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19205 67th Ave SE
Snohomish, WA 98296-5347

August 23, 2004

Allen Fiksdal, Manager
Energy Facility Site Evaluation Council
PO Box 43172
Olympia, Wa 98504-3172

RECEIVED
AUG 25 2004
ENERGY FACILITY SITE
EVALUATION COUNCIL

Dear Mr. Fiksdal,

The following are my comments on reviewing the Draft Supplemental Environmental Impact Statement for the Kittitas Valley Wind Power Project.

Page 1-8, Section 1.5: **SUMMARY OF PUBLIC INVOLVEMENT, CONSULTATION AND COORDINATION.** The writers of the document (EFSEC staff) mention several times about the continued communication with the public either by EFSEC or directly by the Applicant. The last paragraph of that section states, "Further opportunities for the public involvement will occur throughout the remainder of the siting process."

My response to public involvement activities is that the public, in reality, has very little involvement in the process unless they have petitioned for Intervenor status and personally retained legal representation. The public, in general, are treated as second class citizens and limited to letter writing to EFSEC, and limited oral (5 minute) presentations at the few public meetings. Most members of the public have real jobs and families to care for. Meanwhile, attorneys for the Applicant, as well, as other represented interests, file reams of paperwork, banter back and forth with pro-filed testimonies, file briefs and prepare witness cross-examinations. This is the real EFSEC process and it places members of the general public who have an interest in the Applicant's Application at a true disadvantage; time wise and financial resources.

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Page 1-9, Section 1.7: **ISSUES TO BE RESOLVED.** Referring to the Kittitas Valley Wind Power Project Scoping Summary, there are about 16 topics to be discussed and resolved, not just the 6 listed in this DSEIS.

2

Page 2-6, Section 2.3: **DESCRIPTION OF NO ACTION ALTERNATIVE.** The statement is made, "Because constructing and operating a gas-fired combustion turbine is a predictable consequence of not building the project, it is considered a predictable outcome of the No Action Alternative (Bonneville et al., 2002)."

I find this statement troubling as it makes a leap of logic that is unsubstantiated. EFSEC, as you are well aware, recently successfully sited three gas turbine projects (Satsop CT, Chehalis Generation and Sumas 2) totaling 1830 MW of capacity. BP Cherry Point is in the process of being sited. Washington State currently has excess capacity and enough for future growth needs to 2010. To say that if the KVVWPP is not built does not mean that a 60 MW gas turbine facility will have to be built to replace it. There is also no mention of that if the KVVWPP is built, there will still be a need to have excess capacity of conventional means to back up the wind farm when the wind is not blowing or is blowing too much.

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Page 2-8, 2.5.1: **Process for Identifying Off-site Alternatives.** Bottom of the page, it states, "Consideration of alternatives has been limited to sites within Kittitas County, based on EFSEC's requirement to consider locations within the same county where the project has been proposed (WAC 463-28-040 (3))."

Referring to the KVVPP Scoping Summary, page 17 and 18, Section 4.17, Alternatives, several public comments were made about alternative sites, but not limited to Kittitas County, but in the state of Washington. For EFSEC to site a conventional energy facility involving 30-40 acres it is reasonable to keep within the county boundaries. But EFSEC should be given wider latitude (revise the WAC) when it comes to siting a commercial wind facility encompassing 5000-7000 acres in large land parcels. EFSEC limits itself in searching for alternative sites with probably very few viable sites per county.

5

Page 3-8, Section 3.2.1: **Affected Environment**, points out that regarding shrub-steppe habitat, the KVVPP has a greater diversity of plant community than those of the Wild Horse site; also that bald eagles are documented winter residents in the KVVPP vicinity, and that the level of use of bald eagles is greater than that observed in the Wild Horse alternative site. This tells me that the KVVPP is poorly sited in regards to bald eagle use than the Wild Horse project, a preferred site.

6

Page 3-18, Section 3.2.2: **Impacts of Proposed Action and Alternatives states**, "Bald eagle use of this site is higher than that observed at the Wild Horse site; however, the potential for bald eagle mortality is considered low because of use patterns within the site and a lack of habitat features in the immediate vicinity of the proposed turbines." If bald eagles are present in the project area, they are at risk of mortality. Period. This is a minimizing statement, but then again, states the Wild Horse project will not have such risks to bald eagles, a preferred site.

7

Page 3-31, Section 3.4.1.1: **Health and Safety, KVVPP**, states, "Two state highways, two county roads, and several private roads traverse the project area. Approximately 60 dwellings have been identified within one mile of the proposed project, the closest being located in the northeastern portion of the project area, within 790 feet of the nearest proposed wind turbine."

As mentioned in my previous public comments, no mention is made of the NON-PARTICIPATING LAND OWNERS in close proximity to the KVVPP. EFSEC must comment on those properties that are developable into residences. These landowners are being discounted and ignored in this EIS process.

8

Page 3-34, Section 3.4.2: **Impacts of Proposed Action and Alternatives**, states, "Shadow flicker impacts were evaluated for 17 residences in vicinity of the project. Although three residences would be exposed to lengthier shadow flicker effects, it was determined that the exposure would not result in health effects for the residents."

How was "it determined" that shadow flicker would not result in health effects? It has been documented in articles submitted to EFSEC that humans do have an effect on their overall health from shadow flicker.

9

Page 3-40, Section 3.6.1: **Land Use and Recreation, KVVPP**, states, "Land use in the project area consists of cattle grazing interspersed with some rural residential development." Also, "The project area contains two Kittitas County zoning designations—Agriculture-20 and Forest and Range. The Agriculture-20 zone is dominated by farming, ranching, and rural lifestyles. Permitted uses include residential, agriculture, and forestry practices, with minimum lot sizes of 20 acres. The Forest and Range zone is intended to provide areas where natural resource management is the highest priority. Permitted resource management uses include logging, mining, quarrying, agricultural practices, and residential uses including single- family residences, duplexes, and cluster subdivisions. The minimum lot size is 20 acres."

This is not true. AG-20 zoning allows for properties to be subdivided into parcels as small as 4 acres. Refer to Kittitas County Code 16.04, Subdivisions. This is what has happened along Bettas Road. The original 287 acre Archambeau property on Bettas Road is currently subdivided into 25 lots for residential development from 4.04 acres to 29.19 acres. Reference my previous submission to the EFSEC record from Ingram Realty regarding "Horse Canyon Estates".

10

Page 3-45, Section 3.7.1: **Socioeconomic, Affected Environment**, states, "Eight percent of all employees in the county are in farm-related positions, and the remaining 92% are in non-farm positions. Of all non-

farming employees, 74% are in private sector occupations and 26% are in government and government enterprises."

Throughout this DEIS, it is inferred that the KVVWPP is located in farm and ranch land. That land use is primarily farming and ranching. Other alternative sites review, in reality, are such. But the KVVWPP is now in an area of scenic beauty and being developed for residential and recreational use. The Wild Horse alternative is the better site, and impacts very few landowners.

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Page 3-46, Section 3.7.2: **Impacts of Proposed Action and Alternatives - KVVWPP**, states, "Construction and operation of the KVVWPP is not expected to negatively affect long term property values in the vicinity of the project."

This statement by EFSEC is outrageous and irresponsible. As I have said in the past, this just does not pass the laugh test! Landowners in Seattle complain about land devaluation when a utility wants to place a 65 foot cellphone tower close to their property. Placement of 400 foot plus utility wind turbines adjacent to non-participating landowners who may want to build a residence in the future because of the grand views, and say property values will not decline defies all logic. Local real estate brokers have testified that land values will be decimated are on the record. Numerous documents filed by local landowners share the same concern and state their properties will be useless.

13

Even if I accept your premise, what will EFSEC do in the Development Agreement to protect neighboring land owners if you are wrong? Will EFSEC enforce an agreement with Applicant to compensate these affected landowners if they wish to sell? Again, Wild Horse seems to be the best site among the alternatives.

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Page 3-49, Section 3.8.1: **Affected Environment - KVVWPP**, states, "The proposed project is situated in an area ceded by the Kittitas, which is now a part of the Yakama Nation. The Applicant and the Washington Energy Facility Site Evaluation Council have been actively consulting with the Yakama Nation on this project."

I have not seen any documentation regarding this "actively consulting" with the Yakama Nation. The two documents I have seen, one states that the Yakama Nation opposes all commercial wind farm development on ceded lands. The other letter, in particular, from Johnson Meninick of the Confederated Tribes and Bands of the Yakama Nation, dated January 5, 2004 to Allen Fiskdal, EFSEC, specifically stated 3 strong reasons of why the KVVWPP is particularly offensive and should not be developed. I might add it is the same 3 reasons, namely destruction of lithosols and native plant resources, minimizing and undervaluing the visual impact on a scenic viewshed, and avian mortality analysis being insufficient that local land owners object to as well.

16

Page 3-54, Section 3.9.1: **VISUAL RESOURCES - KVVWPP**, states, "There are several clusters of rural residences on large parcels throughout the project area."

"Eleven viewpoints throughout the project area were analyzed and rated for scenic quality and visual sensitivity. These viewpoints were located along the US 97 corridor, along the ridges east of US 97, along Bettas Road, along the State Route (SR) 10 corridor, along the John Wayne Trail, at Thorp Highway, along I-90, along Lower Green Canyon Road, and along Forest Service Road 35. Scenic views of the Stuart Range, a highly noticeable and memorable feature in the project area landscape, were also considered."

As I stated earlier, property (287 acres) along a good portion of Bettas Road was in 2003, advertised as Horse Canyon Estates. The flyer from Ingram Realty states, "19 acreage parcels ranging from 4.04 to 29.19 acres. Mountain and Territorial Views! Power and phone available." That project (Horse Canyon Estates) was recently sold to Thomas Roth (The Roth Company). That area is now being actively developed for rural residential use. Several lots have been sold and they are not going cheap. The main draws to the area are great open scenic views.

17

Page 3-55: **Alternative 3: WHWPP**, states, "The Kittitas Comprehensive Plan does not identify any special scenic or visual resource values in the area, and does not include any policies that are specifically oriented to protection of scenic qualities on or near the Wild Horse site."

Seems to be a no brainer, WHWPP is a better alternative site than highway 97/Bettas Road.

18

Page 3-56, Section 3.9.2: **Impacts of Proposed Action and Alternatives - KVVWPP**.

"During construction, large earthmoving equipment, trucks, cranes, and other heavy equipment would be highly visible from nearby areas. The visual changes associated with construction activities would have a moderate to high visual impact."

"The project has the potential to create high levels of visual impact at several locations. Of the 11 viewpoints analyzed and rated for scenic quality for this alternative, high or moderately high impacts are expected in the U.S. 97 corridor where turbines would be less than 0.5 mile from the highway or from residences; along Bettas Road due to proximity to residences; along SR 10 due to proximity to a Scenic and Recreational highway; and from FS Road 35 due to the high scenic quality of existing views from this area."

"Turbines would also be illuminated at night and night lighting of turbines and other facilities would increase nighttime illumination in the vicinity, potentially impacting views from roads and residences."

Again, with my previous comments, visual impacts for the KVVWPP would be devastating for the area and affect numerous landowners in close proximity. Analysis for the WHWPP states very little visual impacts due to its isolated location and virtually no residences or development.

19

Page 3-66, .1: **AIR QUALITY, Affected Environment. KVVWPP**

"Existing land uses within the Kittitas Valley project area are primarily grazing, rangeland, and low-density residential development; therefore, sources of existing air pollutants in the project area are primarily vehicle emissions."

Even though the project area is zoned AG-20 and Forest and Range, the above statement leads the reader to believe that cattle operations are the main existing land use. This may have been true 10 years ago, but the area is now being subdivided for rural residential and private recreational use. In the project area there are only two landowners left that raise animals. M. Genson (participating with Zilkha) has several buffalo and some horses. G. Gessick (non-participating) raises about 25 head of cattle free range style by Cricklewood Lane. Most of all the other landowners are recreational users or have future plans to build a residence or summer cabin.

20

Page 3-69, Section 3.12.1: **NOISE, Affected Environment. KVVWPP**.

"The study area for project-related noise impact analysis included all areas where residents have the potential to hear construction or operational noise from the project. There are approximately 60 residential structures within 1 mile of the proposed wind turbine strings. The primary source of existing noise in the project area is wind and vehicular traffic on U.S. 97."

I would say that noise subjectivity depends on where your property is located. In my case, the primary source of 'noise' is vehicular traffic on highway 97. My second choice would be 'bird songs' which I do not consider as noise. I do not consider the sounds of the wind as 'noise' and it is only present several months of the year. But if this project is built, myself as well as 5 neighbors will only be several hundred feet from string J, a line of 13 turbines on the down wind side. There will be high levels of mechanical noise from the turbines.

21

Page 3-71, Section 3.12.2: **Impacts of Proposed Action and Alternatives, Alternative 3, WHWPP**

"No noise impacts are expected from the construction of the project. The nearest residence is over 2 miles away from the project site and over 3 miles from the closest rock quarry."

Obviously, this is the only alternative, as every other site suggested will be impacted by noise from the turbines.

22

Page 3.72, Section 3.13: **PUBLIC SERVICES AND UTILITIES.**

The most important issues in this section relate to fire safety as well as public safety. Using the premise that commercial wind farms should be located in private, isolated areas on large land parcels, fire safety rears the most problematic. Most of the alternative sites are outside public fire districts. No matter where you place a wind turbine, malfunctions can occur, from various reasons, and a fire could be started. If it happens to be a windy day, depending on velocity and direction, it could quickly become a public safety issue. So the proper siting of a commercial wind farm is crucial. Unfortunately, Eastern Washington experiences hot and dry summers and the potential exists for fire disasters.

Logic would dictate that the best alternative site would be the one with the least resident population, commercial operations, and forested acreage. Only one site meets that criteria, the WHWPP.

23

Page 3-74, Section 3.13.2: **Impacts of Proposed Action and Alternatives, KVVWPP.**

"Fire hazards could be slightly higher at the Kittitas Valley site due to poor access along a portion of Hayward Hill Road that could hinder responders."

Of all the sites reviewed, only the KVVWPP included this clause. Access through Hayward Hill Road is problematic. Because of all the private property ownership in the project area, several private roads and private locked gates on some properties, access for fire responders could be problematic. This makes KVVWPP a poor candidate.

24

Large land parcels (4000 acres plus) under one ownership, few private roads away from residents is the way to go. Again WHWPP meets that criteria.

IN CONCLUSION.

I applaud EFSEC Staff in the preparation of this supplement. It is indeed difficult to review alternative locations with little documented information, especially in relation to siting a commercial wind farm.

Land use compatibility, parcel size, topography and wind resources all factor into the decision. Chris Taylor, Project Manager for the KVVWPP has stated early on that willing landowners who support the overall project are vital to making a project a success. I would also add that willing NEIGHBORING landowners need to be factored in as well.

25

In evaluating alternative sites, I did not read of comparisons of this vital factor. I have only heard that the few residents in the Ryegrass area support the WHWPP.

I recall hearing, early on, when Springwood Ranch was approached about the idea of a wind farm, their representative stated flat out, they were not interested. If that was the case, then why waste the time and resources to evaluate it? You also found it to be too small and partly protected by the Nature Conservancy.

Swauk Valley Ranch was evaluated and deemed too small and could only accommodate 42 turbines for a potential of 63 MW of energy raising the question of commercial viability.

26

The other potential sites were eliminated due to environmental concerns (fish, wetlands, wildlife).

When all is said and done, there is only one alternative to the KVVWPP and that is out by Whiskey Dick Mountain. EnXco has staked out a possible area by Reecer Creek Road and Green Canyon where Chris Taylor said Zilkha found it unsuitable.

27

When Zilkha Renewable Energy first filed their KVVWPP application with the county, Chris Taylor said it was, "THE ONLY PLACE IN THE COUNTY!" Many residents said go further east, out towards Rye grass. He still insisted that Highway 97 was the only viable project location.

On January 13th, 2003, Sagebrush Power Partners (ZRE) filed an application to EFSEC for KVVWPP. Interestingly, enXco, a French wind developer filed with Kittitas County on January 28th, 2003 for their Desert Claim Project on a site Chris Taylor said was not developable. That could have been an alternative site, but now it is not because another company claims the wind rights.

Then, while processing through the KVVWPP and Chris Taylor's assertion that it was still the only viable spot, on March 9th of 2004, Zilkha filed an application to EFSEC for Wild Horse Wind Power Project right in the area many residents recommended.

The bottom line is that there always was a viable alternative site for the KVVWPP - Whiskey Dick Mountain.

However, with every other site ruled out in this document (Whiskey Dick Mountain excluded), there now appears to be no alternative site for the KVVWPP.

But that does not mean that the KVVWPP is a good site and a proper site or that it has to be built at all.

28

Chris Taylor and Zilkha Renewable Energy should not be allowed to have it both ways. WHWPP meets the criteria as an alternative when they filed in January of 2003. Whiskey Dick Mountain could be a properly placed commercial wind farm. One large land parcel, local support, no one living around for miles and no scenic view shed, other than the Rye grass landfill.

They had over a year to address the issue of alternative siting and chose not to. Instead they filed another application for a second commercial wind farm on this alternative site.

