

Eagle Observation Surveys Number Nine Wind Farm, Aroostook County, Maine

**Final Report
September 2013 – August 2014**



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INTRODUCTION

Number Nine Wind Farm LLC, a subsidiary of EDPR Renewables North America LLC, (EDPR) has proposed a wind energy facility in Aroostook County, Maine, referred to as the Number Nine Wind Farm (Project). EDPR contracted Western EcoSystems Technology, Inc. (WEST) to conduct pre-Project construction surveys for wildlife resources in the Project area, including eagle observation surveys (EOS), to provide data useful in evaluating the potential risk and impacts that the development of a wind energy facility might have on eagles, as well as other raptors and vultures in the area. The survey area was based on an original layout consisting of 166 potential turbine locations. The Project layout has since been decreased to 129 potential turbine locations where 119 turbines will be sited.

The surveys were primarily intended to provide information regarding levels of use by bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) within the study area. Surveys were conducted primarily using methods described in the US Fish and Wildlife Service (USFWS) Eagle Conservation Plan Guidance (ECPG; USFWS 2013), but with additional data collection on all raptor and vulture species observed. Such observational surveys are currently recommended by the USFWS (2012, 2013) and the Maine Department of Inland Fisheries and Wildlife (MDIFW 2014) for characterizing levels of bird use within proposed development sites and for estimating risk a proposed wind energy project may pose to eagles and raptors.

The principal objectives of the surveys were to: 1) provide site-specific eagle resource and use data that would be useful in evaluating the potential impacts from the proposed wind energy facility, and 2) provide spatial data that could be used in project planning and design of the facility to minimize impacts to eagles through a qualitative assessment. The following report focuses on eagles; however, the additional data collected on all raptors and vultures is valuable in estimating potential impacts to these resources and corroborating results of other surveys. The data and analyses for other raptors and vultures observed during the surveys are reported in Appendix A to this report.

STUDY AREA

The Project is located in Aroostook County, in northeastern Maine, approximately eight miles (13 kilometers [km]) west of the town of Bridgewater (Figure 1). The Project is located in the Laurentian Plains and Hills Ecoregion in northeastern Maine (US Environmental Protection Agency [USEPA] 2007). The Laurentian Plains and Hills are characterized by spruce-fir forests with patches of deciduous trees interspersed with glacial lakes. Land within the Project is privately owned and the primary land use is timber harvest. Elevations in the project area range from approximately 500 to 1,700 feet (ft, approximately 150 to 520 meters [m]) above sea level. The dominant vegetation type is mixed spruce-fir and deciduous forest. Common deciduous trees in the Project include maple (*Acer* spp.), beech (*Fagus* spp.), and birch (*Betula* spp.).

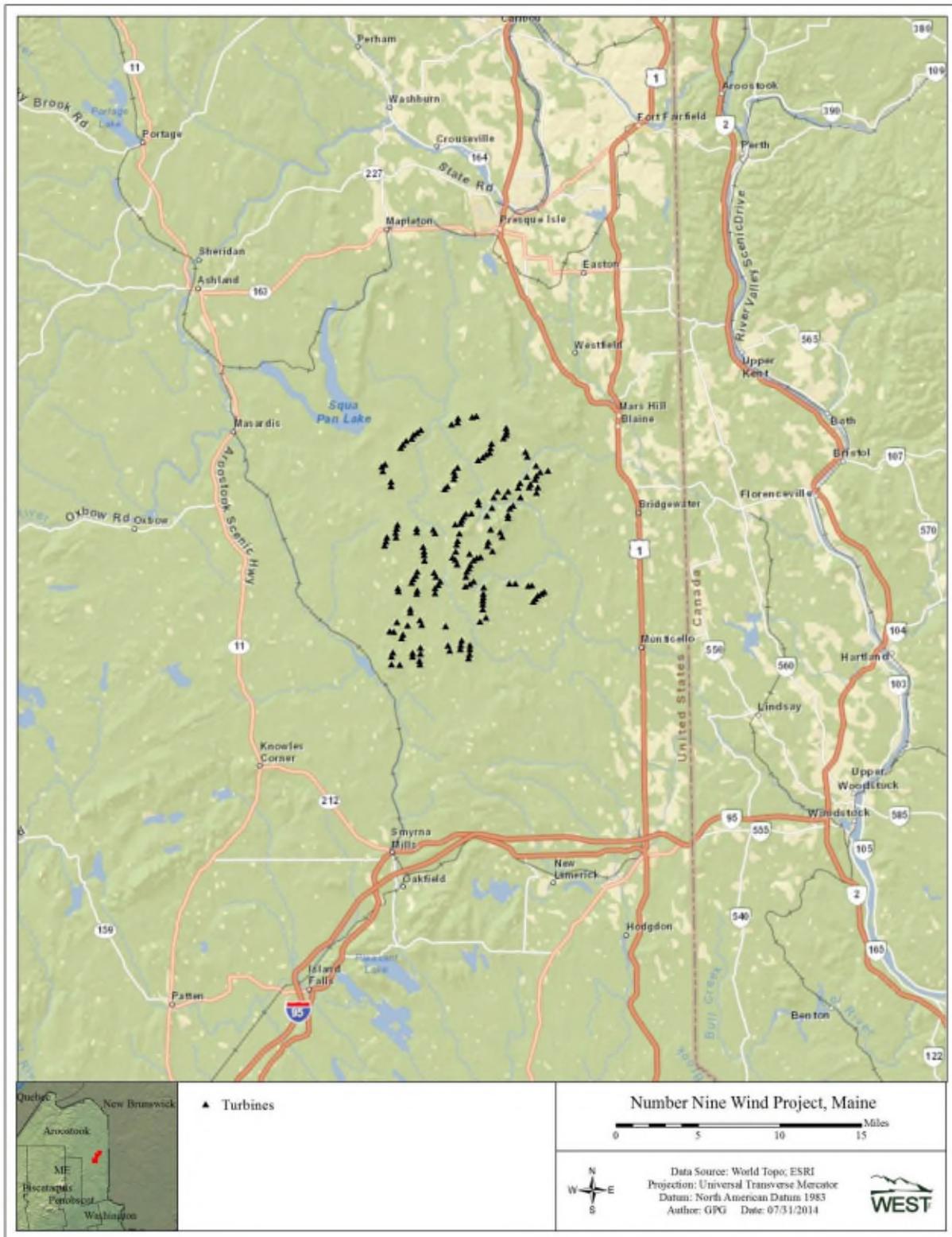


Figure 1. Proposed Number Nine Wind Farm, Aroostook County, Maine.

The area within a 2-mile (3.2-km) buffer around the original 166 proposed turbine layout, is approximately 132,000 acres (approximately 207 square miles [mi²] or 535 km²) in size, and is composed mostly of forest (75.4%; Table 1, Figure 2). Within the forest types are mixed forest (38.2%), deciduous forest (19.2%) and evergreen forest (18.0%; Table 1). Woody wetlands (11.6%) also occur throughout this area, but other wetland types (open water [0.5%] and emergent wetlands [0.2%]) are uncommon. Shrub/scrub habitat (10.4%) is common throughout the study area due to logging activity that has removed the forest cover. The area and regional forests are transitional and in various stages of growth (from regenerating stands to mature forest) due to past and ongoing commercial logging activity.

Table 1. The land cover types, coverage, and percent composition within two miles of the proposed Number Nine Wind Farm turbines.

Habitat	Square Miles	Percent Composition
Mixed Forest	78.85	38.2
Deciduous Forest	39.78	19.2
Evergreen Forest	37.13	18.0
Woody Wetlands	24.07	11.6
Shrub/Scrub	21.41	10.4
Herbaceous	2.73	1.3
Barren Land	1.00	0.5
Open Water	0.95	0.5
Emergent Herbaceous Wetlands	0.43	0.2
Developed, Open Space	0.20	0.1
Hay/Pasture	0.11	0.1
Cultivated Crops	0.01	<0.1
Developed, Low Intensity	<0.01	<0.1
Developed, Medium Intensity	<0.01	<0.1
Total	206.67	100

Data from US Geological Survey National Landcover Database (USGS NLCD2009).

