Review of Eagle Survey Data Collected for the Bluestone Wind Facility

Task 6

Prepared for:

Delaware-Otsego Audubon Society

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Intervenor Funding

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Summary

Bald and Golden Eagles are federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Because of this, the U.S. Fish and Wildlife Service recommends that wind energy projects conduct surveys for eagles as part of a risk assessment to determine if eagles are likely to be incidentally taken at a wind facility. Assessing risk, and thus take of eagles depends on well-designed surveys, the basis for which is an understanding of eagle ecology and behavior in the region in which the study is conducted.

The Bluestone Wind Project (BWP) has been proposed for construction in Broome County, New York. Eagle use surveys were conducted in two years, with increased effort in the second year. Overall, eagle observations were broadly distributed across the project area. Surveys conducted in Year 1 lacked any sightings of Golden Eagles, compared to 26 observations in Year 2. Bald Eagle observations also dramatically increased across years. This suggests that monthly observations, as were conducted in Year 1 and portions of Year 2, may not be sufficient to detect Golden Eagle or Bald Eagle use of this area. Moreover, low visibility of the areas surrounding the survey points could have influenced detection rates and the actual percent of the area surveyed, a key parameter in the model used to predict fatalities.

Introduction

The Bluestone Wind Project (BWP) has been proposed for construction in Broome County, New York. Because both Bald and Golden eagles are known to be killed by wind turbines and are federally protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (Pagel et al. 2013), the U.S. Fish and Wildlife Service recommends that wind energy projects conduct surveys for eagles as part of a risk assessment. The risk assessment is used to determine if eagles are likely to be incidentally taken at a facility during normal operating of that facility (USFWS 2013). Delaware-Otsego Audubon Society requested New York State Article 10 Siting Process Intervenor Funding so that, among other things, materials collected during surveys by BWP could be reviewed by an outside scientist and eagle expert.

WEST, Inc. (hereafter, WEST) was contracted to conduct surveys for BWP. WEST provided a .kmz file of the survey locations, a spreadsheet listing minute-by-minute eagle observations for each year, and a draft report (entitled Appendix OO Eagle Use Studies). The draft report included maps of the survey locations, eagle flight minutes, hours of observation, species lists for surveys and incidental observations, and maps of eagle and raptor flight paths. WEST also provided a Raptor Migration Survey Study Plan and Eagle Survey Protocol. All information was reviewed and is considered confidential.

WEST conducted two sets of eagle surveys in the BWP area. The first surveys were conducted from March 19, 2016 – March 1, 2017. In the first year there were 12 survey locations. The points were each surveyed once a month for one hour. The project area was expanded, and a second set of surveys were conducted from March 13, 2017 – March 29, 2018. The second set of surveys included weekly surveys of all survey locations during peak times of Golden Eagle migration (October 15 – December 2, 2017 and February 20 – March 29, 2018). Surveys were conducted at 24 survey locations across the project area.

1. Map of Survey Locations

Background

Survey locations were evenly distributed across the project area. In Year 1, 12 points were surveyed and in Year 2, 24 points were surveyed including 11 of the Year 1 points. Several of the survey plots (i.e., area within 800 m of each point) overlapped, especially points 13, 14, 15 and 24 (see Fig. 2 and see Figs. 4a and 4b in Appendix OO – Eagle Use Studies of the Article 10 Siting Process documents). Surveys recorded every raptor that was seen in Year 1 and eagles and New York State listed species in Year 2. Observations of eagles that were within 800 m of the point and <200 m high were used to predict eagle fatalities.

For predicting fatalities, the Eagle Conservation Plan Guidance (ECPG) suggests that survey plots cover 30% of the project area (USFWS 2013). It also suggests that the area surveyed takes into account the visual field of the point count plots. If <800 m is visible, then the percent of the area that is visible should be "factored into the calculation of area surveyed." This is important because area surveyed is a key parameter in the Bayesian risk model used to predict fatalities (New et al. 2015).

Methods

The topography of BWP area is rugged with many forested hills. Surveys were generally conducted in valleys along roads. This suggests that visibility from the survey point may be obscured by topography. To examine visibility of the survey areas, the survey points were plotted in ArcGIS 10.3 (ESRI, Redlands, CA) and the Viewshed Tool in Spatial Analyst (ArcGIS 10.3) was used. The Viewshed Tool uses a digital model of the elevation of the earth's surface to estimate the visibility of the area from a particular location on the landscape. It is commonly used to answer questions like, what areas can be seen from a 20 m tall fire tower or is a proposed landfill visible from a highway? In this case, it is being used to answer, what proportion of the survey plots is visible to the observer?