Respectfully Submitted,


Ed Garrett

My name is Jeff Howard

I own a home at 21 Fawn Road in Cle Elum

I am here representing myself

Zilkha is not here with the noble intention of saving the planet. They are here attempting to convert tax dollars to corporate profits at the expense of our property values, and way of life. The proposed siting of their project is in a very unsuitable location and should be rejected outright by any and all authorities both County and State.

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If for some reason this huge, expensive, ugly, noisy, parasitic mistake must be placed within this county, I would request it be sited in the Whisky Dick mountain area instead of amongst our beautiful and populated western valley. Once these monstrosities are in place, we will be stuck with them for decades with absolutely no way to reverse history.

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Thank You,

Jeffrey S. Howard
21 Fawn Rd.
Cle Elum WA

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Makarow, Irina (EFSEC)

From: Janet Lee [ponderosa53@hotmail.com]
Sent: Tuesday, August 24, 2004 7:28 PM
To: EFSEC
Subject: [SPAM] Wind Turbines

Mr. Fisdal - The **Whiskey Dick area** is the alternative site for the KVVWPP. We have a pristine area that we live in on Robbins Road. We own over 200 acres in this valley. David & Janet Lee

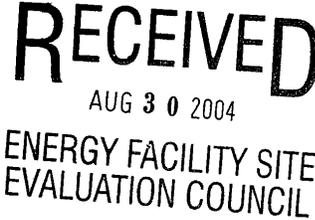
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8/26/2004

Makarow, Irina (EFSEC)

From: Mike Robertson [MHR@Elltel.net]
Sent: Thursday, August 26, 2004 5:58 PM
To: EFSEC
Cc: Fiksdal, Allen (EFSEC); Makarow, Irina (EFSEC)
Subject: Public Comment to the KVVPP SEIS - Mike Robertson



Allen Fiksdal, Manager
Energy Facility Site Evaluation Council
PO Box 43172
Olympia, WA 98504-3172

Dear Mr. Fiksdal,

The following are my comments on reviewing the Draft Supplemental Environmental Impact Statement for the Kittitas Valley Wind Power Project.

=====

From the Draft SEIS "Cover Letter to Reviewers":

Please remember, for a comment to be considered to have substance, it needs to:

1. Provide new information pertaining to the proposed action or an alternative;
2. Identify a new issue or expand upon an existing issue;
3. Identify a different way to meet the underlying need;
4. Provide an opinion regarding an alternative, including the basis or rationale for the opinion;
5. Point out a specific flaw in the analysis; or
6. Identify a different source of credible research which, if used in the analysis, could result in different effects.

From the SEIS:

CHAPTER 1: SUMMARY
1.1 INTRODUCTION

The information and analyses presented in this Draft Supplemental EIS (Draft SEIS) are based primarily on information provided in the following documents: the Kittitas Valley Wind Power Project ASC No. 2003-01 (Sagebrush Power Partners, LLC 2003a); the draft EIS issued for the Kittitas Valley Wind Power Project (EFSEC, 2003); the Desert Claim Wind Power Project Draft EIS (Kittitas County, 2003); the Wild Horse Wind Power Project ASC No. 2004-01 (Wind Ridge Power Partners LLC, 2004); the Wild Horse Wind Power Project Off-Site Alternatives Analysis (Jones and Stokes, 2004a); and the Wild Horse Wind Power Project Off-Site Alternatives Impact Analysis (Jones and Stokes, 2004b). Where additional information was used to evaluate reasonable off-site alternatives, that information has been referenced.

2.5 CONSIDERATION OF OFF-SITE ALTERNATIVES

Prior to Issuance of the KVVPP Draft EIS, EFSEC coordinated the evaluation of off-site alternative sites in Kittitas County with Kittitas County. Four broad geographic areas were defined for investigation: west of US 97, east of US 97, Whiskey Dick Mountain, and south of Whiskey Dick/Boylston Mountains. The four areas were then compared against five key suitability criteria:

- (1) sufficient wind resource (the most important);
- (2) proximate/adequate transmission facilities;
- (3) large land area;
- (4) absence of significant environmental constraints; and
- (5) property owner interest.

2 5.1 Process for Identifying Off-site Alternatives

Existing 115kV or 230 kV transmission line with unused capacity within 10 miles of site.

Wind energy projects must connect to an electric transmission line to deliver power to the regional power grid. The costs associated with constructing a transmission line much further than 10 miles to connect to the regional grid can make a site financially impractical.

=====

This analysis of off-site alternatives for the KVVPP is flawed. It is based on the above noted criteria.

Item #2 is clearly not a criterion for generating 'safe, clean wind power'; it only determines how much money the developer can make. This is a subjective claim made by the applicant and should not be a consideration for EFSEC. The amount of money a wind farm developer can make varies from state to state. In this project, Zilkha argues that the wind farm must be within 10 miles of transmission facilities, but in Freeport, Illinois, Zilkha says legislated give-a-ways are holding them up. There is no objective "fixed" formula for deciding if a wind farm project is economically viable (like traditional energy sources) because the industry only exists at the whim of government price supports and legislated market creation (federal, state, and local); not true market driven forces.

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http://www.journalstandard.com/articles/2004/04/04/local_news/news31.txt

"The other company considering establishing a wind farm in the county, Zilkha Renewable Energy of Houston, Tex, hopes to come in for zoning this fall. However, company officials say the project's viability depends a great deal on the passage of legislation by the state and federal government.

...

Zilkha hopes to build 60 to 80 wind towers in the northeast portion of the county, as part of a larger wind farm stretching into Green County, Wis. But the project likely won't move forward until certain legislation favoring the wind farm industry is approved, said Bill Whitlock, project development manager for Zilkha.

Before the company comes in for zoning to start the permitting process, Zilkha officials want to see the Renewable Portfolio Standard approved by the Illinois Legislature. This would require utility companies like ComEd to purchase a small portion of their power from renewable energy, like that which is generated by wind farms, Whitlock said.

Without this legislation, Whitlock said utility companies may not purchase much wind energy because it isn't as cost-effective.

"Until we see those bills pass, I don't think you'll see any wind farms in Illinois," Whitlock said.

Private corporation business decisions are not a criterion for EFSEC to use to determine site viability.

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The second point I wish to make is that EFSEC considers itself the state-wide energy facility siting authority, but none of the alternatives offered are outside of Kittitas County. Regardless of existing EFSEC rules today, wind farm facilities require large tracks of land and can only effectively be sited with a total state-wide view of viable wind resources. There is only a finite amount of land in an average County, so determination of alternate sites is severely limited if limited to this scope.

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The third, last, and most important point I would like to make is that when the KVVPP was first proposed, the applicant stated there was no other viable option in the county. One year later they are applying for their Wild Horse project in the Rye Grass area (Whiskey Dick), an area that opponents of the KVVPP have said all along was more appropriate. Now, Zilkha says since they are applying for a site permit at Wild Horse, that site can't be considered an alternative site for KVVPP.

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Of course it can! It should be considered the prime (and possibly the only) viable site in Kittitas County.

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cont.

Respectfully,

Mike Robertson
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(509) 857-2113



Public Comment on
the KVWPP SE...

County sees wind farm delay

Stephenson County officials say land acquisitions are slowing the project

By Travis Morse, The Journal-Standard

FREEPORT -- One of the power-generating wind farm projects proposed for Stephenson County is not progressing as quickly as county officials originally predicted, according to County Zoning Administrator Terry Groves. He said the main reason for the slow start is because the wind farm company, Navitas Energy of Minneapolis, is still in the midst of dealing with land acquisition issues.

Earlier this year, officials thought Navitas would apply for zoning permits by March for two proposed farms in the county, one east of Baileyville and the other near Loran Road. Now, Groves expects the company to apply later this year.

The other company considering establishing a wind farm in the county, Zilkha Renewable Energy of Houston, Tex, hopes to come in for zoning this fall. However, company officials say the project's viability depends a great deal on the passage of legislation by the state and federal government.

The wind farm projects are expected to generate significant revenue for the county, if the projects materialize.

Brian Lammers, project manager for Navitas, declined to comment at length about his company's wind farm projects. However, he did say establishing wind farms in Stephenson County remains a viable project for Navitas.

"We're moving forward with the project," Lammers said.

Zilkha hopes to build 60 to 80 wind towers in the northeast portion of the county, as part of a larger wind farm stretching into Green County, Wis. But the project likely won't move forward until certain legislation favoring the wind farm industry is approved, said Bill Whitlock, project development manager for Zilkha.

Before the company comes in for zoning to start the permitting process, Zilkha officials want to see the Renewable Portfolio Standard approved by the Illinois Legislature. This would require utility companies like ComEd to purchase a small portion of their power from renewable energy, like that which is generated by wind farms, Whitlock said.



One of the wind farm projects proposed for Stephenson County is not progressing as quickly as predicted, according to County Zoning Administrator Terry Groves. Photo by Kevin E. Schmidt

Without this legislation, Whitlock said utility companies may not purchase much wind energy because it isn't as cost-effective.

"Until we see those bills pass, I don't think you'll see any wind farms in Illinois," Whitlock said.

Jim Fox, external affairs manager for ComEd, said his company does not oppose the RPS legislation. Though it's unclear how much energy ComEd would purchase from Stephenson County wind farms, the utility already has contracts to purchase electricity from farms in Lee County and Bureau County.

"I don't think there's going to be a lot of opposition to this legislation," Fox said. "We understand the importance of renewable energy. We are advocates of renewable energy."

Zilkha officials also are waiting on the U.S. Congress to approve an energy bill, which includes production tax credits for the wind industry. Basically, the legislation includes a three-year extension of the wind energy Production Tax Credit. The most recent PTC expired Dec. 31, 2003, and the extension would be through Dec. 31, 2006.

Although tests have indicated Stephenson County is a very suitable location for wind mills, Whitlock said, until the legislation is passed, the company likely won't ask for zoning. There is no time frame in place for passage of this legislation, but movement is expected in the next several months, Whitlock said.

"The data we've gathered indicates it's a very valuable site," Whitlock said. "(But) there's no point in continuing to develop until we see that picture resolved. There's no point in taking it to the next level until we see the legislation passed."

In the meantime, Zilkha continues to work on land acquisition issues, Whitlock said.

Groves said he's still confident the Navitas project will move forward in 2004. He said he hopes Navitas makes a request for zoning in the late spring or early summer of this year. If the company files in the fall, the same time as Zilkha is set to file, this would put a lot of pressure on Groves's department, he said.

"I know (Navitas) will be in, in 2004," Groves said. "I do know if it'll be by the end of the year. My biggest fear is that both companies come in at the same time (because of) the workload involved."

Makarow, Irina (EFSEC)

From: RAINWELD@aol.com
Sent: Tuesday, August 31, 2004 12:43 PM
To: EFSEC
Subject: [SPAM] Wind Turbine Alternative Sites

Mr. Fisksdal- as a resident and land owner of Kittitas County I am against any siting of Wind Turbines in any part of the county. The siting of the turbines would permanently destroy the beautiful scenery that this county has to offer. However if the Wind Turbines did have to be sited within the county the best alternative site would be at Whiskey Dick Mountain. The reasons this site is a better alternative site are many-Whiskey Dick is not as important of a scenic byway, the area has only one land owner whereas the 97 project would be built as close as 1000 ft within adjacent property owners. Whiskey Dick also would have fewer environmental issues to deal with and the nearest neighbors to the Whiskey Dick site would be 2 miles. Mr. Fiskdal I would hope you take all considerations for not siting the Turbines in Kittitas County, but if we do have to have the turbines in Kittitas County hopefully they would be at Whiskey Dick a place where the towers would be less unsightly. Thank You for your consideration David Forster

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9/1/2004

Makarow, Irina (EFSEC)

From: Tim Henebry [timhenebry@elltel.net]
Sent: Tuesday, August 31, 2004 2:34 PM
To: EFSEC
Subject: Alternative wind farm siting

Dear Mr. Fisksdal:

I understand that EFSEC is currently considering, as part of it's review of Zilkha's Kittitas Valley Wind Power Project (KVVPP) application, alternative sites that might be available within Kittitas County. While the final merits of wind farm projects have yet to be determined, the scenic, recreational, and rural residential area near Table Mt. and Hwy. 97 in Kittitas County is not the place to experiment. There are certainly better siting locations within Kittitas County if wind farms are to be built--and Zilkha's other proposed location, known as the Wild Horse wind farm is an example of one of them.

Why? Because the area near the KVVPP and Hwy. 97 is, and has been historically, a defining viewshed/landmark of Kittitas County and Central Washington. It is precious recreational and agricultural and rural residential country that would be significantly and devastatingly altered by the building of an industrial project like that of the proposed windfarm. This is recognized independently as well by the authorities that have earmarked that same area of U.S. route 97 for becoming a designated "scenic highway". The Wild Horse area on the other hand, is much more rural, much less uniquely scenic and would impact far fewer people in a negative fashion than a wind farm built near U.S. 97. In addition, the environmental impacts to people, animals and the land would be significantly less as well in an area such as the Wild Horse proposal.

In short, on a personal level, most people would prefer to place a large piece of 'industrial' equipment (i.e., an air conditioner, generator, shed, etc.) in their backyard or at the side of their house--not out in their front yard where they've worked hard to improve the looks of their property and where they greet friends and guests. I think, left to Kittitas County, we would do the same with wind farms--and I trust that the EFSEC, given its authority to make this decision would have the wisdom to act accordingly in behalf of not only Kittitas County residents but all those from around the Washington State, the Northwest, and the country at large who visit and pass through this area.

Thank you for the opportunity to voice my opinion in this matter.

Tim Henebry
1003 Chamith Lane
Ellensburg, WA 98926

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AUG 31 2004
ENERGY FACILITY SITE
EVALUATION COUNCIL

Makarow, Irina (EFSEC)

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SEP 01 2004

ENERGY FACILITY SITE
EVALUATION COUNCIL

From: Darlene Young [hidesert@eburg.com]
Sent: Wednesday, September 01, 2004 1:45 PM
To: EFSEC
Subject: Kittitas County, Wild Horse

Why Wild Horse is the place for wind farms:

Wild Horse is one large land parcel with one owner, whereas Zilkha's hwy 97 project (the KVVWPP) is a patchwork quilt of many properties, with non-participating landowners stuck between rows of turbines.

The closet house to Wild Horse is 2 miles away, whereas the KVVWPP will be built as close as 1,000 feet from some homes.

Wild Horse has far fewer environmental impacts.

Wild Horse is a less important area scenically, whereas the KVVWPP would be built on Hwy 97, a state-designated Scenic Byway.

There are almost no landowners objecting to Wild Horse, whereas almost everyone objects to KVVWPP.

Please keep in mind that where these are designated to be build are where people have CHOSEN to live. We do not want these in our backyards. There has to be places where people can live, enjoy, play and raise families without threats to their quality of live

Thank you,

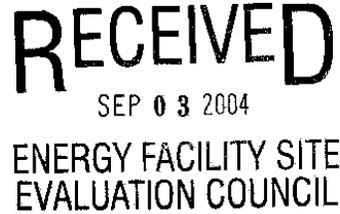
Darlene and Robert Young
Ellensburg

1

9/1/2004

Makarow, Irina (EFSEC)

From: sbscheele [sbscheele@comcast.net]
Sent: Thursday, September 02, 2004 5:41 PM
To: EFSEC
Subject: Kittitas Wind project comment Attn Alan Fisksdal



Dear Mr. Fisksdal,

We divide our time between our residences in both King and Kittitas Counties, and have followed closely the developments of the past few years relative to the efforts of Zilkha and others to bring wind turbines to the Valley. We did not initially object to the concept of wind energy development, but do strongly object to the poor process, and poor tactics for site selection, that have led to a polarization of the community and legitimate disgruntlement.

The Zilkha Company's poor choice in attempting, for whatever, motivation, to force one specific site on the local populace has created the unfortunate backlash of discouraging compromise, and has resulted in lack of planning and thoughtfulness in selecting sites for Wind. If indeed it is EFSEC's opinion that wind power is worth developing, your committee is at a pivotal point where it can promote a more unified spirit and more broad-based acceptance of this development through site selection that has local input, appropriate distance from residential, protected and scenic areas, and does not hinge on quick land leases signed by a company anxious to get started.

Kittitas County happens to have multiple sites with the potential Wild Horse site is a good example of one face that is less impacted, both residentially and environmentally. EFSEC would be doing an important service to all such alternative energy projects if it set the more long-visioned, but stronger stance in favor of promoting careful, independent alternative site selection with local input.

1

There is huge agreement that the Scenic Hwy 97 site that Zilkha jumped on, early on, does NOT meet local approval. What you hopefully do realize and will take great heed of, is that there is almost as much agreement that, within the same County, some appropriate sites for wind development do exist! Now is the opportunity to bring these two concepts to some mutually acceptable fruition.

2

We hope that EFSEC will see that inappropriate development at Scenic Hwy 97 is a detriment to the cause of alternative energy, and therefore the wrong course to take. Leadership should promote acceptable alternatives, such as Wild Horse.

3

Sincerely,

Suzanne & Leonard Scheele

9362 Elk Springs Rd Ellensburg and 1960 NW Blue Ridge Dr., Seattle

(NOTE: Due to email problems, I apologize if you received multiple copies of this email, or if you received different versions - trouble with SEND function!)

