

**BEFORE  
THE OHIO POWER SITING BOARD**

In the Matter of the Application of Firelands Wind, )  
LLC for a Certificate of Environmental Compatibility )  
and Public Need to Construct a Wind-Powered ) Case No: 18-1607-EL-BGN  
Electric Generation Facility in Huron and Erie )  
Counties, Ohio. )

**DIRECT TESTIMONY OF**

**Rhett E. Good  
Research Biologist/Senior Manager  
Branch Manager Indiana Field Office, Bat Practice Group Lead  
Western EcoSystems Technology, Inc.**

**on behalf of  
Firelands Wind, LLC**

**September 11, 2020**

/s/ Christine M.T. Pirik

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1   **1.     Please state your name, current title, and business address.**

2     My name is Rhett E. Good. I am employed by Western EcoSystems Technology, Inc.  
3     (“WEST”) as the Senior Manager and Branch Manager for our Indiana Field Office, and  
4     a Senior Advisor to our Bat Practice Group. My business address is 408 West 6<sup>th</sup> Street,  
5     Bloomington, Indiana.

6  
7   **2.     Please summarize your educational background and professional experience.**

8     I received a Bachelor of Science Degree in Biology with a minor in natural resources  
9     from Ball State University in 1995, and received a Master’s Degree in Zoology and  
10    Physiology from the University of Wyoming in 1998. I have been employed by WEST  
11    for the past 22 years as a research biologist, project manager, and senior manager. I have  
12    24 years of experience conducting wildlife research across the United States (“U.S.”). I  
13    have completed monitoring, research, assessments and conservation plans for private  
14    industry, environmental conservation organizations, and the U.S. Fish and Wildlife  
15    Service (“USFWS”). I am recognized as a Certified Wildlife Biologist® by The Wildlife  
16    Society. I served as project manager and field supervisor for a rangewide survey of  
17    golden eagles across the western U.S. for the USFWS that resulted in two publications in  
18    the Journal of Wildlife Management.<sup>1</sup> Information from the survey is being used by the  
19    USFWS to better manage golden eagle populations across the western U.S. I am  
20    currently involved in research designed to estimate impacts of wind development to  
21    wildlife at several proposed and existing wind-energy facilities in the Midwest. I also  
22    served as project manager on a research study of the impacts of the Fowler Ridge wind-  
23    energy facility on bats, which was the first facility to find an Indiana bat carcass. The  
24    research we conducted was used to determine if feathering turbine blades below raised  
25    cut-in speeds would reduce bat mortality. The results of the research were used to  
26    develop a habitat conservation plan that included adaptive management and mitigation  
27    for bats.<sup>2</sup> My resume is attached as Attachment REG-1.

28  
<sup>1</sup> <https://onlinelibrary.wiley.com/doi/abs/10.1002/jwmg.704>;  
[https://www.jstor.org/stable/4495197?seq=1#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/4495197?seq=1#page_scan_tab_contents)

<sup>2</sup> <https://www.fws.gov/Midwest/endangered/permits/hcp/FowlerRidge/index>

1   **3.     On whose behalf are you offering testimony?**

2     I am testifying on behalf of the Applicant, Firelands Wind, LLC (“Applicant” or  
3     “Firelands”), which is seeking to develop the proposed Emerson Creek Wind Farm  
4     (“Project”).  
5

6   **4.     Have you been involved in other cases before the Ohio Power Siting Board**  
7   **(“Board”)?**

8     I have completed, supervised, and reviewed pre-construction field studies and risk  
9     assessments for the Timber Road II and III Wind Farms, the Hog Creek Wind Farm, the  
10    Blue Creek Wind Farm, the Hardin Wind Farm, and the Icebreaker Wind Farm<sup>3</sup> that  
11    satisfied the Ohio Department of Natural Resources (“ODNR”) and the Board’s  
12    requirements for wildlife studies.  
13

14   **5.     What is the purpose of your testimony?**

15    The purpose of my testimony is to support the portions of Firelands’ Application for a  
16    Certificate of Environmental Compatibility and Public Need (“Application”) regarding  
17    ecological information addressing the presence, abundance, and behavior of avian and bat  
18    species. Specifically, I provide support regarding species of migrating, wintering, and  
19    breeding birds in the Project area. I am providing support for the Applicant’s discussions  
20    with federal and state agencies regarding avoidance and mitigation measures that will be  
21    put into place to minimize risk to the Indiana Bat and Northern Long-Eared Bat. I am  
22    also sponsoring certain Exhibits attached to the Application, all of which I have reviewed  
23    in my professional capacity. My testimony, together with the other witnesses for  
24    Firelands testifying in this case, confirms that the Joint Stipulation and Recommendation  
25    (“Stipulation”), which was filed in this docket on September 11, 2020, and is being  
26    offered in this proceeding as Joint Exhibit 1, supports a finding by the Board that the  
27    Stipulation represents the minimum adverse environmental impact, considering the state

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<sup>3</sup> Timber Road II and III Wind Farms (Case Nos. 09-908-EL-BGN and 10-369-EL-BGN, respectively), the Hog Creek Wind Farms (Case Nos. 09-277-EL-BGN and 10-654-EL-BGN, respectively), the Blue Creek Wind Farm (Case No. 09-1066-EL-BGN), the Hardin Energy Wind Farm (Case No. 09-479-EL-BGN), and the Icebreaker Wind Farm (Case No. 16-1871-EL-BGN).

1 of available technology, and is in the public interest.

2  
3 **6. Please describe the history of your involvement with the Emerson Creek Project.**

4 I began working on the Emerson Creek project in 2010. My role was to assist our project  
5 managers with the development of survey protocols, interpretation of survey results,  
6 reviewing reports, and coordinating with the USFWS and ODNR.

7  
8 **7. Please generally describe the exhibits and studies that you are sponsoring and**  
9 **provide a brief summary of the findings for each study.**

10 For the Emerson Creek Project, I am sponsoring, in whole or in part, Exhibits K, R, S, T,  
11 V, W, and X of the Application, as well as the pages in the Application narrative that  
12 support and explain these exhibits. The documents, exhibits, and studies I am sponsoring  
13 are:

14  
15 a. Application Exhibit K – USFWS and ODNR Correspondence: This Exhibit  
16 contains various documents regarding communications between the Applicant,  
17 ODNR, and/or USFWS between 2010 and 2019.

18  
19 b. Application Exhibit R – Raptor Nest Survey and Monitoring Reports:

- 20 • May 17, 2018 - Raptor Nest Surveys prepared by WEST: WEST completed a  
21 survey to detect raptor nests, which included the northern portion of the  
22 current Project boundary. The purpose of the survey was to document the  
23 presence of bald eagle nests within 2 miles of the Project, and other large  
24 raptor nests within one mile of the Project. Surveys were completed in  
25 accordance with the 2009 ODNR On-Shore Bird and Bat Pre- and Post-  
26 Construction Monitoring Protocol for Commercial Wind Energy Facilities in  
27 Ohio (“ODNR Protocols”) and agency recommendations. Surveys were  
28 completed March 12-15, prior to leaf out, to increase the observer’s ability to  
29 find nest structures.  
30



1 Eagle nests were documented, and are further described within Chris Farmer's  
2 testimony. Eleven active red-tailed hawk nests, one active great-horned owl  
3 nest, and 21 unoccupied, non-eagle raptor nests were found within the 2018  
4 Project area and a one mile buffer.