Inputs into the analysis include a digital elevation model and points, lines, or polygons. The analysis can also include specific parameters, i.e., the height above ground of the object of interest (i.e., the height of the observer), the planimetric or 3-dimensional distance of interest (i.e., the radius of the survey plot), the horizontal direction of interest, or the vertical angle of interest (see http://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/usingviewshed-and-observer-points-for-visibility.htm). For each cell in the digital elevation model, the Viewshed Tool can also calculate the height above ground level that would need to be added to the elevation of that cell in order for that cell to be visible from the observation point. In this case, it can be used to estimate the minimum altitude above ground level that an eagle would need to be flying for it to be visible to an observer.

For this analysis the inputs were the survey locations provided by WEST and the 10 m National Elevation Dataset (Gesch 2007). The latter is a digital elevation model of the earth's surface with a resolution of 10 x 10 m. Each 10 x 10 m cell's value is the elevation of the ground (m). Specific parameters used in the analysis were height of the observer, where it was assumed that the maximum height was 2 m (6.5 ft) and distance from the survey point, which corresponds to the 800 m radius of the point counts measured planimetrically.

The visibility analysis will be affected by the accuracy of the GPS location of the survey points and the resolution of the digital elevation model used in the analysis. The results are an estimate of the areas within 800 m that can be seen from an observer that is 2 m tall. The analysis did not take into account buildings, trees or other objects that might further obscure visibility, although if this information was available it could be included. The analysis also does not take into account an observer moving substantially (>10 m) from the observation point. Nonetheless, the analysis is useful for illustrating the area of a survey plot that is likely visible to an observer based on the surrounding topography. In reality, visibility of the ground and the minimum height above ground level that an eagle might be visible may be somewhat greater or less than estimated, but it should not differ considerably.

Results

This analysis focused on Year 2 survey locations because those were used to predict fatalities of Golden Eagles, because 11 - Year 1 locations overlapped with Year 2 survey locations, and because one survey point for Year 1 was not provided.

Each survey plot is 201 ha. For 24 survey plots, this equates to 4,825 ha (11,923) ac and 31.2% of the project area. However, 7 survey plots (1, 12, and 7 and 13, 14, 15 and 24) overlapped reducing the total area surveyed to 4,750 ha (11,738 ac) and 30.8% of the project area. Therefore, even with overlap the estimate of the survey area met the requirement to survey at least 30% of the project area. However, the visibility analysis showed that visibility was obscured by topography and none of the survey plots were completely visible to observers (Fig. 1 and 2). Estimated visibility for the individual survey plots ranged from 12.1 – 70.2% with an average visibility of 38.3 ±14.3% (SD) (Fig. 1 and 2). This suggests that only an estimated 1,847 ha (11.9%) of the 15,419 ha (38,102 ac) project area was surveyed.

Estimated visibility from survey points was generally low most likely because survey points were primarily located in valleys along roads (See Table 1 and Fig. 3a and 3b in Appendix OO – Eagle Use Studies of the Article 10 Siting Process documents). This analysis suggests that the low visibility also may influence detectability of eagles using the area, because eagles flying at low altitudes may be obscured by the topography surrounding the survey points. For example, the height above ground level that an eagle would need to be flying in order to be visible within the survey plots to an observer ranged from 0 – 215 m. This metric varied among the survey plots with points 1 and 13 – 16 having the best overall visibility and points 2, 8 and 20 having the lowest overall visibility (Fig. 3 and 4).

Data collected during surveys and specific survey information (e.g., effort, area surveyed) are used to inform the Bayesian risk model that predicts fatalities (USFWS 2013, New et al. 2015), thus the fatality predictions may be lower than expected if the actual area surveyed, i.e., the visible area, is substantially lower than estimated area of the survey plots (i.e., 24 plots x 201 ha). Furthermore, the ECPG suggests that eagle minutes counted during point count surveys be used to estimate exposure. One of the key assumptions for estimating exposure is that detection rates of eagles are high (Bay et al. 2016). If low visibility affects detection rates, then this assumption may be violated and doing so may affect the resultant fatality predictions.