9/3/2004

Makarow, Irina (EFSEC)

From: lee bates [bateslee@eburg.com]
Sent: Thursday, September 02, 2004 8:33 AM
To: EFSEC
Subject: Kittitas Valley Wind Power Project DSEIS Comments

Dwight Lee Bates

1509 Brick Road

Ellensburg WA

98926

(509) 925-5055

bateslee@eburg.com

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SEP 03 2004
ENERGY FACILITY SITE
EVALUATION COUNCIL

August 15, 2004

Allen J. Fiksdal

Manager, EFSEC

P.O. Box 4317

Olympia WA

98504-3172

Dear Mr. Fiksdal,

This letter contains my comments on the Kittitas Valley Wind Power Project DSEIS. I am against the project. I do not like

1

9/3/2004

any of the listed alternative sites. The only good alternative site is the Wild Horse site East of Ellensburg. We told Zilkha this in public hearings but were ignored.

1
cont.

Visual Impact of Turbines

The 410 foot high turbines (Section 3.9.2) are too high. They will impact the scenic view. I retired here for the scenic views of the valley. I do not want to see these 410 foot turbines with flashing lights all hours of the day.

The people traveling and living on the US 97 Highway Corridor will see these 410 foot turbines. They are less than .5 of a mile from the highway or from residences (page 3-56). These turbines should not be located anywhere near Highway 97. Wind farms are not scenic. Highway 97 is a Scenic Byway. Do not give

me it is in the eye of the beholder. They may interesting at first but this soon fades. I have seen wind farms at Stateline, Tehachapi and Palm Springs so I know what I am talking about.

2

The simulated views of turbines are ugly. I do not want to see 410 foot turbines out in the country where I drive to relax! You people have no right to destroy a scenic valley I retired to for the scenery. The only reason you want to destroy the scenery with ugly turbines is your greed for the Federal Subsidies. Painting the turbines gray will not help. I do not want to see any turbines at all.

This DSEIS is in error, is insufficient, incomplete and lacking data. It should be redone. To say it is a draft is not good enough. It should be written as thoroughly as possible before being submitted to the public for review. Does not the writer

3

9/3/2004

know the impact of these turbines in the Kittitas Valley for years to come?

3
cont.

Impact on Historical Culture

The DSEIS stated no direct impacts to any known cultural resources would occur during normal operation and maintenance of the project (page 3-50). This ludicrous! There was plenty of time to study this. This DEIS is insufficient, incomplete and lacking data. It should be redone. A Supplemental EIS needs to be done per Section 106 Regulations of the National Historic Preservation Act (NHPA). The respect for the Yakama Tribe is lacking. The tribe's culture depends on preserving Historical Sites. This DSEIS should not proceed without a response from the Yakama Nation since the DSEIS states the impacts on historical and tribal resources is unresolved (page 1-9). Also 9 cultural sensitive areas have been identified (pages 3-49 and 3-50).

4

5

Page 2

Noise

The statement in the DSEIS is alarming that the residents in 60 residential structures within one mile of the proposed turbine strings (page 3-69) will experience elevated noise levels. The Lincoln Township Wisconsin Survey shows that residents can not stand the constant noise from the turbines and have resulting health problems. The noise level of 50 dBA (page 3-70) for these

6

turbines will affect the local residents. Having measured noise myself as an engineer and having visited 3 wind farms, I think this figure is too low. I say this since 50dBA is equal to a quiet

9/3/2004

office and a more accurate figure is 70dBA which is equal to busy traffic (page 3.8-2 Wild Horse Wind Power Project DEIS). This 70 dBA noise level will affect the health of local residents as the Lincoln Township Survey shows. The Lincoln Township Wisconsin Survey showed 67% of people near the wind farm were awakened by wind turbine noises.

6
cont.

Dwight Lee Bates
1509 Brick Road
Ellensburg WA
98926
(509) 925-5055
bateslee@eburg.com

Page 3

9/3/2004

Lathrop, Winbauer, Harrel, Slothower & Denison L.L.P.

Attorneys at Law

Post Office Box 1088, 201 West Seventh Avenue, Ellensburg, WA 98926

*F. Steven Lathrop, P.S.
John P. Winbauer
Susan K. Harrel
Jeff Slothower
James T. Denison, Jr.*

*Tel (509) 925-6916
Fax (509) 962-8093*

September 7, 2004

Allen Fiksdal, EFSEC Manager
Energy Facility Site Evaluation Council
925 Plum Street SE, Building 4
Post Office Box 43172
Olympia WA 98504-3172

Re: Application No. 2003-01
Sagebrush Power Partners LLC, Kittitas Valley Wind Power Project DEIS COMMENT
LETTER

Dear Mr. Fiksdal:

We provide the following comments to the issuance of the SEIS in this matter:

1. The notice of adoption of existing documents does not comply with WAC 197-11-965 and is defective. 1

2. The FEIS has not been adopted. Accordingly, the draft SEIS cannot be issued under WAC 197-11-630. While WAC 197-11-405 does allow for an SEIS on a DEIS, its use is very limited in scope and can only be done if the proposal is changed or if new information became available. In this case the applicant has simply failed to complete a detailed analysis of the off-site alternative and is trying to correct the flaw in the process. However, the off-site alternative did not change the proposal, and there is certainly no information. This is information and a subject that should have been included in the DEIS before it was published, and the present attempt to fix the problem is incorrect. 2

Very truly yours,



Jeff Slothower

deis comment letter

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SEP 09 2004

**ENERGY FACILITY SITE
EVALUATION COUNCIL**

Makarow, Irina (EFSEC)

From: John & Barb Foster [bears@elltel.net]
Sent: Thursday, September 09, 2004 6:32 PM
To: EFSEC
Subject: Proposed Kittitas Valley Wind Power Project along US 97 scenic byway is in the WRONG place

September 9, 2004

Alan Fisksdal
EFSEC manager
Olympia, WA

Dear Sir:

Our question to you, sir, is why would a state commission consider placing an industrial wind farm along state-designated scenic route US 97 in the Kittitas Valley? Why would a commission be discussing the placement of an industrial wind farm of huge towers that would be placed right smack in front of the beautiful Cascade Mountains where most citizens of the Kittitas Valley gaze several times a day? | 1

Each day when we get up we admire these beautiful snow covered mountains and we count our blessings that we live in the Kittitas Valley and have that wonderful view. |

If a wind farm must be placed in Kittitas County, it should go to the Wild Horse area east of Ellensburg. The closest house would be two miles away, unlike the area of US 97 where there are many houses. And the Wild Horse site would be in a less scenic area of our county. | 2

We were disappointed the hearing for the KVVPP came in late August when many of our citizens were vacationing. | 3

Please do not force Kittitas County with an industrial wind farm in a scenic byway along US 97. It is the WRONG place. | 4

Sincerely,

John and Barbara Foster
Kittitas residents since 1965
2263 Killmore Rd
Ellensburg, WA 98926

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EVALUATION COUNCIL

9/10/2004



www.zilkha.com

Ellensburg Offices
222 Fourth Street
Ellensburg, WA 98926
Phone: 509-962-1122
Fax: 509-962-1123

Northwestern Regional Office
210 SW Morrison
Suite 310
Portland, OR 97204
Phone: 503-222-9400
Fax: 503-222-9404

September 10, 2004

Irina Makarow, Siting Manager
EFSEC
P.O. Box 43172
Olympia, WA 98504

Re: Comments on the Draft Supplemental Environmental Impact Statement for the Kittitas Valley Wind Power Project dated August 2004.

Thank you for the opportunity to offer comments on the Draft Supplemental Environmental Impact Statement (SEIS) for the Kittitas Valley Wind Power Project. I am submitting the following comments on behalf of Sagebrush Power Partners, LLC, (the Applicant). The following comments are based on review of the SEIS by our development team as well as the consultants who were involved in the original studies and field work that were submitted as part of our Application for Site Certification.

Sincerely,

A handwritten signature in black ink that reads "Chris Taylor".

Chris Taylor
Project Development Manager

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SEP 13 2004

ENERGY FACILITY SITE
EVALUATION COUNCIL

General Comments:

The Draft SEIS provides pertinent information regarding potential alternative sites for wind power development in Kittitas County. The organization of the document is logical and easy to read.

1

Specific Comments by Section and Page:

Page 1-5, Section 1.4.1, Proposed Action

The facilities, equipment, and features to be installed as part of the project include: approximately 19 miles of new roads.

Comment: This is not accurate, 13 miles of new road and 8 miles of road upgrades are proposed.

2

Page 1-5, Section 1.4.1, Proposed Action

The KVVPP would be constructed across a land area of approximately 7,000 acres...

Comment: This is inaccurate. The statement should be revised to say 'The KVVPP would be constructed across a land area of approximately 6,000 acres...'

3

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS.
•Wetlands impacts and mitigation.

Comment: Applicant has since received a Joint Aquatic Resource Permit and a 401 Water Quality Certification waiver.

4

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS.
•Economic effects of lower and upper end scenarios

Comment: Applicant is unaware of any outstanding issue regarding the economic effects of lower and upper end scenarios. Please refer to ASC Section 8.1, ASC exhibit 23, KV DEIS Section 3.7 and Applicant's

5

comments on the KV DEIS submitted 01/20/2004. Applicant has provided detailed information regarding the costs and economic impacts of the three scenarios.

5
cont.

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS:

- Economic and environmental effects of tourism*

Comment: Applicant is unaware of any outstanding issue regarding the economic and environmental effects of tourism. Please refer to KV ASC Section 5.3, ASC Exhibit 20 and KV DEIS Section 3.7 and Applicant's KV DEIS comments submitted 01/20/2004.

6

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS.

- Impacts on historical tribal resources*

Comment: Applicant has completed thorough site surveys for archeological and historical resources and literature research regarding potential Traditional Cultural Properties at the site. No significant adverse effects are anticipated. Applicant has proposed several mitigation measures to ensure the protection of cultural resources. Please refer to the KV ASC Section 5.1.6 and Exhibit 16, the KV DEIS Section 3.8, and Applicant's KV DEIS comments submitted 01/20/2004. With the mitigations proposed by the Applicant, there will be no impact on cultural resources at the site.

7

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS.

- Television interference*

Comment: Applicant is unaware of any outstanding issue regarding television interference. Applicant has already completed and submitted to EFSEC a thorough television impact study. Please refer to ASC Section 5.3, ASC exhibit 14, KV DEIS Section 3.13 and Applicants Comments on the KV DEIS submitted 1/20/2004. Please also refer to Les Polisky's pre-filed testimony.

8

Page 1-9, Section 1.7, Issues to be Resolved

The status of these issues has not changed since issuance of the Draft EIS.

•Radio interference

Comment: Applicant is unaware of any outstanding issue regarding Radio Interference. Applicant has already completed and submitted to EFSEC a thorough communications impact study and has documented microwave and fresnel zones over the Project area based on the FCC's database. Please refer to Section 3.13 of the DEIS and Exhibit 14 of the ASC. This analysis concludes that there will be no impact to existing communications pathways, including those used by cellular telephone providers therefore, no further study is necessary. Please also refer to Applicant's comments on the KV DEIS submitted 01/20/2004 with which we included additional information requested by Shapiro and associates regarding the non-issue of electromagnetic interference. Please refer also to the pre-filed testimony of Les Polisky.

9

Page 2-4, Section 2.2.1, Project Overview

The estimated 90-acre project site lies within an area covering...

Comment: This statement should be revised to say 'The KVVPP would be constructed across a land area of approximately 6,000 acres...'

10

Page 2-5, Section 2.2.1, Project Overview

...up to 7 miles of existing private roads would be improved, and up to 19 miles of new access roads would be constructed.

Comment: This statement is not correct. It should say 13 miles of new road and 8 miles of road upgrades are proposed.

11

Page 2-6, Section 2.2.1, Project Overview, Meteorological Towers

The towers may alternatively be of a free standing design.

Comment: Applicant has committed to using free-standing (unguyed) permanent met towers to reduce avian impacts.

12

Page 2-12, Section 2.5.2, Results of Site Screening Process, Swauk Valley Ranch

WDFW identified approximately 220 acres of the northern portion of the site as western bluebird nesting habitat (a WDFW Monitor Species) and [oak woodland as Priority Habitat Several reword] DNR-designated Natural Heritage Areas (thyme buckwheat/Sandberg's bluegrass, Ponderosa pine/common snowberry, and Oregon oak/Geyer's sedge plant communities lie? Are Located? along the eastern edge of the site.

Comment: This paragraph contains what appear to be either typos or editorial notes and should be rewritten. | 13

Page 2-22/2-23, Section 2.5.2, Results of Screening Process, Off-Site Alternatives Selection

Based on the screening criteria, it appears that only one site, Swauk Valley Ranch, stands out as a practical off-site alternative to the KVVPP. The Springwood Ranch site, was also retained as reasonable candidate for comparative off-site alternatives analysis, even though a wind resource developed on this site would have lower economic viability.

Comment: It should be noted in the EIS that a viable wind power project also requires the willing participation of the landowner, which does not appear to be the case with the Springwood Ranch alternative. | 14

Page 2-27, Section 2.7.3, Reasonable Off-Site Alternatives Brought Forward for Impact Analysis, Wild Horse Wwind Power Project, Location and Site Characteristics

The Wild Horse Wind Power Project is proposed on an approximately 5,000-acre site located...

Comment: This statement should be revised to say 'The Wild Horse Wind Power Project is proposed on an approximately 8,600 acre site located...' | 15

Page 2-31, Section 2.7.3, Reasonable Off-Site Alternatives Brought Forward for Impact Analysis, Desert Claim Location and Site Characteristics

There are no publicly-owned lands in the project area.

Comment: This statement is somewhat misleading, as there are several DNR (public) parcels interspersed throughout the Desert Claim Project area, but these apparently are not controlled by enXco. It is more accurate to say no project facilities are planned for public lands in the Project vicinity. | 16

Page 3-14, Section 3.2.1, Affected Environment, Alternative 3: Wild Horse Wind Power Project, Wildlife

Sage grouse have historically been observed on the Wild Horse site during the spring and winter, although apparently no leks have been confirmed. Surveys conducted in 2003 did not confirm any lek activity.

Comment: The surveys were done following WDFW protocols and found no sage grouse leks. The word "apparently" should be deleted. | 17

Page 3-17, Section 3.2.2, Impacts on Proposed Action and Alternatives, Kittitas Valley Wind Power Project, Vegetation and Wetlands

Loss of 36-150 acres of sensitive lithosol habitat would be considered an adverse effect of the project. These areas would be replanted and restored after completion of construction activities.

Comment: The EIS should note that in addition to revegetation efforts, these impacts will be fully mitigated in accordance with WDFW wind power guidelines and in consultation with WDFW by purchasing and protecting over 500 acres of on-site habitat currently at risk of development. | 18

Page 3-17, Section 3.2.2, Impacts on Proposed Action and Alternatives, Kittitas Valley Wind Power Project, Vegetation and Wetlands

Potential impacts to vegetation are possible from the introduction, colonization, and spread of noxious weed species. Corresponding control measures would be required.

Comment: It should be noted in the EIS that the Applicant has proposed the implementation of an effective noxious weed control program, in coordination with the Kittitas County Noxious Weed Control Board, to control the spread and prevent the introduction of noxious weeds (KV ASC, Section 3.4.7.5). | 19

Page 3-17, Section 3.2.2, Impacts on Proposed Action and Alternatives, Kittitas Valley Wind Power Project, Vegetation and Wetlands

Impacts associated with project operations would include shading from the turbine towers, increased dust generated by travel on graveled roadways...

Comment: It should be noted in the EIS that both dust and shading have been determined to be insignificant impacts (see WH DEIS Section 3.4.2.2). 20

Page 3-22, Section 3.2.2, Impacts of Proposed Action and Alternatives, Alternative 3: Wild Horse Wind Power Project, Fisheries

Precipitation during construction could result in sediment-laden surface runoff from disturbed areas that could adversely affect nearby surface waters. The quantity and quality of stormwater runoff could be affected by operation of the proposed project because of the increase in impervious surfaces, which could result in impacts on fisheries habitats downstream of the project area, if not mitigated.

Comment: It should be noted in the EIS that the Applicant HAS proposed mitigation and that the total impervious surface area created by the Wild Horse project is minimal. The Applicant proposes to develop and implement, as required by the National Pollutant Discharge Elimination System (NPDES) General Stormwater Permit for Construction Activities, a detailed SWPPP to minimize the potential for discharge of pollutants from the site during construction. See Sections 3.3.4 and 3.6.4 of the WH DEIS for a detailed description of proposed SWPPP activities and additional mitigation measures to be implemented during construction and operations. 21

Page 3-33, Section 3.4.2, Impacts of the Proposed Action and Alternatives

Because of the nature of the terrain and area vegetation, the occurrence of lightning strikes may increase due to the presence of proposed project structures. The frequency of lightning strikes would likely be a function of the height of the wind turbine generators and be proportional to the number of project structures installed.

