey days are unnecessary since raptor use areas are well known in NY and the project area is known not to have increased raptor migration before the period during which the surveys were conducted.

2.3.3 Spring Migratory Surveys

Baseline avian surveys were conducted in the Clinton/Ellenburg and Altona Project Areas during the spring (migratory) season. Because of the proximity of the sites to one another, the survey activities were designed to collect data that will be applicable to all of Noble's Clinton County projects. The effort included conducting reconnaissance surveys to document avian species and search for threatened and endangered species and appropriate habitat. The surveys were conducted during the last week in May 2005.

Point count style surveys were conducted. Sampling points were pre-selected based on the proposed turbine locations, accessibility of land, viewing distances, a variety of habitats, and areas suited for avian occurrence. Some point locations were modified slightly in the field based on site conditions. Eighteen roadside points were surveyed in the Clinton/Ellenburg Project Area on May 25, 2005 (see Figure 2-1). Surveys were conducted at seven proposed turbine locations in the Altona Project Area on May 26, 2005 (see Figure 2-2). The Altona Project Area was not conducive to roadside survey points because few roads exist in the area.

The observer documented all birds (except the unprotected Rock Pigeons, European Starlings, and House Sparrows) identified by sight or sound in 5-minute periods at selected survey points. Because avian activity is greatest in the morning, the surveys were conducted and concentrated in the morning hours. These surveys will supplement the information collected in the spring radar surveys, especially with regard to species-related data.

2.3.4 Breeding Bird Surveys

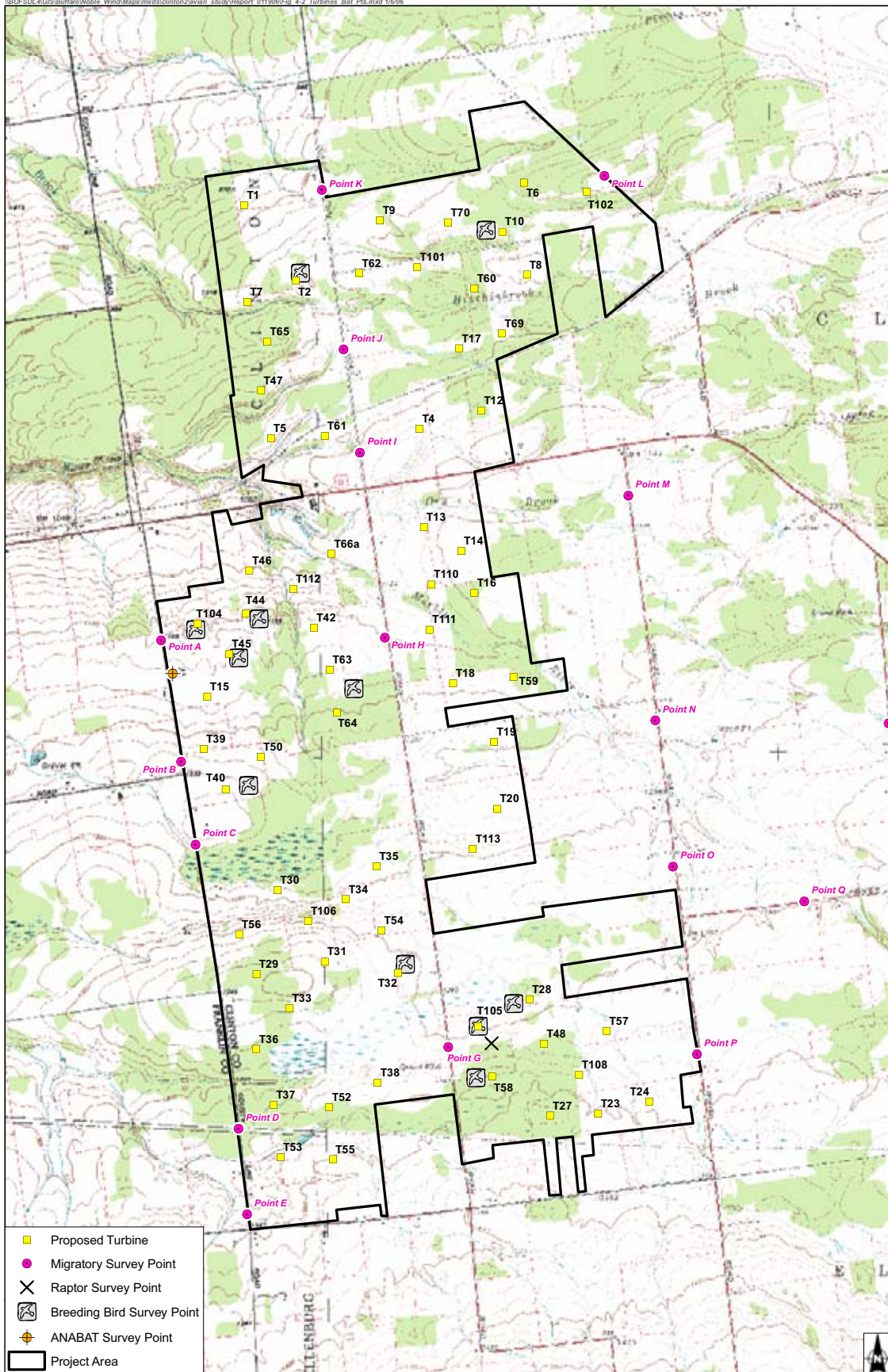
Breeding bird surveys were conducted in the Clinton/Ellenburg and Altona Project Areas during the primary breeding season (June 2005). Two surveys were performed in each Project Area using USFWS Breeding Bird Survey techniques with an observer recording all birds identified by sight or sound in 3-minute periods at each survey point. Survey points were selected based on proposed turbine locations, accessibility, and a variety of habitats. Eleven proposed turbine locations were surveyed in the Clinton/Ellenburg Project Area on June 9 and 29, 2005 (see Figure 2-1). The same seven turbine locations surveyed in the spring migratory study were surveyed in the Altona Project Area on June 8 and 28, 2005 (see Figure 2-2). Any breeding behavior and species in the project areas observed during other site visits and surveys were also documented.

2.3.5 Acoustical Monitoring for Bats

Ecological Specialties LLC, conducted acoustical monitoring for bats within the project area. Acoustical monitoring was conducted using AnaBat II Bat Detectors, to record the unique echolocation calls of bats, for a period of seven weeks in the spring and seven weeks in the fall at the Clinton/Ellenburg project site (mid April to mid June and mid August to mid October, respectively) and for a seven-week period during the fall at the Altona project site (mid August to mid October). Two Anabat detectors were mounted on a silo at the Altona Project Area, and two were mounted on a silo at the Clinton/Ellenburg Project Areas. On each silo, one AnaBat detector was placed approximately 50 feet off the ground, and a second AnaBat detector was placed approximately 100 feet off the ground to sample different levels of bat activity. AnaBat data detectors were located in areas determined as best locations based on access, elevated above tree line, and overall clarity of viewshed to acquire information on bat diversity and density for each location (see Figure 2-1 and 2-2).

The echolocation calls recorded by the AnaBat detectors were converted into audible signals using a zero crossing frequency division method. Quantitative analysis of recorded echolocation calls was done using Analook software. Call sequences were edited by removing approach-phase, terminal-phase, and fragmentary calls. Ten call parameters were then recorded for each remaining call within sequence. Call parameters from unknown calls were statistically compared to parameters in a discriminate-function analysis model containing known calls from known species of bats expected to be present in the area. Species prediction for each call sequence are then tallied for each location and used to determine presence/absence of species in question. P-values relate to the probability that species is absent from a site. Species with less than 5% probability of absence ($\alpha=0.05$) were considered present at a particular site. Total number of call sequences recorded at each site was also noted.

For more complete information on the AnaBat study methodology, see the Ecological Specialties LLC report in Appendix C.



Source: U.S. 24:000 Topographic Map
 Brainardsville quad (1964), Chateauguy quad (1993)
 Charrabusco quad (1977), Eilenberg Center quad (1964).

Figure 2-1 Proposed Turbines and Avian Points
 Clinton Project Area
 12-03-05

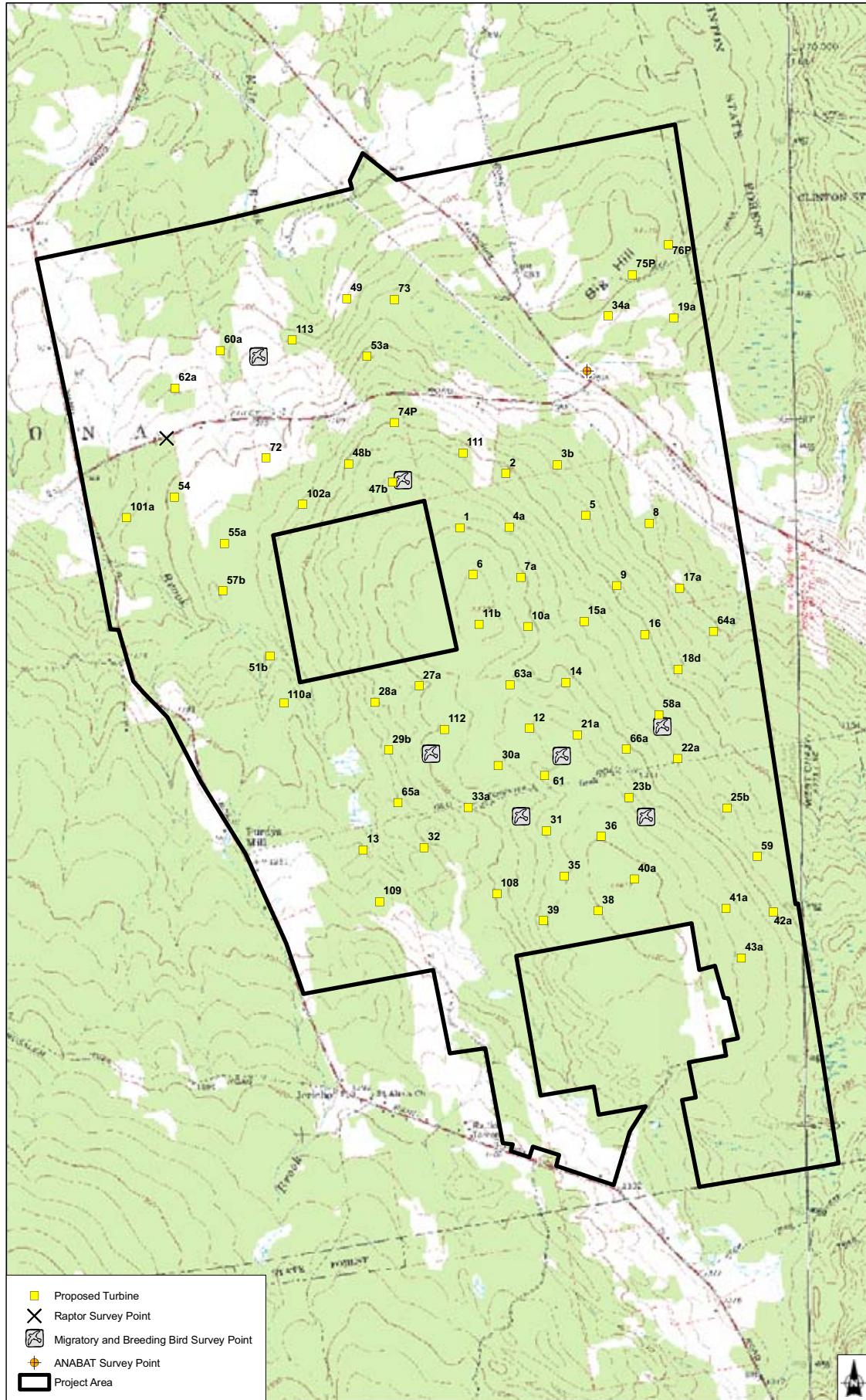


Figure 2-2 Proposed Turbines and Avian Points
Altona Project Area
12-02-05

2.3.6 Bat Habitat Surveys

Based on recommendations from agencies and literature research, initial bat habitat-level surveys were conducted at each Project Area to determine whether habitat was suitable for bat species, particularly habitats required for endangered and threatened species, and species of concern. Habitats were documented based on species composition and general landscape position with particular emphasis placed on forested riparian, floodplain, and wetland areas, which tend to be preferable roost and foraging locations for the Indiana bat. Large tracts of wooded areas were assessed through a combination of aerial and topographical map interpretation, and multiple site visits during migration and summer roosting periods. Habitats were classified using definitions from the Ecological Communities of New York State (Edinger et al. 2002).

To the extent possible, field surveys assessed the potential for bat species to utilize the project areas. Field surveys focused on identifying summer roosting and maternity colony habitat within the Project Area, given the transient nature of bat foraging and migration to and from hibernacula and roost sites. Surveys for identified rock outcroppings, cave dwellings or other hibernacula where bats may roost were also conducted.

3

Results

3.1 Habitat and Topography Description

The project areas are located in the Northern Lowlands of New York State at the northeastern edge of the Adirondack Highlands largely on a plateau of the Adirondack foothills, characterized by slightly to moderately sloping topography and dropping north into the Saint Lawrence River Valley basin. Elevations within the project areas range from approximately 295 meters (970 feet) above mean sea level (amsl) at the northern extent of the project area (Clinton project area) to approximately 427 meters (1,400 feet) amsl at the southern extent of the project area (Altona project area).

The project areas are located within two watersheds, the English-Salmon and Great Chazy-Saranac watersheds, which drain greater than 8,000 square km (3,088 square miles) of land in portions of Clinton and Franklin Counties.

The major land uses within the Project Areas are agricultural and forested land, with forested areas comprising more than 80% of the Project Areas. General land use within the Project Areas includes residential, active and inactive agricultural land, and forested areas. The general population pattern in the area is rural residential, consisting of scattered residences along roads. In general, the active agricultural land occupies the flatter, upland portions of the landscape. The forested communities throughout the Project Areas are a mixture of beech-maple forest, hemlock-northern hardwood forests, and successional northern hardwood forest. Timbering activities occur throughout the area, and forest stands range from recently timbered to more mature (3 to 20 year old cuts). Residential land use within the project areas is typical of rural residential areas, with scattered residences located along roads. Based on field reconnaissance, the residences appear to be a mixture of permanent and seasonal homes (hunting cabins). Agricultural activities within the Project Areas consist of pasture land/hay fields with some interspersed row crops (such as corn).