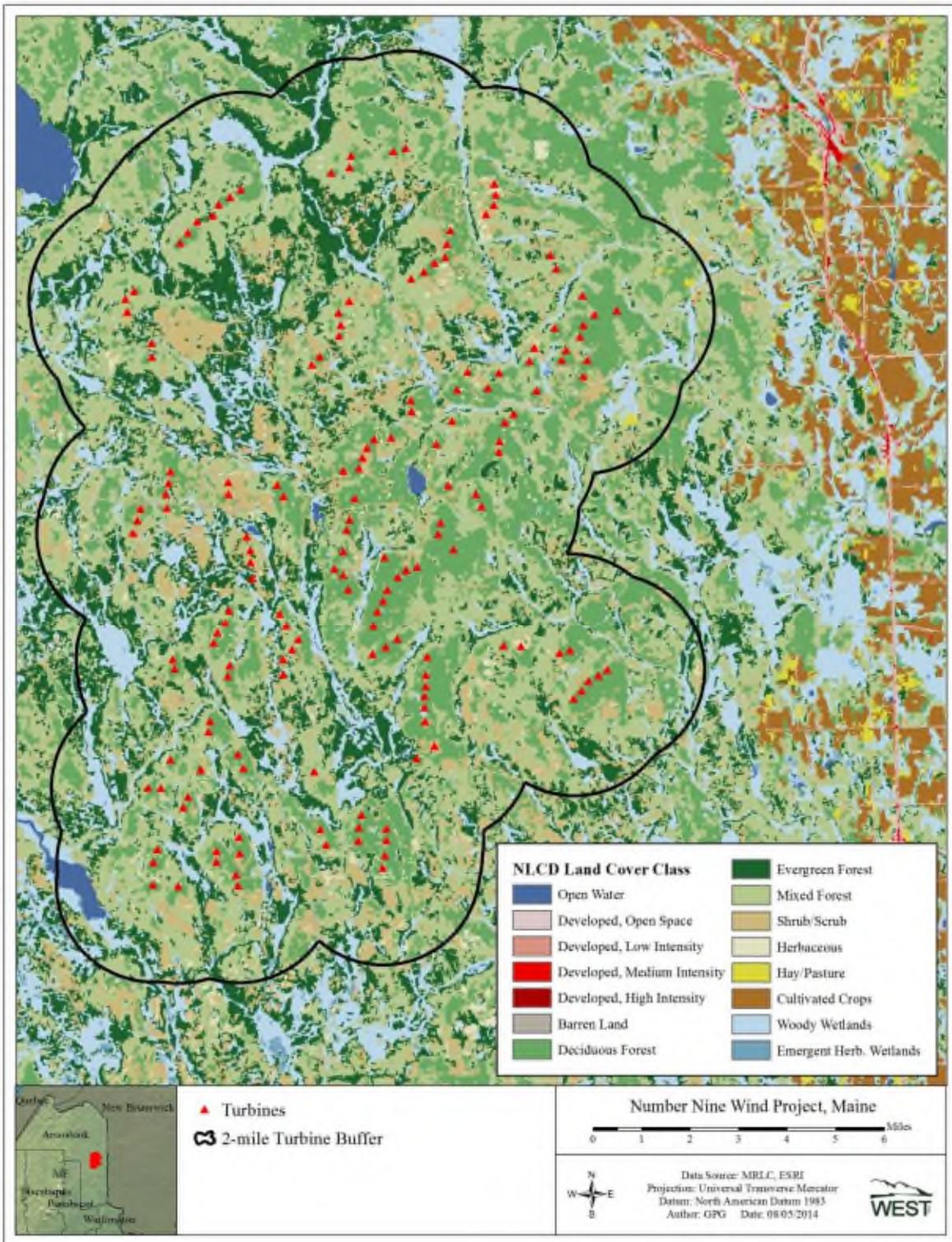


Figure 2. Overview and land cover types and coverage within the Number Nine Farm area.

METHODS

Eagle Observation Surveys

Surveys were conducted primarily following methods described in the USFWS ECPG (USFWS 2013) but with additional data collection on all raptor and vulture species to investigate use of the study area by all raptors to supplement other site specific surveys with less spatial coverage (e.g., raptor migration surveys)¹. The study area for the surveys was defined as the area that is encompassed by a 1-km (0.6-mile) buffer around the original 166 proposed turbine locations (USFWS 2013; Figure 3).

Survey Points

The ECPG recommends that survey plots, defined as a point and the area within 800 meters (2,625 feet [ft]) around that point (approximately two km²), cover 30% of the study area (1-km buffer around the proposed turbine locations). To meet this recommendation, in the fall 2013, 21 point count locations were established within the study area near proposed turbine locations. Beginning in the spring 2014, the number of point count locations was increased to 32 to provide greater spatial coverage over more potential turbine locations (Figure 3). Actual survey points were micro-sited in the field to locations where there was maximal visibility around the point and in a manner so that 800-m buffers around each point did not overlap.

Survey Schedule

The USFWS ECPG recommends one survey hour per survey location per month (USFWS 2013). In the fall 2013, efforts were made to visit between four and five survey plots each week so that all 21 points could be surveyed each month. During spring and summer 2014 surveys, efforts were made to visit approximately seven or eight survey plots per week so that all 32 stations could be surveyed each month. Each plot survey was one hour in duration.

¹ The survey methods were discussed with Maine Department of Inland Fisheries and Wildlife (MDIFW) on October 1, 2013 and March 5, 2014, and with USFWS on April 8, 2014. The USFWS replied via email, April 8, 2014, that they approved the methods.

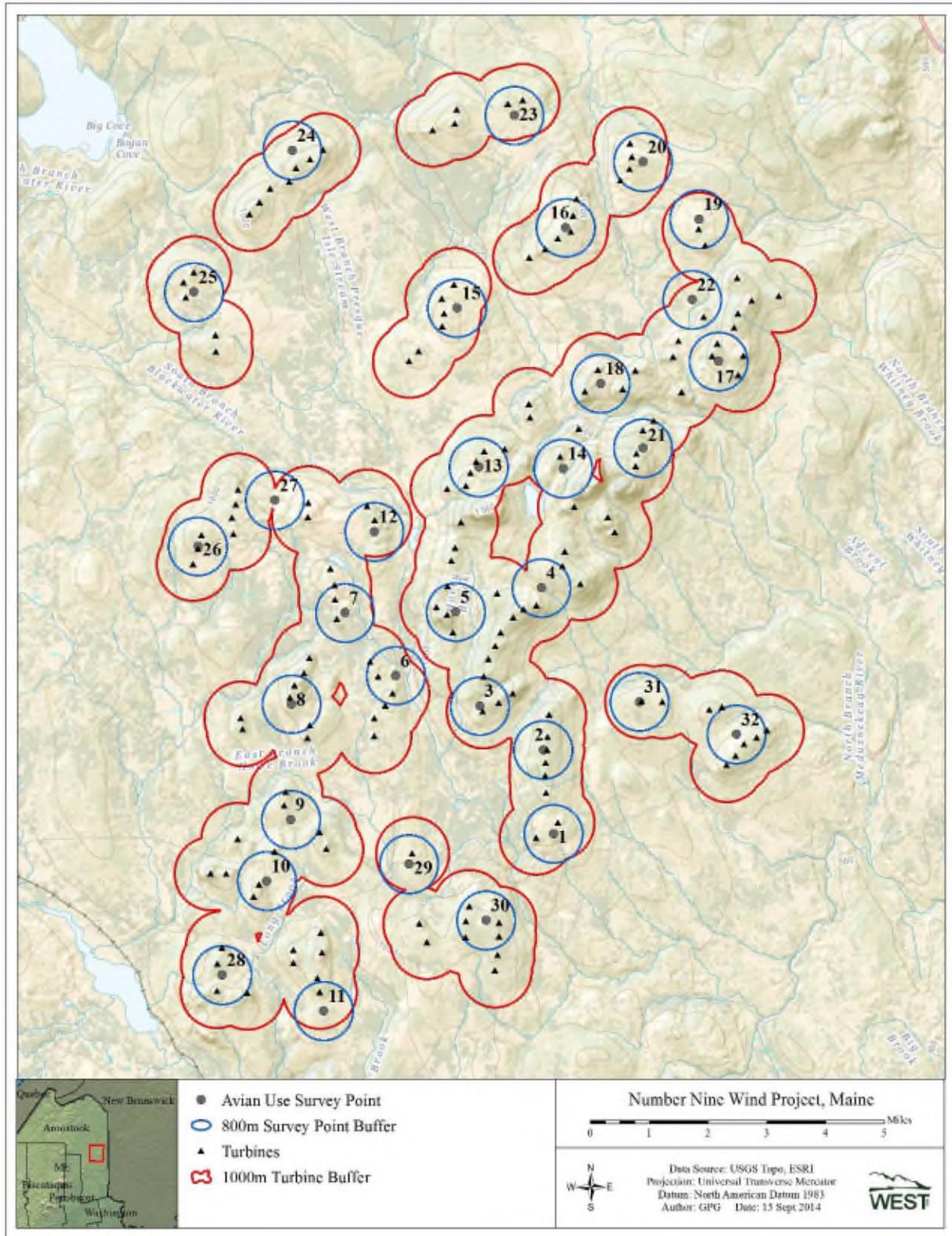


Figure 3. Proposed Number Nine Wind Farm turbine locations with 1-km (0.6-mile) turbine buffer and survey points with 800-m survey point buffers.

Survey Methods

Standard field data collection methods and field forms were employed (see Appendix B). Observers recorded the date, start and end time of each 60-minute (min) survey period, the survey plot number, and then continuously watched and scanned the survey plot and surrounding area for eagles and other raptors. To the extent possible, landmarks were located to aid in estimating distance to each bird observed and identifying the survey plot boundary.