Comment: Applicant questions the basis for this statement. Kittitas County is not a lightning-prone area and is in fact in the second lowest of eight categories of lightning intensity (refer to Figure 2.2.4.1-1 of the Wild Horse ASC). It should be noted that in addition to extensive grounding systems at the WTGs, all critical electrical and control systems at the substation and the WTGs are fitted with lightning suppressors. The EIS should refer to Mike Bernay's pre-filed testimony for the Kittitas Valley Project which indicates there is a minimal fire risk associated with wind power projects. Mr. Bernay states that neither of the two fire claims received by his company, Wind Pro Insurance (which insures over 60% of the wind projects operating in the US and many more abroad), was lightning-related. Mr. Bernay goes on to state that lightning damages are 22

typically related to blade structure and down-time. Furthermore, he states that the indicators for lightning risk are older turbine technology, and a project located in a high-lightning density area. Neither of these conditions apply to this Project.

22
cont.

Page 3-46, Section 3.7.2, Impacts of the Proposed Action and Alternatives, Alternative 1: Swauk Valley Ranch

Operation of the proposed project is expected to require between 12 and 20 full-time employees.

Comment: Swauk Valley Ranch would be a much smaller project and therefore the actual number of operations staff would be closer to 6-10 full-time employees.

23

Page 3-49, Section 3.8.1, Affected Environment, Kittitas Valley Wind Power Project

The proposed project is situated in an area ceded by the Kittitas, which is now a part of the Yakima Nation.

Comment: This statement is somewhat confusing. The EIS should clarify that although the Kittitas Indians are now a part of the Yakama Nation, the Project area is not located on the Yakama Nation reservation.

24

Page 3-50, Section 3.8.1, Affected Environment, Alternative 4: Desert Claim Wind Power Project

Archival research revealed that no Traditional Cultural Properties (TCPs) had been documented within the project boundaries.

Comment: The EIS should note that archival research revealed that no Traditional Cultural Properties (TCPs) have been documented within the Wild Horse or Kittitas Valley project boundaries either.

25

Page 3-50, Section 3.8.2, Impacts of Proposed Action and Alternatives, Kittitas Valley Wind Power Project

Ground-disturbing activity during construction could potentially affect the two prehistoric archaeological sites with the project area.

Comment: The EIS should be revised to say "No project facilities coincide with the locations of inventoried cultural sites." Section 3.8.5 of the DEIS

26

details additional mitigation measures that will be taken to protect any culturally significant resources.

26
cont.

Page 3-51, Section 3.8.2, Impacts of Proposed Action and Alternatives, Kittitas Valley Wind Power Project

Decommissioning the project at the end of its useful life also poses the potential for further impacts if decommissioning activities stay beyond the perimeters of the pre-existing disturbance zones used during construction.

Comment: Decommissioning activities would not occur outside of the pre-existing disturbance zones. This statement should be removed.

27

Page 3-56, Section 3.9.2, Impacts of Proposed Action and Alternatives, Kittitas Valley Wind Power Project

The project has the potential to create high levels of visual impact at several locations.

Comment: This is not an accurate summary of the findings of the KV DEIS. Of the 11 areas discussed in the KV DEIS (Section 3.9), only 2 locations (not "several") were deemed to have a potentially high level of visual impact.

28

Comments Related to the Impacts of the Alternatives, by Section and Page:

Throughout the SDEIS, in sections with comparisons of the impacts of the alternatives, the treatment of the anticipated impacts of the Wild Horse, Kittitas Valley and Desert Claim projects are not consistent. It appears that most of the information in the comparison tables was simply extracted directly from the respective DEISs without making notes or drawing attention to the fact that the analytical approaches, methodologies and resulting conclusions were very different and all performed by different consultants. This does not afford the public and decision makers a true "apples to apples" comparison. Also, there are some clear factual errors in these comparisons that have the effect of presenting the anticipated impacts of the Kittitas Valley project as substantially greater than those of the Desert Claim project (particularly with regard to noise, shadow flicker, telecommunications and traffic) when in fact the Kittitas Valley project impacts are the same or less for these elements of the environment. The Applicant has noted specific examples in the following paragraphs where such comparisons are not accurate and should be revised. Some of the following

29

30

information is drawn from the Desert Claim Final EIS which was not available at the time this Draft SEIS was published.

30
cont.

Page 3-22, Section 3.2.2, Impacts of Proposed Action and Alternatives, Alternative 4: Desert Claim Wind Power Project, Vegetation and Wetlands

...used for agricultural purposes would also be permanently converted to land occupied by the project facility. / Control measures similar to those described for the KVVPP would be implemented.

Comment: To state that similar control measures may be implemented at the Desert Claim project is speculative. Considerably more detailed information is available regarding the specific mitigation measures proposed for the KV and WH projects than for Desert Claim. Applicant is not aware of any formal proposal by enXco to acquire a specific mitigation parcel for protection and enhancement as Applicant has done for the Wild Horse and Kittitas Valley projects.

31

Page 3-39, Section 3.5.2, Impacts of the Proposed Action and Alternatives, Alternative 4: Desert Claim Wind Power Project

Energy consumption during project construction would not have significant impacts because it would not require large volumes of fuel or electricity and not affect locally available energy sources.

Comment: The Desert Claim Project is very similar in size and scope to the Kittitas Valley project. Energy consumption estimates should be similar as well. The majority of the resources discussed under the Kittitas Valley project description are not mentioned in the Desert Claim description. Applicant believes the comparison of the Desert Claim alternative should be more consistent and include a discussion of the proposed use of all the same categories of resources that were discussed for the Kittitas Valley project, or the Kittitas Valley description should be modified to be as vague and general as the Desert Claim description.

32

Page 3-59, Section 3.9.2, Impacts of the Proposed Action and Alternatives, Alternative 4: Desert Claim Wind Power Project

Visual impacts from this alternative are likely to be less than KVVPP or the Wild Horse alternative due to it not being visible from the Columbia River Gorge as compared to the Wild Horse, and greater distance from major transportation routes such as I-90 and US-97 and fewer residences in close proximity than the Kittitas Valley site.

Comment: There is no valid basis for this statement. Based on a review of the Desert Claim EIS by the Applicant's visual resource consultant, it would be more fair to say that in most areas, the Desert Claim project's visual impacts would be moderate. The three premises for the Desert Claim Project's lower visual impact presented in the above comment are seriously flawed as outlined below:

1. None of the projects will be significantly visible from the Columbia River Gorge. The Wild Horse Project would not be significantly visible from the Columbia Gorge. Review of the ZVI map prepared by the Applicant for the WH project makes it clear that the project would be visible in only limited areas of the Gorge, and these areas would be 7 miles and more from the site, limiting the turbines' visibility.
2. This statement about the relationships of the 3 projects to Interstate 90 is too general. For example, in the case of the Kittitas Valley project, the closest turbines will be well over 2 miles from the Interstate, and will not appear in the driver's primary cone of vision. Most of the KVVPP turbines will be located considerably further in the distance from I-90 and will have limited visibility. In the case of the Wild Horse project, the closest turbines will be located 3 miles from I-90, and because of the topography, the areas along I-90 where these closer turbines will be visible will be very limited. Review of the ZVI map indicates that the portions of I-90 from which more extended views of the WHWPP turbines will be visible are on the order of 8 to nine miles from the closest turbines.
3. There are clearly NOT fewer residences in close proximity to the Desert Claim Project compared with either the Kittitas Valley or Wild Horse Projects. Because the Desert Claim project is, for the most part, located in a remote agricultural area, there are relatively few residences located in immediate proximity to turbines. However, there are 83 residences within 1/2 mile of the Desert Claim Project (DC FEIS page 3-136) compared to approximately 53 residences within 1/2 mile of the KVVPP and no houses within 1 mile of the WH project.

There is thus good reason to conclude that the visual effects of the Desert Claim Project would **not** necessarily be substantially less than those of the KVVPP or WHWPP.

Page 3-63, Section 3.10.2, Impacts of the Proposed Action and Alternatives, Kittitas Valley Wind Power Project

Increases in traffic could result in an increase in the accident rate on roads in the project area.

Comment: To the extent this is true, this statement would also apply to the Desert Claim project and should therefore either be deleted from the discussion of KV or included in the discussion of the impacts of Desert Claim.

34

Page 3-65, Section 3.10.2, Impacts of the Proposed Action and Alternatives, Alternative 4: Desert Claim Wind Power Project

Under this alternative, construction traffic is expected to result in an increase in PM peak traffic of 80 trips which would not alter the level of service on roads in the project area. This impact would be less than described for the Kittitas Valley site.

Comment: This statement seems questionable. Desert Claim's expected peak traffic is half that of the Kittitas Valley Project although it is of comparable size and scope. The number of peak trips should be very similar. The data appears suspect (perhaps a typo) and should be further researched. The Wild Horse project should have the lowest peak construction traffic due to the use of the on-site gravel quarries and batch plant.

35

Page 3-70, Section 3.12.1, Affected Environment, Alternative 4: Desert Claim Wind Power Project

Noise-sensitive areas in the project vicinity include Class A and Class C EDNA. The predominant sources of existing noise on and near the project site include agricultural activities, traffic on local roadways, and occasional overhead aircraft (including helicopters). At some locations, wind at higher speeds is also a major source of noise.

Comment: The exact number of receptors used in noise impact studies is described in the FEIS for the Desert Claim Project and should be listed to be consistent with the noise study information provided under the Kittitas Valley Project Alternative.

36

Page 3-71, Section 3.12.2, Impacts of the Proposed Action and Alternatives, Alternative 4: Desert Claim Wind Power Project

Predicted operational noise levels at all receptor locations would meet applicable noise limits. Based on Noise level and/or increase over ambient levels, project noise impacts would be rated either low or medium, and would not be significant.

Comment: Desert Claim shows exceedences of the 50 dBA limit at two locations. The EIS for Desert Claim assumes that the applicable noise

37

limit will be 70 dBA (Table 3.9-6) at almost all residences. The EIS should note that KVVPP and WHWPP both assume a lower regulatory threshold of 50dBA.

37
cont.

Makarow, Irina (EFSEC)

From: Emilia Burdyslaw [emiliaburdyslaw@yahoo.com]
Sent: Sunday, September 12, 2004 4:40 PM
To: EFSEC
Subject: Draft SEIS for KVWWP

I have reviewed the Draft SEIS for the proposed Kittitas Valley Wind Power Project, and have comments to make regarding this matter.

The Kittitas Valley Wind Power Project is not a suitable site for a wind farm, while the Wild Horse site is appropriate for the following reasons:

- 1. Highway 97, which would be flanked on both sides by the KVWWP, has been designated a state Scenic Byway. Wild Horse has no such designation. 1
- 2. There are more riparian vegetation zones with stands of deciduous and evergreen trees at the KVWWP site than at the Wild Horse site. Turbine erection and road construction will compromise these areas since disturbances would occur in close proximity on ridgetops directly above them. Because these areas attract wildlife, more mammals will be displaced; and avian mortality, which includes the bald eagle, will happen to a much greater degree at the KVWWP. 2
- 3. Many non-participating landowners are dispersed within and around the KVWWP site where turbine placement is too close to neighboring properties (turbine blade 50 feet from adjoining property lines), along residential access roads, and 1,000 feet from current residences. However, the Wild Horse project has only one landowner who has an agreement with the Applicant; and the nearest residence is two miles away. 3
- 4. Few objections have been raised against the Wild Horse project. Unfortunately, the objections of hundreds of affected, non-participating landowners in the KVWWP area have been ignored. The Applicant admits that the area would likely be used for residence building if the project does not take place; yet disclaims the fact that the current and planned use is primarily for this purpose. 4
- 5. A purchase agreement to acquire the Wild Horse property will be implemented if that application is approved. No such agreement has been proposed to the impacted landowners of the KVWWP. Instead, the Applicant has sought only lease agreements from a few of these owners while previously stating that they are not in the business of buying land. 5

Since there are obvious differences between these two sites and the methods employed by the Applicant, it is questionable why the KVWWP location was chosen when it negatively affects the environment of so many landowners who will not be compensated. 6

Sincerely

Emilia Burdyslaw
2806 SW Adams
Seattle, WA 98126
Ellensburg Landowner

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EVALUATION COUNCIL

9/13/2004

Makarow, Irina (EFSEC)

From: Randy Fischer [randyjo@elltel.net]
Sent: Sunday, September 12, 2004 5:28 PM
To: EFSEC
Subject: Kittitas county win power comments

Dear EFSEC Committee,

It is my wife's and my feeling that "IF" a wind farm has to be sited in Kittitas County WildHorse is the best place, with the possible exception of locating the wind farms on the Yakima Firing Center. Although that is probably not a possibility.

Wild Horse is one large land parcel with one owner, whereas Zilkha's hwy 97 project is a patchwork quilt of many properties, with nonparticipating landowners stuck between rows of turbines. The closest house to Wild Horse is 2 miles away, whereas the KVVWPP will be built as close as 1,000 ft. from some houses. Wild Horse has far fewer environmental impacts, although the resident elk herds are suffering in numbers today and who knows what will happen if the wind farms are erected. Wild Horse is a less visible area scenically, whereas the KVVWPP would be built on Hwy 97, a state-designated Scenic Byway. There are almost no landowners objecting to Wild Horse, whereas almost everyone objects to KVVWPP.

One other concern we have is the recommendation and action of this monumental decision being made for our county by people who do not live or work here. I realize that there is one member on your council from Kittitas County but I wonder just how much weight her voice carries? We SINCERELY hope that if this decision is made in favor of placing the wind farms in one location that a precedent is not set and in a few years we have turbines surrounding our entire valley! This would in our view destroy the valleys' character, charm, and the reputation of a quality place to reside with little or no benefit to the environment.

Sincerely,
Randy and Joanna Fischer
6440 Hanson Road
Ellensburg, Wa. 98926

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2
3

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9/13/2004



State of Washington
Department of Fish and Wildlife
1701 South 24th Avenue, Yakima, WA 98926
Phone: (509) 575-2740, Fax (509) 575-2474

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EVALUATION COUNCIL

September 13, 2004

Allen J. Fiksdal, Manager
Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, Washington 98504-3172

Subject: Kittitas Valley Wind Power Project – Comments on Draft Supplemental EIS analysis of off-site alternatives for proposed 182-246 megawatt wind power generation facility in Kittitas County northwest of Ellensburg.

Dear Mr. Fiksdal:

Washington Department of Fish and Wildlife staff have reviewed the Draft SEIS analysis of off-site alternatives to the Kittitas Valley Wind Power Project. Analysis for each off-site alternative considers fish and wildlife impacts within the alternate project sites. The DSEIS analysis does not consider fish and wildlife impacts at the landscape scale. This is potentially significant for shrub steppe wildlife such as sage grouse. (Please note the sage grouse recovery plan on the WDFW web site.) In reviewing off-site alternatives, the SEIS should consider the differences between off-site alternatives as to impacts to ecosystem connectivity for shrub steppe wildlife.

1

WDFW worked with proponents of wind power to craft state-wide guidelines for the protection of fish and wildlife resources when siting and operating wind power facilities. One of the objectives of these guidelines was to steer wind projects away from undeveloped native shrub steppe lands and toward cropland and developed areas where fish and wildlife habitat is already highly disturbed. The Draft SEIS only considers wind power development on shrub steppe lands (a priority habitat of special value to wildlife). There are cultivated lands in Kittitas County which appear to have wind potential and are within ten miles of transmission lines. It is possible the initial screening criteria used to select alternate sites for the DSEIS were too restrictive. We recommend the SEIS have one or more alternatives where turbines are located on cultivated lands.

2

A copy of the WDFW statewide wind power guidelines is available at: <http://wdfw.wa.gov/hab/engineer/windpower/index.htm>). A copy of the WDFW sage grouse recovery plan is available at: <http://wdfw.wa.gov/wlm/diversty/soc/status/grouse/sagexsum.htm>.

Draft Supplemental EIS Letter 15

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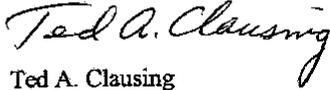
WA DEPT FISH N WILDLIFE

☑ 003/003

- Alan Fiksdahl
September 13, 2004
Page 2 of 2

Thank you for the opportunity to review the DEIS. If you have questions or need additional information, please contact Brent Renfrow of my staff at (509) 925-1013.

Sincerely,



Ted A. Clausing
Regional Habitat Program Manager

cc: Chris Taylor, Zilkha
Lauri Vigue, WDFW
Brent Renfrow, WDFW
Jeff Tayer, WDFW
Peter Birch, WDFW

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SEP 14 2004
ENERGY FACILITY SITE
EVALUATION COUNCIL

September 14, 2004

Energy Facility Site Evaluation Council
PO Box 43172
Olympia, WA 98504-3172

Attention: Allen Fiksdal, EFSEC Manager

Subject: Application No. 2003-01, Kittitas Valley Wind Project
Zilkha Renewable Energy (Sagebrush Power Partners, LLC)
Draft Supplemental Environmental Impact Statement
US 97, MP 142-148 greater vicinity

The Draft Supplemental Environmental Impact Statement (DSEIS) analyzes reasonable off-site alternatives to the proposed action. Previously, we provided comments in several letters regarding the proposal. Those comments remain valid for the proposed action, and for the off-site alternatives, as is applicable. We have no additional comments.