Project Areas show characteristics of the successional northern hardwood community type, which typically occurs in areas that have been previously cleared or otherwise disturbed. Species observed in these areas include: quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), gray birch (*B. populifo-*

lia), yellow birch (*Betula alleghaniensis*), pin cherry (*Prunus pensylvanica*), black cherry (*P. serotina*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*). Based on observations, the Project Areas are of scattered successional northern hardwoods and are likely to be remnants of beech-maple mesic forests ranked as G4 and S4, in which sugar maple and beech would be co-dominant.

Areas where evergreen species are dominant are a mixture of hemlock-northern hardwood forest, spruce flats, and pine plantations. The most mature/undisturbed stands appear to coincide with the locations of wetlands and stream corridors. Evergreen species observed during initial surveys included eastern hemlock (*Tsuga canadensis*), red spruce (*Picea rubens*), black spruce (*P. mariana*), balsam fir (*Abies balsamea*), Scotch pine (*Pinus sylvestris*), and white pine. Many of these species are also common in pine and spruce plantations where they are planted for silviculture, wildlife habitat, erosion control, windbreaks, and landscaping.

Due to the proximity of the three Project Areas, the overall habitats are very similar however minor changes in elevation and difference in land uses account for some differences. Site specific habitats and topography can be reviewed in detail from the EIS in Sections 2.6 and 2.7 on wetlands, Sections 2.9 and 2.10 on vegetation and wildlife, and from EIS Appendix C the Wetland Delineation Report.

General land use within the Altona project area includes small portions of active and inactive agricultural land (to the north), forested areas, and residential areas, with timber harvesting throughout the Project Area. Within the project area, active agricultural areas are used for row crops, hayfields, and pastures; while inactive agricultural areas are in successional stages, including old-field and shrub communities and sugar maple production. The dominant woodland community is successional northern hardwood forest. The Altona project area is defined with greater topographical constraints of steeper ravines and rolling forested hills. The Clinton and Ellenburg project areas have more active and inactive agricultural land, forested areas, and residential areas than Altona. Within the project areas, active agricultural areas are used for row crops, hayfields, and pastures; while inactive agricultural areas are in successional stages, including old-field and shrub communities. The dominant woodland community is successional northern hardwood forest. Timbering activities occur throughout the region.

3.2 Literature Review

3.2.1 Birds

3.2.1.1 Regional Avian Overview

Migration (Spring and Fall)

The primary bird migration seasons in the Project Areas are spring and fall. Typical of New York State and the northeast in general, the migrations of certain avian groups are as follows:

- Raptors (e.g., hawks, falcons, eagles, and vultures) migrate primarily between mid-March and mid-May in spring and then between September and early November in fall;
- Passerines (i.e., songbirds) primarily migrate between mid-April through May in spring and between late August through October in fall;
- Waterbirds (e.g., waterfowl, herons, and shorebirds) migrate primarily between mid-March and mid-May in spring and then between September and mid-November in fall.

There are no raptor monitoring locations (i.e., “hawk watches”) in vicinity of the Project Areas or Clinton County, as raptor migration is diffuse in the region. There are no geographical or topographical features in the Project Areas that attract or concentrate migrating raptors.

No information on migration studies (i.e., radar studies) in the Project Areas or Clinton County was identified during the literature review. There are no geographical or topographical features in the Project Areas that are believed to attract or concentrate migrating passerines (i.e., songbirds) in greater numbers than elsewhere in the county or region.

With the exception of geese, there is not a strong passage of waterbirds in or near the Project Areas. Northern New York, primarily near Lake Champlain, is a pathway for migration of Canada Geese and Snow Geese (Mitchell and Krueger 1997, Gretch 1990). In fall, typically late October and through mid-November, large numbers of geese migrate through Clinton County and often congregate in agricultural fields and wetlands. There is a repeat pattern in spring, typically from mid-March through mid-April. Mitchell and Krueger (1997) indicated that flocks of Canada Geese, numbering in the thousands, stop every spring and fall to feed in the fields along Lake Champlain, especially north of Plattsburgh to Rouses Point and also at Lake Alice Wetland Management Area (WMA). Flocks of about 10,000 Snow Geese use the wetlands along Lake Champlain at Point Au Roche as a staging area (Mitchell and Krueger 1997). The areas of maximum use mentioned are all east of the Project Areas, but there is still a pronounced migration throughout appropriate habitat in Clinton County during the peak periods.

Summer (Breeding Season)

Summer is the primary season for avian breeding in the Project Areas. Breeding activity in the Project Areas has been documented by several sources described in the sections below. Given the relatively uniform habitat in the Project Areas (see Section 3.1), there is not likely a very high diversity of breeding species. The location of the Project Areas between the St. Lawrence Valley and the foothills of the Adirondacks, places them north of breeding habitat for several boreal species (e.g., Spruce Grouse and Boreal Chickadee) that are exclusive in New York State to the Adirondacks.

Winter

Large concentrations of birds do not winter in the Project Areas and diversity is low because of the harsh climate and lack of sufficient food sources. Most species present in other seasons (e.g., warblers, flycatchers, thrushes, etc.) have migrated south for the winter, leaving only year-round species that are not seasonally displaced (e.g., Great Horned Owl, Pileated Woodpecker) and some species that winter in northern New York from farther north (e.g., American Tree Sparrow and Rough-legged Hawk).

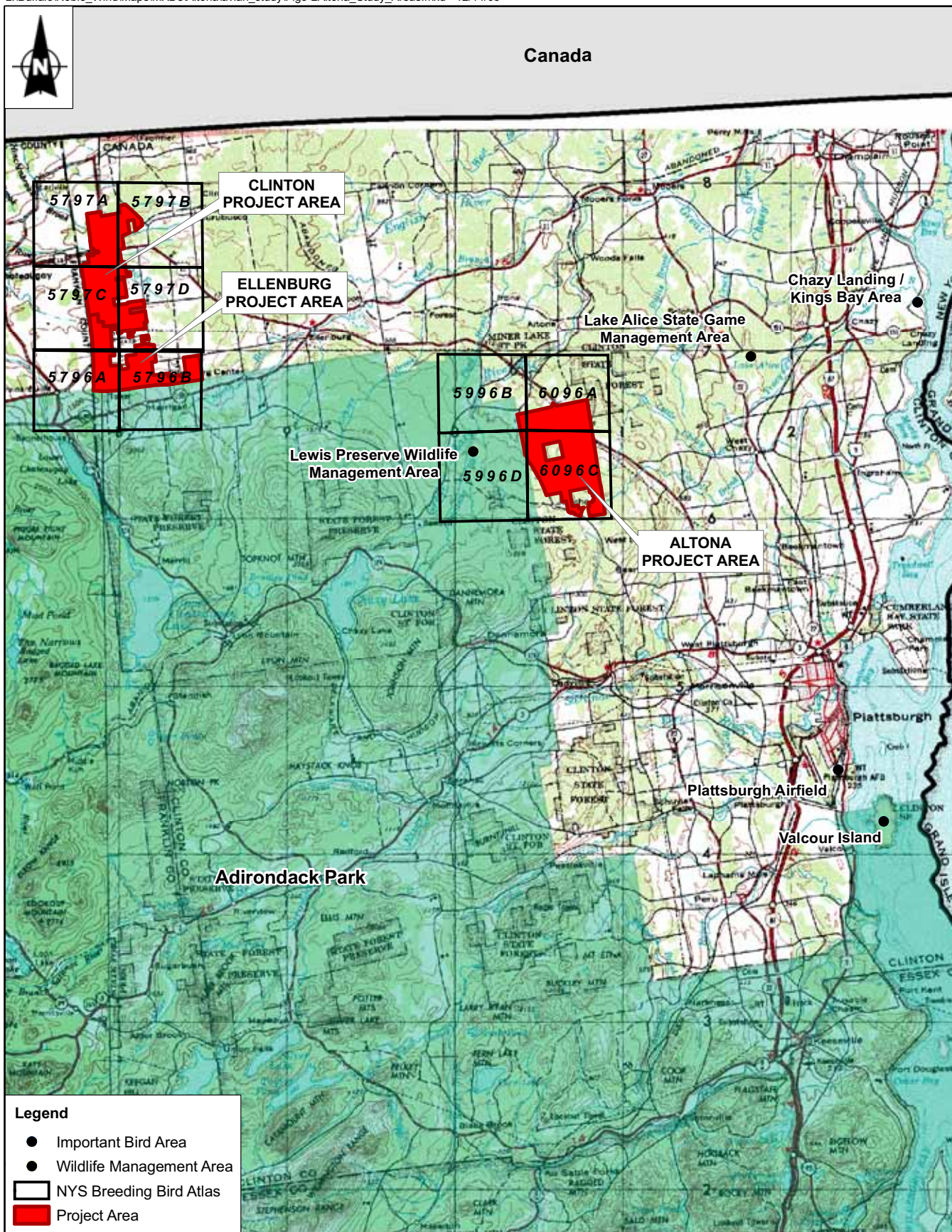
3.2.1.2 Breeding Bird Atlas Projects

The New York State Breeding Bird Atlas (2000) was primarily a volunteer effort to record evidence of breeding bird species throughout the state. The data provide evidence of breeding composition and quality of breeding habitat within 5 kilometers (km) by 5-km blocks. A total of 76 species is considered the approximate average species diversity per block across the state. The Atlas 2000 project (2000-2005) is the second breeding bird atlas project conducted in New York State; the first was conducted between 1980 and 1986. Draft data from the Atlas 2000 project and final data from the 1980 to 1986 Atlas project are available for review on NYSDEC's Atlas 2000 web site

(<http://www.dec.state.ny.us/website/dfwmr/wildlife/bba/index.html>).

Clinton Project Area

The Clinton project area is located within four New York State Breeding Bird Atlas blocks (5797A, 5797B, 5797C, and 5797D), see Figure 3-1. Draft data through the 2005 season indicate 70, 81, 80, and 78 total species have been documented as possible, probable, or confirmed breeders in blocks 5797A-D, respectively (NYSDEC 2005). As these totals are at or near 76 species, these blocks are considered to hold average species diversity compared to the rest of the state. Several state-listed species were included among the species documented in these blocks during the Atlas 2000 project. Pied-billed Grebe (state-threatened) was categorized as a possible breeder in block 5797C. American Bittern (state species of special concern) was found as a possible breeder in blocks 5797B and 5797C. Northern Harrier (state-threatened) was confirmed nesting in block 5797D and



categorized as a possible breeder in blocks 5797A and 5797B. Sharp-shinned Hawk (state species of special concern) was categorized as a possible breeder in block 5797B. Horned Lark (state species of special concern) was confirmed nesting in block 5797C and a possible breeder in block 5797D. Vesper Sparrow (state species of special concern) was categorized as a probable breeder in blocks 5797B, 5797C, and 5797D, and a possible breeder in block 5797A.

Ellenburg Project Area

The Ellenburg project area is located within New York State Breeding Bird Atlas blocks (5796A, 5796B, 5797C, and 5797D) (see Figure 3-1). Two of the blocks (5797C and 5797D) overlap with the Clinton project area, see discussion of those blocks in the previous section (Clinton project area). Draft data through the 2005 season indicate 43 and 36 total species have been documented as possible, probable, or confirmed breeders in blocks 5796A and 5796B, respectively (NYSDEC 2005). The totals for these blocks are much lower than 76, but the low totals are considered a function of decreased observer effort in the blocks. With more effort, totals around 76 species are expected. No state-listed species were included among the species documented in these blocks during the Atlas 2000 project (see Clinton project area summary for species observed in blocks 5797C and 5797D).

Altona Project Area

The Altona Project Area is located primarily within New York State Breeding Bird Atlas block 6096C and there is a small portion of the Project Area included in block 6096A and very small portions to the west in atlas blocks 5996B and 5996D, see Figure 3-1. Draft data through the 2005 season indicate 76, 52, 57, and 57 total species have been documented as possible, probable, or confirmed breeders in blocks 6096C, 6096A, 5996B, and 5996D, respectively (NYSDEC 2005). Block 6096C is at the average species diversity compared to the rest of the state. The total for the other blocks are much lower than 76, but the low totals are considered a function of decreased observer effort in the block.

A few state-listed species were included among the species documented in these blocks during the Atlas 2000 project. Cooper's Hawk (state species of special concern) was categorized as possible breeder in blocks 6096C and 5996B. Sharp-shinned Hawk (state species of special concern) was categorized as possible breeder in block 6096C. Red-shouldered Hawk (state species of special concern) was categorized as possible breeder in block 5996B. Common Nighthawk (state species of special concern) was categorized as a probable breeder in block 6096A. Vesper Sparrow (state species of special concern) was categorized as a possible breeder in block 5996D.

3.2.1.3 Breeding Bird Surveys

USGS breeding bird surveys (BBSs) are conducted annually by volunteers during the peak nesting season (June). All birds heard or observed are documented using a specified protocol. Surveys are conducted for 3 minutes at 50 locations, one-half mile apart, starting 30 minutes before sunrise. The BBS data provide a valu-

able source of information on bird population trends over time in given areas, both locally and nationally.

There are three BBS routes in Clinton County, including two that are in proximity to the Project Areas. The Sciota BBS (#61112) is a mostly east-to-west route, beginning in the town of Clinton and concluding in the town of Mooers. The route begins several miles east and north of the Clinton Project Area boundary. A total of 94 species have been recorded over the duration of the Sciota BBS, which was conducted for only seven years, 1968, 1975-1978, 1989, and 1998 (Sauer et al. 2005). The Ellenburg BBS (#61108) is generally an east-to-west route, beginning in the town of Ellenburg and concluding in the town of Altona. The beginning of the BBS route goes through the Ellenburg Project Area and approaches within several miles at its closest point to the Altona Project Area. A total of 75 species have been recorded over the duration of the Ellenburg BBS, which was only conducted in 1989 and 2004 (Sauer et al. 2005). Table 3-1 includes the listed species that were identified at least once during the BBS between 1965 and 2004 and the number of birds per route (Sauer et al. 2005).