For each eagle, raptor, or vulture observed, the species or best possible identification, number of individuals, sex and age class, location, minimum and maximum height above ground level, activity, flight path and direction, and habitat over or in which the bird occurred, were recorded. For all eagle observations, minute by minute data were collected for: distance from observer, activity, and flight height. Flight paths and perch locations were recorded in the field on the data sheet maps and were digitized using ArcGIS for use in spatial analyses and mapping, if needed.

Behavior and habitat were recorded for each eagle, raptor, and vulture observation. Behavior categories include perched, circling/soaring, flapping, active hunting, hovering, vocalizing, aggression, being mobbed, territorial flight, and other (noted in comments). Habitat over or in which each observation was made was recorded and included the predominant types for the study area: shrub/scrub, open water, forest/woodlot, riparian, rocky outcrop, and other (noted in comments). Weather information recorded for each survey included temperature, wind speed, wind direction and cloud cover.

Statistical Analysis

The primary intent of the surveys was to assess risk to eagles following methods described in the USFWS ECPG (USFWS 2013); however, secondary information and analysis could be conducted with the data for comparing to other studies that may have utilized different field methods or in an overall assessment of all raptor use of the study area.

Bird Use, Species Composition, and Frequency of Occurrence – Bird use is calculated as the mean number of individuals observed per 60-min survey within the 800-m radius plot. Frequency of occurrence is calculated as the percent of surveys in which a particular species was observed. Species composition is represented by the percent of overall use attributable to each species and is calculated as the proportion of the overall use attributable to a particular bird type or species.

Bird Flight Height and Behavior - The first flight height recorded is used to estimate the percentage of birds flying within the likely “zone of risk” (ZOR) which is considered the height above ground occupied by turbine blades. A generic ZOR of 25 m to 150 m (82 to 492 ft) above ground level (AGL), is used, which is slightly larger but representative of typical current turbine options. Percentage of individuals flying within the RSH at any time was calculated using the lowest and highest flight heights recorded.

RESULTS

Eagle observation surveys were conducted four times at each of 21 survey points during the fall survey period beginning September 5 to November 24, 2013, and approximately three times at each of 32 survey points during both the spring (March 3-June 15) and summer (Jun 16-August 28) surveys in 2014. A total of 250 60-min surveys were conducted (Table 2).

Table 2. Summary of the survey effort during fall, spring, and summer eagle observation surveys at the Number Nine Wind Energy Project.

Season	Number of Stations	Number of Visits	Number of Surveys Conducted	Number of Observer-Hours
Fall	21	4	84	84
Spring	32	3	83	83
Summer	32	3	83	83
Overall	32	10	250	250

Eagle Observations

Eleven bald eagle observations were recorded during the surveys; no golden eagles were observed. Two of these observations were outside the 800-m plot radius and were not included in the analysis. Bald eagles were observed at eight of the survey stations (Figure 4).

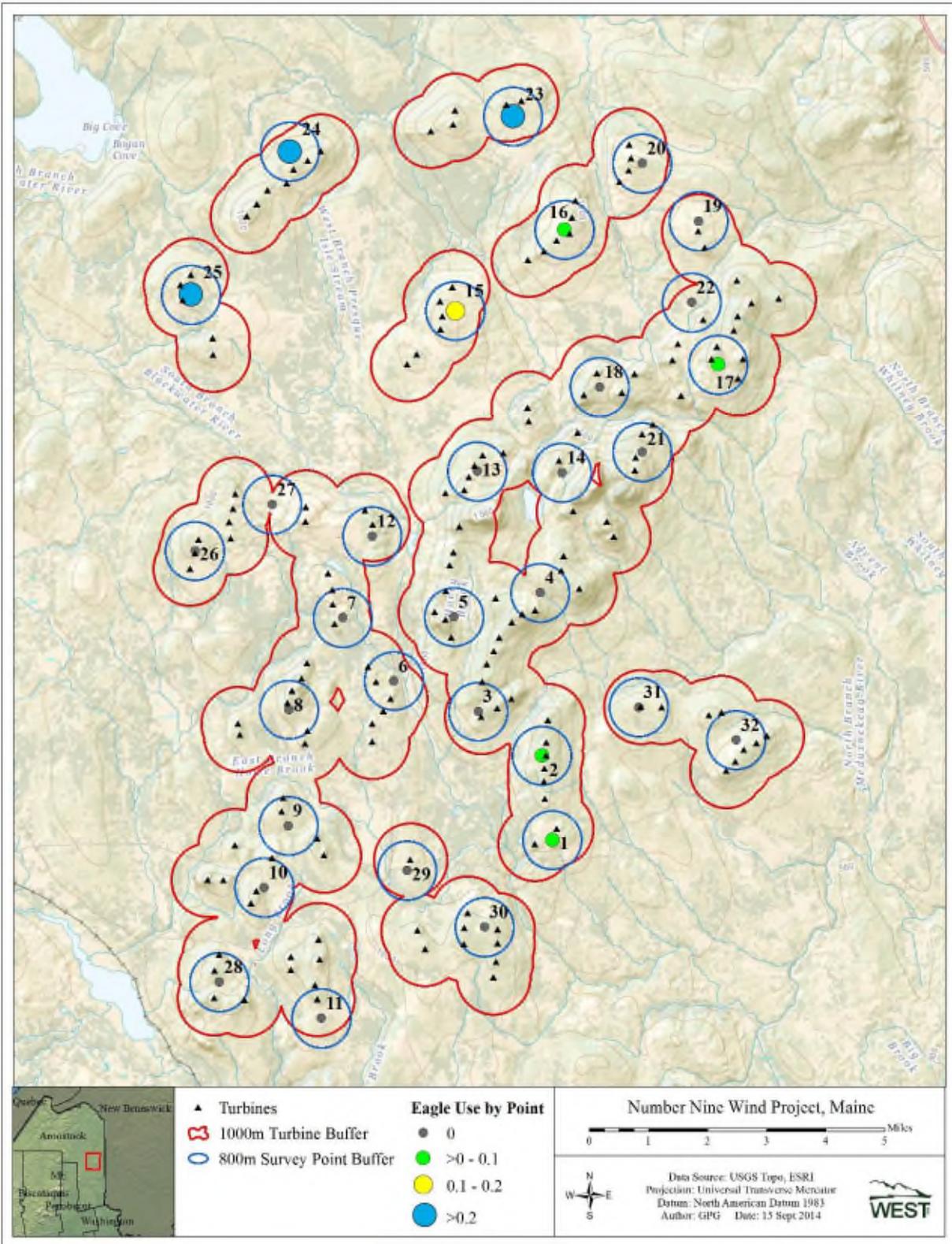


Figure 4. Eagle use by survey point in the Number Nine Wind Farm project area.

DISCUSSION

The overall intent of the eagle observation surveys was to provide data that is useful in evaluating the potential risk and impacts that the proposed Project might have on eagles, and that may be useful in project planning to avoid and minimize potential impacts, to the extent practicable. The surveys were intended to provide information regarding levels of use by eagles (and other diurnal raptors species) near proposed turbine locations. Surveys were conducted primarily using methods described in the ECPG (USFWS 2013). Bald eagles were observed at the site in the spring of 2008 (WEST 2008). This information was used to help establish the survey effort recommended by the ECPG. This survey met the recommendations of the ECPG. Based on the eagle use surveys the relative use of eagle is low for the area associated with the proposed turbine locations. Results of eagle observations among the three season survey yielded results within expected trends and reflects known migration periods when relative eagle abundance may be expected to be higher. Eagles were only observed in the fall (6 observations) and spring (5 observations) survey period (Tables B-1 and B-2). The low use estimates from these surveys were similar to use estimates from surveys during the spring and fall raptor migration periods conducted on the site in 2008 and the spring raptor migration survey in 2014 (see Bay et al. 2014). The overall low abundance of eagles observed does not suggest that exposure to the proposed Project would result in impacts greater than what has been recorded at other regional wind Projects.

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APPENDIX A.
Other Raptor and Vulture Observations, Number Nine Farm Project Area,
September 5, 2013 – August 28, 2014

Other Raptor and Vulture Observations

Surveys were conducted primarily following methods described in the USFWS ECPG (USFWS 2013); however, because this method is a modified point-count survey, it lends itself to comparison with other studies or analyses of point-count surveys. During the surveys all raptors and vultures observed were also recorded to investigate use of the study area by all raptors and to supplement other site specific surveys with less spatial coverage (e.g., raptor migration surveys).

Species lists, with the number of individuals and the number of groups observed, were generated for the study period by season. Raptor diversity was represented by the total number of unique raptor species observed. Eagle, raptor, and vulture use was calculated as the mean number of individuals observed per 60-min survey within the 800-m radius plot. The frequency of occurrence was calculated as the percent of surveys in which a particular species was observed. Species composition was calculated as the proportion of the overall raptor or eagle use that is attributable to a particular raptor type or species.

The first flight height recorded was used to estimate the percentage of birds flying within the likely “zone of risk” (ZOR) which is considered the height above ground occupied by turbine blades. A ZOR of 25 m to 150 m (82 to 492 ft) above ground level (AGL), is used, which is slightly larger but representative of typical current turbine options. Percentage of individuals flying within the RSH at any time was calculated using the lowest and highest flight heights recorded.

