AVIAN AND BAT SCREENING ANALYSIS AND HABITAT CHARACTERIZATION

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UMore Park Research Wind Turbine
Dakota County, Minnesota

June 2010

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NRC Project # 0010-0110-01

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INTRODUCTION

Purpose

The purpose of this desktop analysis is to investigate the general avian and bat resources that are known to, or may, exist in the proposed UMore Park Research Wind Turbine project area so that critical issues can be identified early in the project siting process. The process used to evaluate the project area generally follows the recommended guidelines of the U.S. Fish and Wildlife Service (2003), the National Wind Coordinating Council (2007, and Anderson et al. 1999), and the Canadian Fish and Wildlife Service (2006). The evaluation relies on existing publicly available information sources and a desktop review of recent aerial photographs of the project area. This report includes the results of literature and database reviews and the desktop analysis. This preliminary screening did not include any field verification of habitat types or pre-construction baseline bird or bat surveys, which may be recommended or required by state or federal wildlife agencies in later stages of the project.

Project Location

The proposed UMore Park Research Wind Turbine site is located in Dakota County, Minnesota (Figures 1 and 2). The project area is located in portions of the SW ¼ and NW ¼ of Section 36, and portions of the SW ¼ of Section 25, T115N-R19W.

METHODS

Agency Consultation

The U.S. Fish and Wildlife Service (USFWS) Endangered Species website and the Minnesota Department of Natural Resources (DNR) website were used to develop a list of current federally- and state-listed threatened and endangered avian or bat species potentially occurring in Dakota County (USFWS 2010, Minnesota DNR 2010a).

Barr Engineering consulted with the Minnesota DNR and the USFWS concerning Natural Heritage Information System (NHIS) data and species of possible concern for the project area and surrounding vicinity.

Data Acquisition and Analysis

A literature and database review was used to identify bird and bat species known to occur within or in close proximity to the project area. References included the Minnesota DNR, North American Breeding Bird Survey data (USGS Patuxent Wildlife Research Center 2008), Minnesota Breeding Bird Atlas (MNBBA) data (Cornell Lab of Ornithology 2009), Audubon Christmas Bird Count data (National Audubon Society, Inc. 2010a), Bat Conservation International (BCI; BCI 2010), U.S. Geological Survey (USGS) Fort Collins Science Center Bats & Windmills website (USGS Fort Collins Science Center 2010), and National Renewable Energy Laboratory (NREL) Wind-Wildlife Impacts Literature Database (WILD; NREL 2009). The regulatory status (i.e. threatened, endangered, special concern) of rare birds and bats potentially occurring in the project area was reviewed and summarized.

The North American Breeding Bird Survey (BBS) is a cooperative effort between the U.S. Geological Survey's Patuxent Wildlife Research Center and the Canadian Wildlife Service's National Wildlife Research Centre to monitor the status and trends of North American bird populations. BBS data are collected by volunteers along randomly established roadside routes.

The Minnesota Breeding Bird Atlas Project (MNBBA) was initiated in 2009 and will be conducted through 2013 to document the status and distribution of breeding birds within Minnesota. Among other things, the BBA will provide a permanent record of the bird species breeding in Minnesota, provide baseline data for monitoring future changes in bird populations, document species diversity, and

document distribution of rare and endangered species. Data for the BBA is being collected by standard "blocks" (i.e. subsections) established by the original township-range land surveys in Minnesota. Because the MNBBA was initiated in 2009, data are not yet available for some blocks near the project area.

The Christmas Bird Count (CBC) is an early winter bird survey organized and administered by the National Audubon Society and conducted by volunteers. The primary objective of the CBC is to monitor the status and distribution of bird populations across North America. The survey units are 15-mile diameter circles and the count period is one 24-hour calendar day between December 14th and January 5th. Because it is an early winter survey, some birds detected are still on their southward migration.

The Minnesota County Biological Survey is conducted by the Minnesota DNR to collect baseline data on the distribution and ecology of rare plants and animals and native communities throughout the state. Common species are recorded when observed during rare species surveys; these species are catalogued separately from the rare species. Most counties in Minnesota were surveyed between 1992 and 1994, but surveys are still ongoing (Minnesota DNR 2010b).

Bat species distributions and habitat information were obtained from Bat Conservation International (BCI) and the USGS Fort Collins Science Center Bats & Windmills website. BCI is an internet-based information source on bat ecology and conservation. They have been involved in cutting-edge research and educational products on the subject of bat ecology and conservation. The USGS website presents current research conducted by Paul Cryan, a USGS Research Biologist and bat expert.

A variety of Geographic Information System (GIS) data were also used to locate and evaluate land features within the project area. GIS data included orthophotography, National Wetlands Inventory (NWI) data, Minnesota DNR Natural Resource Areas data and Minnesota DNR Managed Lands and landcover data. The Minnesota DNR landcover data was used to determine the percent cover of each land cover type present within the project area. A desktop review of maps and GIS data was performed to evaluate the physical attributes of the project area and sensitive environmental areas within or near the project area that may influence aves (birds) or chiropterans (bats). Examples of physical attributes that could influence such wildlife include project size, habitat characteristics and suitability, topography, weather, infrastructure, and environmental corridors. Examples of sensitive environmental areas include State Natural Areas, State Wildlife Management Areas, National Wildlife Refuges, Waterfowl Production Areas, and/or designated Important Bird Areas.

RESULTS AND DISCUSSION

General Landscape Characteristics

Topography and aerial photography of the project area are shown in Figures 1 and 2, respectively. Landcover within the project boundary and surrounding vicinity is shown in Figure 3.

The proposed project boundary (proposed turbine location and alternate turbine location) encompasses approximately 74.53 acres and includes six landcover types (Figure 3). Landcover within the proposed project boundary consists of 61.18 acres (82%) of cultivated crops (mostly cornfields), 9.33 acres (13%) of developed open space, and 1.47 acres (2%) of pasture/hay. The cultivated fields and developed open spaces are intersected by narrow lines of buckthorn (*Rhamnus spp.*), boxelder (*Acer negundo*), and other trees/shrubs. However, natural habitats within the project area are limited: shrub/scrub habitat comprises 1.78 acres (2%), deciduous forest comprises 0.66 acres (1%), and grassland/herbaceous habitat comprises 0.11 acres (<1%). No wetlands or streams occur within the project area (Figure 4).

The lands surrounding the project area are also predominantly under cultivated crop and pasture/hay production. However, a higher component of developed areas and forested areas occur on the lands outside of the project area (Figure 3) and small, isolated wetlands and intermittent streams are scattered across the landscape (Figure 4).

Bird Use of the Area

The Minnesota County Biological Survey has recorded a total of 96 breeding bird species for Dakota County (Table 1). This list includes five state-listed species of special concern, two state-listed threatened species (Loggerhead Shrike [*Lanius ludovicianus*] and Peregrine Falcon [*Falco peregrinus*]), and 28 other Species of Greatest Conservation Need (SGCN). No state-listed species have been observed within the project area (Minnesota DNR 2010b).

Existing information on breeding bird use of the project area is restricted to data from 28.5 hours of survey in MNBBA block T115R19b. The entire project area is contained in the southeast corner of this block (Figure 5). A total of 61 species were recorded for this block (Table 2). Of these 61 species, 13 were confirmed to be breeding, including the state-threatened Trumpeter Swan (*Cygnus buccinator*). Nineteen species were probable breeders. Twelve species were possible breeders, including the state-threatened Loggerhead Shrike. Seventeen species were observed within the block but showed no signs of breeding, including Bald Eagle (*Haliaeetus leucocephalus*), a state-listed species of special concern. Ten other SGCN were also reported for this block.