Table 3-1 State- or Federally Listed Species Recorded During Sciota BBS and Ellenburg BBS

Species	Sciota (Birds/Route)	Ellenburg (Birds/Route)	New York State Status
Pied-billed Grebe	0.14	Not recorded	Threatened
American Bittern	0.14	1.00	Special Concern
Northern Harrier	0.14	Not recorded	Threatened
Sharp-shinned Hawk	0.14	Not recorded	Special Concern
Red-shouldered Hawk	0.14	Not recorded	Special Concern
Common Nighthawk	0.14	Not recorded	Special Concern
Whip-poor-will	0.57	Not recorded	Special Concern
Vesper Sparrow	0.43	Not recorded	Special Concern

Source: Sauer et al. 2005.

3.2.1.4 Christmas Bird Counts

There are no Audubon Society CBCs conducted in the Project Areas. The only CBC in Clinton County is the Plattsburgh count (NYPL) which is centered on the former Plattsburgh Air Force Base. This location is approximately 28, 26, and 10 miles from the Clinton, Ellenburg, and Altona Project Areas, respectively. Because the CBC circle includes Lake Champlain and waterfront area, the Plattsburgh CBC data is not considered very representative of the Project Areas, where fewer birds and species occur in winter.

A total of 90 species were identified during the last five years (December 2000 through December 2004) of this CBC (Audubon 2005, http://audubon2.org/birds/cbc/hr/count_table.html). The average species count during that time period was 56.

3.2.1.5 Regional Reports

The Region 7, Adirondack-Champlain, quarterly reports are available in *The Kingbird*, a publication of the New York State Ornithological Association (NYSOA). NYSOA Region 7 includes Clinton, Franklin, Essex, and Hamilton counties. All reports since 1995 were reviewed for bird sightings in the towns of Clinton, Ellenburg, and Altona.

The Birds of Clinton County, second edition (1997), by Charles Mitchell and William Krueger, a publication of the High Peaks Audubon Society was also reviewed by E & E. This book describes the occurrence and distribution of 284 bird species recorded in Clinton County. The five recommended routes detailed in the book do not include any locations in the Clinton, Ellenburg, or Altona Project Areas.

Records of threatened/endangered species from these references were reviewed and information obtained is included in Table 3-8.

3.2.1.6 Important Bird Areas

There are no Important Bird Areas (IBAs) within the Clinton, Ellenburg, and Altona Project Areas. There are several IBAs and state-owned wildlife management areas within Clinton County, including a few within 10 miles of a Project Area (see Figure 3-2).

Audubon New York, the state chapter of the National Audubon Society, has designated three locations in Clinton County as IBAs (Burger and Liner 2005). The Chazy Landing/Kings Bay Area IBA includes the 421-acre Kings Bay Wildlife Management Area and river corridor draining into Lake Champlain. The value and availability of adjacent lands such as farm/fallow fields and the shoreline habitats of Lake Champlain Valley contribute to the importance of this area. The Chazy Landing/Kings Bay Area IBA is approximately 14 miles northeast of the Altona Project Area and more than 25 miles from the Clinton and Ellenburg Project Areas. The Plattsburgh Airfield IBA is a former United States Air Force Base that contains important upland grassland habitat along the 3.5-mile long runway. The Plattsburgh Airfield IBA is located along the shores of Lake Champlain, approximately 15 miles east of the Altona Project Area and more than 25 miles from the Clinton and Ellenburg Project Areas. The Valcour Island IBA is an 1,100-acre island in Lake Champlain, near Plattsburgh. The island is owned by NYSDEC, who manages it as wilderness. The largest Great Blue Heron rookery on Lake Champlain is located on the island (Burger and Liner 2005). Valcour Island is approximately 17 miles east of the Altona Project Area and more than 27 miles from the Clinton and Ellenburg Project Areas.

The Lake Champlain Marshes, consisting of six locations along the Lake Champlain Valley, are designated as Bird Conservation Areas (BCAs) by NYSDEC (NYSDEC 2004). These areas are critical shoreline habitats and important stop over locations for migrant birds. These six locations are located between the

above-mentioned IBAs, approximately 10 miles east of the Altona Project Area and more than 25 miles from the Clinton and Ellenburg Project Areas.

Lewis Preserve WMA is a 1,356-acre NYSDEC wildlife preserve managed mostly for recreational and hunting use. The upper headwaters of the Chazy River are located within the preserve. The preserve is located approximately 2 miles to the west of the Altona Project Area and approximately 10 miles east of the Clinton and Ellenburg Project Areas. The parcel consists of abandoned reverting farm fields and braided tributaries. The Audubon Society's Lake Champlain Birding Trail traverses 2.8 miles through the preserve. This trail is part of a highway based trail system that connects 87 birding sites between New York and Vermont (approximately 300 miles), encompassing the unique birding offered in and around the Lake Champlain uplands and shorelines (National Audubon Society 2004).

Lake Alice WMA is a 1,468-acre NYSDEC management area managed for recreational and scientific purposes (e.g., education, wildlife viewing, fishing and hunting), with the primary objective being waterfowl nesting and foraging habitat. The WMA is located approximately 8 miles northeast of the Altona Project Area and approximately 18 miles east of the Clinton and Ellenburg Project Areas. Northern hardwood forests, wetland complexes, and reverting agriculture fields are the primary communities.

3.2.2 Bats

This section discusses general bat ecology and habitat preference for bat species found in New York State. Very limited information specific to the Project Area was identified during the literature review.

Nine species of bats utilize the various landscapes found in the state of New York, (see Table 3-2).

Habitats utilized by these species include wetlands, agricultural and reverting fields, forests, and cities with a variety of micro-habitats used for foraging, roosting, and maternity roosting. Bats species thrive in these various habitats, as they are proficient predators on insect populations. Generally bats are solitary, outside of mating, hibernation periods, and rearing of young, although some colonial roosting does occur. The most common species of bats (e.g., little brown bat, eastern pipistrelle, and red bat) have adapted to a multitude of habitat types including human-altered landscapes. As such, these species are assumed to utilize the Project Areas. There is a relatively small population of the Big Brown bat in New York but it is also likely to be present in the project area.

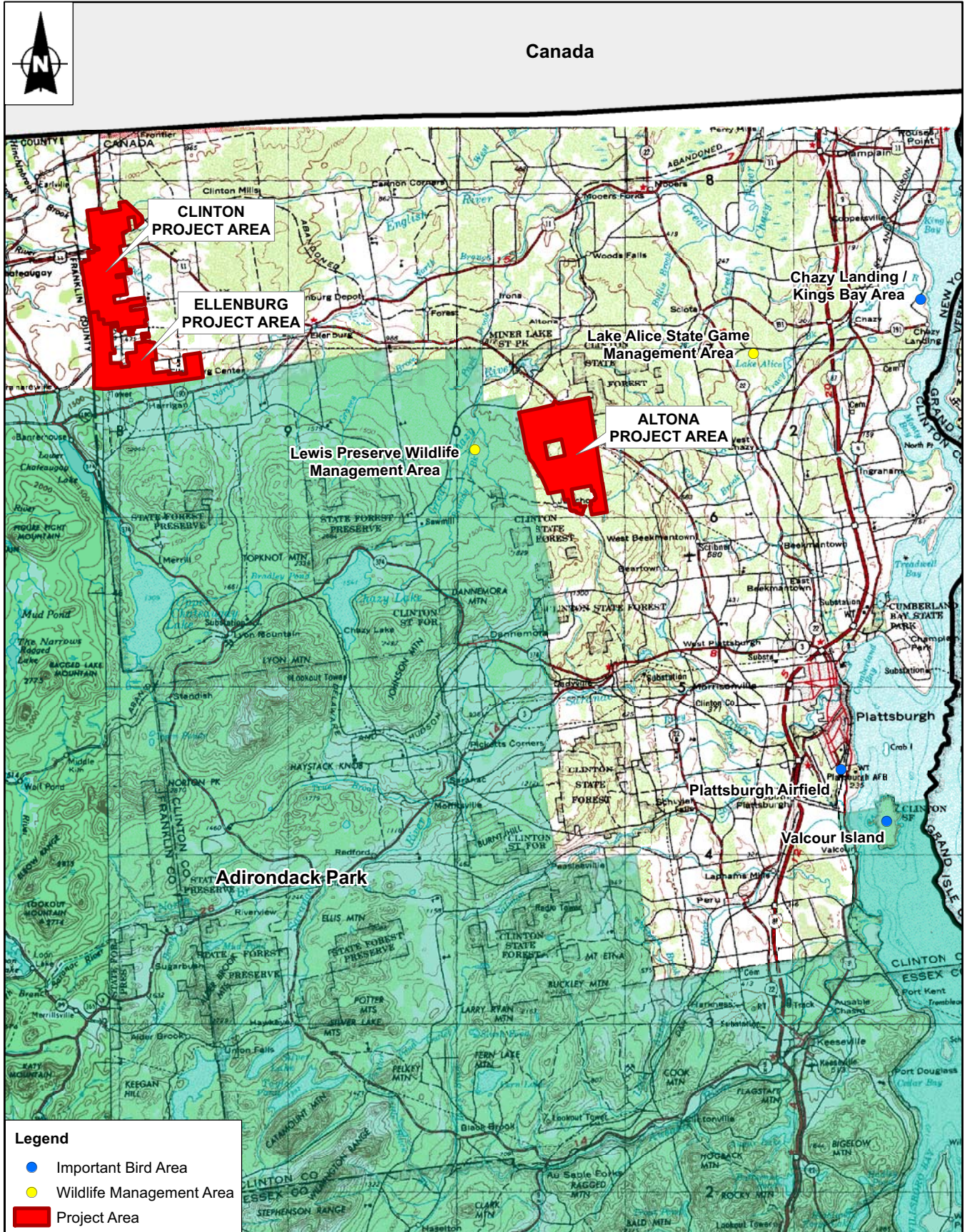


Figure 3-2
Important Bird Areas and
Wildlife Management Areas

0 5 10
Miles

Table 3-2 Bat Species of New York, Habitat Types, and Abundance

Common Name	Scientific Name	Average Size (inches)	Preferred Habitats		
			Summer	Winter	Abundance
Small-footed Myotis	<i>Myotis leibii</i>	1.7-1.9	Hemlock stands	Regional hibernacula/rock outcropping	uncommon/state SOC
Indiana bat	<i>Myotis sodalis</i>	1.8-2.0	Exfoliating bark/cavities	Regional Hibernacula	federally endangered
Little brown bat	<i>Myotis lucifugus</i>	1.8-2.1	Tree cavities/Urban structures	Regional Hibernacula	most common
E. Long-eared bat	<i>Myotis septentrionalis</i>	1.6-2.2	Tree cavities/exfoliating bark	Regional Hibernacula	uncommon
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	1.7-2.0	Tree foliage	Regional Hibernacula	most common
Red bat	<i>Lasiurus borealis</i>	2.2-2.4	Dense riparian tree foliage	Migrates outside region?	most common tree roosting bat
Hoary bat	<i>Lasiurus cinereus</i>	3.2-3.5	Tree foliage of interior forests	Migrates outside region?	uncommon
Silver-haired bat	<i>Lasionycteris noctivagans</i>	2.6-2.8	Tree cavities/exfoliating bark in coniferous forested stands, and rock crevices	Migrates outside region?	uncommon
Big brown bat	<i>Eptesicus fuscus</i>	2.4-3.1	Tree cavities/exfoliating barks/urban structures	Regional Hibernacula	common

2001 Cornell University; 2005 NYSDEC

The remaining bat species tend to be found only in densely forested stands are not expected to be found in the Project Area. Neither the Indiana bat which is federally protected (discussed in more detail below), or the small footed myotis [a state species of concern (SOC)] are expected to be present in the project area.

Specialized habitats required for bats include winter hibernacula, where bat species congregate during hibernation periods (November through March). Identified hibernacula include limestone caves, old mines, and old well shafts. Most bats require a moderated constant temperature and humidity provided by the hibernacula to survive over the winter. Measures have been taken by state and federal agencies in the last decade to protect important bat hibernacula habitats, as any disturbances during critical hibernation periods can be detrimental to large populations of bats, as well as individual bat species. Bats return in fall to established hibernacula. Some New York bats migrate relatively short distances to these loca-

tions, some winter in small hibernacula near their summer roosting areas, or migrate further south to warmer climates following foraging sources, where shorter periods of hibernation may occur.

Summer roosts are generally day-time or night-time roosts, where bats will spend the entire day resting, or portions of the night resting, respectively. Day roosts for New York bats can vary between buildings, exfoliating bark, tree cavities, rock piles, and caves, dependent on species-specific preferences (Pickett, NYSDEC web reference on 12/16/05). No roosting areas were found in the project area during site visits or as indicated in the literature.

Although no significant bat communities were identified within the project area, the NYSDEC Natural Heritage Program (NHP) identified three bat colonies within 40 miles of the project area. One colony is located in the town of Bellmont, Franklin County (Houle 2005). The other two colonies are located in the town of Ausable, Clinton County (Houle 2005).

The closest known Indiana bat hibernacula to the project areas are located in Essex, Warren, and Jefferson County. Figure 3-3 identifies known counties that Indiana bat hibernacula have been located by NYSDEC and their proximity to the Project Area.

3.2.3 Threatened and Endangered Species (Birds and Bats)

Federally listed threatened and endangered plant and animal species are protected by the Endangered Species Act of 1973, which is administered by the USFWS. State-listed threatened and endangered plant and animal species are protected by the New York State Environmental Conservation Law, Article 9 and Article 11, which is administered by NYSDEC.

The USFWS and the NYSDEC New York Natural Heritage Program (NHP) were consulted to determine the potential occurrence of federally and state-listed endangered and threatened species and significant natural communities and habitats within the project site (see Appendix B of the EIS).