- 5  
6 • June 13, 2018 - Raptor Nest Surveys prepared by WEST: WEST completed a  
7 survey to detect raptor nests, which included the southern portion of the  
8 current Project boundary. The purpose of the survey was to document the  
9 presence of bald eagle nests within 2 miles of the Project, and other large  
10 raptor nests within one mile of the Project. Surveys were completed in  
11 accordance with the ODNR Protocols and agency recommendations. Surveys  
12 were completed April 9-10, prior to leaf out, to increase the observer's ability  
13 to find nest structures.

14  
15 Eagle nests were documented, and are further described within Chris Farmer's  
16 testimony. Six active red-tailed hawk nests, two active great horned owl nests,  
17 and 12 unoccupied, unknown raptor nests were found within the revised  
18 Project area and one mile buffer. The unoccupied, unknown raptor nests were  
19 determined to be non-eagle nests based on their size.

- 20  
21 • October 2, 2015 - Raptor Nest Surveys Huron County, Ohio, Spring 2014,  
22 prepared by WEST: The Project area was previously surveyed by Tetra Tech  
23 EM, Inc. ("Tetra Tech") in 2011, 2012 and 2013. WEST conducted raptor nest  
24 surveys outside of the area surveyed by Tetra Tech and to determine if there  
25 were any nesting bald eagles within 3 miles and any raptor nests within 1 mile  
26 of the 2014 Project addition to the south of the Project boundaries. In  
27 addition, 6 previously recorded eagle nests were monitored for activity. The  
28 survey consisted of searching suitable nesting areas from public roads. One  
29 ground survey was conducted on April 29 through May 1, 2014.

1 Eagle nests were documented, and are further described within Chris Farmer's  
2 testimony. Six red-tailed hawk nests were recorded during the survey,  
3 including three active nests, two inactive nests, and one nest of unknown  
4 status.

- 5  
6 • May 9, 2012 Spring 2012 Raptor Nest Survey Results, prepared by WEST:  
7 WEST conducted ground-based raptor nest surveys at the Project area to  
8 locate raptor nests within approximately one mile of the southern portion of  
9 the current Project boundary, per ODNR Protocols. Suitable raptor nesting  
10 habitat is present in the Project area in the form of deciduous trees,  
11 shelterbelts, grasslands, and man-made structures such as power poles. One  
12 survey for raptor nests, including potential northern harrier nesting habitat,  
13 was conducted from March 29 to 31, 2012. The survey consisted of searching  
14 suitable nesting areas from public roads and leased areas within the Project  
15 area and a 1-mile buffer.

16  
17 Eagle nests were documented, and are further described within Chris Farmer's  
18 testimony. Six active red-tailed hawk nests, and two inactive, unknown raptor  
19 nests were found during a survey of a previous version of the Project area and  
20 1-mile buffer. Female northern harriers were observed flying at 8 grasslands  
21 within the survey area, which indicates that those grasslands may have been  
22 used as nest sites in 2012.

- 23  
24 • May 6, 2011 Spring 2011 Raptor Nest Survey Results, prepared by WEST:  
25 WEST conducted ground-based raptor nest surveys within approximately one  
26 mile of the southern portion of the current Project area to locate raptor nests,  
27 per ODNR Protocols. Suitable raptor nesting habitat is present in the Project  
28 area in the form of deciduous trees, shelterbelts, grasslands, and man-made  
29 structures such as power poles. One survey for raptor nests, including  
30 potential northern harrier nesting habitat, was conducted from April 1 to 9,

1           2011. The survey consisted of searching suitable nesting areas from public  
2           roads and leased areas within the Project area and a 1-mile buffer.

3  
4           Eagle nests were documented, and are further described within Chris Farmer's  
5           testimony. Seven active red-tailed hawk nests and nine inactive, unknown  
6           species raptor nests were found within the 2011 Project area. Seven active  
7           red-tailed hawk nests, and six inactive unknown species raptor nests were  
8           found within one mile of the 2011 Project area.

- 9  
10           • June 2009 Raptor Nest Survey and Monitoring, prepared by BHE  
11           Environmental ("BHE"): BHE identified and subsequently monitored raptor  
12           nests within the northern portion of the current Project area, plus a two-mile  
13           perimeter, in accordance with the ODNR Protocol.

14  
15           Eagle nests and activity were documented, and are further described within  
16           Chris Farmer's testimony. Twelve red-tailed hawk nests were recorded during  
17           a survey of a previous version of the Project area and two mile perimeter, four  
18           of which were active.

19  
20           c. Application Exhibit S – Raptor Migration/Use Surveys:

- 21  
22           • February 6, 2013 Wildlife Baseline Studies Seneca and Huron Counties, Ohio,  
23           prepared by WEST: WEST conducted baseline surveys in the southern portion  
24           of the current Project area, following methods described in the final draft of  
25           wildlife study guidelines from ODNR. Wildlife surveys, conducted from  
26           September 1, 2010 through August 30, 2011 at the Project, fulfilled a portion of  
27           the methods recommended in final ODNR guidelines and included ground-based  
28           raptor nest surveys, passerine migration surveys, raptor migration surveys, bald  
29           eagle surveys, and incidental wildlife observations.

1 Seven active red-tailed hawk nests and nine inactive unknown raptor species  
2 nests were observed within the 2011 Project area. An additional seven active  
3 red-tailed hawk nests, and six inactive unknown raptor species nests, were  
4 observed within one mile of the 2011 Project area. Eagle nests were  
5 documented, and are further described within Chris Farmer's testimony.

6  
7 Passerine migration surveys were conducted at 16 points weekly during the  
8 fall and spring migration periods (September 1 – November 15, 2010, April 1  
9 – May 31, 2011, and August 15 – September 1, 2011). Three hundred sixty-  
10 seven 10-min surveys were conducted and 117 unique species were observed.  
11 Overall bird use was higher in the fall (17.36 birds/plot/10-minute survey)  
12 than in the spring (13.45).