Five other MNBBA blocks are located within approximately five miles of the project area (Figure 5). However, no data yet exist for block T114R19a (immediately south of the project area) or block T115R18b (east of the project area). Only 4.5 survey hours of data exist for block T114R18a (also east of the project area). Due to this lack of data east of the project area, block T115R17c (which is immediately adjacent to T115R18b although farther from the project area) has been included in the project vicinity analysis. Blocks T115R20b and T114R20a are west of the project area. A total of 96 species were recorded for these blocks (Table 3). Many of these species were also recorded in the project area MNBBA block. However, likely due to the greater abundance and size of wetlands in these blocks and the proximity of the eastern blocks to the Mississippi River Corridor, more waterfowl and SGCN were recorded for these blocks. Bald Eagles were observed with no evidence of breeding in block T115R20b; the species was confirmed to be breeding in block T115R17c. Also in block T115R17c, American White Pelican (*Pelecanus erythrorhynchos*), a Minnesota species of special concern, was observed with no evidence of breeding. While these survey data indicate that a higher diversity of waterfowl and special status species may be present in the vicinity of the project area, it is unlikely that these species utilize the less-suitable habitats within the project area.

One BBS route, the Lakeville route, is located approximately four miles from the southwest border of the project area (Figure 6). The Lakeville route runs generally east-west, but jogs north in the middle of the route, bringing it near the project area. A total of 108 species were recorded on this route between 1966 and 2007, including two state-threatened species (Loggerhead Shrike and Wilson's Phalarope [*Phalaropus tricolor*]), one state-listed special concern species (Bald Eagle) and 24 other SGCN (Table 4). The composition of species recorded along this route was similar to those documented within the project area and surrounding vicinity by the MNBBA.

Two CBC count circles, Hastings-Etter (MNHE) and Bloomington (MNBL), are adjacent to the project area. The border of the Hastings-Etter circle is located less than one mile from the southeast corner of the project area (Figure 6). A total of 53 species were recorded during the 2009-2010 count in this circle, including one state-threatened species (Trumpeter Swan), three state-listed special concern species (Bald Eagle, Red-shouldered Hawk [*Buteo lineatus*], and Franklin's Gull [*Larus pipixcan*]), and one other SGCN (Table 5). The border of the Bloomington circle is located approximately 2.5 miles from the northwest corner of the project area. A total of 63 species were recorded during the 2009-2010 count in this circle, including two state-threatened species (Peregrine Falcon and Trumpeter Swan), four state-listed species of special concern (Bald Eagle, American White Pelican, Franklin's Gull, and Red-shouldered Hawk), and two other SGCN (Table 6). In both of these CBC count circles, which included sections of the Mississippi and Minnesota River Corridors, respectively, a greater proportion of species were waterfowl. The data did not indicate if waterfowl, particularly the recorded special-status species, were observed in the inland portions of the count circles which are nearer and more similar to the project

area.

Consultation with the Minnesota DNR identified the state-threatened Loggerhead Shrike as the only NHIS known occurrence within one mile of the project area. Loggerhead Shrike has been observed southeast of the proposed turbine location, with the most recent sighting in April 2009. Juveniles were last observed in the area in 2006. The Minnesota DNR has mapped a good portion of UMore Park, and much of Dakota County, as potential Loggerhead Shrike habitat. However, habitat suitability within the project area and immediate vicinity is limited, as Loggerhead Shrike prefer grasslands with a shrub component (NatureServe 2009), and the land is largely under agricultural production. Although a shrub component is present, there are few grasslands.

The project area is located approximately three miles southwest of the Mississippi River Corridor, which is one of four major North American migration corridors (Texas Parks and Wildlife Department 2007; Figure 6). The Mississippi River Corridor funnels more waterfowl to winter habitats than any of the other corridors (Ducks Unlimited, Inc. 2010) in North America, serving as the migratory corridor for approximately 40% of North America's waterfowl and shorebirds (Minnesota DNR 2010c). The Mississippi River, designated as a national Wild and Scenic River, provides ideal migratory habitat (low elevations, consistent water sources, wetlands, and forests) throughout the corridor. The 38 river-mile section from Minneapolis to Hastings is designated as the Twin Cities Mississippi River Important Bird Area (IBA). This IBA covers more than 37,000 acres of migratory habitat and includes three regional park reserves, two county parks, three state-owned Scientific and Natural Areas (SNAs), several city parks, and two small, private nature reserves. More than 200 species of birds have been recorded at the Lower Grey Cloud Island area, the portion of the IBA nearest the project area (National Audubon Society, Inc. 2010b). These species, primarily waterfowl, include: loons, cormorants, gulls, terns, herons, egrets, pelicans, coots, grebes, and others (Minnesota DNR 2010c).The IBA also contains a mixed-species heron rookery, at least eight Bald Eagle breeding territories, and six to eight pairs of Peregrine Falcons. At peak levels in the fall, the waterbird population of the IBA is estimated to be more than 126,000 birds (National Audubon Society, Inc. 2010b). The Hastings-Etter (MNHE) CBC count circle (results summarized above and in Table 5) overlaps a segment of this IBA (Figure 6).

The Minnesota River Valley Corridor is located approximately 11 miles northwest of the project area (Figure 6). Also an important migratory corridor, the waterway and adjacent communities from the Scott/LeSuer County line to the confluence of the Minnesota and Mississippi Rivers is designated as the Lower Minnesota River Valley IBA. This IBA includes the Minnesota Valley National Wildlife Refuge (NWR), Fort Snelling State Park, Black Dog Nature Preserve SNA, and Minnesota Valley State Recreation Area. During fall and spring migrations, the IBA regularly supports more than 50,000 waterfowl. During the winter, Black Dog Lake supports more than 5,000 waterfowl, including an annual congregation of Bald Eagles. The IBA is exceptionally diverse; more than 260 species of birds have been documented, including 20 different duck species. Approximately 100 species nest in the IBA, including several species of concern. The Wilkie Unit of the Minnesota Valley NWR contains a rookery of more than 1,000 nests; more than 100 breeding pairs of Great Blue Herons (*Ardea herodias*) and Great Egrets (*Ardea alba*) use this rookery. Additional heron species breed elsewhere in the IBA (Minnesota DNR 2010d). The Bloomington (MNBL) CBC count circle (results summarized above and in Table 6) overlaps a segment of this IBA (Figure 6).

Although in close proximity to two major migratory corridors, there are limited existing data on migration through the project area. However, the potential for migration activity in the project area is likely to be low. The project area provides minimal suitable stopover habitat. Agricultural fields (primarily corn) and developed open space occupy approximately 95% of the project area, as well as most of the surrounding vicinity (Figure 3). Natural habitat is conferred only by the narrow grassland, scrub and forest fragments which are scattered across the landscape and comprise less than 4% of the project area. Small, isolated wetlands are dispersed across the landscape, but there are none within the project area (Figure 4). The small, intermittent streams originating south of the project area are not large enough to serve as major stopover sites for migratory waterfowl. Given the limited suitability of habitat within the project area, and the abundance of high-quality avian habitats along the Mississippi and Minnesota River Corridors, the

dispersal of birds from the migration corridors into the project area would be unlikely. Any migrating birds moving across the project area would be likely to fly over at high elevation, above the rotor-swept area of the proposed wind turbine.