The USFWS and NHP provided data detailing the known occurrences of threatened, endangered, and rare species within the Clinton, Ellenburg, and Altona Project Areas. In combination, these species are considered “species of concern.” Existing databases track species that are protected by law, as well as unprotected species that are identified as species of concern. For more information, see Section 2.9 of the EIS.

3.2.3.1 NYSDEC Natural Heritage Forms

In addition to the standard analysis of Project Areas for potential occurrences of threatened or endangered plant and animal species, the NHP has developed specific criteria for wind power projects. NHP now reports all records of avian species occurring within a 10-mile radius of identified Project Areas (Ketchum

2005). Records of bat colonies and bat species of concern occurring within a 40-mile radius are also reported.

Response for Clinton Project Area

No bird or bat species were identified by NHP within the Clinton project area. Only one bird species, the Upland Sandpiper (*Bartramia longicauda*), was identified by NHP within 10 miles of the Clinton project area. The Upland Sandpiper is considered a threatened species within New York State. According to NHP, this species has been observed approximately 10 miles from the project area in Franklin County, near the Canadian border, however no date was provided for the observation (Ketchum 2005). The occurrence of this species in Clinton County is described in more detail in Table 3-8. Although no significant communities were identified within the project area, NHP identified a bat colony located approximately 16 miles from the project area in the town of Bellmont, Franklin County (Ketchum 2005). No threatened or endangered bat species were specifically identified by NHP at this location. NHP did identify the Eastern Small-footed Myotis (*Myotis leibii*), a species of concern within New York State, as being associated with the bat colonies in the town of Ausable that is approximately 30 miles from the Clinton project area.

Response for Ellenburg Project Area

No bird or bat species were identified by NHP within the Ellenburg project area. Two bird species, the Bicknell's Thrush (*Catharus bicknelli*) and Common Loon (*Gavia immer*), were identified by NHP within 10 miles of the Ellenburg project area. Both species are considered a species of concern within New York State. According to NHP, Bicknell's Thrush has been observed approximately 9 miles from the project area near the peak of Lyon Mountain (Ketchum 2005). According to NHP, Common Loons occur at Ragged Lake (Franklin County) and Upper Chateaugay Lake (Clinton County), both approximately 9 to 10 miles from the project area. The occurrence of these species in Clinton County and their habitat requirements are described in more detail in Table 3-8. As discussed above, the town of Bellmont and town of Ausable colonies are approximately 16 and 30 miles, respectively, from the Ellenburg project area.

Response for Altona Project Area

No bird or bat species were identified by NHP within the Altona project area. Four bird species, the Black Tern (*Chlidonias niger*), Northern Harrier (*Circus cyaneus*), Sedge Wren (*Cistothorus platensis*), and Pied-billed Grebe (*Podilymbus podiceps*), were identified by NHP within 10 miles of the Altona project area. Northern Harrier, Sedge Wren, and Pied-billed Grebe are considered as threatened species within New York State, while the Black Tern is considered endangered in New York State. According to NHP (Ketchum 2005):

- Black Tern has been observed at Lake Alice WMA, approximately 6 miles from the project area;

- Northern Harrier has occurred at four locations within 10 miles of the project area, including Lake Alice WMA and three marsh/grassland areas along Lake Champlain;
- Sedge Wren has been observed at the McBride Road wetland, approximately 9 miles from the project area; and
- Pied-billed Grebe has occurred at Lake Alice WMA and Dead Creek in Plattsburgh, approximately 6 to 10 miles from the project area.

The occurrence of these species in Clinton County and their habitat requirements are described in more detail in Table 3-8.

The town of Belmont bat colony is located approximately 35 miles from the project area. The Ausable colonies are located approximately 15 miles from the Altona project area.

3.2.3.2 USFWS

According to USFWS, except for transient individuals, no federally listed or proposed endangered or threatened animal species is known to occur in the Clinton, Ellenburg, or Altona project areas (Stilwell 2005). In addition, no federally designated or proposed “critical habitat” exists within the project areas. USFWS has expressed concern pertaining to the potential for wind energy projects, in general, to impact migratory birds and threatened or endangered bat species (such as the Indiana bat [*Myotis sodalis*]). An assessment of potential impacts to avian and bat species is provided in Section 4 of this report.

3.2.3.3 Indiana Bat

As discussed above, Indiana bat hibernacula were not identified by NYSDEC or USFWS within 40 miles of the project areas. The closest known hibernacula are located in Essex County, and Warren County. It is not expected that Indiana bats will be impacted by the project for the reasons presented below.

Specific habitats targeted as being potentially indicative of Indiana bat habitat include well developed riparian corridors along streams, mature timber stands containing larger trees generally with exfoliating bark or cavities (Menzel et al. 2001). These bats react well to habitat disturbances and are known to forage in non-riparian woodlands and open farmlands (USDI FWS 1999).

Summer maternity habitats for Indiana bats require dead/dying, large diameter trees, with exfoliating bark or cavities, located in upland forests, exposed to direct sunlight. Generally, Indiana bat habitat requires streams/riparian areas (or some water source) harboring forage material. Dominant preferred tree species that provide suitable habitat for the Indiana bat include hickory (*Cornus* spp.), elm (*Ulmus* spp.), oaks (*Quercus* spp.), and cottonwood (*Populus deltoides*). Other tree species have been documented as “acceptable” tree habitat; however, these

trees require very specific conditions to attract Indiana bats. These secondary “acceptable” choices of tree species include common trees where size, the presence of cavities, exfoliating bark, or dead “snag” portions occurs. This suggests that preference may not be determined by tree species; so much as it may be the condition of the potential roost site (Menzel et al. 2001).

Female Indiana bats spend a majority of the summer in breeding nurseries, generally located around water resources (i.e., streams, ponds, and wetlands). Male Indiana bats spend most of their time foraging in close proximity to hibernacula and along watercourses, locating preferred food sources of flying insects. In late summer and early fall (late May through November), these bats begin to move back to wintering hibernacula. Recent surveys in 2003-2004 in New York State found Indiana bats that were radio-tagged in regional wintering hibernacula were later found rearing young in breeding colonies along the southern portion of the Lake Champlain floodplain (NYSDEC 2003).

Based on the known locations of Indiana bat hibernacula and the distance that separates the hibernacula from the project area it is unlikely that there would be any migration through the project area. Migration corridors would be expected to trend east of the project area, toward the lower Lake Champlain Valley.

The EIS for the Flat Rock Wind Power Project in Lewis County, New York, identified Indiana bat wintering hibernacula in Jefferson County less than 20 miles to the northwest of the facility location (see Figure 3-3). Known migration areas for the Indiana bat were documented to exist along portions of the Black River; however, due to prevailing winds off of Lake Ontario, it was determined that impacts would be insignificant to the Indiana bat species (Environmental Design & Research February 18, 2004).

3.3 Field Studies

3.3.1 Nocturnal Radar and Visual Study

ABR conducted a nocturnal radar and visual study between April 15 and May 29, 2005, and between August 15 and October 13, 2005. The results of their study, including passage rates, flight altitude, flight direction, weather influence, turbine passage, and visual findings, are summarized in this section. Please see ABR's report in Appendix A for full details.

Passage Rates

Nocturnal radar observations indicate that passage rates in spring 2005 were 110 ± 19 targets/km/hr. Nocturnal passage rates were highly variable from night to night, ranging from 0 to 721 targets/km/hr (see Figure 6a in Appendix A). Passage rates had some variation throughout the night and the lowest mean rates occurred during the first hour after sunset (see Figure 7 in Appendix A).

Nocturnal radar observations indicate that passage rates in fall 2005 were 197 ± 31 targets/km/hr. Nocturnal passage rates were highly variable from night to

night, ranging from 23 to 1,404 targets/km/hr (see Figure 6b in Appendix A). Passage rates had some variation throughout the night and the lowest mean rates occurred 8 to 9 hours after sunset (see Figure 8 in Appendix A).

The overall passage rates in spring and fall were low-to-average compared to other locations in New York State where similar studies were conducted by ABR (see Tables 3-3 and 3-4).

Table 3-3 Comparison of Spring Passage Rates

Location in New York State	Season	Passage Rate (targets/km/hr)
Wethersfield, Wyoming County	Spring 1999	41
Noble Windparks, Clinton County	Spring 2005	110
Carthage, Jefferson County	Spring 1995	159
Prattsburgh-Italy, Steuben County	Spring 2005	170
Westfield, Chautauqua County	Spring 2003	395

Table 3-4 Comparison of Fall Passage Rates

Location in New York State	Season	Passage Rate (targets/km/hr)
Harrisburg, Jefferson County	Fall 1998	122
Martinsburg (Flat Rock), Lewis County	Fall 2004	158
Wethersfield, Wyoming County	Fall 1998	168
Noble Windparks, Clinton County	Fall 2005	197
Prattsburgh-Italy, Steuben County	Fall 2005	200
Carthage, Jefferson County	Fall 1995	225
Westfield, Chautauqua County	Fall 2003	238

Flight Altitude

The mean nocturnal flight altitude based on vertical radar sampling <1,500 meters agl in spring 2005 was 338 ± 3 meters agl, with a range among nights of 99 to 490 meters agl. The mean nocturnal flight altitude based on vertical radar sampling <1,500 meters agl in fall 2005 was 333 ± 1 meters agl, with a range among nights of 176 to 609 meters agl. The spring and fall results are very similar and they are consistent with existing literature regarding the flight of nocturnal migrants (Kerlinger 1989, Mabee et al. 2006). Mean flight altitudes were variable throughout the study periods (see Figure 9 in Appendix A). There was some variation in mean flight altitudes throughout the night and the lowest mean altitudes occurred ~6 to 10 hours after sunset (see Figures 10 and 11 in Appendix A). Approximately 20% of all nocturnal targets in spring 2005 and approximately 12% of all nocturnal targets in fall 2005 flew below 125 meters agl, a close approximation to the maximum turbine height.

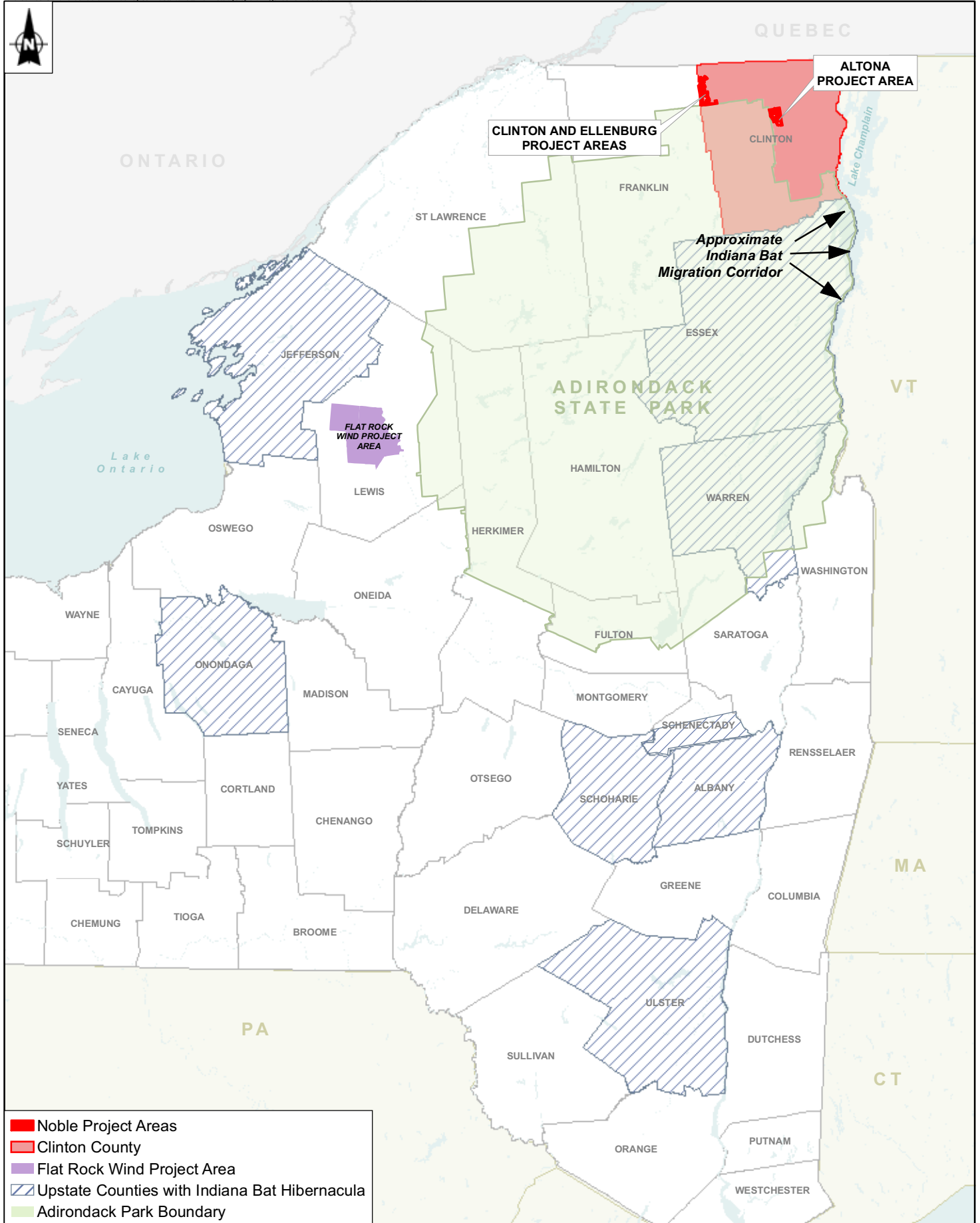


Figure 3-3 Upstate NY Counties with Indiana Bat Hibernacula within the Vicinity of Noble Project Areas

The mean flight altitudes were 219 meters and 214 meters higher than the maximum turbine height but in general, slightly lower than at the other locations in the east where similar studies were conducted by ABR (see Tables 3-5 and 3-6).