Spatial patterns in eagle, raptor, and vulture use in the study area were investigated to the extent practical by comparing use and observations among survey plots.

Other Raptors and Vultures

Nine unique raptors and one vulture species were observed during the surveys (Table B-1). A total of 58 raptors were recorded in 53 groups along with 13 vultures in 12 groups (Table B-1). Eight raptors other than bald eagles were observed during the surveys, including red-tailed hawk (*Buteo jamaicensis*), broad-winged hawk (*B. platypterus*), sharp-shinned hawk (*Accipiter striatus*), American kestrel (*Falco sparverius*), peregrine falcon (*F. peregrinus*), osprey (*Pandion haliaetus*), merlin (*F. columbarius*), and northern harrier (*Circus cyaneus*), along with a single vulture species, turkey vulture (*Cathartes aura*; Table B-1).

Table B-1. Total number of groups and observations for each raptor and vulture type and species by season during the eagle observation surveys in the Number Nine Wind Energy Project, September 5, 2013 – August 28, 2014.

Type / Species	Fall		Spring		Summer		Overall	
	Number of groups	Number of individuals						
Raptors	22	23	19	21	12	14	53	58
<i>Accipiters</i>	2	2	4	4	0	0	6	6
sharp-shinned hawk	2	2	4	4	0	0	6	6
<i>Buteos</i>	6	7	7	8	10	12	23	27
broad-winged hawk	1	1	2	2	4	5	7	8
red-tailed hawk	5	6	5	6	6	7	16	19
<i>Eagles</i>	6	6	5	5	0	0	11	11
bald eagle	6	6	5	5	0	0	11	11
<i>Falcons</i>	4	4	1	1	1	1	6	6
American kestrel	2	2	0	0	1	1	3	3
merlin	0	0	1	1	0	0	1	1
peregrine falcon	1	1	0	0	0	0	1	1
unidentified falcon	1	1	0	0	0	0	1	1
<i>Other Raptors</i>	4	4	2	3	1	1	7	8
Osprey	1	1	2	3	0	0	3	4
northern harrier	0	0	0	0	1	1	1	1
unidentified raptor	3	3	0	0	0	0	3	3
Vultures	1	1	4	4	7	8	12	13
turkey vulture	1	1	4	4	7	8	12	13

Use, Percent Composition, and Frequency of Occurrence

Mean bird use, percent composition, and frequency of occurrence were calculated by season for all raptor and vulture types and species (Table B-2). Overall raptor use was greatest in the spring (0.28 birds/800-m plot/60-min survey) and lowest in the summer (0.17; Table B-2). Red-tailed hawk accounted for more use than any other raptor species during all three seasons: summer (51.8% of raptor use), fall (31.6%), and spring (28.0%; Table B-2). Average use for bald eagles was similar during fall and spring surveys: 0.05 and 0.06 individuals per 60-min survey, respectively (Table B-2). No bald eagles were observed in the summer. Bald eagles accounted for the second highest use in the two seasons they were observed (21.1% in the fall and 23.1% in the spring). Accipiters were observed more frequently in the spring, whereas falcons were observed more frequently in the fall (Table B-2). Vultures had higher average use in the summer (0.10 individuals per 60-min survey) compared to spring (0.05) and were not observed within 800 m of the observation points in the fall.

Table B-2. Mean use, percent of total use, and frequency of occurrence for each raptor and vulture type and species by season during the eagle observation surveys at the Number Nine Wind Energy Project, September 5, 2013 – August 28, 2014.

Type / Species	Mean Use			Percent of Use			Frequency of Occurrence		
	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer
Raptors	0.23	0.28	0.17	100	100	100	17.9	14.5	13.3
<u>Accipiters</u>	0.02	0.05	0	10.5	19.2	0	2.4	5.4	0
sharp-shinned hawk	0.02	0.05	0	10.5	19.2	0	2.4	5.4	0
<u>Buteos</u>	0.08	0.11	0.14	36.8	37.9	84.8	7.1	9.4	12.0
broad-winged hawk	0.01	0.03	0.06	5.3	9.9	33.0	1.2	2.8	4.5
red-tailed hawk	0.07	0.08	0.09	31.6	28.0	51.8	6.0	6.6	7.5
<u>Eagles</u>	0.05	0.06	0	21.1	23.1	0	4.8	6.5	0
bald eagle	0.05	0.06	0	21.1	23.1	0	4.8	6.5	0
<u>Falcons</u>	0.05	0.01	0.01	21.1	4.9	7.6	4.8	1.4	1.3
American kestrel	0.02	0	0.01	10.5	0	7.6	2.4	0	1.3
merlin	0	0.01	0	0	4.9	0	0	1.4	0
peregrine falcon	0.01	0	0	5.3	0	0	1.2	0	0
unidentified falcon	0.01	0	0	5.3	0	0	1.2	0	0
<u>Other Raptors</u>	0.02	0.04	0.01	10.53	14.84	7.58	2.38	2.78	1.28
osprey	0.01	0.04	0	5.3	14.8	0	1.2	2.8	0
northern harrier	0	0	0.01	0	0	7.6	0	0	1.3
unidentified raptor	0.01	0	0	5.3	0	0	1.2	0	0
Vultures	0	0.05	0.10	0	100	100	0	3.9	8.6
turkey vultures	0	0.05	0.10	0	100	100	0	3.9	8.6

Total raptor, not including vultures, use by point was mapped to look at spatial variation in use over the Project area (Figure B-1). Raptors were observed at 21 of the 32 survey points. As with bald eagles, raptor use was generally greater in the northern section of the study area (Figure B-1). Vultures were observed at seven of the survey points (see Appendix C).

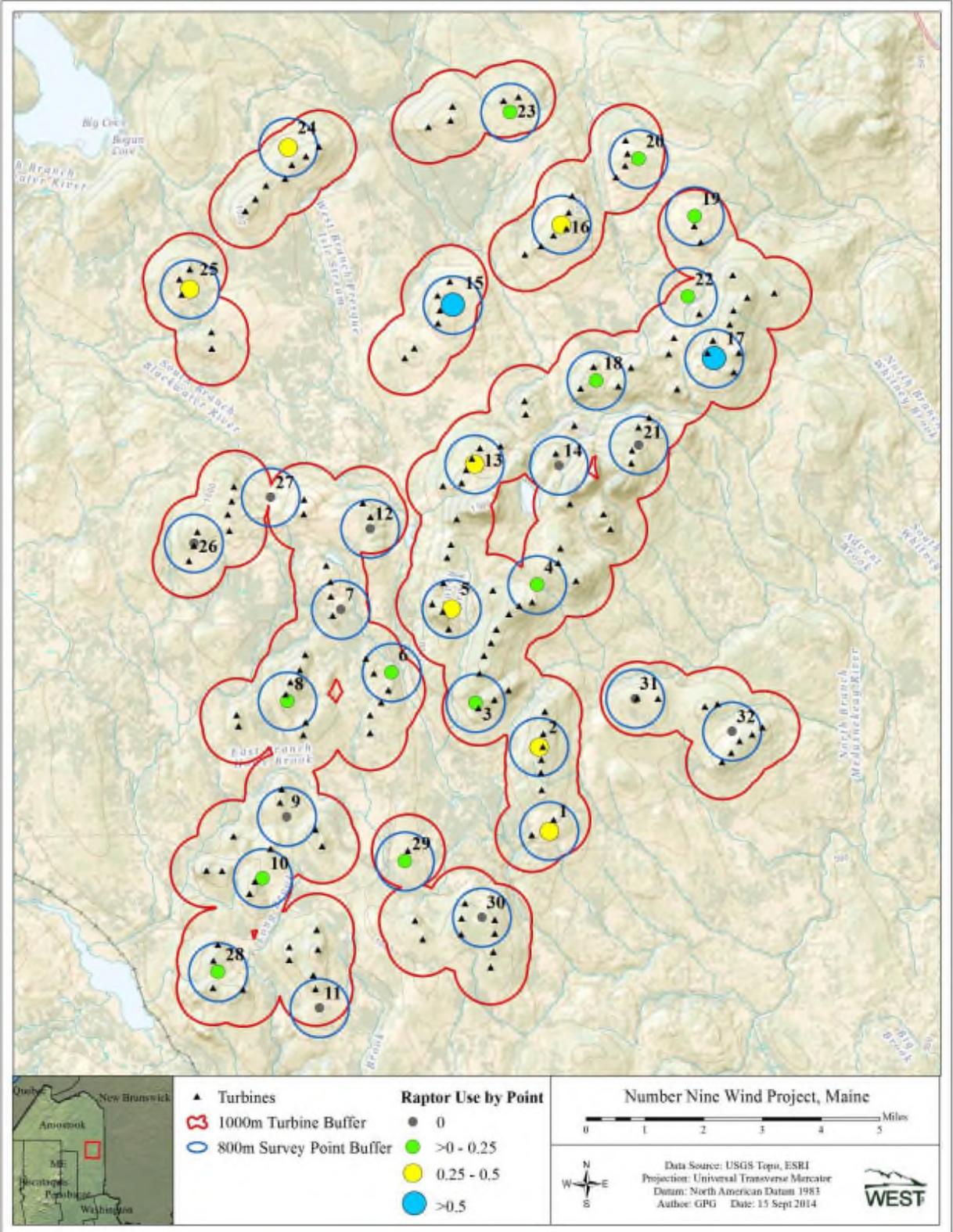


Figure B-1. Raptor use by point at the Number Nine Wind Energy Project area.