1

Thank you for the opportunity to review and comment on the DSEIS. If you have any questions regarding our comments, please contact Rick Holmstrom at (509) 577-1633.

Sincerely,

Salah Al-Tamimi, P.E.
Regional Planning Engineer

SA: jjg

cc: File #2, US 97
Terry Kukes, South Central Area 1 Maintenance Supervisor

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Draft Supplemental EIS Letter 17

Kittitas Valley Wind PP
DSEIS Comment - 17

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SEP 14 2004
ENERGY FACILITY SITE
EVALUATION COUNCIL

September 14, 2004

Energy Facility Site Evaluation Council
PO Box 43172
Olympia, WA 98504-3172

Attention: Allen Fiksdal, EFSEC Manager

Subject: Application No. 2003-01, Kittitas Valley Wind Project
Zilka Renewable Energy (Sagebrush Power Partners, LLC)
Draft Supplemental Environmental Impact Statement
US 97, MP 142-148 greater vicinity

The Draft Supplemental Environmental Impact Statement (DSEIS) analyzes reasonable off-site alternatives to the proposed action. Previously, we provided comments in several letters regarding the proposal. Those comments remain valid for the proposed action, and for the off-site alternatives, as is applicable. We have no additional comments.

Kittitas Valley Wind PP
DSEIS Comment - 18

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FEB 02 2006

To: Allen Fiksdal, Manager
Energy Facility Site Evaluation Council
PO Box 43172
Olympia, Wa. 98504-3172

ENERGY FACILITY SITE
EVALUATION COUNCIL

January 02 2006

Dear Mr. Fiksdal,

Thank you for allowing me to testify on the SDEIS for the Kittitas Wind Power Project.

I am Keith Johnson of 3050 Airport Rd. Cle Elum, Wa. and am representing myself and hopefully the birds and bats.

I believe the SDEIS, although reducing the size of the KVVPP to 6000 acres and the number of turbines to 64, still does not result in a reason to approve this project.

These are the issues I believe make my case for denial of this project.

1.- There will be an impact to avian species. The rapid increase of permits and applications for permits for windfarms, mainly due to the federal and state subsidies and the energy policies by federal and state governments, is generating a caution to reassess regulation of the wind industry.

A congressional investigation report by the Government Accountability Office states, "much work remains before scientists have a clear understanding of the true impacts to wildlife from wind power."

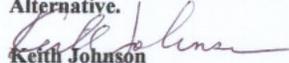
2.-Environmental Issues.

There will be an environmental impact to wildlife and their habitat. The turbines will kill birds and bats and the substantial loss of their habitat is a great concern to me. The birds and bats use the same land and air for their habitat as the project area with its turbines. The extent of this loss of 2,460,000 acre feet of air space [bird habitat] can only be felt by the birds and bats, and this is for eternity. Putting this into perspective, compare the loss of 2,460,000 acre feet of bird habitat to the 400,000 acre feet of irrigation water in lake Cle Elum. If we were to lose this water the agriculture society would be up in arms.

Some environment statements I think give reason to deny this project. Judge Micheal E. Cooper wrote in his ruling on the appeal by enXco of the BOCC's decision to deny the Desert Claim project, "The visual and aesthetic element is recognized as part of the environment that is to be maintained and enhanced." Terrance Wahl, author of "The Birds of Washington" states, "I am not optimistic, birds are an indicator species, reflecting back to us what is going on out there. And I'm afraid our eye-opening awareness will come when it is too late to save what is left."

3.-Property Values. Studies for Horizon Energy DEIS Vol II sec 33 state there will be no impact to property values. The view shed as stated in the DEIS takes in the whole view, therefore the view shed will have the 410 ft turbines in every view, I feel a detriment to the preferred view. It seems that it is not a preferred view of PSE as they are requesting moving the 230kv transmission line from their field of view, this is part of the addendum to the FEIS of the Wild Horse project.

In summary, because of the impact to wildlife, the numerous environment issues and impact to property values, I recommend EFSEC choose the No Action Alternative.


Keith Johnson
3050 Airport Rd.
Cle Elum, Wa. 98922

PSE's recent experience with construction of a similar project (Hopkins Ridge project in Columbia County) is that as permitted, the Maintenance Facility would be adequate for day to day operations but would not provide enough shop space or spare parts storage for the larger and heavier turbine components. Since both Hopkins Ridge and Wild Horse utilize identical turbine components, PSE wishes to provide expanded facilities at Wild Horse that can service both projects. In addition, because of the proximity to major metropolitan areas and the visibility of the Wild Horse site from I-90 it is expected that the facility will receive more visitors than the Hopkins Ridge facility.

2.2 Changes to the 230 kv Transmission Feeder Line

PSE also proposes a partial re-alignment of the project's 230kV Transmission Feeder Line, as shown in Figure 1. PSE desires to move the transmission line several hundred feet away from the Operations Center, so it will not block skyline of views from the facility. As originally permitted, the line passes very close to the Operations Center. PSE is concerned that at this current location the line would be directly in the field of view of some of the better visual panoramas available from this ridge, including views of Mount Rainier and Mount Adams.

The proposed re-alignment has a 1,000 foot overall shorter total length thus resulting in a slightly smaller footprint than the approved proposal. For areas away from the Operations Center, the feeder line will follow the previously studied and permitted alignment.

The total footprint of permanent site impacts approved in the SCA was 165 acres. The actual footprint of permanent project impacts, including the proposed changes described above, is approximately 160 acres. Therefore, with the proposed changes, the permanent footprint of the entire project will remain below that approved in the SCA.

CHAPTER 3: IMPACTS TO THE ENVIRONMENT

3.1 Earth

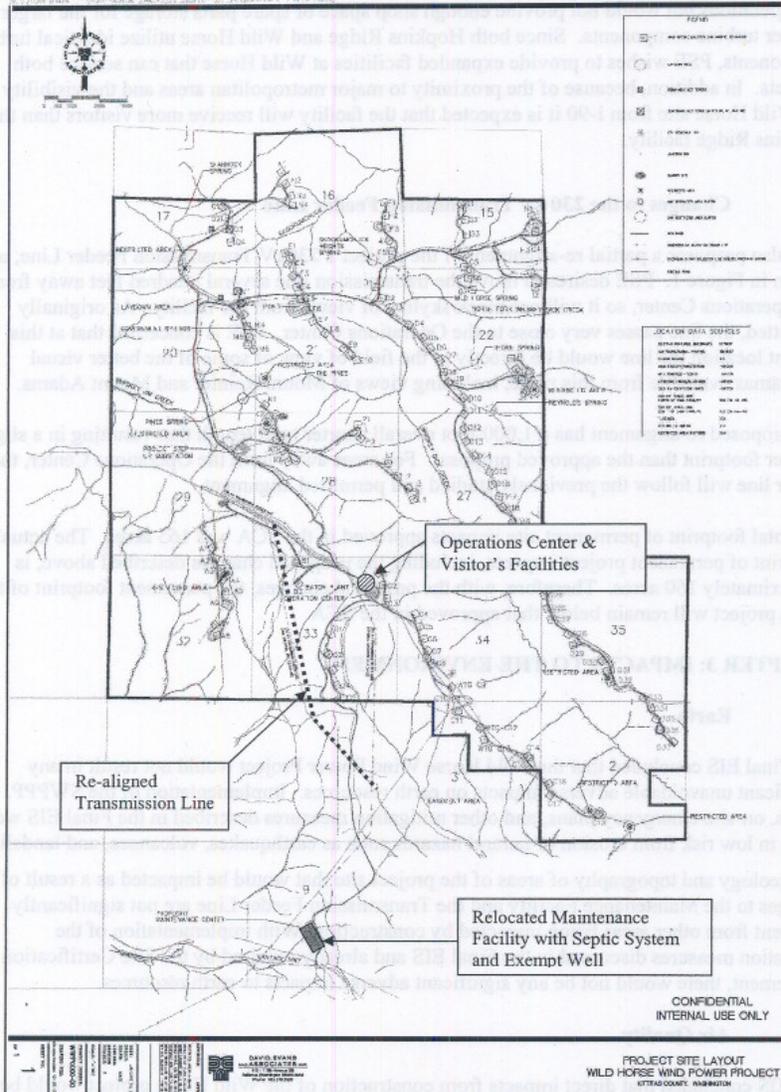
The Final EIS concluded that the Wild Horse Wind Power Project would not result in any significant unavoidable adverse impacts on earth resources. Implementation of the SWPPP, BMPs, on-site emergency plans, and other mitigation measures described in the Final EIS would result in low risk from erosion or natural hazards such as earthquakes, volcanoes, and landslides.

The geology and topography of areas of the project site that would be impacted as a result of the changes to the Maintenance Facility and the Transmission Feeder Line are not significantly different from other areas being impacted by construction. With implementation of the mitigation measures discussed in the Final EIS and already required by the Site Certification Agreement, there would not be any significant adverse impacts to earth resources.

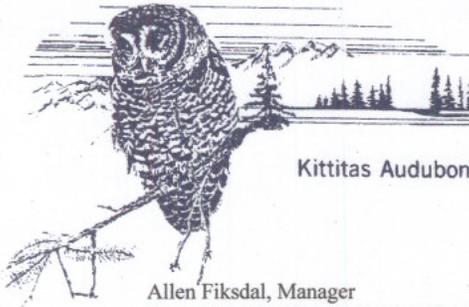
3.2 Air Quality

The EIS concluded that direct impacts from construction of the Wild Horse project would be minimized by ensuring that all construction equipment is in compliance with applicable emission limits and by implementation of BMPs to control fugitive dust. Direct impacts from operation

Addendum Figure 1: Wild Horse Wind Power Project Revisions



Kittitas Valley Wind PP
DSEIS Comment - 19



Kittitas Audubon Society • P.O. Box 1443 • Ellensburg, WA 98926

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January 21, 2006
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ENERGY FACILITY SITE
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Allen Fiksdal, Manager
Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

RE: Kittitas Audubon Comments on the Supplemental DEIS for the Kittitas Valley Wind Power Project

Dear Mr. Fiksdal,

Kittitas Audubon appreciates the opportunity to address EFSEC on the Supplemental DEIS for Kittitas Valley Wind Power Project.

It has now been two years since the original DEIS was completed and we commented on it in January of 2004. Since this time there are some issues we feel are either new or have not been addressed in either the DEIS or SDEIS:

- 1) In 2004, in order to investigate extremely high rates of bat kills at some small newly built wind farms on ridges in the Mid Atlantic region, nocturnal Bat studies were done by renown bat expert Merlin Tuttle for the Bats and Wind Energy Cooperative (BWEC), a government, conservation, wind industry group, at the two wind farms where this had occurred. Thermal infra-red video technology, which can differentiate between birds, bats and insects, was used at night followed by bat fatality searches in the morning. Between August 1 and September 13 of 2004 substantial bat kills were recorded. **The average number of fatalities at the two facilities together is estimated between 1764 and 2900 for the six week period.** Unmeasured kills would have occurred in spring, summer and through early November. Bat kills were associated with average wind speeds and low power production and while turbine blades were still moving at relatively high speeds. Only one turbine had no bat kills associated with it and it was nonoperational. BWEC is attempting to do further research to find methods, such as feathering the blades during periods of low wind (when most of the bat mortality occurred) and testing acoustic detectors but at the time of the report had not found project owners to host the research or been allowed access to desirable sites. We would hope this has changed.
- 2) **Night studies were not done for KVVPP to prove there would be no effect on night migrating birds and bats.** The majority of passerines as well as bats

migrate at night not during the day when the avian studies were done. In addition, winds are strongest in this location during the spring and fall, exactly when the birds and bats are migrating, increasing the chances for them to be hit by the blades.

We are especially concerned for bats on the KVVPP due to the presence of densely forested areas close to some of the turbines in the Elk Springs area, within perhaps a mile. This would put the turbines within potential feeding and migratory routes for bats.

- 3) Local experts, including avian physiologist Phil Mattocks, PhD, are expressing concern for this area as the location of a funnel effect for migratory birds, especially raptors. **The major concern is for the end of the Kittitas Valley the KVVPP would be located on.** This is where mountain ridges would force the concentration of birds and bats as they follow the ridge tops during migration.
- 4) According to Hawkwatch International, who for years during the month of October tallied raptors as they flew south past Diamond Head just north of this area into the exact area of this proposed wind farm, **the entire eastern Cascade Range of north-south ridges is considered a migratory flyway.** Expert ornithologists and wildlife biologists in this area and throughout the state of Washington are well aware of this fact. **We also quote the Supplemental DEIS for KVVPP under section 3.2.1 Affected Environment page 3-9 "The Kittitas Valley site is located within the Pacific flyway. Because it is located close to the Cascade Mountains and the Yakima River it may have a higher incidence of use by migratory birds than the Wild Horse site."**
- 5) Mortality estimates were based on extrapolation from other sites in areas very different from the Kittitas Valley. In addition no day studies were done in October when the birds are migrating in much larger numbers. We have no way of knowing the kill numbers until they occur.
- 6) True cumulative impacts of all the wind farms in the region were not considered. The Audubon Washington State of the Birds team found that of the 317 Species of birds that live or migrate through Washington every year, 93 species and 4 subspecies are at risk. This means almost one- third of our birds are vulnerable to drastic population declines.

Many of the concerns we have are now being expressed by others. Most recently and most notably the Government Accounting Office (GAO).

The "GAO-05-906 Report on Wind Power Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife" reflected many of our concerns.

The study was requested by congressmen from several eastern states where thousands of bats and migratory birds have been killed at newly erected wind farms.

13 December 2004

Studies to develop bat fatality search protocols and evaluate bat interactions with wind turbines in West Virginia and Pennsylvania: an interim report

Edward B. Arnett, Bat Conservation International, Austin, TX 78716

Wallace P. Erickson, Western Ecosystems Technology, Cheyenne, WY 82001

Jessica Kerns, University of Maryland, Center for Environmental Science –
Appalachian Laboratory, Frostburg, MD 21532

Jason Horn, Boston University, Department of Biology, Boston, MA 02215

INTRODUCTION

Wind has been used to commercially produce energy in North America since the early 1970s and has been considered environmentally friendly. Wind energy's ability to generate electricity without many of the environmental impacts associated with other energy sources (air pollution, water pollution, mercury emissions, and greenhouse gas emissions associated with global climate change) can significantly benefit birds, bats, and many other plant and animal species. However, bird and bat fatalities have been reported at wind facilities worldwide. Unexpectedly high numbers of bat fatalities reported at wind energy sites on ridge tops in the eastern United States have heightened the urgency to understand problems and find solutions.

Post-construction monitoring studies have provided much of the available information on avian and bat migration at wind facilities and avian and bat collisions with wind turbines. Current post-construction fatality search protocols have been criticized because search intervals are infrequent (e.g., 7–14 day intervals), which limit information on factors that might explain timing of fatalities and may not provide accurate and precise estimates of fatality rates of bats. These monitoring studies were primarily designed to confirm predicted impacts and provide reasonably precise and accurate estimates of annual or seasonal avian fatality rates and typically were not designed to provide estimates of the timing of fatalities, since the search intervals are relatively infrequent. While past studies have appeared to provide reasonably accurate and precise estimates of avian fatality, they may not be appropriate for bats, particularly given the high levels of impacts on bats observed at Mountaineer in 2003. According to the Metrics and Measurements document developed under the auspices of the National Wind Coordinating Committee Wildlife Working Group, the principal of adaptive management applies, i. e., the level of study intensity is a function of the level of impact or risk observed (http://www.nationalwind.org/pubs/avian99/Avian_booklet.pdf). Thus, a higher level of effort and rigor is justified for assessing the impacts on bats as a result of the 2003 findings. Additionally, important sources of bias influencing estimates of bat fatality, including removal and scavenging by predators and searcher efficiency among different habitats warrants better quantification.

The website for the study is at: <http://www.gao.gov/new.items/d05906.pdf>
Some pertinent quotes:

1. "Once thought to have practically no adverse environmental effects, it is now recognized that wind power facilities can have adverse effects-particularly on wildlife, and most significantly birds and bats."
2. "Large numbers of birds and bats are believed to follow and cross through many parts of the United States, including along mountain ridges, during seasonal migration. Consequently wind power projects located in these areas could potentially impact these species."
3. "...there is a shortage of information on migratory bird routes and bat behavior as well as ways in which topography, weather and turbine type affect mortality."
4. "...studies conducted at one location can rarely be used to extrapolate potential impacts or mitigation effectiveness at other locations.."
5. "it appears when new wind power facilities are permitted no one is considering the impacts of wind power on a regional or "ecosystem" scale that often spans governmental jurisdictions."

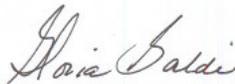
This is not an appropriate site for a wind farm from an environmental perspective. Migratory birds and bats have not been considered at all and there is a potential for a negative impact on them.

Any comment on environmental considerations of this wind power project would not be complete without mentioning what Judge Michael E. Cooper wrote in his ruling on the appeal by EnXco of the Kittitas County BOCC decision to deny the Desert Claim project:

"The visual and esthetic element is recognized as part of the environment that is to be maintained and enhanced."