Table 3-5 Comparison of Mean Flight Altitudes in Spring

Location	Season	Mean Flight Altitude (meters agl)
Prattsburgh-Italy, Steuben County, NY	Spring 2005	319
Noble Windparks, Clinton County, NY	Spring 2005	338
Westfield, Chautauqua County, NY	Spring 2003	528

Table 3-6 Comparison of Mean Flight Altitudes in Fall

Location	Season	Mean Flight Altitude (meters agl)
Noble Windparks, Clinton County, NY	Fall 2005	333
Prattsburgh-Italy, Steuben County, NY	Fall 2005	365
Mount Storm, WV	Fall 2003	410
Martinsburg (Flat Rock), Lewis County, NY	Fall 2004	415
Westfield, Chautauqua County, NY	Fall 2003	532

Flight Direction

The mean flight direction of targets observed on radar was 30° in spring and 162° in fall. This indicates that the predominant flight direction was northerly in spring and southerly in fall, which is consistent with the expected seasonal migration flight directions. See Figure 5 in Appendix A for rose figures showing the flight directions of targets.

Weather Influence

The ABR study examined the influence of various weather conditions on the results for passage rates and flight altitudes using statistical methods. Please see Appendix A for a discussion of the methodology.

During spring migration, passage rates increased with the following conditions:

- Later in the season;
- As the number of days since favorable migration increased; and
- With tail winds and western crosswinds.

Passage rates decreased during the spring when ceiling height was less than 500 meters agl. During fall migration, passage rates increased later in the season and

decreased when ceiling height was less than 500 meters agl and when wind speeds increased.

During spring migration, flight altitudes increased with favorable weather conditions (tailwinds) and decreased when ceiling height was less than 500 meters agl and when fog was absent. Flight altitudes in fall increased with rising barometric pressure and decreased later in the migration season and when fog was absent.

Turbine Passage

The ABR study estimated the turbine passage rate (i.e., the rate of migrants passing within the area occupied by each turbine) for bird/bat migrants in both seasons under existing conditions (i.e., without turbines). (See Appendix A for the methodology and assumptions.) The turbine passage rate in spring was estimated at 1.2 to 8.3 migrants/turbine/day. In fall, the turbine passage rate was estimated at 1.6 to 11.1 migrants/turbine/day. Comparisons to other ABR studies are very limited to one for spring and two for fall. The turbine passage rate in spring during a study at Prattsburgh-Italy, New York, was 1.7 to 12.1 migrants/turbine/day. The turbine passage rates in fall at the proposed Flat Rock project was 0.7 to 4.6 migrants/turbine/day and at Prattsburgh-Italy was 1.1 to 8.0 migrants/turbine/day (Mabee et al. 2006).

Nighttime Visual Study

Based on sampling to an approximate altitude of 150 meters agl with night-vision goggles and spotlights, the proportions of birds and bats below 150 meters agl were:

- 92% birds and 8% bats in spring 2005, and
- 82% birds and 18% bats in fall 2005.

Due to the extreme difficulty in the speciation of bats through nocturnal visual surveys, targets were identified in the categories of small bats, large bats, and unidentified bats. This also allowed the surveyor to discriminate the larger (approximately greater than 2 inches) bats (hoary, Eastern red, big brown and silver-haired bats) from the smaller (approximately less than 2 inches) bats (small-footed, Indiana, little brown, Eastern long-eared, and Eastern Pipistrelle) of the region.

Bat targets were less variable for nightly visual rates compared to bird target rates during spring and fall observation possibly due to the shorter migration distances that the bats cover. Overall, fewer bats were identified in comparison to bird targets during visual observations, with small bats dominating target activity. Fewer numbers of bats were observed during spring surveys than fall surveys. Small bats dominated the two survey periods. See Table 10 in Appendix A for the number of birds and bats identified during the visual survey.

3.3.2 Migratory Raptor Surveys

3.3.2.1 Clinton/Ellenburg Project Areas

Spring migratory raptor surveys were conducted on April 18 to 20, 2005. No migratory raptors were observed. Two Broad-winged Hawks, possibly the same bird, were observed, but both appeared to be local birds as they were foraging and neither was flying in a migratory pattern.

Fall migratory raptor surveys were conducted on September 23, 25, and 28, 2005. Again, no migratory raptors were observed.

3.3.2.2 Altona Project Area

Spring migratory raptor surveys were conducted on May 4 through 6, 2005. No migratory raptors were observed. A group of four Turkey Vultures was observed on May 5, 2005, but they were not flying in a migratory pattern as they arrived from the north.

Fall migratory raptor surveys were conducted on September 24, 27, and 30, 2005. No migratory raptors were observed on any of the survey dates.

3.3.3 Spring Migratory Surveys

3.3.3.1 Clinton/Ellenburg Project Areas

A total of 315 birds of 49 species were recorded during the migratory bird survey conducted at 18 points on May 25, 2005 (see Appendix B, Table B-1 for totals). The most numerous species recorded were Bobolink (29), Red-winged Blackbird (28), and American Crow (20). The species observed were all expected based on the habitat, location, and time of year.

The total number of birds per point ranged between eight and 25, with an average of 17.5 birds per point. Survey points F, J, L, and N had greater than 20 birds, while survey points B, M, and Q had fewer than 15.

The species richness per point ranged between six and 17, with an average of 12.2 species per point. Survey points I, J, L, and N had greater than 15 species, while survey points B, E, M, and Q had fewer than 10.

The survey points with the highest number of birds and species richness, generally, have a mix of habitats. The survey points with the lowest number of birds and species richness, generally, were at or near open fields and away from wooded areas, without a mix of habitats.

Most of the birds tallied during the spring migratory survey were likely local breeders rather than migrants, as all species identified were within their population breeding range. There was no evidence from the survey or other time spent in the project areas during the last week of May 2005 that the Project Area serves as an increased migratory corridor or stopover point for passerines or other bird species.

3.3.3.2 Altona Project Area

A total of 160 birds of 37 species were recorded during the migratory bird survey conducted at seven points on May 26, 2005 (see Appendix B, Table B-2 for totals). The most numerous species recorded were Chestnut-sided Warbler (23) and Ovenbird (17). The species observed were all expected based on the habitat, location, and time of year.

The total number of birds per point ranged between eight and 50, with an average of 22.9 birds per point. Survey points #29b and #60 had greater than 20 birds, while survey points #23b, #47b, and #61 had fewer than 15.

The species richness per point ranged between six and 22, with an average of 12.9 species per point. Survey points #29b and #60 had greater than 15 species, while survey points #23b and #61 had fewer than 10.

Survey point #60 had a highest number of birds and species, which are attributed to a mix of habitats and a survey point with greater visibility than the others. The survey points with the lowest number of birds and species richness, generally, were in uniform and/or dense habitat.

Most of the birds tallied during the spring migratory survey were likely local breeders rather than migrants, as all species identified were within their population breeding range. There was no evidence from the survey or other time spent in the project areas during the last week of May 2005 that the Project Area serves as an increased migratory corridor or stopover point for passerines or other bird species.

3.3.4 Breeding Bird Surveys

3.3.4.1 Clinton/Ellenburg Project Areas

Three-minute breeding bird surveys were conducted on June 9 and 29, 2005, at 11 turbine locations (see Figure 2-1). A total of 289 birds of 56 species were recorded during the two surveys (see Table B-3 for totals). Forty-four species, consisting of 127 total birds, were identified on the June 9, 2005, survey (see Table B-4). Thirty-seven species and 162 total birds were identified on the June 29, 2005, survey (see Table B-5). The most numerous species recorded were American Robin (21), Song Sparrow (17), Red-winged Blackbird (17), and Bobolink (17).

The average number of birds per point was 11.5 and 14.7, respectively, with a range of six to 26. The average species count per point was 10.2 and 9.5, respectively, with a range of five to 16. The highest totals for both birds and species were tallied at turbine points #2, #10, and #28. All have a mix of habitats within view and earshot, conditions that are often best for recording high species diversity.

The species identified during the breeding bird survey, including others identified on that day outside of the three-minute survey intervals, were generally consistent with those species regularly found in Clinton County during the New York State Breeding Bird Atlas (2000-2005) and USGS breeding bird survey, and were as expected for the geographic area. Three state-listed species were observed: Pied-billed Grebe, Northern Harrier, and Sedge Wren.

The Pied-billed Grebe is considered an uncommon breeder in Clinton County (Mitchell and Krueger 1997). One was heard calling from the pond just north of survey point #28 on June 9, 2005.

A Northern Harrier was observed during the breeding bird survey at point #105 on June 9, 2005, and at point #2 on June 29, 2005. This species is a regular occurrence in Clinton County, just like in most other areas of New York State.

The Sedge Wren is a rare breeder in Clinton County (Mitchell and Krueger 1997). A male was heard singing on June 9, 2005, from a grassy field immediately adjacent to Ryan Road. The bird was identified after parking the car and walking to survey point #32, but it was too distant to be heard or seen during the breeding bird survey. The bird was not heard or observed later that day or on June 29, 2005.

3.3.4.2 Altona Project Area

Three-minute breeding bird surveys were conducted on June 8 and 28, 2005 at seven turbine locations (see Figure 2-2). A total of 193 birds of 41 species were recorded during the two surveys (see Table B-6 for totals). Thirty species, consisting of 83 total birds, were identified on the June 8, 2005, survey (see Table B-7). Thirty-five species and 110 total birds were identified on the June 28, 2005, survey (see Table B-8). The most numerous species recorded were Chestnut-sided Warbler (24) and Ovenbird (20), the same two species as on the spring migratory count.

The average number of birds per point was 11.9 and 15.7, respectively, with a range of six to 23. The average species count per point was 8.6 and 11.0, respectively, with a range of 4 to 14. The highest totals for both birds and species were tallied at turbine points #29b and #60, the same points as during the spring migratory survey. The lowest totals were at point #58a.

The species identified during the breeding bird survey, including others identified on that day outside of the three-minute survey intervals, were generally consistent with those species regularly found in Clinton County during the New York State Breeding Bird Atlas (2000-2005) and USGS breeding bird surveys, and were as expected for the geographic area. No state-listed species were observed.

3.3.5 Acoustical Monitoring for Bats

Four bat species were detected during AnaBat surveys at the project areas, including the Red Bat, Hoary Bat, Big Brown Bat, and Little Brown Bat. All four species are found throughout New York State. The Little Brown Bat is considered to be the most common species in the State and it was recorded at both the Clinton/Ellenburg (73 call sequences) and Altona (134 call sequences) survey sites. The Big Brown Bat was the most frequently detected species at the Clinton/Ellenburg survey (309 call sequences) and it was not detected at Altona. Red Bat (575 call sequences) and Hoary Bat (22 sequences) were only detected during the Altona survey.

A total of 497 bat call sequences were recorded in the spring and fall sampling periods at the Clinton/Ellenburg locations. There were more sequences (352 to 145) detected during the fall study period of August 15 through October 9, 2005 (55 nights) than during the spring study period of April 20 through June 13, 2005 (54 nights), although anthropomorphic disturbance limited data collection during a early portion of the spring study. A greater number of calls (368 to 129) were recorded at the 100-foot detector than at the 50-foot detector. A total of 115 calls were unidentified and may have resulted primarily from roosting pigeons at the site and fragmented bat calls. Calls were detected most frequently between the hours of 2000 and 0100.

A total of 1,031 bat call sequences were recorded during the fall sampling period at the Altona location. A greater number of calls (730 to 301) were recorded at the 100-foot detector than at the 50-foot detector. A total of 300 calls were unidentified and were attributed to noise from roosting pigeons at the site. Calls were detected most frequently between the hours of 2000 and 0100.

No occurrences of the federally endangered Indiana bat were identified at either study location.

For more complete results and discussion on the AnaBat surveys, see Ecological Specialties LLC report in Appendix C.

3.3.6 Bat Habitat Surveys

Habitat surveys of the Project Areas were conducted May 24 through 26, 2005, and were supplemented during other field efforts throughout spring, summer, and fall 2005. The surveys included both general assessments of the entire project areas, as well as more detailed analysis in proximity to each turbine. Surveys identified no major rock outcroppings, cave dwellings, or hibernacula where bats may roost.

Based on the mosaic of habitat types found throughout the Project Area, suitable habitat was identified for the most common bats species that would be expected to occur in the Project Area. The AnaBat surveys confirmed the presence of the little brown bat and big brown bat as occurring in the Project Area.

In order to determine the potential for Indiana bats to occur in the project area, field surveys were conducted focusing on the evaluation of the suitability of the project area to support the Indiana bat. Although bat species are found in many environments throughout New York State, the Indiana bat has very specific habitat requirements. As identified during the literature review for this species, the northernmost range of the Indiana bat extends into Northern New York; however, no known hibernacula were documented by NYSDEC. Field surveys did not identify any suitable hibernacula within the Project Area, nor did they find any areas meeting the specific summer roost and maternity roost habitats for the Indiana bat. Surveys confirmed that the Project Area does not contain significant timber stands of the necessary age or species composition to provide suitable habitat for this species. The current land use practices (i.e., a mix of agriculture and silviculture) coupled with the lack of defined water courses through the Project Area largely eliminates the potential for suitable habitat to exist within the Project Area.

Altona Project Area

Based on the assessment of the Altona Project Area as maternity and summer roosting habitat, the existing ecosystems offer little habitat for maternity and roosting specific to the Indiana bat. Silvicultural and agricultural practices have eliminated contiguous tracts of mature timber (with cavities and exfoliating bark), and no significant water courses occur within the Project Area. Although, other species of bats may be found in the area, the Indiana bat is not likely to forage, or bear and rear young in these underdeveloped woodlands, wetlands, forests, and field/croplands complexes that occur in the Project Areas.

Clinton/Ellenburg Project Areas

Based on the assessment of the Clinton/Ellenburg Project Areas as maternity and summer roosting habitat, the existing ecosystems offer little habitat for maternity and roosting specific to the Indiana bat. Silvicultural and agricultural practices have eliminated contiguous tracts of mature timber (with cavities and exfoliating bark), and no significant water courses occur within the Project Area. Although, other species of bats may be found in the area, the Indiana bat is not likely to forage, or bear and rear young in these underdeveloped woodlands, wetlands, forests, and field/croplands complexes that occur in the Project Areas.