Flight Height Characteristics for Raptors and Vultures

To evaluate the relative risk of turbine collision, a ZOR of 25-150 m above ground level (AGL) was used to approximate rotor-swept area of many modern turbines. Overall 68.5% of raptors observed during surveys were within the ZOR (Table B-3). Of the 54 raptors observed flying, the mean flight height was approximately 121 m (367 ft). Bald eagles were the only eagle species observed and were observed flying at mean height of approximately 157 m (515 ft). Approximately one-third of these observations were flying over 150 m (above the ZOR) and approximately two-thirds were observed within the ZOR. The majority of the 12 vulture observations were observed flying within the ZOR (83.3%), with a mean flight height of approximately 49 m (161 ft). In general, the low number of raptors and vultures observed (see Tables B-1 and B-2) results in a weak analysis of flight height at the species level.

Table 9. Flight height characteristics by raptor or vulture type during the fall, spring, and summer eagle observation surveys.

Type / Species	Number of Individuals Flying	Mean Flight Height (m)	Percent within Flight Height Categories		
			0 - 25 m	25 - 150 m ^a	> 150 m
Raptors	54	120.82	11.1	68.5	20.4
Accipiters	6	38.33	33.3	66.7	0
Buteos	27	139.78	7.4	66.7	25.9
Northern Harrier	1	60.00	0	100	0
Eagles	9	157.22	0	66.7	33.3
Falcons	6	31.67	33.3	66.7	0
Osprey	4	256.67	0	75	25
Other Raptors	1	40.00	0	100	0
Vultures	12	48.64	16.7	83.3	0

^a. The likely "rotor-swept height" for potential collision with a turbine blade, or 25 to 150 m (82 to 492 ft) above ground level.

DISCUSSION

For other raptors and vultures, a description of use across seasons can provide a general assessment for activity of raptor species at the Project which is helpful in understanding potential impacts based on relative abundance and composition of species. Results of raptor observations among the three season survey yielded results within expected trends and reflects known migration periods when relative raptor abundance may be expected to be higher. The greatest number of raptors were observed in the fall and spring, while fewer were observed during the summer survey period (Tables B-1 and B-2). The low use estimates from these surveys were similar to use estimates from surveys during the spring and fall raptor migration periods conducted on the site in 2008 and the spring raptor migration survey in 2014 (see Bay et al. 2014). The overall low abundance of raptors observed does not suggest that raptor exposure to the proposed Project would result in impacts greater than what has been recorded at other regional wind Projects.

APPENDIX B.
Example Eagle, Raptor, and Vulture Observation Survey Datasheet

Fixed-Point Bird Use Surveys

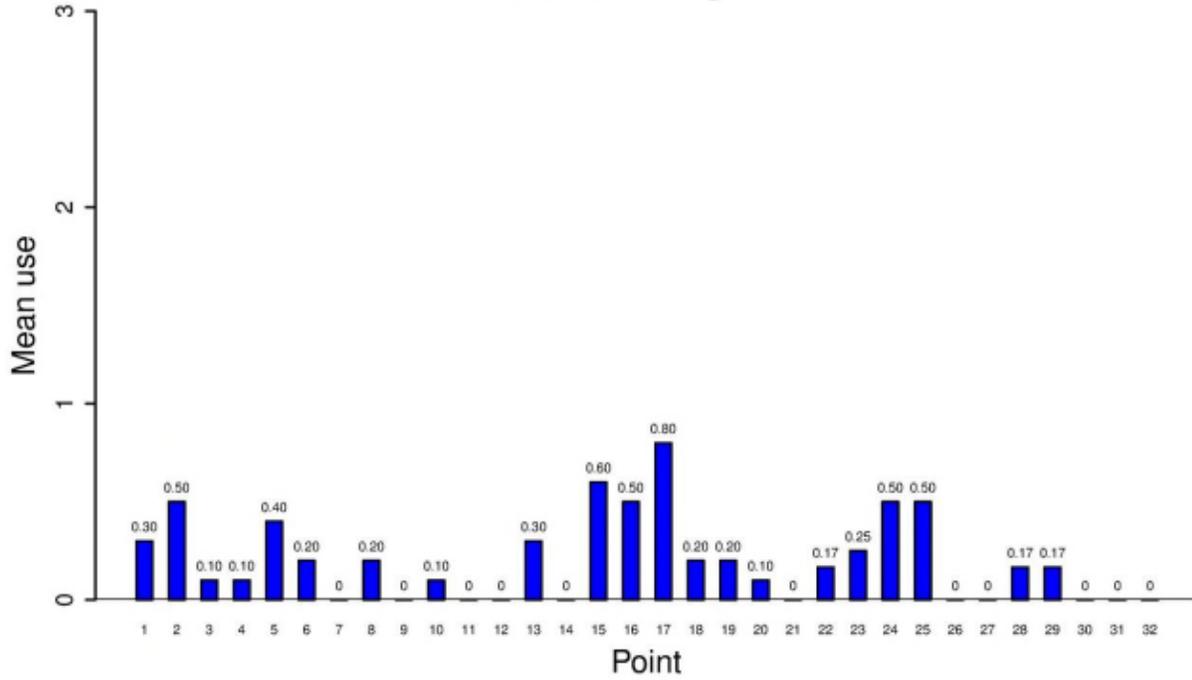
- Points are selected to survey representative habitats and topography of the study area, while also providing relatively even coverage and good viewsheds.
 - Record GPS coordinates for each point for subsequent mapping if you establish a new point or move a point. **Only** move established points if approved by your Project Manager or Field Supervisor.
 - Plots are 800-m radius circle centered on the survey point.
 - Surveys period at each plot should be 60 minutes
 - Surveys should be conducted during daylight hours
 - Survey periods should vary to approximately cover all daylight hours during a season
 - Each point should be surveyed the same number of times to the extent practical
 - Schedule may vary in response to adverse weather conditions (e.g., fog and/or rain), which cause delays and/or missed surveys.
 - **Don't** try to make-up for a missed survey at a point during another visit, it is understood that not all surveys are possible and the make-up surveys complicate the analysis.
 - Record all birds observed during the 20-min survey
 - Record all birds observed, particularly those birds within 800 meters
 - Map the perch location and flight patterns of all large species and sensitive species observed on the map on the bottom of the datasheet along with their observation number. There are 400-m and 800-m radius buffers around the point to aid in the mapping of the observations.
 - Each observation should include the following data:
 - A unique observation number
 - Species or best possible identification
 - "Unknown" species are appropriate (i.e. unknown raptor – UNRA)
 - Sex and age class (if possible)
 - Number of individuals
 - Distance from plot center when **first observed** and **closest distance**
 - Circle the activity (behavior) based on the point of **first observation**
 - Check next to any addition activities
- | | | | |
|----|--|-----|--------------------------------------|
| SO | soaring flight | PE | perched |
| FL | flapping-gliding | MOB | being mobbed |
| HU | hunting, kiting-hovering | TER | undulating/territorial flight |
| ST | stooping/diving at prey | AUD | auditory |
| AG | stooping or diving in an agonistic context with other eagles or other bird species | OT | other (explain in comments or notes) |
- Altitude above ground in meters
 - At first observation
 - lowest flight altitude observed
 - don't record zero if the bird goes from flight to perched but rather record the lowest flight altitude
 - highest altitude observed
 - Approximate flight direction at **first observation**
 - Circle the habitat(s) or the vegetation type in which or over which the bird occurred based on the point of **first observation**
 - Check next to any additional habitats
 - SB - shrub
 - GR - grassland
 - RI - riparian
 - WA - open water
 - CR – cropland
 - FR – forest/woodlot
 - RO – rocky outcrop
 - OT - other
 - Check if the observation was auditory only
 - The 10-min interval of the 20-min survey in which it was first observed (or heard) [1 or 2, or 3 if 30-min]
 - Any specific notes on the particular observation.
- Any comments about the general survey should be included in the comment section
- If any unusual observations are recorded in the comments section of the data sheet they **MUST** be transcribed to the incidental datasheets

Update Information on GOEAs and BAEAs Every Minute.

Whenever an eagle is observed, record the observation in the FPIC portion of the datasheet, but also record the observation in the special eagle section of the datasheet. In the eagle section, record the observation number (which should match the obs number from the FPIC portion of the datasheet), the time of the initial sighting, distance from observer in meters, activity, and flight height in meters. At every minute after initial sighting, record the same information again until eagle is out of sight or the survey time ends. If more than one eagle is being tracked, be careful to record the correct observation number.