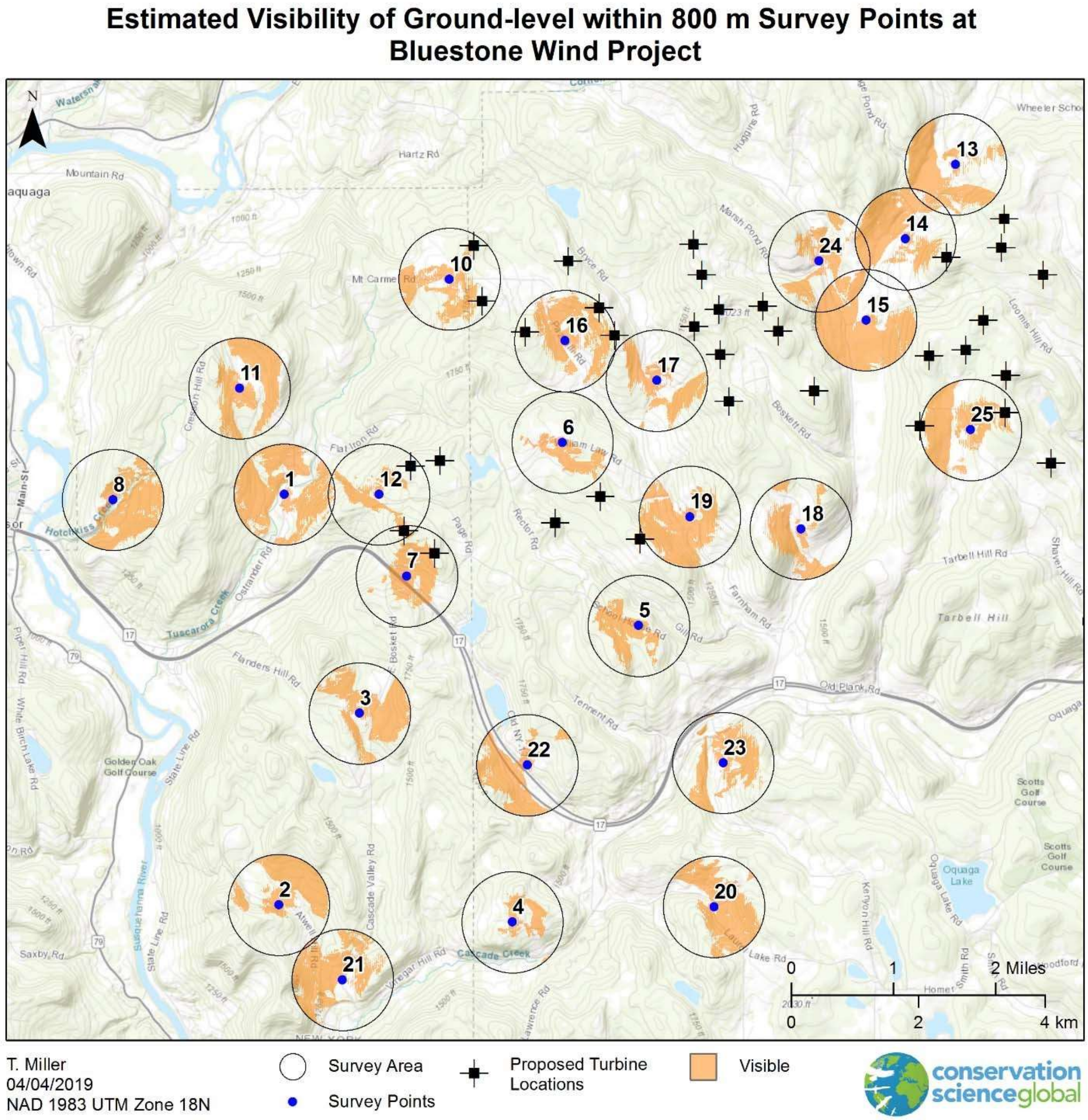

Figure 1. *Estimated visibility of the ground from each survey point for an observer that is 2 m (6.5 feet) above ground level. Visibility was calculated using the 10 m National Elevation Dataset (Gesch et al. 2007) and the Viewshed Tool in ArcGIS 10.3 (ESRI, Redlands, CA). See methods for additional details.*