The Kittitas Audubon Society feels because of these environmental deficiencies and the inappropriateness of the location that the **No Action alternative** should be selected for this project.

Sincerely,



Gloria Baldi
President



Janet Nelson
Conservation Chair

To address bat mortality issues at wind facilities, a collaborative research initiative, the Bats and Wind Energy Cooperative, was developed among Bat Conservation International (BCI), the U.S. Fish and Wildlife Service (USFWS), the American Wind Energy Association (AWEA), and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL). A workshop held in February 2004 served to gather several of the world's leading bat scientists and experts from other relevant disciplines, as well as the wind industry and federal and state agencies, to discuss what research is needed to understand and resolve issues involving bat mortality at wind turbines. This workshop revealed that several gaps in knowledge still exist concerning bat migration and ecology, bat behavior and bat use near wind turbines, and bat interactions and collisions with turbines.

Several key research needs were identified by experts from the aforementioned workshop, including 1) to conduct daily mortality searches to develop a dataset required to evaluate search effort needed to meet a desired level of precision and accuracy for fatality estimates; 2) to better assess the effects of carcass removal and searcher efficiency bias corrections in making fatality estimates; and 3) to observe the interactions of bats and wind turbines. The goal of this project was to address the aforementioned key research needs. Here, we present preliminary key findings from the 2004 field season.

OBJECTIVES

Specific objectives for this project include: 1) conducting both daily and weekly searches for bat fatalities at wind turbines to compare the precision and accuracy of intensive searches (daily) to precision and accuracy of other intervals (e.g., 7-day intervals); 2) improving searcher efficiency and scavenging bias corrections to estimates; 3) developing recommendations for improving and standardizing fatality search protocols for bats at turbines; 4) associating fatality location and timing to turbine lighting, weather and other characteristics; and 5) employing different methods and technologies to evaluate bat activity and interactions with turbines and determine which provide the most reliable information for problem solving.

STUDY AREA

We collected data at two different wind facilities in the eastern U.S. The Mountaineer Wind Energy Center has 44 1.5 MW turbines arrayed along an 8.8 km portion of the crest of Backbone Mountain near Thomas, West Virginia. The second study area was located at the Meyersdale Wind Energy Facility located immediately east of Meyersdale, Pennsylvania. This site has 20 1.5 MW turbines arrayed along approximately 3.8 km of ridgeline. Each turbine at both sites has a rotor diameter of 72 m and a rotor swept area of 4,072 m².

SYNTHESIS OF METHODS

Fatality Searches

Rectangular plots with maximum dimensions of 120 m (north-south) by 130 m (east-west) were centered on each sample turbine, but the actual area sampled varied with topography and vegetative conditions (Figure 1). Forest edges defined the plot boundary and habitat conditions unsuitable for searching (e.g., shrub cover, steep topography) were eliminated from the searchable area (see Figure 1 for an example depiction). Transects were established every 10 m in a north-south direction. Fatality searches were conducted from 31 July to 11 September and 2 August to 13 September, 2004, at the Mountaineer and Meyersdale facilities, respectively. We conducted daily searches at all odd numbered turbines and weekly searches at even numbered turbines during the first 3 weeks, and then switched turbine sets and search intervals during the later 3 weeks of the study. Each turbine plot was searched for approximately 30–90 min, depending on the searchable area and habitat conditions.

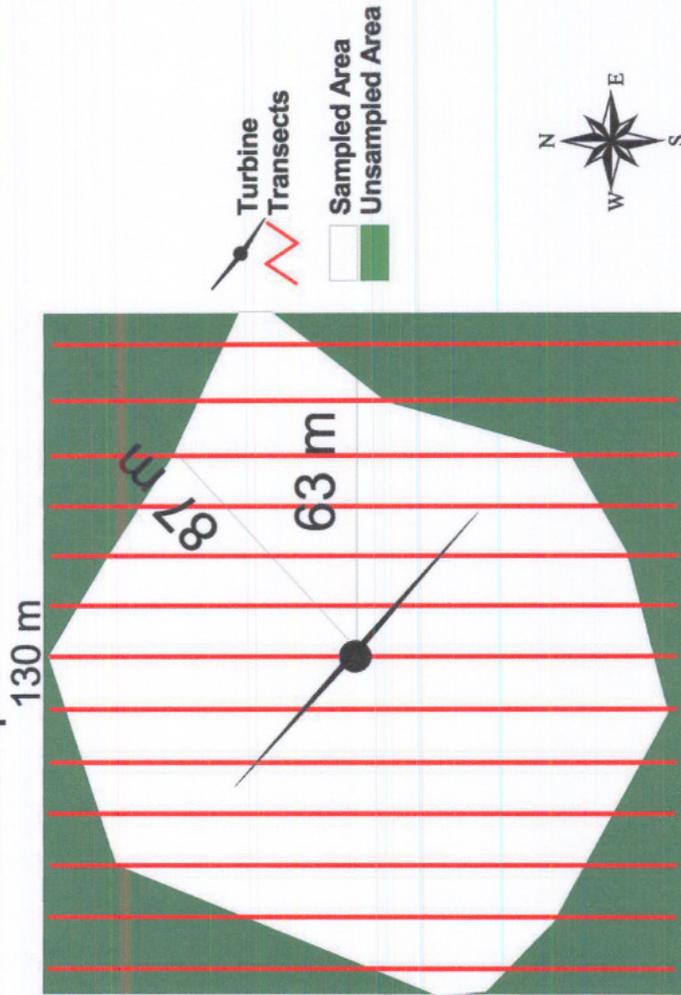
We conducted searcher efficiency and scavenger removals trials throughout the study period at both sites using both fresh and frozen bats that were randomly distributed within sample plots. More than 200 bats were used in each type of bias correction trial at both study sites. Adjustments to the fatality estimates will be made to account for searcher efficiency, carcass removal by scavengers, and detectability differences among vegetation types sampled.

Thermal Imaging

To evaluate the abundance, timing and interaction of bat flight behavior at operating wind turbines, we recorded thermal infra-red video data at a single turbine each night from sunset to sunrise (9 hr datasets) from 2–27 August 2004. We used 3, FLIR S60 cameras to simultaneously observe bat-turbine interactions in the left, right, and lower thirds of the “sweep” zone at each sampled turbine. We used 45° field-of-view (FOV) lenses to provide a FOV that was the best compromise between image-able area and minimum detectable object size. We positioned cameras beneath turbines at elevation angle of approximately 60°. This gave us a FOV that measured 32 m high, and 43 m wide. We recorded digital radiometric data to external storage disks using FLIR Researcher software at a rate of 30 frames per second. Continuous recordings from the three cameras produced a total of 345 GB of data nightly. After thermal imaging data were gathered during the night, bat fatality searches were conducted the following day at the same turbine.

Recorded sequences were later examined in detail and analyzed for flight activity. Targets were classified as bird, bat or insect based on a set of criteria consistent with the ecology and known flight behavior of each. Among the criteria, visible morphology, and wing beat frequency were weighted heavily in determining object type. Secondarily, inertia, flight path and maneuver types were considered. Flight path was categorized as either straight-line or erratic. Object classifications were made conservatively with

Example Carcass Search Plot



many targets falling into an "unknown" category. Flight passes were classified as well, indicating contact with blades, near misses, and no-contact events. In addition flight vector both entering and exiting the FOV were noted to the closest increment of 30°.

KEY FINDINGS – FATALITY SEARCHES

Mountaineer

- 466 bat fatalities found comprising 6 species (hoary bat, eastern red bat, eastern pipistrelle, little brown bat, silver-haired bat, and big brown bat, from highest to lowest number found). This does not constitute total estimated mortality; number of bats found must be adjusted for searcher efficiency and scavenging by habitat types.
- More adult and more male bats were found than juvenile and female bats, respectively.
- Turbine #11 was non-operational (blades feathered, though allowed to free-wheel) throughout the study period and no fatalities were found at this turbine.
- Searcher efficiency was generally high on bare ground and in high visibility habitats and very low in dense vegetation, boulder and rock piles, slash, and other low visibility habitats. Final estimated SE has not been calculated, but it will likely be <45% overall at Mountaineer and <25% at Meyersdale. Searcher efficiency was much lower at Meyersdale, likely due to more dense tall grass ground cover on the majority of timbered turbine plot areas
- Carcass removal by scavengers (particularly early morning removal by crows and ravens) was extremely high at the Mountaineer Wind Energy Center during the study period.
- 15 bird fatalities were found (primarily nocturnal migrant songbirds and 1 raptor); over half of these were found during the last two days of searching on 9/10-11.

Meyersdale

- 290 bat fatalities found comprising 7 species (hoary bat, eastern red bat, eastern pipistrelle, silver-haired bat, big brown bat, little brown bat, and northern long-eared bat, from highest to lowest number found). This does not constitute total estimated mortality; number of bats found must be adjusted for searcher efficiency and scavenging by habitat types.
- More adult and more male bats were found than juvenile and female bats respectively.
- Carcass removal by scavengers was low at Meyersdale.

Common Findings at Both Study Sites

- No endangered species of bat (e.g., Indiana bat) was found.
- Fatalities were distributed throughout the turbine string independent of FAA lighting.
- A number of randomly selected ultrasonic resonance anemometers on turbines were turned off from 8/26–9/13 to test whether their ultrasonic emission might be attracting bats. Fatalities continued to occur at turbines with both operating and non-operating ultrasonic anemometers.
- Bat fatalities generally are equally distributed among quadrants of individual turbine plots.

- Searcher efficiency was generally high on bare ground and in high visibility habitats and very low in dense vegetation, boulder and rock piles, slash, and other low visibility habitats.
- The timing of fatalities at the Mountaineer and Meyersdale Wind Energy Facilities was positively correlated, suggesting region-wide similarities in bat activity near the wind turbines.
- Days of high bat fatalities appear to be correlated to nights of relatively low wind speed.
- Our findings are limited to 6 weeks in scope, which did not include all periods when bats are active. Fresh bat fatalities found prior to the study period suggest that bat strikes at turbines are not limited to the fall migration period.

KEY FINDINGS – THERMAL IMAGING

- Bat activity was highly variable across nights sampled.
- Individual bats were often observed flying through the rotor swept area of sampled turbines.
- Bats appeared to investigate both moving and non-moving blades.
- Occasionally, collisions between bats and turbine blades were observed.
- Most bat activity was observed during the first few hours after sunset.
- The ratio of avoidance behavior to contact with blades is high.

NEXT STEPS and TIMELINES

Data analysis will continue through December and a final report is expected in the first quarter of 2005. We currently are preparing study proposals for 2005 research.

ACKNOWLEDGEMENTS

The American Wind Energy Association, Bat Conservation International, Community Foundation for the Alleghenies, FPL Energy, Massachusetts Technology Collaborative, New York State Energy Research and Development Authority, PPM Energy, the Rhode Island Renewable Energy Fund, and the Sustainable Energy Fund of Pennsylvania provided funding this project. We wish to thank Manuela Huso (Oregon State University), Patrick Jodice (Clemson University), and members of the Bats and Wind Energy Cooperative Scientific and Technical Advisory Committees for their comments and suggestions on the study design and methods. We also wish to thank our field crews for their hard work on the project.

Bats and Wind Energy Cooperative Scientists Release 2004 Final Report

After reviewing data collected during a groundbreaking research effort, the Bats and Wind Energy Cooperative (BWEC), a government-conservation-industry partnership, reported today substantial bat kills at two wind farms in the mid-Atlantic region between August 1 and September 13 of 2004.

The report summarizes the first year's research on potential causes and solutions. The research included the most detailed studies ever performed on bat fatality at wind sites and provides a foundation for further efforts aimed at better understanding why bats are being killed and how to minimize future fatalities.

"This is state-of-the-art research that could not have been carried out without the BWEC partnership and the support of all parties involved," said Merlin Tuttle, President of Bat Conservation International (BCI) of Austin, Texas. "Working together, we've advanced the state of knowledge to the point where we have a much better understanding of causes and potential solutions. However, we still face numerous challenges for solving these complex problems and we need the full support and cooperation of all players, especially industry, to maintain this as a credible cooperative. The science required to test and develop solution(s) requires money, time, and commitment."

Key findings of the report include:

- Remains of 765 bats were found by searchers at the two sites (one in West Virginia and one about 60 miles away in Pennsylvania) over a six-week period from August 1 through September 13. After correcting for bats removed by scavengers or missed by searchers, the average number of fatalities at the two locations is estimated between 1,764 and 2,900 for the six-week period. BWEC scientists believe that high kills had begun at least by mid-July and that they continued at least through September. Unmeasured mortality also would have occurred in spring and summer and through early November.
- Species of bats killed included the hoary bat, eastern red bat, eastern pipistrelle, silver-haired bat, little brown bat, big brown bat, and northern long-eared bat. No listed species were found.
- Timing of fatalities at the two sites was positively correlated, suggesting region-wide similarities in conditions which contribute to bat risks at wind turbines.

- Several weather and turbine variables were associated with bat mortality. At both locations, the majority of bats were killed on nights when average wind speeds and power production were low, but while turbine blades were still moving at relatively high speeds. One wind turbine at one site was non-operational during the research period. This turbine was the only one where no bat kills were detected, indicating that bats are not colliding with stationary objects.

Based on 2004 findings, BWEC scientists recommend comparisons of feathered versus normally operated turbines during periods of low wind, the condition under which most bat mortality occurred. The goal is to measure exactly how much mortality can be prevented and at what cost to industry. To date, the BWEC has not been able to identify a project owner willing to host such experiments.

The BWEC was formed in late 2003 after bat kills were discovered during post-construction monitoring at the West Virginia site.

The BWEC is also planning long-term projects to test the reliability of acoustic detectors to assess relative risk at proposed wind facility locations, comparing pre- and post-construction bat detection in relation to post-construction fatality. They also will evaluate the potential for use of alerting/deterring devices at turbines to reduce risks, experimentally testing under controlled conditions in laboratory settings and at locations of concentrated bat use to evaluate bat responses. Finally, the BWEC is very desirous of surveying existing wind power sites in other regions of the country where there appear to be patterns of impacts. However, to date, BWEC has not obtained access to any such site.

“Over the past year, we’ve drawn on the knowledge of some of the world’s foremost bat experts, and have not only quantified bat mortality at wind sites, but have improved research methods and opened promising leads toward solutions,” commented Robert Thresher, director of the wind program at the U.S. Department of Energy’s National Renewable Energy Laboratory. “This work has laid the foundation that is essential for understanding this problem and finding ways for wind energy and bats to co-exist.”

The Bats and Wind Energy Cooperative was founded by the American Wind Energy Association, Bat Conservation International, the National Renewable Energy Laboratory (U.S. Department of Energy) and the U.S. Fish and Wildlife Service.

Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines

A Summary of Findings from the Bats and Wind Energy Cooperative's 2004 Field Season



The Bats and Wind Energy Cooperative (BWEC) was formed in 2003 by Bat Conservation International (BCI), the US Fish and Wildlife Service, the American Wind Energy Association (AWEA), and the National Renewable Energy Laboratory of the US Department of Energy (NREL). The BWEC is an alliance of state and federal agencies, private industry, academic institutions, and non-governmental organizations interested in cooperating to develop and coordinate research opportunities and identify solutions to prevent or minimize threats to bats.

The BWEC implemented research to improve fatality search protocols for bats and to evaluate interactions between bats and wind turbines from 31 July through 13 September 2004, the period when bat fatalities have most often been reported at wind facilities. The goal was to establish a basis for developing solutions to prevent or minimize threats to bats at wind energy facilities.

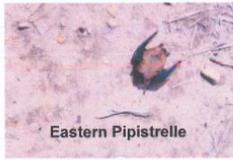
Specific Objectives of the 2004 Research:

- Compare results of daily versus weekly carcass searches, quantify bias corrections needed to more accurately estimate fatality, and recommend improved search protocols for bats.
- Correlate bat fatalities detected during daily searches with the previous nights' weather and turbine conditions.
- Observe and quantify behavior of bats encountering moving and non-moving blades at turbines with and without FAA lights.
- Evaluate the use of trained dogs to detect bat fatalities beneath turbines.

Study Areas and General Approach:

- Studies were conducted at the Mountaineer and Meyersdale Wind Energy Centers located along the Appalachian plateau in West Virginia and Pennsylvania, respectively. The Mountaineer site has 44 and the Meyersdale site has 20 NEG Micon 1.5 MW turbines. Mountaineer began operation in December 2002, Meyersdale exactly one year later.
- Fatality searches were conducted at both sites between 31 July and 13 September, 2004. Half of the turbines at each site were searched daily and the other half weekly. Search time per turbine was 30-60 minutes depending on terrain, vegetative cover, and weather.
- Thermal imaging cameras were used to assess bat, bird, and insect activity at turbines only at Mountaineer (2-27 August). Thermal images were downloaded through laptop computers onto external harddrives and later analyzed by viewing and quantifying objects in "real time."





Characteristics of Bat Fatalities:

- Six species were killed at Mountaineer and 7 at Meyersdale: hoary bats, eastern red bats, eastern pipistrelles, little brown bats, silver-haired bats, big brown bats, and northern long-eared bats (only found at Meyersdale) were discovered (from highest to lowest number found).
- More adult and more male bats were found than juvenile and female bats, respectively.