APPENDIX C.
**Use by Point Figures for the Eagle Observation Surveys within the Number Nine Wind
Farm Project Area, September 5, 2013 – August 28, 2014**

Diurnal Raptors



Eagles

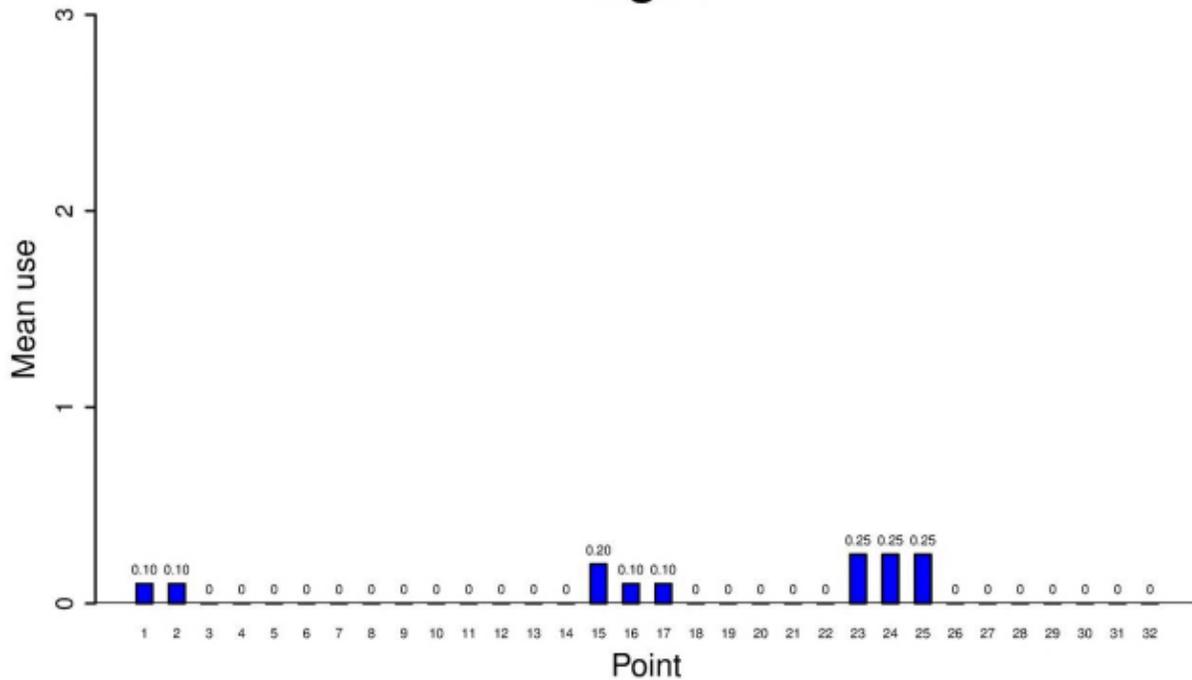


Figure B1. Mean use (number of birds/60-min survey) at each ERVOS point at the Number Nine Wind Energy Project.

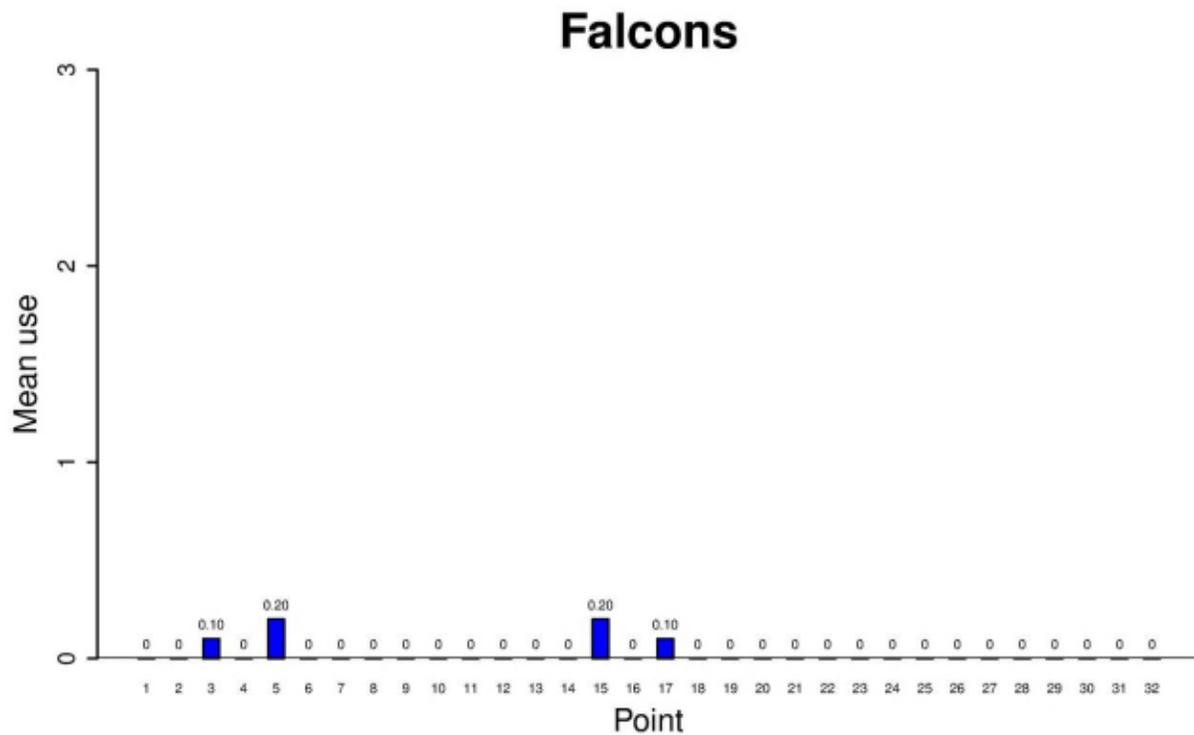
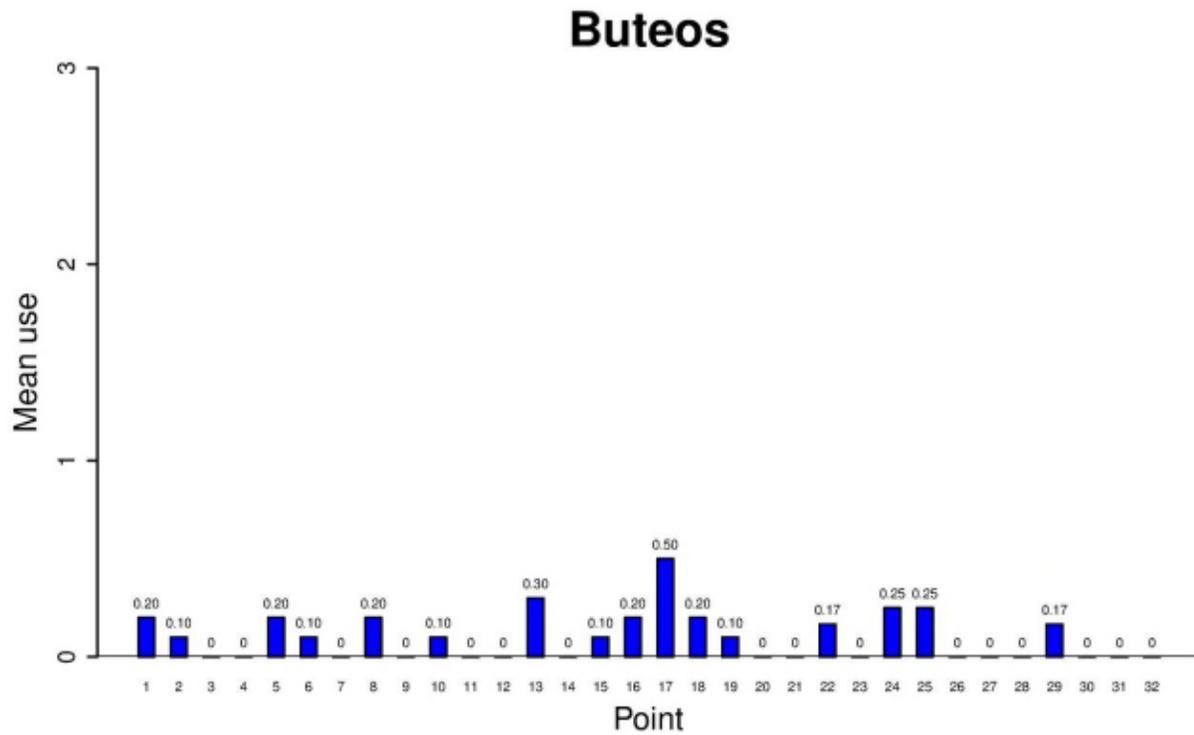
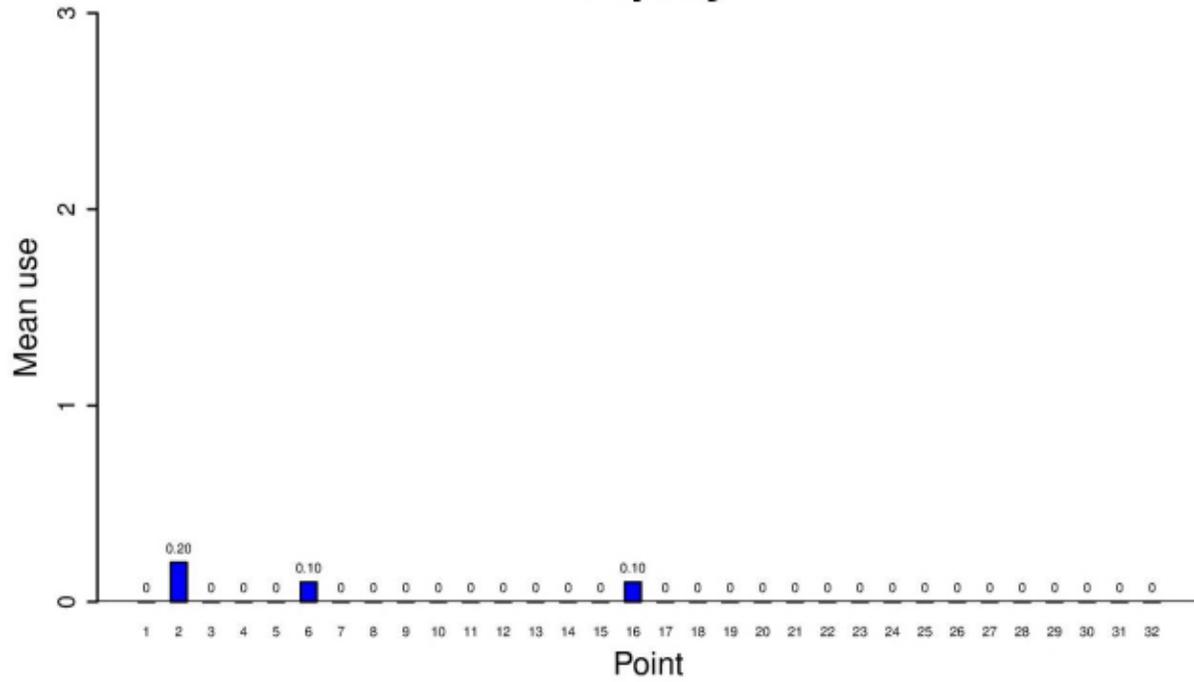