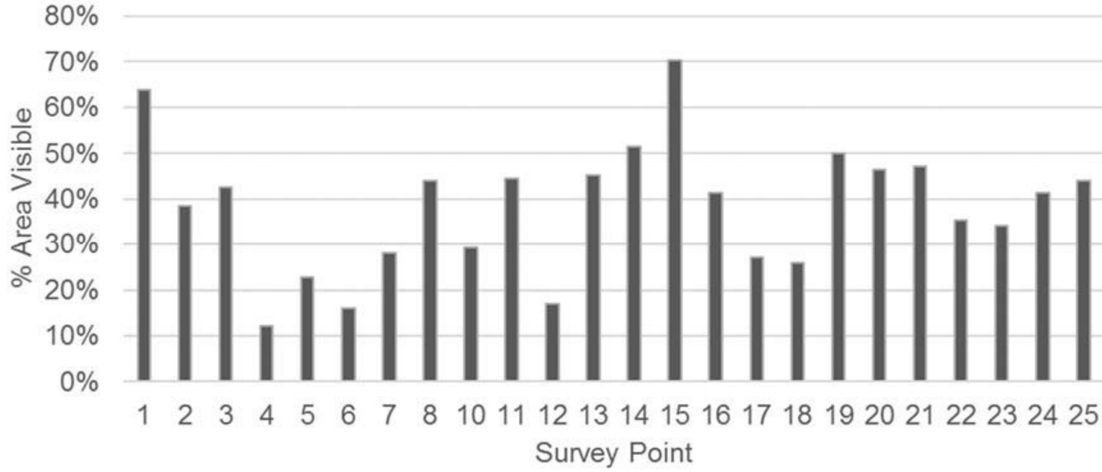

Figure 2. *Estimated percent of each survey plot that was visible to an observer that was 2 m (6.5 feet) above ground level. Visibility was calculated using the 10 m National Elevation Dataset (Gesch et al. 2007) and the Viewshed Tool in ArcGIS 10.3 (ESRI, Redlands, CA). See methods for additional details.*

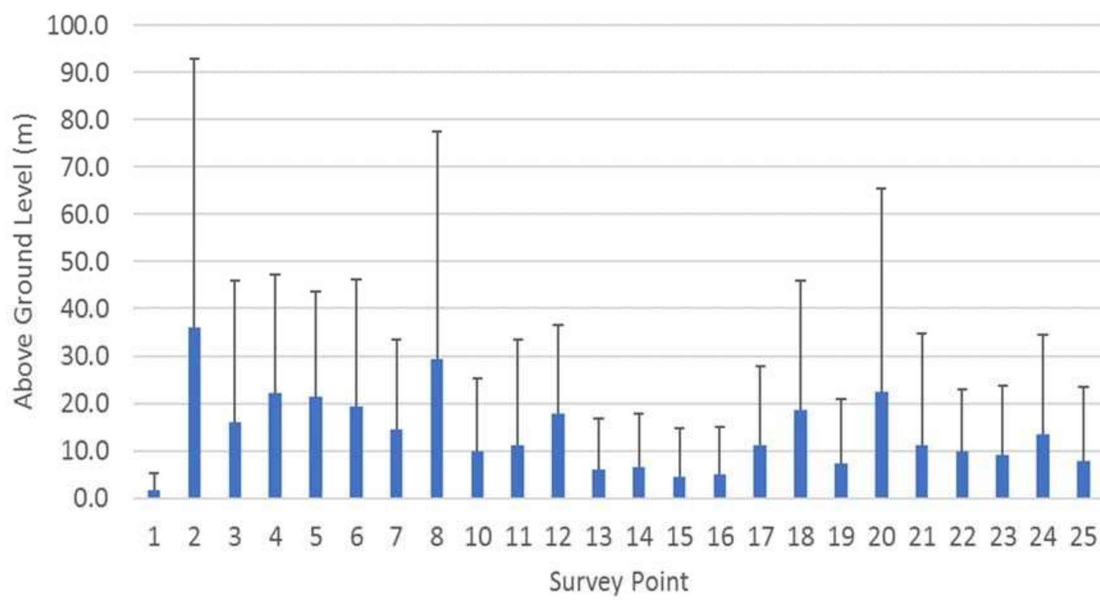

Figure 3. *Mean and standard deviation of estimated altitude above ground level (m) for an object to be visible within each survey plot for an observer that is 2 m (6.5 feet) tall. Visibility was calculated using the 10 m National Elevation Dataset (Gesch et al. 2007) and the Viewshed Tool in ArcGIS 10.3 (ESRI, Redlands, CA). See methods for additional details.*