3.3.7 Bird Species List and Threatened/Endangered Species

During the bird surveys and other activities in the Project Areas, E & E identified totals of 91 species and 83 species in the Clinton and Altona Project Areas, respectively (see Table 3-7).

Table 3-7 Bird Species Observed During E & E Surveys and Site Work in Clinton and Altona Project Areas

	Common Name	Clinton Project Area	Altona Project Area
1	Snow Goose	1	–
2	Canada Goose	1	1
3	Mallard	1	1
4	Hooded Merganser	–	1
5	Ruffed Grouse	1	1
6	Wild Turkey	1	1
7	Pied-billed Grebe	1	--
8	Great Blue Heron	1	1
9	Turkey Vulture	1	1
10	Bald Eagle	1	–
11	Northern Harrier	1	1
12	Sharp-shinned Hawk	1	–
13	Broad-winged Hawk	1	–
14	Red-tailed Hawk	1	1
15	American Kestrel	1	1
16	Killdeer	1	1
17	Wilson's Snipe	1	1
18	Ring-billed Gull	1	1
19	Rock Pigeon	1	1
20	Mourning Dove	1	1
21	Black-billed Cuckoo	1	–
22	Great Horned Owl	–	1
23	Ruby-thr. Hummingbird	1	1
24	Yellow-bellied Sapsucker	1	1
25	Downy Woodpecker	1	1
26	Hairy Woodpecker	1	1
27	Northern Flicker	1	1
28	Pileated Woodpecker	1	–
29	Eastern Wood-Pewee	1	1
30	Alder Flycatcher	1	1
31	Least Flycatcher	1	1
32	Eastern Phoebe	1	1
33	Great Crested Flycatcher	1	1
34	Eastern Kingbird	1	1
35	Blue-headed Vireo	1	1
36	Warbling Vireo	1	–
37	Red-eyed Vireo	1	1
38	Blue Jay	1	1
39	American Crow	1	1
40	Common Raven	1	1
41	Tree Swallow	1	1

Table 3-7 Bird Species Observed During E & E Surveys and Site Work in Clinton and Altona Project Areas

	Common Name	Clinton Project Area	Altona Project Area
42	N Rough-winged Swallow	1	1
43	Bank Swallow	1	–
44	Cliff Swallow	1	1
45	Barn Swallow	1	1
46	Black-capped Chickadee	1	1
47	Red-breasted Nuthatch	1	1
48	Brown Creeper	1	1
49	House Wren	1	1
50	Winter Wren	1	1
51	Sedge Wren	1	–
52	Eastern Bluebird	1	1
53	Veery	1	1
54	Hermit Thrush	1	1
55	Wood Thrush	1	–
56	American Robin	1	1
57	Gray Catbird	1	1
58	Brown Thrasher	–	1
59	European Starling	1	1
60	Cedar Waxwing	1	1
61	Nashville Warbler	1	1
62	Yellow Warbler	1	1
63	Chestnut-sided Warbler	1	1
64	Magnolia Warbler	1	1
65	Black-throated Blue Warbler	–	1
66	Yellow-rumped Warbler	1	1
67	Black-thr. Green Warbler	1	1
68	Black-and-white Warbler	1	1
69	American Redstart	1	1
70	Ovenbird	1	1
71	Northern Waterthrush	1	–
72	Mourning Warbler	1	1
73	Common Yellowthroat	1	1
74	Scarlet Tanager	1	1
75	Eastern Towhee	1	1
76	Chipping Sparrow	1	1
77	Savannah Sparrow	1	1
78	Song Sparrow	1	1
79	Lincoln's Sparrow	1	–
80	Swamp Sparrow	1	1
81	White-throated Sparrow	1	1
82	Dark-eyed Junco	1	1

Table 3-7 Bird Species Observed During E & E Surveys and Site Work in Clinton and Altona Project Areas

	Common Name	Clinton Project Area	Altona Project Area
83	Northern Cardinal	1	1
84	Rose-breasted Grosbeak	1	1
85	Indigo Bunting	1	1
86	Bobolink	1	1
87	Red-winged Blackbird	1	1
88	Eastern Meadowlark	1	1
89	Common Grackle	1	1
90	Brown-headed Cowbird	1	1
91	Baltimore Oriole	1	1
92	Purple Finch	1	1
93	House Finch	–	1
94	Red Crossbill	–	1
95	Pine Siskin	1	–
96	American Goldfinch	1	1
97	House Sparrow	1	1
	Total	91	83
	97 total species observed		

NYSDEC maintains a list of bird species that are considered endangered, threatened, or of special concern within the state of New York. Table 3-8 lists these species along with notes of possible or confirmed occurrence within the Project Areas. Information was obtained from various sources, including E & E field surveys, Breeding Bird Atlas projects, and Clinton County birding references.

Table 3-8 Occurrence of Endangered, Threatened, or Species of Special Concern within New York State at the Clinton County Project Areas

Listed Species ^{1,2}	Notes
Endangered Species	
Golden Eagle	Considered extirpated as a breeder in New York State. Only a few have been reported in Clinton County (Mitchell and Krueger 1997). Likely a very rare transient or migrant over the Project Areas.
Peregrine Falcon	No nests are located in the Project Areas. Likely an uncommon migrant over the Project Areas. It is categorized by Atlas 2000 project as a probable breeder in block 5796A (southern Ellenburg).
Spruce Grouse	New York State range limited to Adirondacks, where rare. Location/habitat not suitable in Project Areas. Very few reports in Clinton County; most near Mount Lyon.
Black Rail	Extremely rare in New York; no confirmed reports in Clinton County. Location/habitat not suitable in Project Areas.
Piping Plover	Federally endangered in Great Lakes region. Location/habitat not suitable in Project Areas. No records of occurrence in Clinton County.

Table 3-8 Occurrence of Endangered, Threatened, or Species of Special Concern within New York State at the Clinton County Project Areas

Listed Species ^{1,2}	Notes
Roseate Tern	Federally endangered. New York State range limited to coastal Long Island. Location/habitat not suitable in Project Areas.
Black Tern	Formerly bred at Lake Alice WMA, where migrants still occur occasionally (Mitchell and Krueger 1997). Location/habitat in the Project Areas not suitable for breeding or foraging. No records of occurrence at Project Areas.
Short-eared Owl	Despite plentiful habitat in Clinton County, there have been only two breeding records, both near Lake Champlain (Mitchell and Krueger 1997). It is a regular migrant in the county and may over winter. Habitat in the Clinton and Ellenburg Project Areas is suitable for wintering birds. No records of occurrence in the Project Areas.
Loggerhead Shrike	Very rare and declining. A few breeding records in Clinton County occurred in 1980s. No records of occurrence at the Project Areas.
Threatened Species	
Pied-billed Grebe	An uncommon breeder in Clinton County (Mitchell and Krueger 1997). One heard at pond in Clinton Project Area during breeding bird surveys.
Least Bittern	Breeding in Clinton County is primarily limited to marshes near Lake Champlain and Lake Alice WMA. Location/habitat within Project Areas not suitable for breeding, with the possible exception of the pond near Ryan Road in the Clinton Project Area. No records of occurrence in the Project Areas.
Bald Eagle	Federally threatened (currently in de-listing process). Likely a migrant and transient over the Project Areas. Location/habitat within Project Areas not suitable for breeding. Confirmed breeder near Upper Chateaugay Lake and Bradley Pond and probable breeder at Lake Alice WMA (NYSDEC 2005), the closest locations to Project Area. E & E observed one adult flying high above County Line Road in the Clinton Project Area on May 25, 2005.
Northern Harrier	Has bred in a number of locations in Clinton County (Mitchell and Krueger 1997). Confirmed nesting in block 5797D and categorized as a possible breeder in blocks 5797A and 5797B, all in or near Clinton Project Area. Likely breeds in the vicinity of the Clinton, Ellenburg, and Altona Project Areas. Observed on three occasions during E & E migratory and breeding bird surveys in the Clinton Project Area. E & E staff also observed on several other occasions in summer and fall 2005 within the Clinton, Ellenburg, and Altona Project Areas. Considered fairly common in Northern New York (Peterson 2005).
King Rail	Extremely rare in upstate New York. No records of occurrence in Clinton County. Location/habitat in the Project Areas is unsuitable for breeding.
Upland Sandpiper	Considered uncommon and declining in Clinton County (Mitchell and Krueger 1997). There is some limited habitat (pasturelands) suitable for breeding in the Clinton and Ellenburg Project Areas. No records of occurrence in the Project Areas.

Table 3-8 Occurrence of Endangered, Threatened, or Species of Special Concern within New York State at the Clinton County Project Areas

Listed Species ^{1,2}	Notes
Common Tern	Very rare in Clinton County away from Lake Champlain. Location/habitat in the Project Areas is unsuitable for breeding or foraging.
Least Tern	New York State range limited to coastal Long Island. Location/habitat not suitable in Project Areas.
Sedge Wren	Sedge Wren is a rare breeder in Clinton County (Mitchell and Krueger 1997). A male was heard singing on June 9, 2005, from a grassy field immediately adjacent to Ryan Road in the Clinton Project Area. This species often does not return to the same nest location from year to year. There is some suitable habitat in the Clinton and Ellenburg Project Areas.
Henslow's Sparrow	No records of occurrence in Clinton County. There is some potentially suitable habitat in the Clinton and Ellenburg Project Areas.
Species of Special Concern	
Common Loon	Location/habitat in Project Areas not suitable for breeding. Breeding occurs on lakes within the Adirondacks; however, the closest breeding pairs would not travel to Project Areas to forage. Likely, a rare migrant over the Project Areas. Regularly occurs on Lake Champlain to the east.
American Bittern	Breeding in Clinton County is mostly at marshes near Lake Champlain and Lake Alice WMA. Listed as possible breeder in blocks 5797B and 5797C, north of the Clinton Project Area. Location/habitat within Project Areas not suitable for breeding, with the possible exception of the pond near Ryan Road in the Clinton Project Area.
Osprey	Likely a migrant and transient over the Project Areas. Location/habitat within Project Areas not suitable for breeding. Breeds at Lake Alice WMA, near Lake Champlain, and at lakes in the Adirondacks.
Sharp-shinned Hawk	Considered the most common Accipiter and a regular occurrence in Clinton County (Mitchell and Krueger 1997). Location/habitat in the Project Areas is suitable for breeding. One was observed in June 2005 in the Clinton Project Area. Listed as possible breeder in atlas blocks in the Clinton and Altona Project Areas.
Cooper's Hawk	Considered an uncommon occurrence and breeder in Clinton County (Mitchell and Krueger 1997). Location/habitat in the Project Areas is suitable for breeding. Was not observed during E & E surveys or field work. Listed as possible breeder in atlas block in the Clinton Project Area.
Northern Goshawk	Considered a rare, permanent resident of Clinton County (Mitchell and Krueger 1997). Location/habitat in the Project Areas is suitable for breeding. Was not observed during E & E surveys or field work.
Red-shouldered Hawk	Considered rare in all seasons in Clinton County (Mitchell and Krueger 1997). Has bred at Lake Alice WMA. Location/habitat in the Project Areas is suitable for breeding. Was not observed during E & E surveys or field work.
Black Skimmer	New York State range restricted to coastal Long Island. Location/habitat not suitable in Project Areas.

Table 3-8 Occurrence of Endangered, Threatened, or Species of Special Concern within New York State at the Clinton County Project Areas

Listed Species ^{1,2}	Notes
Common Nighthawk	Location/habitat within Project Areas possibly suitable for breeding. Likely an occasional spring and late summer migrant over Project Areas. Considered a probable breeder in atlas block 6096A, near the Altona Project Area.
Whip-poor-will	An uncommon migrant and summer resident in Clinton County (Mitchell and Krueger 1997). Location/habitat possibly suitable for breeding. No records of occurrence in Project Areas.
Red-headed Woodpecker	A rare and declining breeder in Clinton County (Mitchell and Krueger 1997). Location/habitat in Clinton and Ellenburg possibly suitable for breeding. No records of occurrence in Project Areas.
Horned Lark	Likely breeds in low numbers in plowed fields within the Clinton and Ellenburg Project Areas. Confirmed nesting in block 5797C and a possible breeder in block 5797D, near Clinton Project Area. Was not observed during E & E surveys or site work. A regular, often common, species in winter throughout New York.
Bicknell's Thrush	New York State range restricted to Adirondacks and Catskills, where it breeds in stunted fir forests above 3,000 feet. Location/habitat in the Project Areas is unsuitable for breeding. Nearest breeding location is at Lyon Mountain, south of the Clinton and Ellenburg Project Areas.
Golden-winged Warbler	There is limited habitat in the Clinton and Ellenburg Project Areas suitable for breeding. No records of occurrence in the Project Areas, although it has bred elsewhere in the town of Altona (Mitchell and Krueger 1997).
Cerulean Warbler	Location/habitat in the Project Areas unsuitable for breeding. No records of occurrence in the Project Area. No confirmed breeding records for Clinton County.
Yellow-breasted Chat	Location/habitat in the Project Areas unsuitable for breeding. No records of occurrence in Clinton County.
Vesper Sparrow	Formerly common in Clinton County through the 1960s, it is now uncommon (Mitchell and Krueger 1997). Location/habitat in the Clinton and Ellenburg Project Areas is suitable for breeding. Considered a probable breeder in the atlas blocks in and near Clinton Project Area. None were observed during E & E surveys or site work.
Grasshopper Sparrow	Location/habitat in the Project Areas is suitable for breeding. None were observed during E & E surveys or site work. Has occurred in Rand Hill area, which is near Altona Project Area (Mitchell and Krueger 1997).
Seaside Sparrow	New York State range restricted to coastal Long Island. Location/habitat in the Project Areas is unsuitable for occurrence.

¹ All species are state-listed. Federally listed species are indicated in the notes column.

² Special concern species are not afforded protection under state and/or federal endangered species acts.