Figure B1 (continued). Mean use (number of birds/60-min survey) at each EAGLE, RAPTOR, AND VULTURE SURVEY point at the Number Nine Wind Energy Project.

Osprey



Accipiters

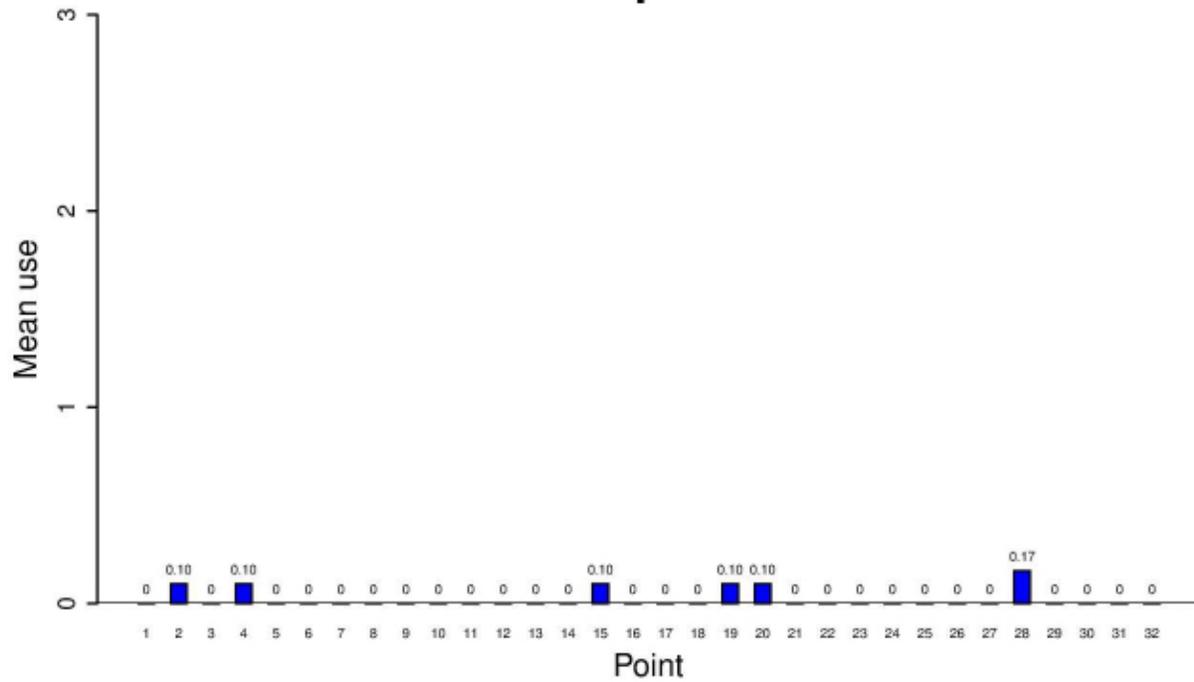


Figure B1 (*continued*). Mean use (number of birds/60 min survey) at each EAGLE, RAPTOR, AND VULTURE SURVEY point at the Number Nine Wind Energy Project.

Vultures

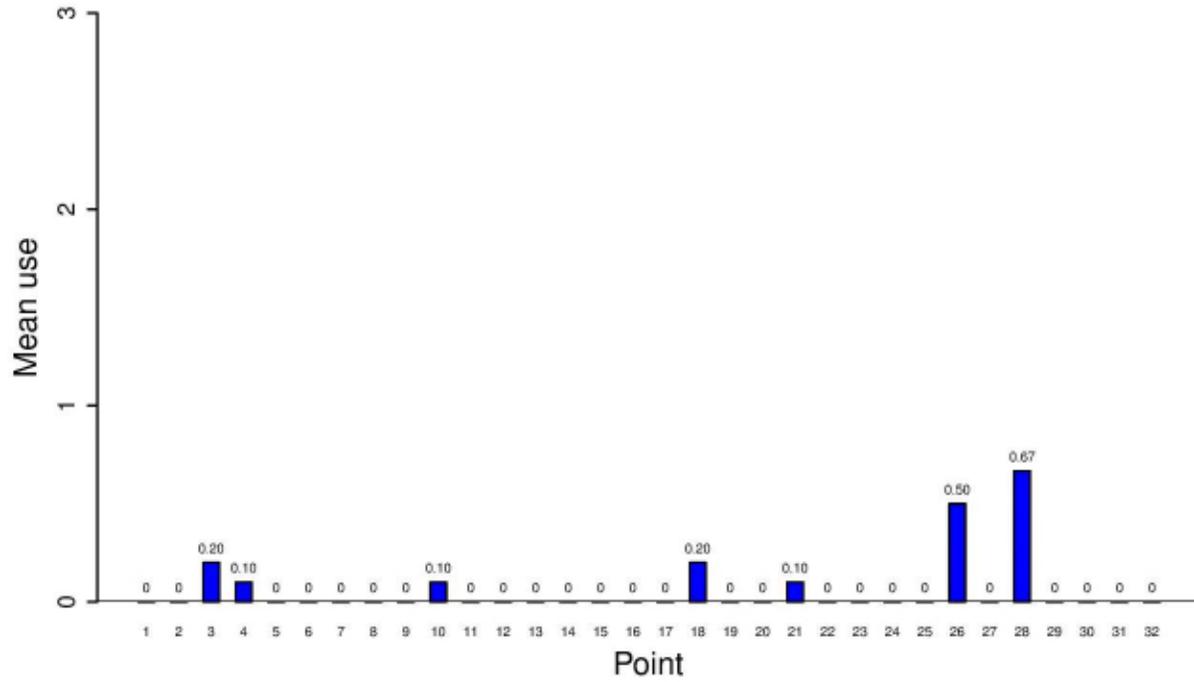


Figure B1 (*continued*). Mean use (number of birds/60 min survey) at each ERVOS point at the Number Nine Wind Energy Project.

APPENDIX D.
Incidental Wildlife Observations, Number Nine Wind Farm Project Area,
September 5, 2013 – August 28, 2014

Incidental Observations

Observations of other wildlife species are recorded while observers are in the study area moving between survey stations. In addition, non-focal species are recorded opportunistically during the surveys when no raptors or eagles are being observed and recorded.

Non-Raptors Observed During Eagle Observation Surveys

Thirty-nine bird species were observed incidentally during the eagle observation surveys, totaling 1,308 individual birds within 383 separate groups (Table C1). Canada goose (*Branta canadensis*) accounted for 35% of the other birds seen due to observation of several larger flocks, presumably migrants moving over the study area. Other species that accounted for roughly 10% or more of the other birds seen were blue jay (*Cyanocitta cristata*; 168 observations), and American crow (*Corvus brachyrhynchos*; 130 observations; Table C1).

Table C1. Non-raptor bird species observed incidentally while conducting the eagle observation surveys.