13  
14 Raptor migration surveys were conducted three times per week at four survey  
15 points during the fall (September 1 to October 29) and spring (March 15 to  
16 May 1). A total of 324 raptors, representing 11 species, were observed during  
17 fall and spring raptor migration surveys. Overall raptor use within the 2011  
18 Project area was relatively higher during the spring (1.15 birds/observer hour)  
19 than in the fall (0.72). Buteos had the highest relative use of raptor subtypes  
20 during spring and fall (0.78 and 0.43 birds/observer hour). Raptor migration  
21 and bald eagle migration rates collected at the 2011 Project area during the  
22 raptor migration surveys were lower than rates observed at Hawk Migration  
23 Association of North America ("HMANA") Hawkwatch sites in the same  
24 geographic region as the project. The results of the raptor migration surveys  
25 within the 2011 Project area show that raptor use rates were low compared to  
26 observations at other wind energy facilities across the U.S., and within the  
27 range of raptor use rates observed within the Midwest.

28



1 Bald eagle use was documented, and is further described within Chris  
2 Farmer's testimony. The objective of incidental wildlife observations was to  
3 provide use and occurrence information for wildlife seen outside of the  
4 standardized surveys. Thirty-seven bird species totaling 4,627 individuals  
5 within 283 separate groups during the study were recorded incidentally at the  
6 2011 Project area. The most abundant species recorded incidentally was  
7 mallard (1,588 individuals) followed by red-tailed hawk (582) and ring-  
8 necked duck (572). Four mammal species were also recorded incidentally.

9  
10 No federally-listed threatened or endangered species were observed during  
11 surveys within the 2011 Project area. Twenty-seven species designated as  
12 endangered (five species), threatened (six species), species of special concern  
13 (four species) or species of special interest (12 species) by the ODNR were  
14 observed during surveys and incidentally within the 2011 Project area.

- 15  
16 • July 20, 2012 Avian Survey Report, prepared by Tetra Tech: Tetra Tech  
17 conducted various surveys and studies required for successful permitting and  
18 development of the proposed Project. The Tetra Tech report documents the  
19 multiple avian surveys conducted, and provides background information, a  
20 description of the existing site conditions, survey methodologies, survey  
21 results, survey discussion, and conclusions. The purpose of the avian survey  
22 effort was to gather site specific data to characterize the bird community  
23 within the Project area. The surveys were completed within the  
24 Firelands/Lyme Project areas, a portion of which overlaps the northern portion  
25 of the currently proposed Project area. The survey methods were reviewed and  
26 approved by the ODNR and USFWS.

27  
28 Eagle nest surveys were completed within 10-mi of the Firelands/Lyme  
29 Project, and raptor nest surveys within 2-mi from the ground. Eagle nests were

1 documented, and are described within Chris Farmers testimony. Seven red-  
2 tailed hawk nests were reported in 2011; however their status was not  
3 described within the report. The amount of area surveyed exceeded the ODNR  
4 guideline recommendations.

5  
6 Forty eight, day long surveys were completed to document raptor migration.  
7 Two locations were surveyed during the spring and fall, within the ODNR  
8 defined migration seasons, and using methods consistent with ODNR  
9 guidelines. Tetra Tech reported a total of 147 observation hours in the spring  
10 and 189 hours in the fall. 823 observations of raptors were recorded. The  
11 most commonly observed raptors were turkey vultures and red-tailed hawks.  
12 Raptor migration rates were lower than rates recorded at important hawk  
13 migration corridors in the Midwest. Twenty seven northern harriers, a state  
14 endangered species, were observed. Relatively low numbers of observations  
15 were recorded, given the large number of survey hours. Highest overall  
16 encounter rates for all observations was during the fall. The majority of  
17 raptors were observed flying at heights similar to the height of proposed  
18 turbine blades. 15,668 observations of non-raptor species were recorded. 86%  
19 of these observations were reported as passerines or land birds; over 92% of  
20 observations were observed flying below 40-m or above 180-m. The species  
21 recorded were generally typical of Midwest agricultural landscapes, with a  
22 few exceptions. 100 tundra swans were recorded on one occasion during the  
23 spring, and likely occur in the Project periodically during the spring migration  
24 period. One flock of common terns, a state-listed endangered species, was  
25 observed during migration.

26  
27 Breeding bird surveys were completed at 35 points during May and June.  
28 Birds observed were reported to be generally common in the region, and no  
29 state or federally listed species were observed.  
30

1 Twelve, day-long sandhill crane surveys were completed, and no sandhill  
2 cranes were reported over 80 hours of surveys during the late fall. Two  
3 incidental observations of sandhill cranes were recorded during other surveys.  
4 The authors concluded that the project does not appear to be of great  
5 importance to special status or migratory birds. The Project does receive use  
6 by migrating and nesting birds; I agree with the conclusion that the Project  
7 does not appear to be located in a concentrated migration corridor based on  
8 the survey results.

9  
10 d. Application Exhibit T – Passerine Migration Surveys:

- 11  
12 • May 8, 2018 - Passerine Migration Surveys Huron and Erie Counties, Ohio,  
13 prepared by WEST: This report presents the results of the 2016 – 2017  
14 passerine migration surveys completed by WEST within the northern portion  
15 of the current Project area. Survey protocols were developed following  
16 ODNR Protocols. The objective of the surveys was to determine seasonal and  
17 spatial use of the Project by migrating passerines and other birds. In addition,  
18 the report assesses potential risk associated with the construction and  
19 operation of the Project to migrating passerines, specifically federal- and  
20 state-listed bird species.

21  
22 Passerine migration surveys following the ODNR protocols were completed  
23 during the fall and spring of 2016 and 2017 within the 2017 Project area. 137  
24 surveys were completed, during which 3,220 individual birds, within 993  
25 groups were recorded. 76 individual species were observed, comprised of  
26 primarily widespread and abundant species; no state or federal threatened or  
27 endangered species were observed. Two birds of conservation concern defined  
28 by the USFWS were observed, including nine red-headed woodpeckers and  
29 10 wood thrush. The results indicate the project is not heavily used by listed  
30 species or other species of concern as migratory stopover habitat.

- July 17, 2018 - Passerine Migration Surveys Huron County, Ohio, prepared by WEST: WEST completed passerine migration surveys within the southern portion of the current Project during fall 2016 and spring and fall 2017. Survey protocols were developed following ODNR Protocols. The objective of the surveys was to evaluate the use of the Project by migrating passerines and other birds during the spring and fall. In addition, results from these surveys were compared to early surveys completed with similar protocols in 2010, 2011 and 2012.

A total of 17 points were surveyed for passerines within the 2017 Project area in 2010, 2011, 2012, and 2017, which meets the total survey effort recommended by the ODNR guidelines. The species composition was generally similar between years, with more species reported in years that had more survey effort. 205 surveys were completed at 7 points in 2016 and 2017, during which 83 species were recorded. Mean use was similar to surveys during other years in the Project area. No federal or state threatened or endangered species were recorded. Four USFWS birds of conservation concern were recorded, including one bald eagle, four observations of bobolink, three observations of wood thrush, and three observations of red-headed woodpecker. The species composition and rates of use were similar to other Midwest wind-energy projects in agricultural landscapes.