Among non-migrating birds, generalist or fringe species are more likely to utilize the project area than grassland or forest specialists or waterfowl, considering the landcover composition within the project area. The predominance of cultivated crops and development in the project area and surrounding vicinity has likely resulted in a lower overall diversity of avian species, although avian density may or may not have been impacted.

Potential Impacts

Wind energy facilities impact birds in three ways: loss of habitat; avoidance of turbines and the surrounding habitat by birds; and fatalities resulting from collisions with turbines, powerlines, and other project related structures (Winegrad 2004). The magnitudes of these impacts vary across taxa and geographic regions. Most research to-date has focused on the avian mortality associated with wind energy facilites; however, the other types of impacts may also significantly affect avian populations and require consideration when assessing the potential consequences of a wind energy facility (The Ornithological Council 2007).

Avian habitat within the project area is already of limited quality, given the predominance of cultivated crops. Therefore, the footprint of the proposed project would not be likely to cause serious disturbance to high-quality avian habitat in the area. Moreover, wind farms typically only result in the loss of 0.7-1.0 acres per turbine, leaving the majority of existing habitats on the project area intact (Strickland 2004).

Although bird activity within the project area appears to be low, there is potential for the project to cause avoidance. Although bird diversity is generally low in agricultural areas such as the project area, bird density may actually be fairly high. Avoidance impacts generally extend 75-800m from a turbine, depending on the environment and the bird species affected (Strickland 2004). Many Midwestern sites show small-scale avoidance impacts around turbines, particularly for grassland bird species (eg. Grasshopper Sparrow [*Ammodramus savannarum*]; Strickland 2004, Shaffer and Johnson 2008). Bird species adapted to human disturbances, such as those species (eg. Killdeer [*Charadrius vociferus*]) which are likely to utilize agricultural areas, are less likely to exhibit avoidance behavior near turbines (Shaffer and Johnson 2008).

There is also potential for the project to cause bird fatalities from collisions. Nationally, wind turbines are responsible for 0.01-0.02% of all avian fatalities due to human structures, averaging 0-3 birds killed per turbine per year (Erickson et al. 2002). Mortality rates at Midwest sites, particularly agricultural ones, are typically lower, generally averaging 1-2 birds killed per turbine per year (Erickson et al. 2002 and 2008). Studies have shown mortality rates to be very consistent across wind energy facilities, both nationally and within regional ranges. The number of avian fatalities at wind energy facilities is generally low when compared to the total number of birds detected at these sites (Erickson et al. 2002).

Mortality reports from projects located on farmland in the Midwest are the most relevant to the UMore Park Research Wind Turbine project. A four-year mortality study at the Buffalo Ridge, Minnesota wind energy facility, which is located in an agricultural landscape similar to the UMore Park site, has reported mortality rates ranging from 1 bird killed per turbine per year to 4.45 birds killed per turbine per year (Johnson et al. 2000). The higher number resulted from one incident in which 14 birds were killed at two adjacent turbines in one night. This event seems to be an anomaly, as no other single mortality event of this magnitude has been reported to-date (Erickson et al 2002). Thirty-one different species were reported killed; 70% were migrants, only 2% were raptors (Johnson et al. 2000). A one-year study at a wind energy facility in Wisconsin reported 0.58 birds killed per turbine. Another one-year study of two turbines in Shirely, WI, reported 0.5 birds killed per turbine. Other studies at very small wind facilities in Iowa and Kansas have reported no fatalities (Kerlinger 2002).

Passerines, both resident and migrant, are likely to constitute the greatest number of fatalities on the

project area, as these are nationally the most commonly killed, comprising nearly 80% of avian fatalities at Midwest wind energy facilities (Erickson et al. 2008). Night-migrating passerines may be at a higher risk, accounting for over 50% of avian fatalities at certain sites, but no particular species or group of species has been identified as incurring greater numbers of fatalities (Erickson et al. 2002). Furthermore, no large scale night migration related mortality events have been observed at wind farms as has been seen at communications towers (Erickson et al. 2002).

Although the project area is located near the Mississippi River Corridor and the Minnesota River Valley and therefore may experience some waterfowl activity, wind energy facility impacts on waterfowl are generally very low. Together, waterfowl, waterbirds, shorebirds, and rails/coots account for approximately 15% of avian fatalities at Midwest wind energy facilities (Erickson et al. 2008). The only sites experiencing regular waterfowl fatalities have been those located on the shores of large, open expanses of water. Risk to waterfowl may be increased on the project area during the winter months if the croplands within the project area attract large flocks of Canada Geese (Erickson et al. 2002).

Raptor mortality at wind energy facilities has been a high-profile issue in the past, largely due to the high levels of mortality observed at the Altamont Wind Resource Area in California. New wind energy facilities, however, have greatly lessened their impacts to raptors, mostly based on the new turbine design. New generation turbines have tubular support structures instead of lattice structures, which eliminates perching by raptors; they also have larger blades, which reduces motion blur. Risk to raptors from the proposed project is likely to be low; outside of California, where rates are greatly influenced by the Altamont site, nation-wide raptor mortality rates average 0.006 mortalities/turbine/year (Erickson et al. 2002). Four years of post-construction monitoring reported only one raptor kill (a red-tailed hawk [*Buteo jamaicensis*]) on the Buffalo Ridge site, which is located in Minnesota in habitat similar to that in the project area (Johnson et al. 2000).

Although avian abundance appears to be low within the project area and surrounding vicinity, this does not necessarily indicate a reduced risk of mortalities. To-date, no studies have successfully correlated observed measures of abundance with subsequent mortality. Several factors could explain this, including the low variance in mortality rates which makes detection of patterns in the data difficult, as well as the potential importance of avian behavior. Collision avoidance behaviors and rates vary between species and habitats. Small differences in the rate of collision avoidance have been shown to strongly influence predicted mortality rates (Chamberlain et al. 2006). However, the study of avian behavior is expensive, labor-intensive, and difficult to accurately document.

Given the similarity of the UMore Park project area to other Midwest wind energy facility sites, its lack of unique avian species or habitat, and the consistency of mortality rates across the region, the mortality rates for a wind energy facility at this site are likely to be comparable to those at other Midwest sites. The best available indicator of the risk to birds resulting from the UMore Park Research Wind Turbine project may be the mortality rates which have been reported for similar sites in the Midwest. Based on these rates, avian mortality at the UMore Park turbine would be expected to be low, likely only 1-2 birds killed per year.

Other possible risks to birds may result from the meteorological (MET) tower which will be constructed on the project area. Data on MET tower impacts to birds are limited to two post-construction monitoring surveys. Over a four-year study at the Foote Creek Rim Wind Plant in Wyoming, avian fatalities were found at all five MET towers. Habitat in the project area consisted primarily of mixed grass prairie and sagebrush shrubland. An average of 8.09 birds were killed per MET tower per year, comprised of both resident and migrant species. On average, avian mortality was three times greater at MET towers than at the turbines (Young et al. 2003). Over a one-year study at the Klondike Wind Project in Oregon, no avian fatalities were found at the single MET tower. Habitat at this wind energy facility consisted of grazed shrub-steppe, cultivated wheat fields, and other agricultural fields (Johnson et al., 2003). The difference in these study results may be due to differences in location, habitat, and structural characteristics between the two projects.