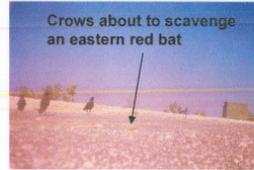
Patterns of Bat Fatality:

- Bat fatalities were highly variable and periodic throughout the study.
- At both sites, bat fatalities were evenly distributed within each cardinal direction around the turbines for all days and turbines combined.
- Ninety-three and 84% of all fatalities were found within 40 m from turbines at Mountaineer and Meyersdale, respectively.
- Fatality was distributed across all turbines, although higher than average numbers of bats generally were found at turbines located near an end or center of the string at both sites.
- Of the 64 turbines studied, one (turbine 11 at Mountaineer) was non-operational throughout the study period and this was the only turbine where no fatalities were found.
- Although we found more male than female bat fatalities, the timing by sex was similar at both sites.
- Fatalities of hoary and eastern red bats were distributed throughout the study period and there was a positive correlation in the timing of fatality for these two species at both sites.
- Timing of bat fatalities at Mountaineer and Meyersdale was highly correlated, providing evidence that broader landscape, perhaps regional, patterns dictated by weather and prey abundance/availability or other factors.
- FAA lighting had no detectable impact on bat fatality.
- At both locations, the majority of bats were killed on low wind nights when power production appeared insubstantial, but turbine blades were still spinning and often at or close to full operational speed (17 rpm).



Searcher Efficiency and Scavenger Removal:

- The overall, average searcher efficiency for bat carcasses was estimated to be 44 and 25% at Mountaineer and Meyersdale, respectively, for all trials and habitats combined. Searcher efficiency was highest on bare ground and declined rapidly as height and density of vegetation increased.
- The highest rates of searcher efficiency were estimated within 10 m of the turbines at both sites (64 and 63% at Mountaineer and Meyersdale, respectively) because much of this area is covered with bare ground. Searcher efficiency was variable >10 m away from turbines, but was lower because this area contained more low visibility habitat.
- Searcher efficiency was highest within 1 m of the transect line, and detection of carcasses placed further than 3.0 m from the transect line dropped significantly, with only 17.9% of carcasses placed at distances >4 m from the transect line being found.
- Scavenger removal rates were very different between the two study sites. At Mountaineer, 24% of bats that were killed the previous night and then left where they fell for trials were removed on the same day the trial started and 70% of these bats were removed within 24 hr. Bat carcasses placed in high visibility habitats at Mountaineer were removed at nearly twice the rate in the first 24 hr compared to those placed in low visibility habitats.
- In contrast, scavenger removal rates were very low at Meyersdale, with only 3% of fresh bat carcasses removed within the first 24 hr and 16% by day 7.
- Mountaineer began operation one-year earlier than Meyersdale and it is possible that scavenger had more time to learn of a new food source beneath turbines at Mountaineer. Also, differences could be a function of species composition of bird and mammal scavengers at the different sites.



Bat Fatality Estimates:

- Estimates of total fatality were heavily influenced by the periodicity of bat kills and carcass removal by scavengers, particularly at Mountaineer where estimates from weekly searches were nearly 3x lower compared to those from daily estimates because of high scavenging.
- Daily searches at Mountaineer yielded an estimated 38 bats killed per turbine for the 6-week study period (90% confidence interval = 31–45) and a daily kill rate of 0.90 bats per turbine. The total number of bats estimated to have been killed by the 44 turbines during this 6-week period was 1,364–1,980.
- At Meyersdale, an estimated 25 bats were killed per turbine based on daily searches during the 6-week study (90% confidence interval = 20–33), yielding a daily kill rate of 0.6 and a total of 400–660 bats killed by the 20 turbines during the 6-week study. Because of low scavenging rates, weekly searches at Meyersdale yielded similar results; an estimated 30 bats killed per turbine during the 6-week study (90% confidence interval = 20–46) and a daily kill rate of 0.71 for a total estimated 400–920 bats killed during the 6-week study.
- These estimates are among the highest ever reported, and support the contention that forested ridges are locations of especially high risk for bat fatality at wind facilities.



Observations of Bats and Insects at Turbines:

- Thermal imaging observations of bat and insect activity support the conclusion that fatality occurs primarily on low wind nights, but when blades are pitched so as to rotate, which may be at or near their maximum speeds of 17 RPMs.
- Thermal images indicated that bats are attracted to and investigate both moving and non-moving blades.
- Thermal images of bats attempting to land or actually landing on stationary blades and turbine masts suggest possible curiosity about potential roosts or use for gleaning insects. Images of bats chasing turbine blades rotating at slow speeds suggest possible attraction to movement that may be confused with prey or perhaps other bats.
- Most bat activity was observed within 2-hours after sunset. Nightly numbers of bat passes observed at a single turbine were highly variable, with as few as 9 per night, and as many as 291.
- There was a significant positive correlation between insect passes and bat passes observed across all nights.
- Although insect activity was somewhat higher at turbines with FAA lights, aviation lighting did not appear to affect the incidence of foraging bats around turbines and there was no difference between numbers of bat passes at lit and unlit turbines.
- Most of the observed collisions (7 of 8) were between bats and fast-moving (17 rpm) turbine blades.

Use of Trained Dogs to Recover Bat Fatalities:

- Dog-handler team searcher efficiency trials were performed on 3 different days at 4-6 turbines each day at Mountaineer, using a total of 45 trial bats. At Meyersdale, trials were performed on 5 different days at 4-6 turbines each day, with 52 trial bats.
- Dogs found 71% of the bats randomly placed in searcher efficiency trials at Mountaineer and 81% of those at Meyersdale, compared to 42% and 14% for human searches, respectively.
- Both the dog-handler team and humans found a high proportion of trial bats within 10 m of the turbine, usually on open ground (88 and 75%, respectively). However, human search efficiency declined as vegetation height and density increased while dog-handler efficiency remained high.
- The dog-human team consistently found higher proportions (65-100%) of trial carcasses in high, medium, and low visibility habitats at both sites, and 40-50% in extremely low visibility habitats.



Scope:

- This study only covered 6 weeks (31 July to September 13) in just one year and is not a measure of full season bat activity, behavior, or fatality. Estimated fatality rates from the 6-week period appeared to be as high during the first site visits in mid-July and likely continued at least through September.
- Unusually cool summer temperatures and passage of 4 major hurricanes in August may have influenced these findings because such weather conditions are known to suppress bat and insect activity, particularly at higher elevations.
- Until a full season of fatality searches is gathered (April through October), it should not be assumed that: 1) fatalities do not occur and/or are biologically insignificant during other periods; 2) the 6-week period we studied includes the peak of fall migration; and 3) that other species of bats, such as Indiana bats, are not being killed at wind facilities during different times of the year.
- Scavenging rates should not be assumed similar between sites even in close proximity and in similar habitat conditions. Scavenging could be expected to change over time as well.
- Our study was conducted in two areas located on forested ridges in the Appalachian Mountains and statistical inferences are limited to these sites. However, we believe that our findings reflect an emerging pattern of bat fatality associated with wind turbines located on forested ridges and suggest that similar fatality rates could be expected at sites with comparable forest composition and topography, especially in the eastern U.S.



Future Research Needs:

Results from this study suggest the following research needs:

- Conduct extensive post-construction fatality searches for a "full season" of bat movement and activity (April-October) to fully elucidate temporal patterns of fatality.
- Experimentally compare fatality at moving versus "feathered" (i.e., blades parallel to the wind and free-wheeling) turbine blades during periods of low wind speeds to quantify reductions in bat fatality relative to economic costs of curtailment.
- Further investigate the relationship between passage of storm fronts, weather conditions (e.g., wind speed, barometric pressure), turbine blade movement, and bat fatality.
- Conduct post-construction fatality searches at existing wind facilities that encompass a broad range of habitat types and topographic features to further understand patterns of fatality in relation to surrounding landscape context. These data are essential for assessing potential risks at future developments.
- Investigate approaches for making turbines less attractive to bats or for deterring bats.
- Demonstrate synergy of complimentary technologies, such as acoustics, radar, and thermal imaging, used simultaneously to describe use at proposed and existing wind facilities.





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Jason Horn, Boston University
Jessica Kerns, University of Maryland

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All photos provided by M.D. Tuttle, J. Kerns, and E.B. Arnett

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13 December 2004

Studies to develop bat fatality search protocols and evaluate bat interactions with wind turbines in West Virginia and Pennsylvania: an interim report

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INTRODUCTION

Wind has been used to commercially produce energy in North America since the early 1970s and has been considered environmentally friendly. Wind energy's ability to generate electricity without many of the environmental impacts associated with other energy sources (air pollution, water pollution, mercury emissions, and greenhouse gas emissions associated with global climate change) can significantly benefit birds, bats, and many other plant and animal species. However, bird and bat fatalities have been reported at wind facilities worldwide. Unexpectedly high numbers of bat fatalities reported at wind energy sites on ridge tops in the eastern United States have heightened the urgency to understand problems and find solutions.

Post-construction monitoring studies have provided much of the available information on avian and bat migration at wind facilities and avian and bat collisions with wind turbines. Current post-construction fatality search protocols have been criticized because search intervals are infrequent (e.g., 7–14 day intervals), which limit information on factors that might explain timing of fatalities and may not provide accurate and precise estimates of fatality rates of bats. These monitoring studies were primarily designed to confirm predicted impacts and provide reasonably precise and accurate estimates of annual or seasonal avian fatality rates and typically were not designed to provide estimates of the timing of fatalities, since the search intervals are relatively infrequent. While past studies have appeared to provide reasonably accurate and precise estimates of avian fatality, they may not be appropriate for bats, particularly given the high levels of impacts on bats observed at Mountaineer in 2003. According to the Metrics and Measurements document developed under the auspices of the National Wind Coordinating Committee Wildlife Working Group, the principal of adaptive management applies, i. e., the level of study intensity is a function of the level of impact or risk observed (http://www.nationalwind.org/pubs/avian99/Avian_booklet.pdf). Thus, a higher level of effort and rigor is justified for assessing the impacts on bats as a result of the 2003 findings. Additionally, important sources of bias influencing estimates of bat fatality, including removal and scavenging by predators and searcher efficiency among different habitats warrants better quantification.

To address bat mortality issues at wind facilities, a collaborative research initiative, the Bats and Wind Energy Cooperative, was developed among Bat Conservation International (BCI), the U.S. Fish and Wildlife Service (USFWS), the American Wind Energy Association (AWEA), and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL). A workshop held in February 2004 served to gather several of the world's leading bat scientists and experts from other relevant disciplines, as well as the wind industry and federal and state agencies, to discuss what research is needed to understand and resolve issues involving bat mortality at wind turbines. This workshop revealed that several gaps in knowledge still exist concerning bat migration and ecology, bat behavior and bat use near wind turbines, and bat interactions and collisions with turbines.

Several key research needs were identified by experts from the aforementioned workshop, including 1) to conduct daily mortality searches to develop a dataset required to evaluate search effort needed to meet a desired level of precision and accuracy for fatality estimates; 2) to better assess the effects of carcass removal and searcher efficiency bias corrections in making fatality estimates; and 3) to observe the interactions of bats and wind turbines. The goal of this project was to address the aforementioned key research needs. Here, we present preliminary key findings from the 2004 field season.

OBJECTIVES

Specific objectives for this project include: 1) conducting both daily and weekly searches for bat fatalities at wind turbines to compare the precision and accuracy of intensive searches (daily) to precision and accuracy of other intervals (e.g., 7-day intervals); 2) improving searcher efficiency and scavenging bias corrections to estimates; 3) developing recommendations for improving and standardizing fatality search protocols for bats at turbines; 4) associating fatality location and timing to turbine lighting, weather and other characteristics; and 5) employing different methods and technologies to evaluate bat activity and interactions with turbines and determine which provide the most reliable information for problem solving.

STUDY AREA

We collected data at two different wind facilities in the eastern U.S. The Mountaineer Wind Energy Center has 44 1.5 MW turbines arrayed along an 8.8 km portion of the crest of Backbone Mountain near Thomas, West Virginia. The second study area was located at the Meyersdale Wind Energy Facility located immediately east of Meyersdale, Pennsylvania. This site has 20 1.5 MW turbines arrayed along approximately 3.8 km of ridgeline. Each turbine at both sites has a rotor diameter of 72 m and a rotor swept area of 4,072 m².

SYNTHESIS OF METHODS

Fatality Searches

Rectangular plots with maximum dimensions of 120 m (north-south) by 130 m (east-west) were centered on each sample turbine, but the actual area sampled varied with topography and vegetative conditions (Figure 1). Forest edges defined the plot boundary and habitat conditions unsuitable for searching (e.g., shrub cover, steep topography) were eliminated from the searchable area (see Figure 1 for an example depiction). Transects were established every 10 m in a north-south direction. Fatality searches were conducted from 31 July to 11 September and 2 August to 13 September, 2004, at the Mountaineer and Meyersdale facilities, respectively. We conducted daily searches at all odd numbered turbines and weekly searches at even numbered turbines during the first 3 weeks, and then switched turbine sets and search intervals during the later 3 weeks of the study. Each turbine plot was searched for approximately 30–90 min, depending on the searchable area and habitat conditions.

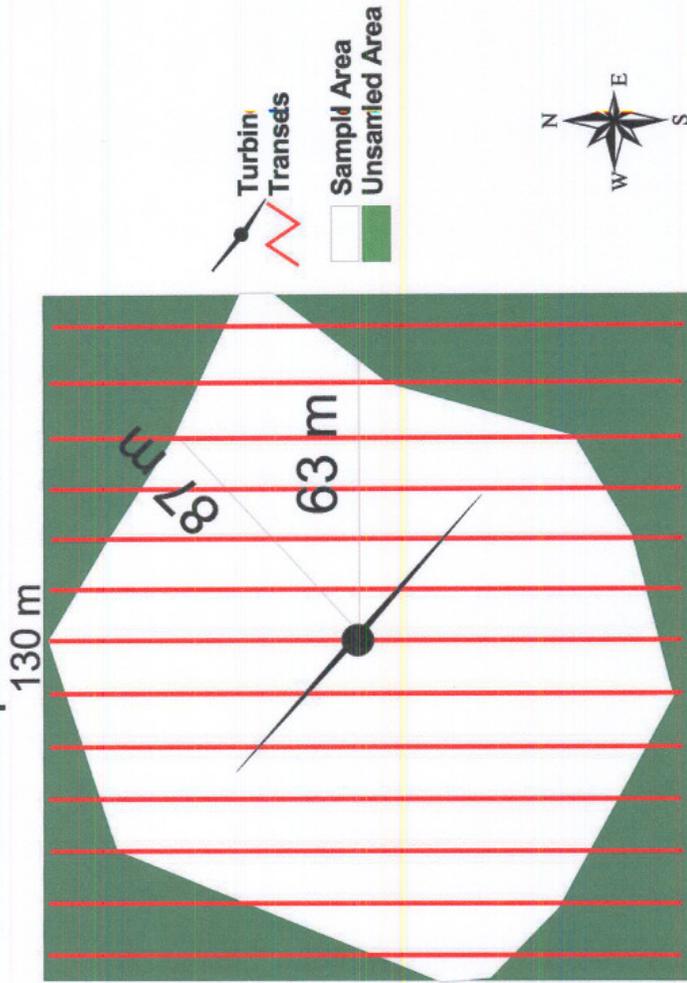
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- More adult and more male bats were found than juvenile and female bats, respectively.
- Turbine #11 was non-operational (blades feathered, though allowed to free-wheel) throughout the study period and no fatalities were found at this turbine.
- Searcher efficiency was generally high on bare ground and in high visibility habitats and very low in dense vegetation, boulder and rock piles, slash, and other low visibility habitats. Final estimated SE has not been calculated, but it will likely be <45% overall at Mountaineer and <25% at Meyersdale. Searcher efficiency was much lower at Meyersdale, likely due to more dense tall grass ground cover on the majority of timbered turbine plot areas
- Carcass removal by scavengers (particularly early morning removal by crows and ravens) was extremely high at the Mountaineer Wind Energy Center during the study period.
- 15 bird fatalities were found (primarily nocturnal migrant songbirds and 1 raptor); over half of these were found during the last two days of searching on 9/10-11.

Meyersdale

- 290 bat fatalities found comprising 7 species (hoary bat, eastern red bat, eastern pipistrelle, silver-haired bat, big brown bat, little brown bat, and northern long-eared bat, from highest to lowest number found). This does not constitute total estimated mortality; number of bats found must be adjusted for searcher efficiency and scavenging by habitat types.
- More adult and more male bats were found than juvenile and female bats respectively.
- Carcass removal by scavengers was low at Meyersdale.

Common Findings at Both Study Sites

- No endangered species of bat (e.g., Indiana bat) was found.
- Fatalities were distributed throughout the turbine string independent of FAA lighting.
- A number of randomly selected ultrasonic resonance anemometers on turbines were turned off from 8/26–9/13 to test whether their ultrasonic emission might be attracting bats. Fatalities continued to occur at turbines with both operating and non-operating ultrasonic anemometers.
- Bat fatalities generally are equally distributed among quadrants of individual turbine plots.

very low in dense vegetation, boulder and rock piles, slash, and other low visibility habitats.