- January 7, 2013 - Summary of Results of 2012 Passerine Migration Surveys, prepared by WEST: WEST conducted baseline surveys in the southern portion of the current Project area. Its survey design followed methods described in the final draft of the ODNR Protocols. This report includes results from the 2012 passerine migration surveys conducted in a revised, 2012 version Project area between April 4 and November 14, 2012. The 2012 passerine migration surveys along with the surveys completed in 2010/2011 were intended to fulfill the ODNR recommendations outlined in the June 19, 2012 letter. The objective of the



1 passerine migration survey was to estimate the rate of use of the combined forest,  
2 shrub and wooded wetland habitats in the general project area by migrating birds.

3  
4 241 passerine migration surveys were completed at 11 points during the spring  
5 and fall migrations of 2012. 6783 birds were recorded, with rates of use higher in  
6 the fall than the spring. No federal listed threatened or endangered species were  
7 recorded. One state listed endangered species, northern harrier, was recorded  
8 during six observations. One bald eagle was also recorded. 16 species of concern  
9 or interest were also recorded. Overall low rates of use by threatened or  
10 endangered species were recorded, and the rates of use and species recorded were  
11 typical of other wind-energy projects in the Midwest.

12  
13 e. Application Exhibit V – Breeding Bird Surveys:

- 14  
15 • August 23, 2018 - Breeding Bird Surveys Huron and Seneca Counties, Ohio,  
16 prepared by WEST: WEST completed breeding bird surveys from May 21 -  
17 June 27, 2018 within the northern portion of the current Project area in  
18 accordance with ODNR Protocols. The objectives of the study were to  
19 document the diversity and abundance of bird species observed within the  
20 Project during the breeding season, and document occurrences and locations  
21 of sensitive species.

22  
23 Breeding bird surveys were completed at 16 points in potential nesting habitat,  
24 within the 2018 Project area during May and June. The ODNR survey  
25 guidelines only require breeding bird surveys for turbines that will be located  
26 in potential bird nesting habitat. Turbine locations were not known at the time  
27 of the survey, and the survey effort was conservatively based on the number  
28 of turbines proposed in 2018, and the amount of potential breeding bird  
29 habitat within the 2018 Project boundary. All of the final turbine locations

1 will be within tilled cropland, and thus the ODNR recommended survey effort  
2 was exceeded. 959 observations were recorded of 64 species during the  
3 survey. No federal or state threatened or endangered species were recorded  
4 during the survey. Three USFWS birds of conservation concern were recorded  
5 in low numbers near forested riparian habitat, including willow flycatcher,  
6 wood thrush, and red-headed woodpecker. The majority of species observed  
7 were typical of Midwest agricultural landscapes.  
8

- 9 • October 9, 2017 - Breeding Bird Surveys Huron County, Ohio, prepared by  
10 WEST: WEST completed breeding bird surveys within the southern portion  
11 of the current Project area in accordance with ODNR Protocols. The  
12 objectives of the study were to document the diversity and abundance of bird  
13 species observed within the Project during the breeding season, and document  
14 occurrences and locations of sensitive species. Surveys were originally  
15 completed for the Project in 2012, and additional surveys were completed  
16 within an expanded portion of the project in 2017.  
17

18 Breeding bird surveys were completed at 16 points in potential nesting habitat,  
19 within the 2017 Project area during May and June. The ODNR survey  
20 guidelines only require breeding bird surveys for turbines that will be located  
21 in potential bird nesting habitat. Turbine locations were not known at the time  
22 of the survey, and the survey effort was conservatively based on the number  
23 of turbines proposed in 2017, and the amount of potential breeding bird  
24 habitat within the 2017 Project boundary. No turbines will be located within  
25 potential nesting habitat, thus the survey exceeded the recommended effort  
26 within the ODNR guidelines.  
27

28 26 points were surveyed in 2012, and 8 points were surveyed in 2017 within  
29 potential breeding bird habitat during May and June. 55 and 68 species were  
30 recorded in 2017 and 2012, respectively. 472 bird observations were recorded

1 in 2017 and 1,220 were recorded in 2012. The most commonly observed  
2 species were typical of Midwest agricultural landscapes. No federal or state  
3 threatened or endangered species were documented during the surveys. Three  
4 USFWS birds of conservation were observed, including the field sparrow  
5 (n=32), northern flicker (n=5), and red-headed woodpecker (n=4) over both  
6 years of study.

- 7
- 8 • October 15, 2012 - Summary of Results of Breeding Bird Surveys, prepared  
9 by WEST: WEST conducted breeding bird surveys in the southern portion of  
10 the current Project area, following methods described in the final draft of  
11 ODNR's wildlife study guidelines. This summary includes results from the  
12 breeding bird surveys conducted between May 10 and July 18, 2012. The  
13 objective of the breeding bird surveys was to document the type and number  
14 of bird species observed at the Project during the breeding season.

15

16 Breeding bird surveys were completed at 45 points in potential nesting habitat,  
17 within the 2012 Project area during May and June, and at 1 point in July. The  
18 ODNR survey guidelines only require breeding bird surveys for turbines that  
19 will be located in potential bird nesting habitat. Turbine locations were not  
20 known at the time of the survey, and the survey effort was conservatively  
21 based on the number of turbines proposed in 2012, and the amount of  
22 potential breeding bird habitat within the 2012 Project boundary. No turbines  
23 will be located within potential nesting habitat, thus the survey exceeded the  
24 recommended effort within the ODNR guidelines.

25

26 88 species were identified, and a total of 2,446 bird observations recorded.  
27 Bird species observed were typical of Midwest agricultural landscapes. No  
28 federally threatened or endangered species were recorded. Two state listed  
29 species recorded, including the northern harrier (endangered) and the sandhill  
30 crane (threatened). Four species of Ohio special concern or interest were also

1 recorded.

2  
3 f. Application Exhibit W – Owl Surveys:

- 4  
5 • May 21, 2013 - Owl Surveys, prepared by WEST: WEST conducted baseline  
6 surveys in the southern portion of the current Project area, following methods  
7 described in the ODNR's final draft of wildlife study guidelines. This report  
8 includes results from the owl surveys conducted at the Project between  
9 December 2012 and April 2013. The objective of the surveys was to  
10 determine if three species of owl were present within the Project area during  
11 the winter (great horned owl, barred owl, and eastern screech owl). Survey  
12 methods followed the ODNR guidelines. Two points were surveyed within the  
13 2013 Project area. One eastern screech owl was recorded during the survey.

14  
15 g. Application Exhibit X – Acoustic Bat Surveys:

- 16  
17 • July 20, 2012 - Bat Acoustic Survey Report, prepared by Tetra Tech: The  
18 purpose of this pre-construction study was to provide information on bat  
19 activity within the northern portion of the current Project area and to  
20 determine the relative levels of bat activity between acoustic monitoring  
21 locations, as well as to identify peak periods of bat activity, and how these  
22 peaks may relate to weather conditions.