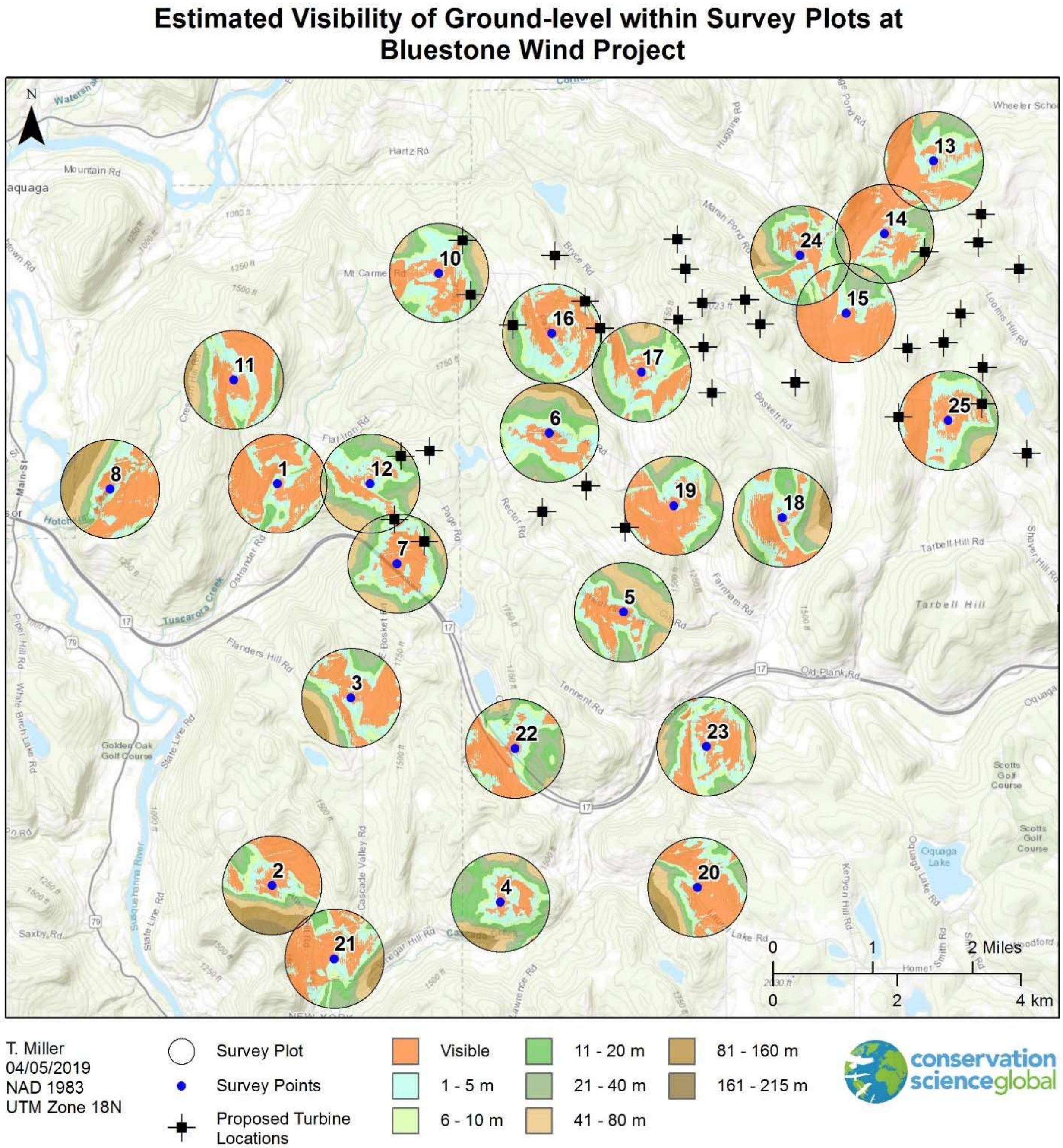

Figure 4. *Estimated altitude above ground level (m) for an object to be visible within 800 m of a survey point for an observer that is 2 m (6.5 feet) tall. Visibility was calculated using the 10 m National Elevation Dataset (Gesch et al. 2007) and the Viewshed Tool in ArcGIS 10.3 (ESRI, Redlands, CA). See methods for additional details.*

2. Eagle Flight Minutes

Sixteen Bald Eagle flight minutes were reported for Year 1; observations occurred in January and February 2017 and March and May 2016. In Year 2 the report indicated that there was 191 flight minutes for Bald Eagles and 50 minutes for Golden Eagles. Overall, the data appear consistent, however, there were some minor inconsistencies between the results in the report and the raw data. After removing observations from the raw data of perched birds, observations >200 m AGL, and observations >800 m from the observer, there were 188 minutes of observations for Bald Eagles and 49 minutes for Golden Eagles (6 min. in Feb., 22 min. in Mar., 13 min. in Oct. and 12 min. in Nov.). These discrepancies are small. Nonetheless it is important that the information provided is accurate.