Impacts to birds from the MET tower proposed for the project area may be comparable to impacts caused by similar communications towers, for which more data are available. Direct avian mortality appears to be the primary impact associated with these structures. Avian mortality at communications towers varies greatly depending on tower height, lighting, color, structure, and the presence of guy wires. Mortality may range from 82-3,199 birds killed per tower per year (The Ornithological Council 2007). Guyed towers 380-480 feet tall may have mortality rates ranging from one per tower per 20 days to 12.3 per tower per 20 days, depending on the type of lighting on the tower – white strobe lighting typically results in the lowest mortality rate (The Ornithological Council 2007). The proposed MET tower would be 130 meters (426 feet) tall, with a tubular structure and guy wires. This MET tower may therefore result in single and small-scale bird fatality events, although the number of fatalities may be reduced through the use of bird flight diverters on the guy wires and white strobe lighting on the tower. Any impacts would be temporary, as the proposed MET tower would be an impermanent structure and would only have the potential to impact bird resources on the project area while it remained in operation.

Bat Use of the Area

No records of specific bat surveys were found for Dakota County. The project area is located in a region of moderate bat species diversity (Cryan 2008). Based on review of national range maps (BCI 2010), a total of six species of bats have geographic distributions that may include the project area:

Little Brown Myotis (*Myotis lucifugus*)	Silver-haired Bat (*Lasionycteris noctivagans)*
Big Brown Bat (*Eptesicus fuscus*)	Eastern Red Bat (*Lasiurus borealis*)
Hoary Bat (*Lasiurus cinereus*)	Eastern Pipistrelle (*Perimyotis subflavus*)*
	*Minnesota species of special concern & SGCN

All of these species, except the big brown bat, require woodland habitat for feeding or roosting at some time during the year (BCI 2010). Many of these species also forage along stream corridors or over water. The big brown bat is most abundant in deciduous forests but this generalist species will also forage over agricultural fields (BCI 2010). The project area consists primarily (82%) of agricultural (corn) fields, which may provide suitable habitat for the big brown bat. The cultivated fields are intersected by lines of trees and shrubs, although this potentially-suitable bat habitat only comprises approximately 3% of the project area (Figure 3). A few small, intermittent streams originate south of the project area. Additionally, small, isolated wetlands are scattered across the landscape in the project vicinity (Figure 4). These features may provide limited roosting or foraging habitat for other bat species in the area.

The eastern pipistrelle, a Minnesota species of special concern and SGCN, has been recorded for several counties which border Dakota County. The species has been recorded in Washington, Ramsey, and Hennepin counties to the north; Goodhue, Wabasha, and other counties bordering the Mississippi River to the south; and Nicollet County to the west (Minnesota DNR 2010e). The species remains listed as a special concern species and SGCN in Minnesota due to its small population size and its potential susceptibility to disturbances (Minnesota DNR 2010e). During avian mortality studies for a wind energy development in Lincoln County, MN, seven eastern pipistrelle fatalities were recorded between 1995 and 1999 (Minnesota DNR 2010e). Although no records of occurrence presently exist for Dakota County, eastern pipistrelles may potentially occur in the vicinity of the project area, given the fragments of woodland habitat and small intermittent streams which transect the agricultural and developed areas (Figures 3 and 4).

Potential Impacts

As with birds, wind energy facilities can have a variety of impacts on bats, including indirect impacts due to habitat loss as well as direct mortality from turbine collisions and barotrauma. Indirect impacts may result from the loss of habitat for roosting and foraging, as well as the loss of habitat along migration

corridors. There are no data available on indirect impacts to bats resulting from wind energy facilities; all studies are currently focused on attempting to understand and mitigate the direct mortalities occurring at these sites.

Wind turbine collisions and/or barotrauma are causing a greater magnitude of direct mortalities of the affected bat species than result from any other human source of bat mortality (i.e. large buildings, met towers, etc.; Cryan 2008). The risk to bats at wind energy facilities appears to vary greatly by species, season, and geographic region. Of the 45 North American bat species, three migratory tree bat species: the eastern red bat, hoary bat and silvered-haired bat (all of which potentially occur within the project area), comprise nearly 75% of all bat fatalities at wind energy facilities (Kunz et al. 2007). Other species frequently killed at wind energy facilities include the eastern pipistrelle (a Minnesota species of special concern and SGCN), the little brown myotis, and the big brown bat, all of which potentially occur within the project area (Kunz et al. 2007).

Tree bat fatalities predominately occur in late summer and autumn (Cryan 2008). Mortalities appear to be primarily associated with migrating or dispersing bats, not residents, given the seasonality of the mortalities (Erickson et al. 2002). Studies indicate that most bat fatalities occur on low-wind nights and during thermal inversions following storm fronts, when insects are likely to be most active (Kunz et al. 2007). Larger turbines and those operating at lower cut-in speeds (below 5.0 m/s) cause higher numbers of bat fatalities (Cryan 2008, and Arnett et al. 2009). The proposed Siemens 2.3 MW turbine is moderately-sized, having an 80-meter hub height, a 93-meter diameter rotor, and a 5,333-meter^2 rotor-swept area. This may lower the risk to bats from the project. Studies suggest that increasing cut-in speeds during periods of high-risk for bat mortalities could potentially reduce nightly fatalities by 53-87%, with only marginal annual power loss (Arnett et al. 2009).The proposed Siemens 2.3 MW turbine has a cut-in speed of 3-5 m/s; at the higher end of this cut-in range, the risk to bats from the project would likely be much lower. Nationwide, bat mortalities have been highest at wind energy facilities located along forested ridge tops in eastern North America and lowest at facilities sited in relatively open landscapes in the Midwest and West (Kunz et al. 2007). It is unclear, however, if this may partially be a result of less-stringent bat-mortality monitoring at facilities in the West (Kunz et al. 2007). The estimated mean bat fatality per turbine per year for Midwest sites is between 0.1 and 7.8 (Arnett et al. 2008).

The proposed MET tower could also potentially cause impacts to bats in the project area. However, no bat mortality data have yet been collected for MET towers. Neither the Foote Creek Rim Wind Plant nor the Klondike Wind Project surveys reported any bat fatalities at MET towers (Young et al., 2003; Johnson et al., 2003). The risk to bats from the proposed MET tower would appear to be similar to the risk to birds, as bat mortalities at communications towers, although not well-understood, were often associated with avian mortalities in the few studies available (Osborn et al. 1996). Therefore, the MET tower may be expected to cause single and small-scale bat mortality events. As with the proposed turbine, the potential risk to bats from the proposed MET tower would be more likely to affect migratory bats, since migrants have comprised the majority of mortalities found at similar man-made structures (Johnson et al. 2000).

Designated Natural Resource Areas

There are no federal-, state-, or Minnesota DNR-managed natural resource areas within or immediately adjacent to the proposed UMore Park Research Wind Turbine project area (Figure 7). The nearest is Vermillion Highlands, a 2,822 acre research, recreation, and wildlife management area (WMA), which borders UMore Park to the south, approximately one mile from the project area. Vermillion Highlands is jointly managed by the University of Minnesota and the Minnesota DNR for research, recreation, hunting, and wildlife management (Regents of the University of Minnesota 2009). This WMA provides core habitat and wildlife corridors for avian species which may include Henslow's Sparrow (*Ammodramus henslowii;* SGCN, State-Endangered), Loggerhead Shrike, Grasshopper Sparrow (SGCN), Upland Sandpiper (*Bartramia longicauda*; SGCN), Bobolink (*Dolichonyxoryzivorus*; SGCN), Dickcissel (*Spiza Americana*; SGCN), Field Sparrow (*Spizella pusilla*; SGCN), and Eastern Meadowlark (*Sturnella magna*; SGCN; Coberly and Chapman 2008a, b, and c).