4

Risk Assessment

4.1 Wind Energy and Avian and Bat Issues

4.1.1 Overview

There are a number of positive impacts on bird populations that would result from an increased use of renewable energy including wind. Air emissions and global climate change have been cited as serious concerns for North American bird populations (see *A Birdwatcher's Guide to Global Warming* by the National Wildlife Federation and American Bird Conservancy [Price and Glick 2004]). Increased renewable energy use would slow down the negative impacts of global climate change and air emissions on people and wildlife. Wind energy facilities also have the potential to cause injury or death to birds through collisions and result in habitat loss, degradation, or displacement. While studies have shown that these negative impacts have occurred at a few sites, the results from numerous studies and reviews of avian impacts from wind energy facilities in North America and Europe indicate that mortality rates are low (Erickson et al. 2001; NWCC 2004; GAO 2005).

In November 2004, the National Wind Coordinating Committee (NWCC), a consortium of wind energy developers, researchers, proponents, opponents, and agencies, issued the second edition of a fact sheet entitled “Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions” (NWCC 2004). The following, taken from the fact sheet, is part of an overview on the status of bird issues at wind energy facilities that aptly describes the current understanding:

“Wind energy’s ability to generate electricity without many of the environmental impacts associated with other energy sources (air pollution, water pollution, mercury emissions, and greenhouse gas emissions associated with global climate change) can significantly benefit birds, bats, and many other plant and animal species. However, the direct and indirect local and cumulative impacts of wind plants on birds and bats continue to be an issue” (NWCC 2004).

In a September 2005 report to Congressional requesters, the United States Government Accountability Office (GAO) reviewed the impacts on wildlife from

wind power. The GAO report concluded that outside of the Altamont site in northern California, the research to date has not shown bird kills in alarming numbers (GAO 2005). The GAO review of postconstruction mortality studies found that bird fatalities ranged from 0 to 7.28 birds per turbine per year. Similarly, the 2004 NWCC fact sheet shows an average of 2.3 birds per turbine per year (3.1 birds per MW per year) are killed at facilities outside of California (NWCC 2004). For eastern wind farms, the average was 4.3 birds per turbine per year (3.0 birds per MW per year) (NWCC 2004).

The research regarding bats and wind turbines is much more limited. As of 2004, no known collisions of federally endangered or threatened bat species have been documented in conjunction with wind turbines (BCI 2006). Collisions involving other bat species are considered insignificant with less than 3.4 kills per turbine, per year (Resolve 2004).

United States Fish and Wildlife Service, NYSDEC, the NWCC, and bat organizations, such as Bat Conservation International, are currently trying to determine the biological significance of the large bat kills at the Mountaineer site in 2003 and 2004. These two incidents occurred during migration periods (i.e., late summer), with little to no impacts from collisions during foraging periods associated with these bat summer roost sites. This suggests that local bats are able to adjust flight patterns to avoid wind turbines, while bats in migration would experience greater impact, potentially indicating a modified behavior during migration.

4.1.2 Avian Collisions

There is a potential that direct collisions with the wind turbine rotors or tower can result in injury or mortality to birds and bats. However, the data from numerous postconstruction mortality studies at wind turbine projects, particularly newer facilities, demonstrate that avian mortality rates are low. This is primarily due to three factors:

- Most migrating birds fly at altitudes higher than the maximum turbine height;
- A very high percentage of birds flying toward wind turbines will detect and avoid them; and
- Of those birds that do not alter their flight path in time to avoid the rotor swept area of a turbine, a majority will still avoid a collision.

Migration Flight Altitude

Birds migrate at varying altitudes, with most in the following ranges (Smithsonian Migratory Bird Center 2005):

- Songbirds: 500 to 6,000 feet, with 75% of songbirds migrating between 500 and 2,000 feet;

- Shorebirds: 1,000 to 13,000 feet;
- Waterfowl: 200 to 4,000 feet; and
- Raptors: 700 to 4,000 feet.

Given these ranges, only a small percentage of migrating birds are expected to be regularly flying lower than the maximum turbine height and be at risk of collision with turbine rotors. Weather conditions such as precipitation, low cloud ceilings, and strong opposing winds will usually lower the altitude of migrating birds, although fewer birds typically migrate under such unfavorable conditions.

Turbine Avoidance

Various studies of birds approaching wind turbines have demonstrated that most birds detect the presence of wind turbines and react by altering their flight path to avoid them (Strickland et al. 2001; BirdLife 2003; Sterner 2002). In comparison of flight behavior, one study in Spain found that migrating birds flew at higher average altitudes (>100 meters versus 60 meters) over wind turbines than over areas without wind turbines (Janss 2000). In a study in the Netherlands, Winkelman observed that at 300 meters from wind turbines, the change in flight behavior was five times more horizontal than vertical and that 75% of the reactions occurred 100 meters from the turbines (Winkelman 1994).

In the Netherlands, Winkelman found that 1.2% of birds flying at the maximum turbine height were killed (Winkelman 1994). In Belgium, Everaert et al. calculated the chance of a gull colliding with a turbine to be 0.05% and for a tern 0.2% (BirdLife 2003, Everaert 2002). At three wind turbine facilities in the United States, Erickson (2003) estimated that more than 99.99% of birds exhibited behavioral avoidance. Because of site-specific differences in turbines, wind farm layout, weather, and bird species, these results cannot be universally applied; however, they demonstrate strong avoidance behavior.

Rotor Avoidance

For birds that do not alter their flight path when approaching a turbine, studies have documented low collision rates for birds flying through the rotor swept area (the area of the rotating turbine blades). In a direct visual study, Winkelman observed that 84% of the birds passing through a rotor swept area were not killed (Winkelman 1994). Predictive models based on physics also indicate that more than half of the birds passing through a rotor swept area will survive (Tucker 1996) because so little space is occupied by the rotating rotors in relation to the speed of the bird's flight.

4.1.3 Avian Habitat Loss, Degradation, or Displacement

There is also a potential that habitat disturbance from wind turbines may result in habitat loss, habitat degradation through fragmentation (i.e., the loss of quality or quantity of habitat), or result in behavioral displacement from habitats. These im-

pacts have occurred in certain instances at wind turbine facilities (BirdLife 2003). The disturbances can be temporary (i.e., during construction) or permanent. Some studies have documented decreased breeding densities, primarily in grassland-nesting songbirds, in proximity to wind turbines (Leddy et al. 1999). However, other studies have documented little impact on nesting birds and that some birds or species groups habituate to the areas around the turbines (BirdLife 2003, NWCC 2004). Post construction site features will neither add nor detract from habitat attractiveness. However, if post-construction impacts are observed, mitigation will be undertaken in order to remedy them.

4.2 Potential Avian Impacts from Proposed Projects

4.2.1 Potential Impacts to Migratory Birds

The dynamics of migration and the potential impacts from wind turbines differ among groups of birds. Therefore, this section contains separate discussions of the migration of raptors, passerines, and waterbirds. The majority of passerines migrate during the night while raptors migrate almost exclusively during the day. Waterbirds migrate during the day and night (Richardson 1998).

Raptors

As indicated in Section 3.2.1.1, raptor migration is diffuse in the region. There are no geographical or topographical features in the Project Areas that attract or concentrate migrating raptors. The Project Areas are not proximate to the recognized raptor migration pathways in New York State (i.e., near shorelines of the Great Lakes in spring or select mountainous ridges in fall). Therefore, very low numbers of migrant raptors are anticipated in the Project Areas.

Results of the migratory raptor surveys demonstrate that migratory raptor use in the Project Areas is very low. No migrating raptors were observed during six days of spring surveys (three at Clinton/Ellenburg and three at Altona) and six days of fall surveys (three at Clinton/Ellenburg and three at Altona).

Concerns about raptor impacts from wind turbines persist from the continued fatalities occurring at the Altamont Pass and other older wind farms in California. However, several site-specific features at Altamont Pass contribute to the number of raptor deaths (GAO 2005) including older turbines that allow raptors to perch and nest on lattice structures; the large number of turbines (over 5,000); and an abundant source of prey, which contributes to a large number of raptors in the area. Outside of northern California, such large numbers of raptor kills have not occurred at wind farms elsewhere in the United States and raptor fatalities have ranged from 0 to 0.07 raptors per turbine per year (GAO 2005).

As raptor use in the Project Areas is low, no biologically significant impacts to raptors are anticipated from any of the projects.

Passerines

A collision risk exists for nocturnal migrant passerines at all tall structures, including wind turbines. Nocturnal migrant passerines comprised the greatest number of bird fatalities (34 to 59%) in a review of postconstruction mortality studies by Erickson et al. (2001). However, there have been no documented large fatality events of nocturnal migrants at wind energy facilities, with the largest limited to 30 songbirds at a floodlit substation and nearby turbines in West Virginia on a night with heavy fog (NWCC 2004).

As indicated in Section 3.2.1.1, there are no geographical or topographical features in the Project Areas that attract or concentrate nocturnal migrant passerines. The Project Areas are not proximate to any large water bodies where nocturnal migrants tend to concentrate at stopover areas. Outside of such concentration areas, passerine migration is typically diffuse over a broad front. Results of the nocturnal radar study are consistent with this assessment, as the migratory passage rates over the Project Areas were relatively low in both spring and fall 2005 compared to other locations ABR has sampled.

The mean flight altitudes were 219 meters and 214 meters higher than the maximum turbine height in spring and fall 2005, respectively. The mean flight altitudes in both spring and fall were slightly lower than at the few other locations in the east where similar studies were conducted by ABR. Approximately 20% of all nocturnal targets in spring 2005 and approximately 12% of all nocturnal targets in fall 2005 flew below 125 meters agl, a close approximation to the maximum turbine height. These findings are consistent with literature as most nocturnal migrants fly well above the maximum turbine height.

There are conditions when nocturnal migrants will be more susceptible to collision. There is an increase for potential impacts when adverse weather conditions cause birds to fly at lower altitudes. Studies have shown that bird collisions with communication and television towers (much taller than wind turbines) are increased during low cloud ceilings, heavy fog, and precipitation.

It is likely that nocturnal migrant passerines will make up the majority of bird kills from the projects. However, the potential mortality risk to migrant passerines is considered low based on the project location, the passage rate and altitude data from the radar study, and the avoidance behavior of passerines typically exhibited at wind energy facilities. No biologically significant impacts are anticipated for any species.

Waterbirds

There are risks of potential impacts to migratory geese (Canada Geese and Snow Geese) simply because of their high seasonal abundance in Clinton County. Migration altitude is typically above maximum turbine height; however, diurnal foraging flights are often lower than the maximum turbine height.

Migrant geese flocks were observed in the Clinton/Ellenburg Project Areas in October and November 2005. They were most often observed making local movements between plowed fields, alfalfa fields, and the wetland on the east side of Ryan Road. Turbines located in areas with this habitat may produce more potential risk.

Postconstruction studies at existing wind energy facilities have shown that waterfowl are less susceptible to collision than other species groups (Erickson et al. 2002; BirdLife 2003). Therefore, despite high seasonal abundance, the potential risk for waterfowl mortality from the projects is estimated to be low.

4.2.2 Potential Impacts to Breeding Birds

Given the relatively uniform habitat in the Project Areas, there is not an extremely high diversity of breeding species. There is some degree of habitat fragmentation already in each Project Area, and much of the Altona Project Area was recently de-forested. Minimizing the project footprint, especially near wetlands, will help reduce potential impacts on resident birds.

There is a low risk of any substantial negative impact on habitat through loss, degradation, or displacement of breeding birds. Outside of localized temporary construction disturbance, no significant impacts to breeding birds are anticipated.

4.2.3 Potential Impacts to Threatened and Endangered Avian Species

Low numbers of threatened avian species and no endangered avian species were observed in the Project Areas. Four threatened avian species were identified in the Project Areas (Pied-billed Grebe, Bald Eagle, Northern Harrier, and Sedge Wren). The potential impacts to these species and those listed by NYSDEC on the Natural Heritage Program reports are discussed below by Project Area.

Only limited use of the Project Areas is anticipated by threatened and special concern avian species. The overall risk to threatened and endangered avian species is considered low.

Clinton Project Area

Only the Upland Sandpiper (*Bartramia longicauda*) was identified by NHP within 10 miles of the Clinton Project Area. The Upland Sandpiper is considered a threatened species within New York State. The NHP listing was approximately 10 miles from the Project Area, which is likely well beyond the foraging range for breeding birds. This species was not observed in the Project Area, despite searching for it on two occasions in June 2005. The occurrence of this species in Clinton County is rare (see Table 3-8). The potential impact to this species is considered remote.

Pied-billed Grebe (*Podilymbus podiceps*) was not identified by NHP or USFWS; however, one was heard calling from the pond just north of survey point #28 in

the Clinton Project Area during the breeding bird surveys. It is an uncommon breeder in Clinton County (Mitchell and Krueger 1997). Habitat requirements include a combination of open water along with an abundance of emergent aquatic vegetation (Andrle and Carroll 1988). Besides the pond location along Ryan Road, where identified, habitat in the Project Area is not suitable for foraging or breeding. The Pied-billed Grebe is secretive during the breeding season except for its loud call. It spends most of its time on the water and is rarely seen in flight. Assuming a pair breeds at the Ryan Road pond, they would stay near their nest during the breeding season and would not need to fly to other locations to forage given the suitable habitat near the nest. Therefore, the potential risk of collision is considered remote. Similarly, the potential risk of displacement is considered very low because the suitable habitat will not be altered.

Bald Eagle (*Haliaeetus leucocephalus*) was not identified by NHP or USFWS; however, E & E observed one adult flying high above County Line Road in the Clinton Project Area on May 26, 2005. This bird may have been a late migrant, a transient, or one of the birds that nests near Upper Chateaugay Lake and Bradley Pond, both approximately 8 miles to the south. There is not suitable habitat for breeding in the Project Area and the foraging potential is considered very low given the absence of any large bodies of water. Therefore any potential impacts to Bald Eagle are considered remote.