The large change in flight minutes of Bald Eagles from Year 1 to Year 2 as well as the lack of Golden Eagle observations in Year 1 is interesting. Importantly, although the survey area was expanded, there were observations of Golden Eagles at observations points used in Year 1. Together, these suggest that conducting monthly surveys of points may not be sufficient to detect Bald or Golden Eagles in areas like BWP. This may deserve a more detailed analysis, which is outside the scope of this report, but would be a useful exercise to better understand detectability at similar sites in eastern USA.

Finally, there was no information in the Eagle Use Survey Protocol provided by WEST or elsewhere that described how flight altitude or distance from observer was determined. Although the Bayesian risk model accounts for errors in flight altitude estimation (New et al. 2015), it is useful to include any specialized training of observers or instruments used for such metrics.

3. Hours of Observation

The total number of observation points was 12 in Year 1 and 24 in Year 2. One point was surveyed in Year 1 that was not surveyed in Year 2. There were 155 and 563 hours of observation, in Years 1 and 2 respectively. This equates to 12 complete surveys of all points plus surveys of 11 additional points or 12.9 hours/point in Year 1. For Year 2, the hours of observation equals 23 complete surveys of all points plus 1 additional survey of 11 points or 23.5 hours/point. This is consistent with USFWS recommendations.

4. Species List for Eagle Observations Studies and Incidental Observations

The species lists for eagle observation studies and incidental observations include species that are expected in the area.

5. Maps of Eagle and Raptor Flight Paths

Maps of flight paths of raptors and eagles were provided. These show the relative abundance of visible flight paths throughout the surveyed areas. Most flight paths occurred in areas that were visible according to the visibility analysis above. The scale of the maps gives general information about movement, but obscures detail. Additionally, the lack of symbology indicating direction of flight makes interpretation of status (e.g., migrant, resident) difficult. Regardless, the surveys are used to estimate eagle use of an area by counting the minutes that eagles are observed in the 800 x 200 m survey cylinders. Although this may be influenced by status (e.g., a