Other Minnesota DNR-managed wildlife management areas in the region which may provide habitat for bird and bat species include:

- Vermillion River
- Hastings
- Chub Lake
- Gores Pool #3

Minnesota DNR-managed scientific and natural areas in the region include:

- Grey Cloud Dunes (117 recorded bird species)
- Pine Bend Bluffs (111 recorded bird species)
- Black Dog Nature Preserve (81 recorded bird species)
- Hastings
- Hastings Sand Coulee
- Pig's Eye Island Heron Rookery (89 recorded bird species; one of four locations in MN with breeding Yellow-crowned Night Herons [*Nyctanassa violacea*]; other breeders include egrets, cormorants, other heron species, and Bald Eagles)

There are also two state parks in the region (Figure 7). Fort Snelling State Park is approximately 12 miles north of the project area and contains lowland river, lake, marsh, shore, and woodland habitats which support an abundance of waterfowl and other avian species (Minnesota DNR 2010f). Afton State Park is approximately 17 miles to the northeast and contains grassland, woodland, and riverine habitats that host a wide variety of avian species. Additionally, Afton State Park is located along the St. Croix River Corridor, which is frequently used by migrating raptors such as Turkey Vultures (*Cathartes aura*) and Bald Eagles (Minnesota DNR 2010g).

The Mississippi River Corridor, located approximately 3 miles northeast of the project area (Figure 6), is one of four major North American migration flyways, serving as the migratory corridor for approximately 40% of North America's waterfowl and shorebirds (Minnesota DNR 2010c).The Mississippi River Corridor is discussed in greater detail under **Bird Use of the Area**, above. The 38 river-mile section from Minneapolis to Hastings is designated as the Twin Cities Mississippi River IBA. This IBA provides stopover habitat for migratory waterbirds, including: loons, cormorants, gulls, terns, herons, egrets, pelicans, coots, grebes, and others. The IBA also contains a mixed-species heron rookery, at least eight Bald Eagle breeding territories, and six to eight pairs of Peregrine Falcons (Minnesota DNR 2010c).

The Minnesota River Valley is located approximately 11 miles northwest of the project area (Figure 6). The Minnesota Valley NWR and the Lower Minnesota River Valley IBA are located in this area. The Minnesota River Valley is discussed in greater detail under **Bird Use of the Area**, above. The Lower Minnesota River Valley IBA includes Fort Snelling State Park, the Minnesota Valley NWR, the Black Dog Nature Preserve SNA, and the Minnesota Valley State Recreation Area. This IBA regularly supports 50,000 waterfowl during the spring and fall migrations. Over 260 bird species have been recorded at this IBA, including 20 species of ducks and over 100 resident breeding species. A rookery with more than 1,000 nests is located within the NWR. In the winter, Black Dog Lake supports more than 5,000 waterfowl, including several Bald Eagles (Minnesota DNR 2010d).

The Murphy-Hanrehan Park Reserve IBA is located several miles southwest of the project area. At least 85-90 native bird species regularly breed within this IBA, including Minnesota's only known breeding population of Hooded Warblers (*Wilsonia citrina*), and several Minnesota species of concern (Minnesota DNR 2010h).

SUMMARY

NRC conducted an avian and bat screening analysis for the proposed UMore Park Research Wind Turbine project in Dakota County, Minnesota. The screening included a search and review of existing bird and bat literature and databases, as well as a desktop analysis to identify and locate sensitive and

designated natural resource areas within or near the project area. Below is a summary of the results of the screening analysis:

- Landcover within the project boundary and surrounding environmental study area is predominately agricultural, with approximately 82% of the area in rowcrop production. Approximately 13% of the land within the project area is developed open space. Approximately 2% is utilized for pasture/hay production and may provide some habitat for grassland bird species. Shrub/scrub habitat, deciduous forests, and grassland/herbaceous habitat make up less than 4% of the project area. Although limited, these areas may provide some habitat for woodland and grassland-specialist bird and bat species.

- A total of 103 bird species have been identified as breeding in the project area and vicinity (within approximately 5 miles), including two state-threatened species (Loggerhead Shrike, Trumpeter Swan), two state-listed special concern species (Bald Eagle and American White Pelican), and 19 other SGCN.

- The Mississippi River Corridor, although not located within the proposed project boundary, is a major North American migration corridor and includes important conservation areas for the region. The Minnesota River Valley, also a major migration corridor and site of several important conservation areas, is near the project area as well. It is possible that migrating birds utilizing the Mississippi and Minnesota River Corridors occasionally pass through the project area as they make their way along the flyways. However, given the lack of highly suitable stopover habitat, it is unlikely that migrant waterfowl would pass through the project area at an altitude that would subject them to collision risk.

- Given the similarity of the UMore Park Research Wind Turbine project area to other Midwest wind energy facility sites, its lack of unique avian species or habitat, and the consistency of mortality rates across regions, the mortality rates for a wind energy facility at this site are likely to be comparable to the low mortality rates observed at other Midwest sites (1-2 birds killed per year per turbine).

- Limited information is available concerning the bats in the area. No specific records are known for the project area; however, it is located within the known range of six species of bats, including the eastern pipistrelle, a state-listed special concern species and SGCN.

- The state-threatened Loggerhead Shrike is the only federally- or state-listed species with a record of occurrence within the project area or immediate vicinity (<1 mile).

- There are no designated natural resource areas or other areas of concern located within the project area.

RECOMMENDATIONS

Based on the size of the proposed facility, the amount of existing information regarding birds and bats in and around the project area, the consistently low mortality rates observed at other wind energy facilities in the Midwest, and the low potential for significant impacts to birds and bats resulting from this project, we do not recommend any additional study of bird and bat abundance in the project area. Moreover, because pre-construction use and abundance metrics are apparently not correlated with subsequent mortality rates, additional field studies would be unlikely to provide greater accuracy in predicting potential impacts.

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TABLES

Table 1. Dakota County Breeding Bird Species List
(Minnesota County Biological Survey)

Bird Species[1]	Status[2]	SGCN (Y/N)[3]
Acadian Flycatcher	SC	Y
Alder Flycatcher		N
American Crow		N
American Goldfinch		N
American Kestrel		N
American Redstart		N
American Robin		N
American Woodcock		Y
Bald Eagle	SC	Y
Baltimore Oriole		N
Bank Swallow		N
Barn Swallow		N
Belted Kingfisher		N
Bell's Vireo		Y
Black-billed Cuckoo		Y
Black-capped Chickadee		N
Black-crowned Night-Heron		Y
Blue-gray Gnatcatcher		N
Blue Jay		N
Blue-winged Teal		N
Blue-winged Warbler		Y
Bobolink		Y
Brown Creeper		N
Brown-headed Cowbird		N
Brown Thrasher		Y
Canada Goose		N
Cedar Waxwing		N
Cerulean Warbler	SC	Y
Chipping Sparrow		N
Clay-colored Sparrow		N
Cliff Swallow		N
Common Grackle		N
Common Yellowthroat		N
Cooper's Hawk		N
Double-crested Cormorant		N
Downy Woodpecker		N
Eastern Bluebird		N
Eastern Kingbird		N
Eastern Meadowlark		Y
Eastern Phoebe		N