23  
24 Acoustic bat surveys were completed at 3 locations within the Firelands/Lyme  
25 Project area, consistent with ODNR survey guidelines during the spring,  
26 summer and fall. Bat activity was recorded at two met towers located in more  
27 open corn and soybean fields, and at two ground locations near forested areas.  
28 Bat activity was higher near forested areas than recorded at met towers. Tree  
29 bat species, such as eastern red bat, hoary bat, and silver-haired bat, were



1 recorded at all stations, and all three species are most commonly found as  
2 fatalities at wind-energy projects in the U.S. Silver-haired bat, big brown bat,  
3 and unknown Middle Frequency calls were the most common call types  
4 identified by Tetra Tech. Bat activity increased in August and September,  
5 which is consistent with the period when most bat mortality occurs in the U.S.  
6 No Indiana bat calls were identified during the acoustic survey, or a mist-net  
7 survey completed for both projects. Northern long-eared bats, now listed as  
8 threatened by the USFWS and endangered by the ODNR, were recorded  
9 during the acoustic and mist-net survey. Little brown bat and tri-colored bat,  
10 listed as endangered by the ODNR, were also recorded.  
11

- 12 • March 11, 2011 - Bat Activity Studies for the Proposed Seneca and Huron  
13 WEST: WEST initiated bat acoustic surveys within the southern portion of  
14 the current Project area. The objective of the bat acoustic surveys was to  
15 estimate the seasonal and spatial use of the Project area by bats and the  
16 methods used to survey for bats followed recommendations received from  
17 ODNR.

18  
19 Bat activity was recorded at one met tower during the spring, summer and fall  
20 with two Anabat units. One unit was placed 5-m above ground level, and a  
21 second elevated to near turbine blade height at 50 m above ground level. Bat  
22 activity rates were highest during the fall migration season (mid July to mid  
23 September), and were lower than projects in the eastern U.S.. Activity rates  
24 were higher than projects in the western U.S. and one wind-energy facility in  
25 Ohio. The majority of bat calls recorded were low frequency species, such as  
26 hoary bat, silver-haired bat, and big brown bat. Hoary and eastern red bat call  
27 rates, both species found as fatalities at U.S. wind turbines, were higher at the  
28 raised compared to the 5-m bat detector.  
29  
30

1   **8.     What is the role of you and your firm in regards to the studies listed in your answer**  
2   **to Question 7 above?**

3     Our role is to ascertain, based on my experience and familiarity with the methods  
4     and protocols of the applicable guidance documents, whether the studies and surveys  
5     described above are in conformance with the ODNR Protocols, USFWS Land-Based  
6     Wind Energy Guidelines (“USFWS Wind Guidelines”), and USFWS Eagle Conservation  
7     Plan Guidance (“USFWS ECPG”). I have also reviewed the study reports to make sure  
8     that they included target species.

9  
10   **9.     Have there been any additional bird or bat surveys conducted in the Project Area?**

11     Additional surveys for large birds and eagles were completed in the current Project area,  
12     following methods described within the Eagle Conservation Plan Guidance. Surveys  
13     were completed from February 8, 2018 – April 23, 2019 at 54 survey points, resulting in  
14     648 total hours of survey effort. Twenty five species totaling 2,958 individual  
15     observations were recorded. The ring-billed gull, Canada goose, turkey vulture, tundra  
16     swan, and American crow, mourning dove, and rock pigeon were the most commonly  
17     observed species. Five species of raptor were recorded (red-tailed hawk, Cooper’s hawk,  
18     northern harrier, bald eagle, and American kestrel), with the majority of observations  
19     composed of red-tailed hawks. 1,160 large bird observations were recorded flying, with  
20     69.9% occurring within the approximate rotor swept height. Bald eagles were observed,  
21     and are further described within Chris Farmer’s testimony.

22  
23     Raptor migration rates were quantified; a total of 37 raptor observations were recorded in  
24     the spring, and 42 in the fall. Raptor migration was not concentrated within any certain  
25     portion of the Project area, and use was similar between all seasons, including non-  
26     migration seasons. Raptor use was low relative to many wind-energy facilities. Raptor  
27     mortality rates in the Midwest have been relatively low at other wind-energy facilities.

28  
29  
30

1 No federal threatened or endangered species were observed. One state endangered  
2 species, the northern harrier, was recorded during 28 observations, the majority of which  
3 were low flights below the approximate rotor swept area. Most observations of northern  
4 harriers were recorded outside of the breeding season. One red-headed woodpecker, a  
5 USFWS species of concern, was recorded incidentally during the summer.

6  
7 Survey results were similar to previous surveys within the Project, and were comprised  
8 primarily of geographically abundant species, whose populations are likely to be  
9 unaffected by collision mortality from the Project. Population level impacts to large bird  
10 species are not expected to occur.

11  
12 **10. Please discuss the standards that were followed when these various studies and**  
13 **reports were prepared.**

14 The methodologies and protocols used for the avian studies conducted for the Project  
15 are very familiar to me. I had used the basic methodology and protocols to conduct  
16 similar studies at other wind energy projects in the U.S. The agency recommended  
17 methods and protocols used for the Project that have been standard for many years, and  
18 some were accepted and used prior to the issuance of the ODNR Protocols, the USFWS  
19 Wind Guidelines, and the USFWS ECPG. The studies and reports for the Project were  
20 performed in accordance with the ODNR Protocols, the USFWS Wind Guidelines, and  
21 the USFWS ECPG.

22  
23 **11. What degree of confidence do you have in the studies set forth in Exhibits R, S, T, V,**  
24 **W, and X of the Application?**

25 I have a high degree of scientific certainty that the studies completed in exhibits  
26 R,S,T,V,W, and X were consistent with the ODNR survey protocols, and applicable  
27 USFWS guidelines. This conclusion stems from my review of the study reports, my  
28 involvement in some of the studies, and my experience implementing similar protocols at  
29 other wind-energy projects. This conclusion also comes from my review of agency  
30 correspondence, which shows APEX coordinated with the ODNR and USFWS

1 throughout the development process.

2  
3 **12. Please discuss the process of the Applicant's consultation with ODNR and USFWS**  
4 **when preparing the various studies and reports.**

5 The Applicant consulted with ODNR and USFWS in preparing wildlife study plans prior  
6 to conducting those studies. The original consultations with these agencies occurred in  
7 2010. When preparing wildlife study plans, the Applicant utilized the ODNR Protocols,  
8 the USFWS Wind Guidelines, and the USFWS ECPG, or initial feedback to develop  
9 the study plan, and then discussed the plan with the ODNR and/or USFWS. Each study  
10 plan would outline how the surveys were in accordance with ODNR, USFWS, or ODNR  
11 and USFWS guidance. The objectives and methods within the study plans were discussed  
12 with the applicable agencies. Once field surveys were completed, a final report was  
13 provided to ODNR and USFWS and next steps (if any) were determined.