Northern Harrier (*Circus cyaneus*) was not identified by NHP or USFWS, but was observed on three occasions during E & E migratory and breeding bird surveys in the Clinton Project Area. It is a regular occurrence in Clinton County, just like in most other areas of New York State. Various wetland and upland habitats, including cattail marshes, wet meadows, and hayfields, are used for nesting. Unlike most raptors, it is a ground nester. It is highly visible in all seasons and has a large hunting range (Andrle and Carroll 1988). Because there is ample suitable nesting habitat in and near the Project Areas, the potential risk of displacement is low. Very low Northern Harrier mortality has been documented from wind turbines, even at sites that have relatively high use by this species (Erickson et al. 2002). It is anticipated that local Northern Harriers will habituate to the presence of wind turbines, however, the collision risk is considered low-to-moderate because of the species' frequency of occurrence in the Project Areas.

Sedge Wren (*Cistothorus platensis*) was not identified by NHP or USFWS, but was heard singing on June 9, 2005, from a grassy field immediately adjacent to Ryan Road. It is a rare breeder in Clinton County (Mitchell and Krueger 1997). Typical breeding habitat consists moist sedge meadows, commonly with grasses and scattered shrubs (Andrle and Carroll 1988). This elusive species is unpredictable, as it often does not reappear from year to year in the same breeding location. Habitat is often temporary and replaced through plant succession (Andrle and Carroll 1988). The Sedge Wren is secretive and spends most of its time near the ground, with limited flights just above the vegetation. The potential risk of collision is considered remote and the potential risk of displacement is considered very

low because suitable habitat will not be altered and the unpredictable nature of its breeding.

Ellenburg Project Area

No threatened or endangered bird species were identified by NHP or USFWS within the Ellenburg Project Area. Two bird species of special concern, the Bicknell's Thrush (*Catharus bicknelli*) and Common Loon (*Gavia immer*), were identified by NHP within 10 miles of the Ellenburg Project Area. Bicknell's Thrush is a rare breeder with specialized habitat as it breeds in stunted spruce and fir forests above 3,000 feet. Common Loon breeds on large lakes and ponds in the Adirondacks. There is no suitable breeding habitat for these species in the Project Area and they are not likely to occur. Therefore, the potential impacts to these species are extremely remote.

Altona Project Area

No threatened or endangered bird species were identified by NHP or USFWS within the Altona Project Area. NHP identified four bird species, the Black Tern (*Chlidonias niger*), Northern Harrier (*Circus cyaneus*), Sedge Wren (*Cistothorus platensis*), and Pied-billed Grebe (*Podilymbus podiceps*), within 10 miles of the Altona Project Area. Northern Harrier, Sedge Wren, and Pied-billed Grebe are considered as threatened species within New York State, while the Black Tern is considered endangered in New York State.

Northern Harrier (*Circus cyaneus*) was observed on one occasion in summer 2005 in the Altona Project Area. It is a regular occurrence in Clinton County, just like in most other areas of New York State. Various wetland and upland habitats, including cattail marshes, wet meadows, and hayfields, are used for nesting. Unlike most raptors, it is a ground nester. It is highly visible in all seasons and has a large hunting range (Andrle and Carroll 1988). There is little suitable nesting habitat in the Project Area, but there is ample habitat near Lake Champlain. The potential risk of displacement is very low. The collision risk is considered low because most of the wind turbines would be constructed in habitat that is not suitable for breeding or foraging for this species.

Typical breeding habitat for Sedge Wren consists moist sedge meadows, commonly with grasses and scattered shrubs (Andrle and Carroll 1988). Habitat requirements for Pied-billed Grebe include a combination of open water along with an abundance of emergent aquatic vegetation (Andrle and Carroll 1988). Black Tern breeds at large, freshwater marsh communities (Andrle and Carroll 1988). There is no suitable breeding habitat for Sedge Wren, Pied-billed Grebe, or Black Tern in the Project Area and they are not likely to occur. Therefore, the potential impacts to these species are extremely remote.

4.2.4 Comparison to Other Wind Projects

There are no turbines currently constructed in Clinton County, or northern New York State, to use for reference. The Flat Rock Power Project (recently renamed

as the Maple Ridge project) is the closest project in proximity of the Project Areas. It is located in the towns of Martinburg, Lowville, Watson, and Harrisburg in Lewis County, approximately 100 miles and 115 miles from the Clinton/Ellenburg and Altona Project Areas, respectively. Construction at Flat Rock was initiated in the summer of 2005. The project will consist of 120 1.65-MW turbines for a total of 198 MW. A preconstruction nocturnal radar and visual study was conducted in fall 2004 by ABR for the, then proposed, project. See Section 3.3.1 for comparison of results. Project review was conducted by the towns, NYSDEC, and USFWS among other agencies.

NWCC compiled regional and overall bird fatality rates based on 12 post-construction mortality studies that were conducted for a minimum of three seasons and where scavenging and searcher efficiency biases were incorporated into the estimates (NWCC 2004). The overall national average is 2.3 birds/turbine/year, ranging from 0.6 to 7.7 birds/turbine/year. The eastern regional average, based on only two studies, is higher at an average of 4.3 birds/turbine/year.

No wind energy facilities in New York State were included in the NWCC compilation; however, mortality studies have been conducted at several facilities in the region. A one year postconstruction mortality study at the Madison County facility (seven turbines) found a fatality rate of 0.42 birds/turbine/year (Kerlinger and Kerns 2003). No dead birds were found at the Wethersfield, Wyoming County, facility (10 turbines at 290 feet agl) during a postconstruction mortality study conducted by E & E in 2005. The Huron Wind site, five turbines located along Lake Huron in Ontario, had no bird mortality found between April and October 2003. Only two dead birds were found during a mortality study at a single turbine in the city of Toronto along the Lake Ontario waterfront (James and Coady 2003).

It is anticipated that the fatality rates at the Project Areas will be near the national average and within the range of the national and eastern results. This prediction is based on the results of the avian studies and because there are no features in the Project Areas that attract or concentrate large numbers of migrating birds.

4.2.5 Comparison to Other Sources of Avian Mortality

There are many widespread sources of avian mortality. However, it is challenging to compare predicted mortality from a proposed wind site to other sources of mortality, because it is only a prediction and local mortality rates from other sources are rarely quantified to allow comparison. On a national scale, the annual avian mortality associated with wind energy facilities is slight compared to other sources of mortality, such as vehicles (60 to 80 million), buildings and windows (98 to 980 million), power and transmission lines (50,000 to 174 million), communication towers (4 to 50 million), pesticides (tens of millions), cats (8 to 39 million estimated in Wisconsin alone), agricultural practices, and hunting (Erickson et al. 2001). These sources of mortality are also present within the Project Areas.

4.2.6 Cumulative Avian Impacts

Beyond the potential impacts of each individual project, the potential cumulative impact is evaluated in this section. Multiplying the national average and eastern fatality rates with the proposed number of turbines provides an approximate number of bird fatalities for the proposed projects (see Table 4-1). The number of bird fatalities can only be determined with postconstruction mortality studies, however, this estimate allows an evaluation of the potential cumulative impacts.

Table 4-1 Approximate Number of Bird Fatalities Based on Average National and Eastern Rates

Project	Number of Turbines	Approximate Bird Fatalities Per Year Based on National Average Rate ¹	Approximate Bird Fatalities Per Year Based on Average Eastern Rate ²
Clinton	68	157	293
Ellensburg	54	125	233
Altona	68	157	293
TOTAL	190	439	819

¹ 2.3 birds/turbine/year (NWCC 2004)

² 4.3 birds/turbine/year (NWCC 2004)

Despite the expectation that the mortality rate will be near the national average at these projects, the approximate numbers of bird fatalities are increased because of the number of turbines. Collectively, the potential impacts are greater than for any individual project.

The cumulative loss of 400-to-800 birds per year sounds large, however, that estimate is not considered to be biologically significant, especially in consideration of other sources of avian mortality. For example, there have been nightly kills from communication towers that exceed the estimate range from the 190 turbines in the three windparks by an order of magnitude (USFWS 2005).

The bird kills would be from many different species. As indicated in Section 4.1.2, nocturnal migrant passerines will likely make up the majority of bird kills from the projects. This is of concern because of the potential of neotropical migrants, many of which are considered in decline, to be among the fatalities. However, these are also among the species that are most harmed by global warming and air pollution (Price and Glick 2004). For example, recent research suggests that acid precipitation from air pollution contributes to the steady decline of the Wood Thrush in the Adirondacks (Hames et al. 2002), where numbers are dropping up to 5% per year. Therefore, there are impacts from both non-renewable energy production and from wind turbines.

4.3 Potential Bat Impacts from Proposed Projects

Based on site-specific conditions and the limited historic data associated with other similar projects the potential for significant impacts to bats at the Clinton County Windparks is low. The greatest concern would be to transient individuals colliding with wind turbines. There is almost no risk to the resident/summering populations occurring in the Project Areas.

New York State is not recognized as containing federal designated priority 1 critical habitat, or for containing large populations of the federally protected Indiana bats. The Indiana bat is known to winter only in isolated hibernacula within the state. Based on the known locations of hibernacula in New York Counties (Albany, Essex, Warren, Jefferson, Onondaga, and Ulster counties), coupled with the lack of recognized habitat for the Indiana bat in the Project Area, it is unlikely that Indiana bats would be found residing in any of the Clinton County Windpark project areas.

Cumulative Impacts

The potential cumulative impact for the three proposed Windparks is evaluated in this section. Historically the average number of bat kills has varied from facility to facility, and is a function of a number of factors including the proximity to hibernacula, known migration corridors, and topography. Until the Mountaineer Wind Farm bat kills in 2003 and 2004, the average had remained low, approximately less than three bats/turbine/year killed (AWEA 2003). To date, the average has grown to approximately 4.3 bats/turbine/year with the inclusion of the Mountaineer results of 47 bats/turbine/year (GAO 2005). Multiplying the national average rate with the proposed number of turbines provides an approximate number of bat fatalities for the proposed projects (see Table 4-2).

Table 4-2 Approximate Number of Bat Fatalities Based on National Average

Project	Number of Turbines	Approximate Bat Fatalities Per Year Based on National Average Rate ¹
Clinton	68	293
Ellenburg	54	232
Altona	68	293
TOTAL	190	818

¹ 4.3 bats/turbine/year (low = 0.7; high= 47) (AWEA 2005).

Despite the expectation that the mortality rate will be near the national average at these projects, the approximate cumulative numbers of bat fatalities associated with the three windparks are increased because of the number of turbines. Collectively, the potential impacts are greater than for any of the projects individually. Although the Clinton County Windparks are not considered optimal migration corridors for bats it has been conservatively estimated that the average range in mortality will be consistent with the documented national average of 0 to 4.3

bats/turbine/year. This will result in a cumulative an annual mortality for the three sites of 0 to 818 bats/year. This number is not considered to be biologically significant, especially in consideration of other potential sources of bat mortality such as impacts from agricultural pesticide and herbicide uses, and decreasing foraging habitats.

Any impacts will likely be distributed through several species. Transient bats will likely make up the majority of bat kills from the projects. Impacts to the Indiana bat are highly unlikely as its presence in the region has not been documented in the literature or through AnaBat studies in the Project Area during any of the migrant periods.

5

Recommendations

5.1 Comparison to USFWS Voluntary, Draft, Interim Guidance Recommendations

The USFWS issued voluntary, draft, interim guidance for site development of wind projects in July 2003 (USFWS 2003). The general ideas behind the “Site Development Recommendations” and “Turbine Design and Operation Recommendations” included in the USFWS voluntary, draft, interim guidance were reviewed for the Projects.

Site Development Recommendations (USFWS 2003)

Each Project Area compares favorably to the site development recommendations as discussed below. For example, recommendation 2 indicates:

Avoid locating turbines in known local bird migration pathways or in areas where birds are highly concentrated, unless mortality risk is low (e.g., birds present rarely enter the rotor-swept area). Examples of high concentration areas for birds are wetlands, state or federal refuges, private duck clubs, staging areas, rookeries, leks, roosts, riparian areas along streams, and landfills. Avoid known daily movement flyways (e.g., between roosting and feeding areas) and areas with a high incidence of fog, mist, low cloud ceilings, and low visibility (USFWS 2003).

Each of the project areas is outside of daily movement flyways and high concentration areas. Another example that each project compares favorable to is recommendation 3 which indicates:

Avoid placing turbines near bat hibernation, breeding, and maternity/nursery colonies, in migration corridors, or in flight paths between colonies and feeding areas (USFWS 2003).

There is no evidence to suggest that the Project Areas are critical for any portion of the bat life cycle. While there are many things unknown about bat movements and migration, the Project Areas are in locations where potential impacts to bats are considered low.

Turbine Design and Operation Recommendations (USFWS 2003)

The design of each project compares favorably to the turbine design and operation recommendations. For example, recommendation 1 indicates:

Use tubular supports with pointed tops rather than lattice supports to minimize bird perching and nesting opportunities. Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting. Avoid use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices (USFWS 2003).

The “modern” turbine style will be used at each project and guy wires and lattice supports will not be included on turbines.

5.2 Other Recommendations

5.2.1 Lighting and Structural Recommendations

During nights of inclement weather and/or poor visibility, passerines may fly at lower altitudes and may be attracted to lights, especially steady (i.e., not blinking) lights. While the reasons for this attraction to lights are not certain, it coincides with evidence from tall structures (e.g., communication/television towers and buildings) that events of increased avian collisions occur on nights with poor visibility at structures with steady light. In order to reduce this potential, turbines equipped with slow blinking rather than steady lights are recommended.

Recommendations to reduce potential risk include:

- Provide the minimum allowable lighting as per the Federal Aviation Administration requirements;
- Install slow blinking red lights rather than steady lights or blinking white lights;
- Do not use any flood lights at any structures on site and avoid any steady light sources near the turbines;
- Do not install any guy wires with the turbines or transmission lines; and
- Install modern turbines that are designed to prevent birds from perching or nesting on the turbines.

5.2.2 Postconstruction Monitoring

Postconstruction mortality monitoring is recommended to determine the impacts of the projects on birds and bats. This will help identify if there are certain turbines that produce more bird/bat fatalities than others and, potentially, what the

5. Recommendations

weather or environmental conditions are that result in greater impacts. This adaptive management approach can help improve mitigation.

6

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