Table 1. Dakota County Breeding Bird Species List
(Minnesota County Biological Survey)

Bird Species[1]	Status[2]	SGCN (Y/N)[3]
Eastern Towhee		N
Eastern Wood-Pewee		Y
European Starling		N
Field Sparrow		Y
Grasshopper Sparrow		Y
Gray Catbird		N
Great Blue Heron		N
Great Crested Flycatcher		N
Great Egret		N
Green Heron		N
Hairy Woodpecker		N
Hooded Merganser		N
Hooded Warbler	SC	Y
Horned Lark		N
House Finch		N
House Wren		N
Indigo Bunting		N
Killdeer		N
Least Bittern		Y
Least Flycatcher		Y
Loggerhead Shrike	ST	Y
Mallard		N
Marsh Wren		Y
Mourning Dove		N
Mourning Warbler		N
Northern Cardinal		N
Northern Flicker		N
Northern Rough-winged Swallow		Y
Ovenbird		Y
Peregrine Falcon	ST	Y
Pied-billed Grebe		N
Pileated Woodpecker		N
Prothonotary Warbler		Y
Red-bellied Woodpecker		N
Red-breasted Nuthatch		N
Red-eyed Vireo		N
Red-headed Woodpecker		Y
Red-shouldered Hawk	SC	Y
Red-tailed Hawk		N
Red-winged Blackbird		N

Table 1. Dakota County Breeding Bird Species List
(Minnesota County Biological Survey)

Bird Species[1]	Status[2]	SGCN (Y/N)[3]
Ring-necked Pheasant		N
Rose-breasted Grosbeak		Y
Ruby-throated Hummingbird		N
Ruffed Grouse		N
Scarlet Tanager		N
Sedge Wren		Y
Song Sparrow		N
Sora		N
Spotted Sandpiper		N
Swamp Sparrow		Y
Tree Swallow		N
Upland Sandpiper		Y
Veery		Y
Vesper Sparrow		N
Warbling Vireo		N
Western Meadowlark		N
White-breasted Nuthatch		N
Wild Turkey		N
Willow Flycatcher		Y
Wilson's Snipe		N
Winter Wren		Y
Wood Duck		N
Wood Thrush		Y
Yellow-bellied Sapsucker		Y
Yellow-headed Blackbird		N
Yellow-throated Vireo		N
Yellow Warbler		N

Footnotes

[1] Species present according to the Minnesota County Biological Survey (Minnesota DNR 2010b)

[2] Status is based on protection categories designated by the Minnesota DNR: SC= state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

[3] Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

Table 2. UMore Park Project Area Breeding Bird Species List

MNBBA Survey Block T115R19b (Region 25)

Bird Species[1]	Status[2]	SGCN (Y/N)[3]	Breeding Status[4]
American Crow		N	Observed
American Goldfinch		N	Probable
American Robin		N	Confirmed
Bald Eagle	SC	Y	Observed
Baltimore Oriole		N	Observed
Barn Swallow		N	Confirmed
Black-capped Chickadee		N	Observed
Blue-winged Teal		N	Possible
Brown-headed Cowbird		N	Observed
Brown Thrasher		Y	Observed
Canada Goose		N	Confirmed
Cedar Waxwing		N	Probable
Chimney Swift		N	Observed
Chipping Sparrow		N	Possible
Common Grackle		N	Probable
Common Yellowthroat		N	Probable
Cooper's Hawk		N	Observed
Dickcissel		Y	Probable
Eastern Bluebird		N	Confirmed
Eastern Kingbird		N	Probable
Eastern Meadowlark		Y	Probable
Eastern Phoebe		N	Possible
Eastern Towhee		N	Possible
Eastern Wood-Pewee		Y	Possible
European Starling		N	Confirmed
Field Sparrow		Y	Possible
Grasshopper Sparrow		Y	Probable
Gray Catbird		N	Probable
Green Heron		N	Possible
Hooded Merganser		N	Confirmed
Horned Lark		N	Observed
House Finch		N	Probable
House Sparrow		N	Probable
House Wren		N	Probable
Indigo Bunting		N	Probable
Killdeer		N	Confirmed
Lark Sparrow		N	Probable
Loggerhead Shrike	ST	Y	Possible
Mallard		N	Confirmed
Mourning Dove		N	Observed
Northern Cardinal		N	Probable
Northern Rough-winged Swallow		Y	Confirmed
Northern Shoveler		N	Observed
Purple Martin		N	Confirmed

Table 2. UMore Park Project Area Breeding Bird Species List

MNBBA Survey Block T115R19b (Region 25)

Bird Species[1]	Status[2]	SGCN (Y/N)[3]	Breeding Status[4]
Red-eyed Vireo		N	Observed
Red-tailed Hawk		N	Observed
Red-winged Blackbird		N	Probable
Ring-necked Pheasant		N	Possible
Rock Pigeon		N	Observed
Rose-breasted Grosbeak		Y	Possible
Sandhill Crane		N	Probable
Sedge Wren		Y	Probable
Song Sparrow		N	Probable
Tree Swallow		N	Confirmed
Trumpeter Swan	ST	Y	Confirmed
Turkey Vulture		N	Observed
Vesper Sparrow		N	Observed
Wild Turkey		N	Observed
Willow Flycatcher		Y	Possible
Wood Duck		N	Confirmed
Yellow Warbler		N	Possible

Footnotes

1 Species present according to the Minnesota BBA survey of block T115R19b (Cornell Lab of Ornithology 2009)

2 Status is based on protection categories designated by the Minnesota DNR: SC= state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

3 Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

4 "Observed"= Species observed in a block within safe dates, but no evidence of breeding.

Table 3. UMore Park Project Vicinity[5] Breeding Bird Species List

Bird Species[1]	Status[2]	SGCN (Y/N)[3]	Breeding Status[4]			
			T115R20b	T114R20a	T114R18a[6]	T115R17c
American Crow		N	Confirmed	Probable		Confirmed
American Goldfinch		N	Confirmed	Probable		
American Kestrel		N		Possible		
American Redstart		N				Probable
American Robin		N	Confirmed	Confirmed		Confirmed
American White Pelican	SC	Y				Observed
American Woodcock		Y		Probable		Probable
Bald Eagle	SC	Y	Observed			Confirmed
Baltimore Oriole		N	Confirmed			Confirmed
Bank Swallow		N	Confirmed	Possible		
Barn Swallow		N	Confirmed	Confirmed		Possible
Bell's Vireo		Y				Probable
Belted Kingfisher		N				Possible
Black-capped Chickadee		N	Confirmed	Probable		Probable
Black-crowned Night-Heron		Y				Observed
Blue-gray Gnatcatcher		N				Probable
Blue Jay		N	Possible	Probable		Confirmed
Blue-winged Teal		N		Probable		
Bobolink		Y				Possible
Brown-headed Cowbird		N	Confirmed	Possible		Confirmed
Brown Thrasher		Y	Confirmed	Possible		
Canada Goose		N	Confirmed	Confirmed	Observed	Confirmed
Cedar Waxwing		N	Possible			
Chimney Swift		N	Probable			Possible
Chipping Sparrow		N	Confirmed	Probable		Possible
Clay-colored Sparrow		N	Possible	Possible		
Cliff Swallow		N	Confirmed	Probable		Probable
Common Grackle		N	Confirmed	Confirmed		Confirmed
Common Nighthawk		Y		Probable		Possible
Common Yellowthroat		N		Probable		Probable
Cooper's Hawk		N	Confirmed	Possible		Confirmed
Dickcissel		Y	Confirmed			Possible
Double-crested Cormorant		N	Observed	Observed		Observed
Downy Woodpecker		N	Possible	Possible	Observed	Possible
Eastern Bluebird		N	Confirmed	Confirmed		Confirmed
Eastern Kingbird		N	Possible			Probable
Eastern Meadowlark		Y				Possible
Eastern Phoebe		N	Confirmed	Probable		Probable
Eastern Wood-Pewee		Y		Probable		Possible
European Starling		N	Possible	Probable		Confirmed
Field Sparrow		Y		Possible		
Grasshopper Sparrow		Y	Probable			
Gray Catbird		N	Probable	Confirmed		Probable
Great Blue Heron		N	Observed	Observed		Observed
Great Crested Flycatcher		N				Possible
Great Egret		N	Observed	Observed		Observed