14  
15 **13. Have you reviewed the Stipulation that was filed in this docket on September 11,**  
16 **2020?**

17 Yes.

18  
19 **14. Is it your opinion that the conditions laid out in the Stipulation enable the Board to**  
20 **determine the probable environment impact from the facility?**

21 Yes.

22  
23 **15. Is it your opinion that the conditions laid out in the Stipulation enable the Board to**  
24 **determine that the facility represents the minimum adverse environmental impact?**

25 Yes. I am reviewing existing reports and providing testimony on avian and bat studies,  
26 and the potential impacts to bats and most bird species, except eagles. Chris Farmer's  
27 testimony addresses the eagle survey results and impacts.

28  
29 The Project has completed surveys and coordinated with the ODNR and USFWS well  
30 ahead of development, which is recommended by the ODNR and the USFWS land-based



1 wind-energy guidelines. Several studies of bird and bat use have been completed at the  
2 Project since 2009. Some of the studies have occurred in multiple years prior to  
3 development, and included portions of the current Project and surrounding areas as a  
4 result of changing development plans. The cumulative number of survey locations, and  
5 the amount of area surveyed for raptor and eagle nest surveys, passerine migration  
6 surveys, breeding bird surveys, and acoustic bat surveys exceeded the effort  
7 recommended within the ODNR guidelines, and survey methods were consistent with  
8 ODNR and USFWS recommendations. The ODNR has allowed surveys from multiple  
9 years to be used to satisfy ODNR requirements on other projects. Inclusions of multiple  
10 years of surveys is an advantage for this application, and allows for between year  
11 variability in the level of use by birds and bats to be better assessed. The survey methods  
12 and results were reviewed with the ODNR and USFWS, and no further surveys were  
13 recommended.

14  
15 The potential impacts of wind-energy to birds is an important consideration. The impacts  
16 of wind to birds can take the form of indirect impacts, such as loss of habitat or avoidance  
17 of areas near turbines, or direct impacts, such as collision mortality. The primary reason  
18 for declining bird populations is habitat loss and fragmentation of important habitat, such  
19 as nesting areas. The proposed Project is dominated by tilled agriculture and is highly  
20 fragmented, and the majority of the Project does not provide suitable nesting habitat for  
21 many bird species. The Project has reduced impacts to bird habitat by avoiding forested  
22 areas, grasslands, and wetlands when siting turbines.

23  
24 Hundreds of post-construction monitoring studies have been completed at wind-energy  
25 projects across the U.S. and Canada, and bird mortality occurred at every Project that I  
26 am aware of. Passerines, including nocturnal migrants as well as passerines that use the  
27 Project for foraging or nesting, are the most common type of bird mortality at wind  
28 projects. The median bird mortality rate in the Midwest is 2.63 birds per MW per year,  
29 which is similar to the mortality rate for the Northeast U.S. (2.49 birds per MW per

1 year).<sup>4</sup> The Project has reduced potential impacts to birds by siting wind turbines in tilled  
2 agriculture, which is not used as stopover or nesting habitat by many bird species. Wind  
3 is just one of many sources of bird mortality; collisions with buildings, communication  
4 towers, and predation by cats causes orders of magnitude more bird fatalities than the  
5 combined mortality from all wind projects. See Attachment REG-2.

6  
7 Mortality of rare species with lower population sizes, and declining populations has the  
8 potential to be greater impact to a species population. Bird mortality at wind-energy  
9 projects is typically not concentrated within a few species, rather, lower numbers of  
10 fatalities occur among several different species, primarily passerines. This means that  
11 passerine mortality at wind projects is not concentrated among a few species, and thus the  
12 potential population level impacts are very low for any single species. Use of the Project  
13 by federal and state bird species listed as threatened or endangered, which are species that  
14 have been identified by federal and state agencies as having declining populations that  
15 are vulnerable to additional impacts, was low at the Project. The siting of turbines within  
16 tilled agriculture should further minimize potential impacts to birds, including listed  
17 species.

18  
19 Turbines proposed for the Project will be 4.0 MW or larger, which are larger than  
20 turbines assessed at many post-construction mortality studies. The potential exists for  
21 bird mortality to be higher on a per turbine basis at the proposed Project relative to older,  
22 and smaller turbines due to their larger size.<sup>5</sup> The use of larger, more efficient turbines  
23 also means that fewer turbines are needed to meet the Project's contract requirements,  
24 which is expected to reduce the Project's overall number of bird mortalities. Using fewer  
25 turbines also results in lower amounts of land required to develop and construct turbines.  
26 Bird mortality is higher at tall buildings and communication towers, in part, because birds  
27 can be attracted to lights associated with buildings and some communication towers,  
28 especially during migration if weather conditions reduce visibility and force a higher  
29 proportion of birds to fly lower. To date, no large mortality events on the scale of those

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<sup>4</sup> [https://awwi.org/wp-content/uploads/2019/02/AWWI-Bird-Technical-Report-02\\_25\\_19.pdf](https://awwi.org/wp-content/uploads/2019/02/AWWI-Bird-Technical-Report-02_25_19.pdf).

<sup>5</sup> <https://www.fws.gov/migratorybirds/pdf/management/lossetal2013windfacilities.pdf>.



1 documented at tall communication towers and buildings, where up to ten thousand birds  
2 have been documented during a single mortality event have been documented at wind-  
3 energy projects, despite extensive monitoring at many facilities.<sup>6</sup> This is largely because  
4 wind turbines utilize flashing lights instead of steady burning lights, which reduces or  
5 eliminates the potential for birds to be confused during migration and be attracted to  
6 turbines.<sup>7</sup> The lack of guy wires on wind turbine towers also reduces collision risk.<sup>8</sup>

7  
8 The Project has agreed to stipulations proposed by the OPSB and ODNR that are  
9 designed to help ensure that the Project's impacts are measured to determine if bird  
10 mortality reaches levels that could impact bird populations, or if unanticipated impacts to  
11 threatened or endangered species occurs. Stipulations will also require the Project to  
12 coordinate with the ODNR and USFWS on potential mitigation or changes to operation if  
13 impacts are significant.

14  
15 The impacts of wind-energy on bats can also be indirect or direct. Indirect impacts  
16 include loss of habitat. The Project was designed to avoid placing turbines in forested  
17 areas, and minimizing forest clearing associated with the construction of associated  
18 infrastructure. Direct impacts include bat mortality associated with forest clearing and  
19 turbine operation. The Project has minimized the amount of forest that will be cleared,  
20 and what clearing will occur will be completed during the winter to avoid direct impacts  
21 to bats roosting in forest.

22  
23 Direct impacts includes bat mortality through collision with wind turbine blades. Bat  
24 mortality occurs at every wind-energy project. Acoustic and mist-net surveys at the site  
25 have documented the presence of several bat species that have occurred as mortalities at  
26 other wind-energy projects. Currently there is no established link between the rates of bat  
27 captured or rates of bat calls recorded and the level of bat mortality. The best estimate of

---

<sup>6</sup> [http://www.audubon.org/sites/default/files/documents/loss\\_et\\_al\\_bird-building\\_collisions\\_condor\\_2014.pdf](http://www.audubon.org/sites/default/files/documents/loss_et_al_bird-building_collisions_condor_2014.pdf);  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0034025>

<sup>7</sup> <https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/07-1708.1>.