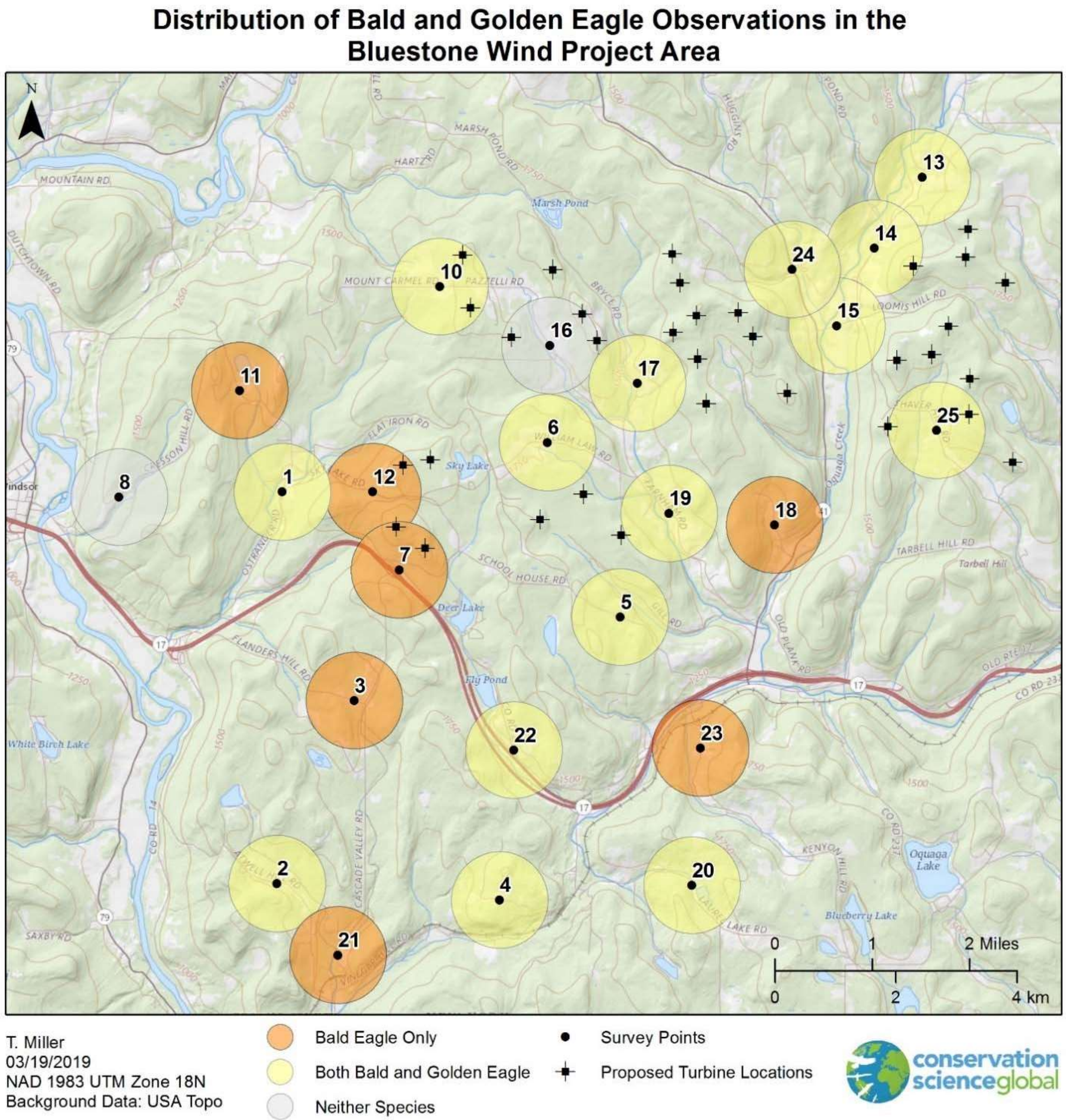

Figure 5. *Distribution of Bald and Golden Eagle observations in the Bluestone Wind Project area and proposed locations of wind turbines (FAA).*

migrant may use an area for less time than a resident), it is not essential to estimating fatality (but see #1 for other factors that may affect fatality predictions).

6. Distribution of Eagles and Other Large Birds Using Project Area

Eagle observations were broadly distributed across the project area (Fig. 5; see also Fig 6b in Appendix OO – Eagle Use Studies of the Article 10 Siting Process documents). Likewise, other large birds were broadly distributed across the Year 1 project area. There was a concentration of eagle observations at a cluster of survey points in the northeast section of the project area that is slated for a large number of turbines. Flight paths of that area were concentrated along a ridge with a north-south orientation. No other obvious concentration points were discernable from the data provided.

Conclusions

Assessing risk, and thus take of eagles depends on well-designed surveys and an understanding of eagle ecology and behavior in the region in which the study is conducted (USFWS 2013, New et al. 2015). Importantly, there were 9 observations of Bald Eagles totaling 16 minutes and no Golden Eagles observed during the first year of surveys. Bald Eagles were observed in 4 of the 12 months of Year 1 and there were no concentration areas for Bald Eagle movements noted in Year 1. In contrast, during Year 2, there were 101 observations of Bald Eagles totaling 191 minutes with observations in every month except May and July. Twenty-six observations of Golden Eagles totaling 50 minutes during 4 months of the year were recorded. Although much of the eagle activity occurred in the northeast section of the Year 2 project areas, Golden Eagles were also documented at 6 of the Year 1 survey locations, suggesting that increase effort in Year 2 may have played a role in increased detections. The increase in eagle observations as well as the widespread presence of Golden Eagles throughout the project area highlight the importance of conducting an adequate number of surveys to meet the assumption of high detection rates of the Bayesian risk model. Future eagles use surveys in the region should consider a similar design, but one that also includes increased survey effort in winter (e.g., weekly surveys from mid-Oct – mid-April) if a site is located in the Golden Eagle migratory corridor and wintering areas. Additionally, because effort, which is a function of time and area surveyed, is a key parameter in the Bayesian risk model, low visibility of the area surrounding the survey points may affect the fatality predictions.

Literature Cited

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