Table 3. UMore Park Project Vicinity[5] Breeding Bird Species List

Bird Species[1]	Status[2]	SGCN (Y/N)[3]	Breeding Status[4]			
			T115R20b	T114R20a	T114R18a[6]	T115R17c
Great Horned Owl		N	Probable	Confirmed		
Green Heron		N	Probable	Probable		Confirmed
Green-winged Teal		N		Possible		
Hairy Woodpecker		N		Possible	Observed	Possible
Herring Gull		N	Observed			
Hooded Merganser		N	Possible	Confirmed		
Horned Lark		N	Confirmed	Possible	Probable	Possible
House Finch		N	Confirmed	Probable		Confirmed
House Sparrow		N	Confirmed	Confirmed		Confirmed
House Wren		N	Confirmed	Confirmed		Confirmed
Indigo Bunting		N	Possible	Probable		Possible
Killdeer		N	Confirmed	Confirmed		Confirmed
Lark Sparrow		N	Probable			
Mallard		N	Confirmed	Confirmed		Confirmed
Marsh Wren		Y				Probable
Mourning Dove		N	Confirmed	Probable		Probable
Northern Cardinal		N	Confirmed	Probable	Observed	Probable
Northern Flicker		N				Possible
Northern Rough-winged Swallow		Y		Possible		
Pileated Woodpecker		N				Possible
Pine Siskin		N				Possible
Prothonotary Warbler		Y				Probable
Red-bellied Woodpecker		N	Possible			Possible
Red-tailed Hawk		N	Possible	Possible		Possible
Red-winged Blackbird		N	Confirmed	Confirmed		Probable
Ring-billed Gull		N	Observed			Observed
Ring-necked Pheasant		N	Possible			Possible
Rock Pigeon		N	Confirmed	Probable		Possible
Rose-breasted Grosbeak		Y		Probable		Possible
Ruby-throated Hummingbird		N	Possible	Possible		Possible
Sandhill Crane		N				Probable
Savannah Sparrow		N	Confirmed	Probable		Probable
Scarlet Tanager		N				Possible
Song Sparrow		N	Confirmed	Probable		Probable
Sora		N		Possible		Probable
Spotted Sandpiper		N	Confirmed	Confirmed		Possible
Swamp Sparrow		Y				Probable
Tree Swallow		N	Confirmed	Confirmed		Confirmed
Turkey Vulture		N		Observed		Observed
Vesper Sparrow		N				Probable
Virginia Rail		Y				Possible
Warbling Vireo		N		Possible		Probable
White-breasted Nuthatch		N	Confirmed			Probable
Wild Turkey		N		Possible		
Willow Flycatcher		Y		Probable		
Wilson's Snipe		N	Observed			
Wood Duck		N	Confirmed	Confirmed		Confirmed

Table 3. UMore Park Project Vicinity[5] Breeding Bird Species List

Bird Species[1]	Status[2]	SGCN (Y/N)[3]	Breeding Status[4]			
			T115R20b	T114R20a	T114R18a[6]	T115R17c
Yellow-billed Cuckoo		N				Possible
Yellow-headed Blackbird		N		Possible		
Yellow-throated Vireo		N				Confirmed
Yellow Warbler		N				Probable

Footnotes

1 Species present according to the Minnesota BBA survey of the listed blocks (Cornell Lab of Ornithology 2009)

2 Status is based on protection categories designated by the Minnesota DNR: SC=state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

3 Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

4 "Observed"= Species observed in a block within safe dates, but no evidence of breeding.

5 Within 5 miles of the project area boundary; exception is block T115R17c, which is considered in this analysis in place of adjacent block T115R18b, for which no data have yet been collected.

6 Records for this survey block are limited, as only 4.5 survey-hours of data have been collected thus far.

Table 4. North American Breeding Bird Survey – Lakeville Route (Dakota County) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Birds/Route[4]
Alder Flycatcher		N	0.03
American Bittern		Y	0.03
American Coot		N	0.19
American Crow		N	20.64
American Goldfinch		N	10.75
American Kestrel		N	3.42
American Redstart		N	0.03
American Robin		N	47.42
American Woodcock		Y	0.06
Bald Eagle	SC	N	0.03
Baltimore Oriole		N	3.64
Bank Swallow		N	3.72
Barn Swallow		N	39.92
Belted Kingfisher		N	0.78
Black-billed Cuckoo		Y	0.36
Black-capped Chickadee		N	1.22
Black-crowned Night Heron		Y	0.14
Black Tern		Y	0.28
Blue-grey Gnatcatcher		N	0.03
Blue Jay		N	5.22
Blue-winged Teal		N	0.31
Bobolink		Y	10.78
Brewer's Blackbird		N	2.31
Brown-headed Cowbird		N	24.36
Brown Thrasher		Y	4.61
Canada Goose		N	10.78
Cedar Waxwing		N	3.39
Chimney Swift		N	1.69
Chipping Sparrow		N	13.17
Clay-colored Sparrow		N	3.67
Cliff Swallow		N	8.53
Common Grackle		N	179.33
Common Nighthawk		Y	0.39
Common Snipe		N	0.33
Common Yellowthroat		N	24.75
Cooper's Hawk		N	0.06
Dickcissel		Y	5.72
Downy Woodpecker		N	0.44
Eastern Bluebird		N	0.81

Table 4. North American Breeding Bird Survey – Lakeville Route (Dakota County) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Birds/Route[4]
Eastern Meadowlark		Y	0.89
Eastern Kingbird		N	3.50
Eastern Phoebe		N	0.83
Eastern Wood-Pewee		Y	1.06
European Starling		N	131.78
Field Sparrow		Y	0.53
Gadwall		N	0.03
Grasshopper Sparrow		Y	2.39
Gray Catbird		N	6.56
Gray Partridge		N	0.28
Great Blue Heron		N	2.64
Great Crested Flycatcher		N	0.81
Great Egret		N	2.75
Great Horned Owl		N	0.39
Green Heron		N	0.94
Hairy Woodpecker		N	0.19
Horned Lark		N	8.17
House Finch		N	3.61
House Sparrow		N	65.53
House Wren		N	11.86
Indigo Bunting		N	4.06
Killdeer		N	14.78
Least Flycatcher		Y	0.11
Loggerhead Shrike	ST	Y	0.22
Mallard		N	14.89
Marsh Wren		Y	0.19
Mourning Dove		N	56.03
Northern Bobwhite		N	0.03
Northern Cardinal		N	5.56
Northern Flicker		N	3.92
Northern Harrier		Y	0.25
Northern Rough-winged Swallow		Y	0.42
Orchard Oriole		N	0.22
Pied-billed Grebe		N	0.28
Purple Martin		N	1.19
Red-eyed Vireo		N	0.17
Red-headed Woodpecker		Y	1.72
Red-tailed Hawk		N	0.86
Red-winged Blackbird		N	103.56
Ring-billed Gull		N	0.06