<sup>8</sup> <https://www.fws.gov/migratorybirds/pdf/management/gehringetal2011theroleoftowerheight.pdf>.

1 potential impacts comes from the rates of bat mortality at other wind-energy projects. Bat  
2 mortality rates from 36 post-construction monitoring studies in the Midwest have ranged  
3 from 0.4 – 61.8 bats / MW / Year.<sup>9</sup> To date no evidence exists that bat mortality is higher  
4 in the Midwest or Eastern U.S. at projects with more forest; projects in the Midwest that  
5 lack forested areas in Iowa and Indiana have shown bat mortality rates to be similar to  
6 projects in the eastern U.S. located on forested ridgetops.

7  
8 Previous surveys within the Project and adjacent areas have documented the presence of  
9 two federally listed species (Indiana and northern long-eared bat), and two species listed  
10 as threatened under Ohio's endangered species act (little brown bat and tri-colored bat).  
11 Mortalities of all of these species have been documented at wind-energy facilities,  
12 although typically in much lower numbers than eastern red, hoary bat, and silver-haired  
13 bat.<sup>10</sup> Previous research at other wind-energy facilities in North America have  
14 consistently shown that bat mortality rates for most species, including listed and non-  
15 listed species, are highest during the late summer and fall migration periods.<sup>11</sup>

16  
17 The Project has begun coordination with the USFWS and ODNR on the development of a  
18 Habitat Conservation Plan that will require the mortality of covered species to be  
19 minimized to the maximum extent practicable, and will require additional mitigation to  
20 offset any avoidable impacts, that will result in the issuance of an incidental take permit.  
21 Option exist for reducing bat mortality, including feathering turbine blades during low  
22 wind speeds<sup>12</sup> or use of acoustic deterrents<sup>13</sup>, which significantly reduces bat mortality.  
23 Minimization measures proposed for the project will require USFWS review and  
24 approval, and will significantly reduce bat mortality. The Project's development and  
25 implementation of a Habitat Conservation Plan will significantly reduce and help offset

---

<sup>9</sup> <https://awwi.org/resources/awwic-bat-technical-report/>; [https://www.west-inc.com/wp-content/uploads/2020/06/WEST\\_2019\\_RenewWildlifeFatalitySummaries.pdf](https://www.west-inc.com/wp-content/uploads/2020/06/WEST_2019_RenewWildlifeFatalitySummaries.pdf)

<sup>10</sup> <https://awwi.org/resources/awwic-bat-technical-report/>.

<sup>11</sup> [https://www.researchgate.net/publication/229523680\\_Patterns\\_of\\_Bat\\_Fatalities\\_at\\_Wind\\_Energy\\_Facilities\\_in\\_North\\_America](https://www.researchgate.net/publication/229523680_Patterns_of_Bat_Fatalities_at_Wind_Energy_Facilities_in_North_America)

<sup>12</sup> [http://batsandwind.org/pdf/Good%20et%20al.%202012\\_Fowler%20Report.pdf](http://batsandwind.org/pdf/Good%20et%20al.%202012_Fowler%20Report.pdf);

<https://tethys.pnnl.gov/sites/default/files/publications/Martin-et-al-2017.pdf>;

<https://tethys.pnnl.gov/sites/default/files/publications/Arnett-et-al-2013.pdf>

<sup>13</sup> <https://wildlife.onlinelibrary.wiley.com/doi/full/10.1002/wsb.1025>



1 the Project's impact to all bat species.

2  
3 In summary, the results of site specific studies that exceed the ODNR guidelines provide  
4 evidence that the overall mortality rates for birds is expected to be similar to other wind-  
5 energy projects, and the potential for impacts to federal and state listed bird species is  
6 expected to be low. The Project has sited turbines in tilled agriculture, which avoids  
7 potential habitat for most bird species. Existing post-construction mortality studies from  
8 hundreds of wind-energy facilities show that the level of bird mortality that is expected to  
9 occur is much lower than other sources of bird mortality.

10  
11 Similar to many other wind-energy projects located in the range of the Indiana bat, listed  
12 bat species are present within the proposed Project. The Project has avoided placing  
13 turbines in forested areas to reduce potential impacts to listed bat species. The Project  
14 will either avoid impacts to listed at species through curtailment, or develop a Habitat  
15 Conservation Plan that requires impacts to be minimized to the maximum extent  
16 practicable, and mitigate for the remaining impacts, per the OPSB permit conditions.  
17 Implementation of avoidance or minimization measures required within a Habitat  
18 Conservation Plan that requires USFWS approval will significantly reduce and offset the  
19 impacts of the Project to listed and non-listed bat species.

20  
21 **16. Are your opinions and conclusions in your testimony made with a reasonable degree**  
22 **of scientific certainty?**

23 Yes.

24  
25 **17. Does this conclude your testimony?**

26 Yes. However, I reserve the right to update this testimony to respond to any further  
27 testimony, reports, and/or evidence submitted in this case.

**CERTIFICATE OF SERVICE**

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to these cases. In addition, the undersigned certifies that a copy of the foregoing document is also being served upon the persons below this 11<sup>th</sup> day of September, 2020.

/s/ Christine M.T. Pirik

Christine M.T. Pirik (0029759)

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## **Attachment REG-1**

### **Resume**





## **EDUCATION**

M.S.  
University of Wyoming  
Laramie, Wyoming  
1998  
Zoology

B.A.  
Ball State University  
Muncie, Indiana  
1995  
Biology

## **SCIENTIFIC ORGANIZATION MEMBERSHIPS**

The Wildlife Society  
Raptor Research Foundation

## **ADDITIONAL TRAINING AND CERTIFICATION**

Habitat Conservation Planning,  
2011, U.S. Fish and Wildlife  
Service

Indiana Department of  
Transportation NEPA and CE  
Training, 2009

Golden Eagle Aging Workshop,  
2003, Bill Clark

Wetland Delineation with an  
Emphasis on Soils and Hydrology,  
2002, Wetland Training Institute

Wetland Plant Identification, 2001,  
Wetland Training Institute

Golden Eagle Aging Workshop,  
2003, Bill Clark

American burying beetle survey  
method and identification training,  
2003, Mark Payton, Nebraska  
Public Power District

# **Rhett E. Good, *Wildlife Biologist/Senior Manager***

## **PROFESSIONAL EXPERIENCE**

1998-Present *Research Biologist/Senior Manager*, Western EcoSystems Technology, Inc.,  
Bloomington, Indiana  
1997-1999 *Wildlife Ecology and Management Teaching Assistant*, University of  
Wyoming, Laramie, Wyoming  
1995-1997 *Graduate Research Assistant*, Wyoming Cooperative Fish and Wildlife  
Research Unit, University of Wyoming, Laramie, Wyoming