Species	Scientific Name	Number of Groups	Number of Individuals
ruffed grouse	<i>Bonasa umbellus</i>	5	5
herring gull	<i>Larus argentatus</i>	2	2
unidentified gull		1	2
belted kingfisher	<i>Ceryle alcyon</i>	2	2
American crow	<i>Corvus brachyrhynchos</i>	1	130
common raven	<i>Corvus corax</i>	79	120
American goldfinch	<i>Spinus tristis</i>	19	85
American redstart	<i>Setophaga ruticilla</i>	2	3
American robin	<i>Turdus migratorius</i>	8	8
black-capped chickadee	<i>Poecile atricapilla</i>	22	66
blue-headed vireo	<i>Vireo solitarius</i>	4	5
blue jay	<i>Cyanocitta cristata</i>	126	168
clay-colored sparrow	<i>Spizella pallida</i>	1	1
common yellowthroat	<i>Geothlypis trichas</i>	4	4
chestnut-sided warbler	<i>Setophaga pensylvanica</i>	1	1
dark-eyed junco	<i>Junco hyemalis</i>	13	31
eastern phoebe	<i>Sayornis phoebe</i>	1	2
golden-crowned kinglet	<i>Regulus satrapa</i>	3	7
gray jay	<i>Perisoreus canadensis</i>	1	1
hermit thrush	<i>Catharus guttatus</i>	1	1
magnolia warbler	<i>Setophaga magnolia</i>	2	2
myrtle yellow-rumped warbler	<i>Setophaga coronata coronata</i>	15	20
Nashville warbler	<i>Oreothlypis ruficapilla</i>	2	2
pine grosbeak	<i>Pinicola enucleator</i>	2	5
purple finch	<i>Haemorhous purpureus</i>	1	2
red-breasted nuthatch	<i>Sitta canadensis</i>	9	12
ruby-crowned kinglet	<i>Regulus calendula</i>	4	4
red crossbill	<i>Loxia curvirostra</i>	1	6
red-eyed vireo	<i>Vireo olivaceus</i>	1	1
snow bunting	<i>Plectrophenax nivalis</i>	3	55
song sparrow	<i>Melospiza melodia</i>	1	1
unidentified warbler		2	8
winter wren	<i>Troglodytes hiemalis</i>	1	1

Table C1. Non-raptor bird species observed incidentally while conducting the eagle observation surveys.

Species	Scientific Name	Number of Groups	Number of Individuals
white-throated sparrow	<i>Zonotrichia albicollis</i>	17	61
solitary sandpiper	<i>Tringa solitaria</i>	2	3
great blue heron	<i>Ardea herodias</i>	1	1
Canada goose	<i>Branta canadensis</i>	9	464
downy woodpecker	<i>Picoides pubescens</i>	2	2
hairy woodpecker	<i>Picoides villosus</i>	2	2
northern flicker	<i>Colaptes auratus</i>	7	9
pileated woodpecker	<i>Dryocopus pileatus</i>	2	2
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	1	1
Total	43 Species	383	1308

Incidental Wildlife Observations

Three mammal species and a total of 75 bird species were recorded incidentally while biologists were moving around the Project traveling between survey stations (Table C2). Of the 75 bird species, eight were unique raptor species, totaling 19 individuals among 17 groups (C2). Overall, 2,013 birds in 1,222 groups were recorded incidentally (Table C2).

Table C2. Incidental wildlife observed while conducting the eagle observation surveys.

Type / Species	Scientific Name	Number of Groups	Number of Individuals
Raptors		17	19
American kestrel	<i>Falco sparverius</i>	1	3
bald eagle	<i>Haliaeetus leucocephalus</i>	3	3
broad-winged hawk	<i>Buteo platypterus</i>	2	2
merlin	<i>Falco columbarius</i>	1	1
northern harrier	<i>Circus cyaneus</i>	1	1
peregrine falcon	<i>Falco peregrinus</i>	1	1
red-tailed hawk	<i>Buteo jamaicensis</i>	7	7
sharp-shinned hawk	<i>Accipiter striatus</i>	1	1
Other Birds		1,205	1,994
common loon	<i>Gavia immer</i>	1	2
great blue heron	<i>Ardea herodias</i>	1	3
American black duck	<i>Anas rubripes</i>	1	2
Canada goose	<i>Branta canadensis</i>	1	19
solitary sandpiper	<i>Tringa solitaria</i>	1	1
Wilson's snipe	<i>Gallinago delicata</i>	1	1
barred owl	<i>Strix varia</i>	1	1
turkey vulture	<i>Cathartes aura</i>	2	6
ruffed grouse	<i>Bonasa umbellus</i>	12	13
American crow	<i>Corvus brachyrhynchos</i>	13	16
common raven	<i>Corvus corax</i>	117	220
alder flycatcher	<i>Empidonax alnorum</i>	5	5
American goldfinch	<i>Spinus tristis</i>	20	26
American redstart	<i>Setophaga ruticilla</i>	39	56
American robin	<i>Turdus migratorius</i>	121	204
black-and-white warbler	<i>Mniotilta varia</i>	9	10
bay-breasted warbler	<i>Setophaga castanea</i>	2	3
black-capped chickadee	<i>Poecile atricapilla</i>	63	110

Table C2. Incidental wildlife observed while conducting the eagle observation surveys.

Type / Species	Scientific Name	Number of Groups	Number of Individuals
blue-headed vireo	<i>Vireo solitarius</i>	5	7
Blackburnian warbler	<i>Setophaga fusca</i>	1	1
blue jay	<i>Cyanocitta cristata</i>	57	72
boreal chickadee	<i>Poecile hudsonicus</i>	1	2
brown creeper	<i>Certhia americana</i>	1	1
black-throated blue warbler	<i>Setophaga caerulescens</i>	24	29
black-tailed gnatcatcher	<i>Polioptila melanura</i>	3	3
boat-tailed grackle	<i>Quiscalus major</i>	1	1
black-throated green warbler	<i>Setophaga virens</i>	8	11
blue-winged warbler	<i>Vermivora cyanoptera</i>	2	2
cedar waxwing	<i>Bombycilla cedrorum</i>	25	55
cordilleran flycatcher	<i>Empidonax occidentalis</i>	9	10
common grackle	<i>Quiscalus quiscula</i>	13	153
common yellowthroat	<i>Geothlypis trichas</i>	63	78
chestnut-sided warbler	<i>Setophaga pensylvanica</i>	50	72
dark-eyed junco	<i>Junco hyemalis</i>	46	68
eastern wood-pewee	<i>Contopus virens</i>	1	2
golden-crowned kinglet	<i>Regulus satrapa</i>	1	1
hermit thrush	<i>Catharus guttatus</i>	45	54
indigo bunting	<i>Passerina cyanea</i>	1	1
least flycatcher	<i>Empidonax minimus</i>	3	9
magnolia warbler	<i>Setophaga magnolia</i>	9	13
mourning warbler	<i>Geothlypis philadelphia</i>	4	4
Nashville warbler	<i>Oreothlypis ruficapilla</i>	6	7
northern parula	<i>Setophaga americana</i>	17	21
olive-sided flycatcher	<i>Contopus cooperi</i>	3	3
ovenbird	<i>Seiurus aurocapilla</i>	28	34
palm warbler	<i>Setophaga palmarum</i>	2	3
purple finch	<i>Haemorhous purpureus</i>	28	41
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	14	15
red-breasted nuthatch	<i>Sitta canadensis</i>	13	77
red-eyed vireo	<i>Vireo olivaceus</i>	66	89
red-winged blackbird	<i>Agelaius phoeniceus</i>	1	1
scarlet tanager	<i>Piranga olivacea</i>	2	2
song sparrow	<i>Melospiza melodia</i>	6	6
Swainson's thrush	<i>Catharus ustulatus</i>	1	2
tree swallow	<i>Tachycineta bicolor</i>	1	2
unidentified passerine		3	3
veery	<i>Catharus fuscescens</i>	15	20
winter wren	<i>Troglodytes hiemalis</i>	34	35
white-throated sparrow	<i>Zonotrichia albicollis</i>	92	137
yellow-rumped warbler	<i>Setophaga coronata</i>	24	32
common nighthawk	<i>Chordeiles minor</i>	1	1
chimney swift	<i>Chaetura pelagica</i>	9	17
ruby-throated hummingbird	<i>Archilochus colubris</i>	2	2
downy woodpecker	<i>Picoides pubescens</i>	3	3
hairy woodpecker	<i>Picoides villosus</i>	6	6
northern flicker	<i>Colaptes auratus</i>	20	59
pileated woodpecker	<i>Dryocopus pileatus</i>	3	3
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	22	26
Bird Subtotals		1,222	2,013
mink	<i>Mustela vison</i>	1	2

Table C2. Incidental wildlife observed while conducting the eagle observation surveys.

Type / Species	Scientific Name	Number of Groups	Number of Individuals
moose	<i>Alces alces</i>	4	6
white-tailed deer	<i>Odocoileus virginianus</i>	1	2
Mammal Subtotals		6	10