Table 4. North American Breeding Bird Survey – Lakeville Route (Dakota County) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Birds/Route[4]
Ring-necked Pheasant		N	20.83
Rock Dove		N	25.25
Rose-breasted Grosbeak		Y	1.36
Ruby-throated Hummingbird		N	0.03
Savannah Sparrow		N	4.36
Scarlet Tanager		N	0.03
Sedge Wren		Y	3.42
Song Sparrow		N	26.06
Sora		N	0.22
Spotted Sandpiper		N	0.78
Swainson's Hawk		Y	0.03
Swamp Sparrow		Y	0.44
Tree Swallow		N	2.61
Upland Sandpiper		Y	0.11
Vesper Sparrow		N	14.56
Warbling Vireo		N	4.33
Western Kingbird		N	0.08
Western Meadowlark		N	40.06
White-breasted Nuthatch		N	0.39
Wild Turkey		N	0.03
Willow/Alder Flycatcher		N	1.22
Willow Flycatcher		Y	1.19
Wilson's Phalarope	ST	Y	0.06
Wood Duck		N	1.25
Wood Thrush		Y	0.06
Yellow-billed Cuckoo		N	0.06
Yellow-headed Blackbird		N	2.22
Yellow-throated Vireo		N	0.06
Yellow Warbler		N	2.53

Footnotes

[1] Species present according to the North American Breeding Bird Survey for the Lakeville route (USGS Patuxent Wildlife Research Center, 2008)

[2] Status is based on protection categories designated by the Minnesota DNR: SC= state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

[3] Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

[4] Represents the average species abundance of the Lakeville route from 1966-2007

Table 5. Christmas Bird Count – Hastings-Etter (MNHE) Count Circle (Dakota and Washington Counties) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Number[4]
American Crow			318
American Coot			2
American Goldfinch			120
American Robin			519
American Tree Sparrow			220
Bald Eagle	SC	Y	29
Barred Owl			2
Barrow's Goldeneye			0[5]
Black-capped Chickadee			447
Blue Jay			174
Brown Creeper			3
Brown-headed Cowbird			4
Canada Goose			256
Cedar Waxwing			185
Common Goldeneye			400
Common Merganser			4
Cooper's Hawk			2
Dark-eyed Junco			692
Downy Woodpecker			90
Eurasian Collared-Dove			2
European Starling			244
Franklin's Gull	SC	Y	1
Gray Partridge			3
Hairy Woodpecker			28
Harlequin Duck			0[5]
Herring Gull			1
Horned Lark			24
House Finch			205
House Sparrow			346
Iceland Gull			0[5]
Lapland Longspur			23
Lesser Scaup		Y	3
Long-tailed Duck			2
Mallard			577
Mourning Dove			33
Northern Cardinal			195
Northern Flicker			3
Northern Shrike			5
Pileated Woodpecker			6

Table 5. Christmas Bird Count – Hastings-Etter (MNHE) Count Circle (Dakota and Washington Counties) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Number[4]
Pine Siskin			2
Purple Finch			12
Red-bellied Woodpecker			45
Red-breasted Nuthatch			2
Red-shouldered Hawk	SC	Y	1
Red-tailed Hawk			28
Ring-billed Gull			55
Ring-necked Duck			2
Ring-necked Pheasant			11
Rock Pigeon			346
Ruffed Grouse			2
Sharp-shinned Hawk			2
Snow Bunting			210
Thaver's Gull			0[5]
Trumpeter Swan	ST	Y	24
Tufted Titmouse			1
White-breasted Nuthatch			52
Wild Turkey			40

Footnotes

[1] Species present according to the Christmas Bird Count at the Hastings-Etter (MNHE) count circle (National Audubon Society, Inc., 2010a)

[2] Status is based on protection categories designated by the Minnesota DNR: SC= state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

[3] Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

[4] Represents the number of individuals recorded during the count year 110 (2009-2010) survey

[5] Species was reported in the area during count week, but not reported during the count

Table 6. Christmas Bird Count – Bloomington (MNBL) Count Circle (Dakota and Ramsey Counties) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Number[4]
American Black Duck		Y	4
American Crow		N	887
American Goldfinch		N	330
American Kestrel		N	1
American Robin		N	1340
American Tree Sparrow		N	169
American White Pelican	SC	Y	1
Bald Eagle	SC	Y	48
Barred Owl		N	6
Belted Kingfisher		N	3
Black-capped Chickadee		N	1109
Blue Jay		N	183
Brown Creeper		N	10
Canada Goose		N	614
Carolina Wren		N	2
Cedar Waxwing		N	293
Common Goldeneye		N	19
Common Merganser		N	269
Cooper's Hawk		N	3
Dark-eyed Junco		N	365
Double-crested Cormorant		N	1
Downy Woodpecker		N	231
European Starling		N	558
Franklin's Gull	SC	Y	1
Fox Sparrow		N	3
Gadwall		N	7
Glaucous Gull		N	3
Golden-crowned Kinglet		N	1
Great Horned Owl		N	5
Hairy Woodpecker		N	80
Herring Gull		N	925
Hooded Merganser		N	4
Horned Lark		N	5
House Finch		N	240
House Sparrow		N	701
Iceland Gull		N	3
Mallard		N	5016
Merlin		N	2
Mourning Dove		N	19

Table 6. Christmas Bird Count – Bloomington (MNBL) Count Circle (Dakota and Ramsey Counties) Species List

Bird Species Present[1]	Status[2]	SGCN (Y/N)[3]	Number[4]
Northern Cardinal		N	316
Northern Flicker		N	5
Nothern Shrike		N	7
Peregrine Falcon	ST	Y	1
Pileated Woodpecker		N	10
Purple Finch		N	1
Red-bellied Woodpecker		N	75
Red-breasted Merganser		N	0[5]
Red-breasted Nuthatch		N	6
Red-shouldered Hawk	SC	Y	1
Red-tailed Hawk		N	76
Red-winged Blackbird		N	1
Ring-billed Gull		N	11
Ring-necked Pheasant		N	7
Rock Pigeon		N	219
Rough-legged Hawk		N	6
Sharp-shinned Hawk		N	1
Snowy Owl		N	0[5]
Song Sparrow		N	4
Swamp Sparrow		Y	1
Thaver's Gull		N	7
Trumpeter Swan	ST	Y	43
White-breasted Nuthatch		N	198
White-winged Dove		N	1
Wild Turkey		N	204
Wood Duck		N	4

Footnotes

[1] Species present according to the Christmas Bird Count at the Blooomington (MNBL) count circle (National Audubon Society, Inc., 2010a)

[2] Status is based on protection categories designated by the Minnesota DNR: SC= state-listed special concern, ST= state-listed threatened, SE= state-listed endangered. No federally-listed avian species are recorded.

[3] Species of Greatest Conservation Need; Minnesota Wildlife Action Plan (Minnesota DNR 2010i)

[4] Represents the number of individuals recorded during the count year 110 (2009-2010) survey

[5] Species was reported in the area during count week, but not reported during the count