## **SPECIALTY AREAS**

**Wildlife Research:** Mr. Good has over 20 years of experience designing and conducting wildlife research and monitoring studies. Studies Mr. Good has been involved in include research and monitoring of small mammals, bats, big game, songbirds, shorebirds, waterfowl, and raptors. As a part of his Master's Thesis, Mr. Good examined factors affecting the relative use of goshawk kill areas, conducted studies of parental and juvenile behaviors at nests, studied aspects of prey ecology, and examined goshawk food habits in southcentral Wyoming. Mr. Good has also completed assessments of wildlife and threatened endangered species use and risk at various development projects, including airports, solar projects, cellular towers, pipelines, and highway construction. Mr. Good served as project manager and field supervisor for a rangewide survey of golden eagles across the western U.S. that resulted in a publication in the Journal of Wildlife Management. Information from the survey is being used by the U.S. Fish and Wildlife Service to better manage golden eagle populations across the western U.S.

**Wind-Energy Research:** Mr. Good has served as field supervisor and project manager on over 50 studies of wind energy and wildlife interactions across the U.S., including projects in Michigan, New York, Illinois, Indiana, Missouri, Ohio, Tennessee, Arkansas, Oregon, Washington, Arizona, Wyoming, Colorado, South Dakota, and Montana. Wildlife studies that Mr. Good has been involved with include pre-construction risk assessments for wildlife studies and post-construction studies of fatality rates. Mr. Good has also studied the behavioral responses of shorebirds, songbirds, and waterfowl to wind turbines, to determine if projects could displace wildlife from occupied habitats. Mr. Good research at the Fowler Ridge Wind Farm in Indiana was one of the first in the Midwest to examine if blade feathering reduced bat mortality in the Midwest. Mr. Good has interacted extensively with agency personnel and has successfully developed and implemented wildlife monitoring protocols that have been approved by the U.S. Fish and Wildlife Service and state wildlife agencies across the U.S. Mr. Good has also assisted several wind-power companies with studies of protected bat and eagle use and compliance with the endangered species act and bald and golden eagle protection act at wind-energy projects. Mr. Good has also assisted several companies with understanding and implementing the U.S. Fish and Wildlife Service Land Based Wind Energy Guidelines.

## **SELECTED PROFESSIONAL PUBLICATIONS**

Good, R.E., S.H. Anderson, J.R. Squires and G. McDaniel. 2001. Observations of northern goshawk prey delivery behavior in southcentral Wyoming. *Journal of Intermountain Sciences* 7(1) 34-40.

Good, R.E., R. Nielson, H. Sawyer, and L. McDonald. 2007. A Population Estimate for golden eagles in the western United States. *Journal of Wildlife Management* 71(2): 395-402.

Nielson, R. M., McManus, L., Rintz, T., McDonald, L. L., Murphy, R. K., Howe, W. H. and Good, R. E. (2014), Monitoring abundance of golden eagles in the western United States. *The Journal of Wildlife Management*, 78: 721-730. doi: 10.1002/jwmg.704

Good, R.E., W.P. Erickson, A. Merrill, S. Simon, K. Murray, K. Bay, C. Fritchman. 2011. Bat Monitoring Studies at the Fowler Ridge Wind-Energy Facility, Benton County, Indiana: April 13 – October 15, 2010. Prepared for Fowler Ridge Wind Farm. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. January 28, 2011.



## **Attachment REG-2**

### **Bird Mortality Chart**

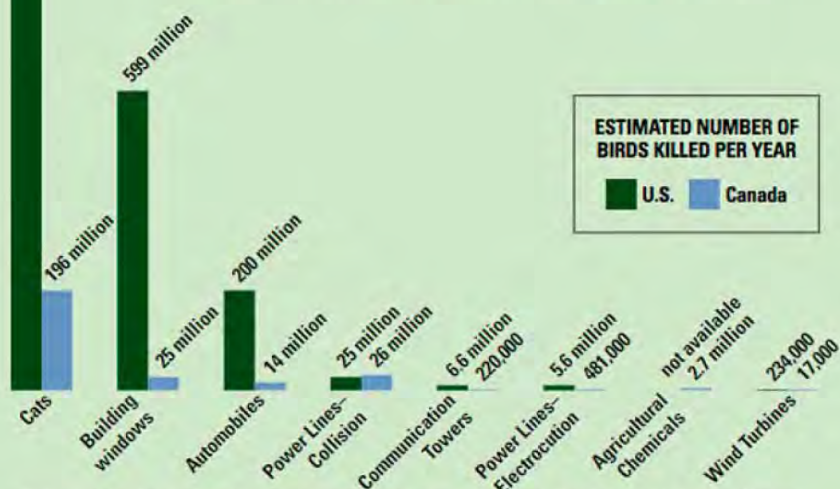
2.4 billion

# ADDITIONAL DRIVERS OF BIRD DECLINES

Habitat loss is by far the greatest cause of bird population declines. Humans also kill billions of birds in the U.S. annually through more direct actions, such as allowing outdoor cats to prey upon birds. Canadian bird mortality estimates show remarkably similar patterns. Data-driven assessments of how different human-caused sources of bird mortality contribute to population declines are essential for developing strategic conservation objectives and science-based policies.

Reducing or eliminating direct sources of mortality could save millions, if not billions, of birds annually. The best ways to reduce bird mortality include:

- **CATS:** Keeping pet cats indoors and implementing policies to eliminate feral cat colonies.
- **COLLISIONS:** Following bird-friendly window practices, reducing night lighting in and on tall buildings, warning auto drivers in high-collision areas, installing flashing rather than steady-burning lights on communication towers, and locating wind turbines away from areas of high bird concentrations (especially areas that pose threats to particular species such as eagles).
- **CHEMICALS:** Limiting the broadcast spraying of pesticides and insecticides and introducing integrated pest management practices (which reduce or eliminate chemical applications) in agricultural areas.



BAR CHART BASED ON INDEPENDENT ASSESSMENTS OF DIRECT HUMAN-CAUSED MORTALITY IN THE UNITED STATES AND CANADA. THIS DATA IS ADAPTED FROM LOSS SR, WILL T, MARRA PP. DIRECT HUMAN-CAUSED MORTALITY OF BIRDS. ANNUAL REVIEW OF ECOLOGY, EVOLUTION, AND SYSTEMATICS IN PREP

The **Cornell** Lab of Ornithology

nabci



The Nature Conservancy  
Protecting nature. Preserving life.

**USGS**  
science for a changing world



**Audubon** University of Idaho



Point Blue  
Conservation  
Science



Environment  
Canada

Environnement  
Canada

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Summary: Testimony direct of Rhett Good electronically filed by Christine M.T. Pirik on behalf of Firelands Wind, LLC