- The timing of fatalities at the Mountaineer and Meyersdale Wind Energy Facilities was positively correlated, suggesting region-wide similarities in bat activity near the wind turbines.
- Days of high bat fatalities appear to be correlated to nights of relatively low wind speed turbines are not limited to the fall migration period.

KEY FINDINGS – THERMAL IMAGING

- Bat activity was highly variable across nights sampled.
- Bats appeared to investigate both moving and non-moving blades.
- Occasionally, collisions between bats and turbine blades were observed.
- Most bat activity was observed during the first few hours after sunset.
- The ratio of avoidance behavior to contact with blades is high.

NEXT STEPS and TIMELINES

Data analysis will continue through December and a final report is expected in the first quarter of 2005. We currently are preparing study proposals for 2005 research.

ACKNOWLEDGEMENTS

The American Wind Energy Association, Bat Conservation International, Community Foundation for the Alleghenies, FPL Energy, Massachusetts Technology Collaborative, New York State Energy Research and Development Authority, PPM Energy, the Rhode Island Renewable Energy Fund, and the Sustainable Energy Fund of Pennsylvania provided funding this project. We wish to thank Manuela Huso (Oregon State University), Patrick Jodice (Clemson University), and members of the Bats and Wind Energy Cooperative Scientific and Technical Advisory Committees for their comments and suggestions on the study design and methods. We also wish to thank our field crews for their hard work on the project.

Bats and Wind Energy Cooperative Scientists Release 2004 Final Report

After reviewing data collected during a groundbreaking research effort, the Bats and Wind Energy Cooperative (BWEC), a government-conservation-industry partnership, reported today substantial bat kills at two wind farms in the mid-Atlantic region between August 1 and September 13 of 2004.

The report summarizes the first year's research on potential causes and solutions. The research included the most detailed studies ever performed on bat fatality at wind sites and provides a foundation for further efforts aimed at better understanding why bats are being killed and how to minimize future fatalities.

"This is state-of-the-art research that could not have been carried out without the BWEC partnership and the support of all parties involved," said Merlin Tuttle, President of Bat Conservation International (BCI) of Austin, Texas. "Working together, we've advanced the state of knowledge to the point where we have a much better understanding of causes and potential solutions. However, we still face numerous challenges for solving these complex problems and we need the full support and cooperation of all players, especially industry, to maintain this as a credible cooperative. The science required to test and develop solution(s) requires money, time, and commitment."

Key findings of the report include:

- Remains of 765 bats were found by searchers at the two sites (one in West Virginia and one about 60 miles away in Pennsylvania) over a six-week period from August 1 through September 13. After correcting for bats removed by scavengers or missed by searchers, the average number of fatalities at the two locations is estimated between 1,764 and 2,900 for the six-week period. BWEC scientists believe that high kills had begun at least by mid-July and that they continued at least through September. Unmeasured mortality also would have occurred in spring and summer and through early November.
- Species of bats killed included the hoary bat, eastern red bat, eastern pipistrelle, silver-haired bat, little brown bat, big brown bat, and northern long-eared bat. No listed species were found.
- Timing of fatalities at the two sites was positively correlated, suggesting region-wide similarities in conditions which contribute to bat risks at wind turbines.

- Several weather and turbine variables were associated with bat mortality. At both locations, the majority of bats were killed on nights when average wind speeds and power production were low, but while turbine blades were still moving at relatively high speeds. One wind turbine at one site was non-operational during the research period. This turbine was the only one where no bat kills were detected, indicating that bats are not colliding with stationary objects.

Based on 2004 findings, BWEC scientists recommend comparisons of feathered versus normally operated turbines during periods of low wind, the condition under which most bat mortality occurred. The goal is to measure exactly how much mortality can be prevented and at what cost to industry. To date, the BWEC has not been able to identify a project owner willing to host such experiments.

The BWEC was formed in late 2003 after bat kills were discovered during post-construction monitoring at the West Virginia site.

The BWEC is also planning long-term projects to test the reliability of acoustic detectors to assess relative risk at proposed wind facility locations, comparing pre- and post-construction bat detection in relation to post-construction fatality. They also will evaluate the potential for use of alerting/deterring devices at turbines to reduce risks, experimentally testing under controlled conditions in laboratory settings and at locations of concentrated bat use to evaluate bat responses. Finally, the BWEC is very desirous of surveying existing wind power sites in other regions of the country where there appear to be patterns of impacts. However, to date, BWEC has not obtained access to any such site.

“Over the past year, we’ve drawn on the knowledge of some of the world’s foremost bat experts, and have not only quantified bat mortality at wind sites, but have improved research methods and opened promising leads toward solutions,” commented Robert Thresher, director of the wind program at the U.S. Department of Energy’s National Renewable Energy Laboratory. “This work has laid the foundation that is essential for understanding this problem and finding ways for wind energy and bats to co-exist.”

The Bats and Wind Energy Cooperative was founded by the American Wind Energy Association, Bat Conservation International, the National Renewable Energy Laboratory (U.S. Department of Energy) and the U.S. Fish and Wildlife Service.

United States Government Accountability Office

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Report to Congressional Requesters

September 2005

WIND POWER

Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife



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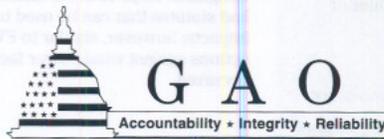
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GAO-05-906



Highlights of GAO-05-906, a report to congressional requesters

September 2005

WIND POWER

Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife

Why GAO Did This Study

Wind power has recently experienced dramatic growth in the United States, with further growth expected. However, several wind power-generating facilities have killed migratory birds and bats, prompting concern from wildlife biologists and others about the species affected, and the cumulative effects on species populations.

GAO assessed (1) what available studies and experts have reported about the impacts of wind power facilities on wildlife in the United States and what can be done to mitigate or prevent such impacts, (2) the roles and responsibilities of government agencies in regulating wind power facilities, and (3) the roles and responsibilities of government agencies in protecting wildlife. GAO reviewed a sample of six states with wind power development for this report.

What GAO Recommends

GAO recommends that FWS provide state and local regulatory agencies with information on the potential wildlife impacts from wind power and the resources available to help make decisions about where wind power development should be approved.

The Department of the Interior agreed with GAO's recommendation.

www.gao.gov/cgi-bin/getrpt?GAO-05-906.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Robin Nazzaro at (202) 512-3841 or nazzaror@gao.gov.

What GAO Found

The impact of wind power facilities on wildlife varies by region and by species. Specifically, studies show that wind power facilities in northern California and in Pennsylvania and West Virginia have killed large numbers of raptors and bats, respectively. Studies in other parts of the country show comparatively lower levels of mortality, although most facilities have killed at least some birds. However, many wind power facilities in the United States have not been studied, and, therefore, scientists cannot draw definitive conclusions about the threat that wind power poses to wildlife in general. Further, much is still unknown about migratory bird flyways and overall species population levels, making it difficult to determine the cumulative impact that the wind power industry has on wildlife species. Notably, only a few studies exist concerning ways in which to reduce wildlife fatalities at wind power facilities.

Regulating wind power facilities is largely the responsibility of state and local governments. In the six states GAO reviewed, wind power facilities are subject to local- or state-level processes, such as zoning ordinances to permit the construction and operation of wind power facilities. As part of this process, some agencies require environmental assessments before construction. However, regulatory agency officials do not always have experience or expertise to address environmental and wildlife impacts from wind power. The federal government plays a minimal role in approving wind power facilities, only regulating facilities that are on federal lands or have some form of federal involvement, such as receiving federal funds. In these cases, the wind power project must comply with federal laws, such as the National Environmental Policy Act, as well as any relevant state and local laws.

Federal and state laws afford generalized protections to wildlife from wind power as with any other activity. The U.S. Fish and Wildlife Service (FWS) is the primary agency tasked with implementing wildlife protections in the United States. Three federal laws—the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act—generally forbid harm to various species of wildlife. Although significant wildlife mortality events have occurred at wind power facilities, the federal government has not prosecuted any cases against wind power companies under these wildlife laws, preferring instead to encourage companies to take mitigation steps to avoid future harm. All of the six states GAO reviewed had statutes that can be used to protect some wildlife from wind power impacts; however, similar to FWS, no states have taken any prosecutorial actions against wind power facilities where wildlife mortalities have occurred.

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Abbreviations

BLM	Bureau of Land Management
DOE	Department of Energy
FWS	U.S. Fish and Wildlife Service
MW	megawatts

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United States Government Accountability Office
Washington, D.C. 20548

September 16, 2005

The Honorable Nick J. Rahall, II
Ranking Democratic Member, Committee on Resources
House of Representatives

The Honorable Alan B. Mollohan
Ranking Democratic Member, Subcommittee on Science,
the Departments of State, Justice, and Commerce
and Related Agencies
Committee on Appropriations
House of Representatives

The production of wind power, a renewable energy source, has recently experienced dramatic growth in the United States, although it still generates less than 1 percent of the electricity used in this country. Wind power-generating facilities were first built in California about 25 years ago. Now wind power facilities can be found in over 30 states, and the industry is expected to continue to grow rapidly. The vast majority of wind power facilities are located in just 10 western and midwestern states; most are on nonfederal land. Development has slowly made its way east and is currently being pursued along the ridge tops of the Appalachian Mountains in Maryland, Pennsylvania, Virginia, and West Virginia. Once thought to have practically no adverse environmental effects, it is now recognized that wind power facilities can have adverse impacts—particularly on wildlife, and most significantly on birds and bats.

Large numbers of birds and bats are believed to follow and cross through many parts of the United States, including along mountain ridges, during their seasonal migrations. Consequently, wind power projects located in these areas could potentially impact these species. At wind power-generating facilities in Appalachia and California, wind turbines have killed large numbers of migratory birds and bats. Wind power facilities may also have other impacts on wildlife through alterations of habitat. Habitat destruction and modification is a leading threat to the continued survival of wildlife species in the United States.

In this context, we assessed (1) what available studies and experts have reported about the impacts of wind power facilities on wildlife in the United States and what can be done to mitigate or prevent such impacts, (2) the roles and responsibilities of government agencies in regulating wind



power facilities, and (3) the roles and responsibilities of government agencies in protecting wildlife.

To address these objectives, we reviewed major scientific studies and reports on direct impacts from wind power on avian species and other wildlife (we did not assess indirect impacts, such as habitat impacts). We interviewed experts from the Department of the Interior's U.S. Fish and Wildlife Service (FWS), state agencies, academia, industry, and conservation groups and obtained their views on these studies and reports. We also reviewed a nonprobability sample of six states with wind power development—California, Minnesota, New York, Oregon, Pennsylvania, and West Virginia.¹ We selected these states to reflect a range in installed wind generating capacity, regulatory processes, history of wind power development, and geographic distribution and to reflect our requesters' interests. We identified and reviewed relevant federal, state, and local laws and regulations. In addition, we interviewed federal, state, and local officials who were responsible for implementing related programs. More information about the objectives, scope, and methodology of our evaluation is presented in appendix I. We conducted our work between December 2004 and July 2005 in accordance with generally accepted government auditing standards, including an assessment of data reliability and internal controls.

Results in Brief

Recent studies and interviews with experts indicate that the impacts of wind power facilities on birds and other wildlife vary by region and by species. Wildlife mortalities in two locations in particular have elicited concerns from scientists, regulators, and the public. Specifically, a recent study shows that over 1,000 raptors are killed by wind power facilities in northern California each year. Many experts attribute this large number of fatalities to unique aspects of wind power development in northern California, such as the unusually large number of turbines (over 5,000), the type of turbines in the region, and the presence of abundant raptor prey in the area. On the other side of the country, a recent study estimated that over 2,000 bats were killed during a 1-year period at a wind power facility in the mountains of eastern West Virginia. Studies from these two locations stand in contrast to studies from other wind power facilities. These studies

¹Results from nonprobability samples cannot be used to make inferences about a population because in a nonprobability sample, some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

show relatively lower bird and bat mortality. However, bat estimates are less precise because most of the studies were designed to estimate only bird mortality. These studies have not elicited the same degree of concern from biologists as the studies from West Virginia and California. However, significant gaps in the literature make it difficult for scientists to draw conclusions about wind power's impact on wildlife in general. For example, experts told us that there is a shortage of information on migratory bird routes and bat behavior as well as the ways in which topography, weather, and turbine type affect mortality. In addition, studies conducted at one location can rarely be used to extrapolate potential impacts or mitigation effectiveness at other locations because of differences in site-specific conditions, such as topography, the types and densities of species present, and the type of wind turbines installed. Finally, while some authors have recommended mitigation strategies for reducing bird and bat kills, there are relatively few comprehensive studies testing the effectiveness of these strategies.

Regulating wind power facilities on nonfederal land is largely the responsibility of state and local governments. In the six states we reviewed, the permitting of wind power development consisted of local-level processes, state-level processes, or a combination of the two. In California, New York, and Pennsylvania, local governments regulate the development of wind power. Local governments in these states generally require wind developers to adhere to local zoning ordinances and obtain special use permits before construction. In addition, California and New York have state environmental laws that require various studies and analyses to be conducted before a permit can be issued. West Virginia uses a state-level process, whereby its Public Service Commission is responsible for, among other things, regulating the activities of all public utilities operating in the state, including wind power. The commission has the authority to include certain conditions in wind power certificates, such as requiring wildlife studies before and after construction. In Minnesota and Oregon, local and state agencies regulate wind power development. In these two states, local agencies, such as county planning commissions or zoning boards, permit the development of wind power unless a project exceeds a certain level of electric-generating capacity; larger facilities are regulated by a state agency. While some state and local regulatory agencies require environmental assessments before construction, some state and local regulatory agency officials told us that they have little experience or expertise in addressing environmental and wildlife impacts from wind power. For example, officials in one state told us that they did not have the expertise to evaluate wildlife impacts and review studies prior to

construction. The federal government generally only has a regulatory role in wind power development when development occurs on federal land or involves some form of federal participation, such as providing funding for projects. In these cases, the development and operation of a wind power facility must comply with any state and local laws as well as federal laws, such as the National Environmental Policy Act and the Endangered Species Act—which often require preconstruction studies or analyses and possibly modifications to proposed projects to avoid adverse environmental effects.

As with any activity, federal and state laws afford protections to wildlife from wind power facilities. Three laws—the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act—are the federal laws most relevant to protecting wildlife from wind power facilities, and these laws generally forbid harm to various species of wildlife. FWS is the federal agency that has primary responsibility for implementing and enforcing these three laws. Although none of the three laws expressly require wind power developers and operators to take specific steps to ensure that wildlife will not be harmed during either the construction or operation of their facilities, wind power developers or operators are liable for any harm to protected species that may occur. In some cases, developers voluntarily consult with FWS—or a state natural resources agency—before they construct a project or they do so as a requirement of a state or local wind power regulatory agency, to identify potential impacts to wildlife. In other cases, federal involvement may consist of FWS law enforcement officials investigating instances of wildlife fatalities at a wind power facility. While significant mortality events have occurred at some wind power facilities—and, in some cases, are recurring—the federal government has not prosecuted any cases against wind power companies for violations of federal wildlife laws. In some cases, FWS has not taken action because the species killed are not federally protected, such as the bat species killed in West Virginia. In cases where violations of federal law have occurred, FWS law enforcement officials told us that before FWS pursues civil or criminal penalties, the agency prefers to work with companies to encourage them to take mitigation steps to avoid future harm. According to FWS officials, they have been reasonably successful in resolving impacts to wildlife by following this approach with the electric power industry. FWS has also referred cases against wind power developers to either the Interior's Office of the Solicitor San Francisco field office or the Department of Justice for killing raptors, but Justice was unable to comment on the specifics of its ongoing investigation. FWS has been working with the wind industry to help identify solutions and ensure that wildlife mortality at wind power

facilities is minimized. For example, FWS has participated in industry-sponsored workshops and conferences, issued voluntary guidelines for industry to use in developing new projects, and served as a member in a wildlife working group with industry. Regarding state wildlife protections, all of the six states we reviewed have statutes that can be used to protect some wildlife from wind power impacts. However, similar to FWS, no states have taken any prosecutorial actions against wind power facilities where wildlife mortalities have occurred.

To encourage potential wildlife impacts to be considered when wind power facilities are permitted, we are making a recommendation to FWS to reach out to state and local regulatory agencies with information on the potential wildlife impacts due to wind power and on the resources available to help make decisions about the siting of wind power facilities.

We received written comments on a draft of this report. The Department of the Interior stated that they generally agree with our findings and our recommendation in the report. Written comments from the department are included in appendix III.

Background

The energy used to generate our nation's electricity comes from many different sources. Currently, most electricity in the United States is generated with fossil fuel and nuclear technologies—coal (52 percent), nuclear (20 percent), natural gas (16 percent), and oil (3 percent). Fossil fuels are considered nonrenewable because they are finite and will eventually dwindle or become too expensive or environmentally damaging to retrieve. Wind, however, is one of several sources of energy known as renewable energy. Other forms of renewable energy sources include sunlight (photovoltaics), heat from the sun (solar thermal), naturally occurring underground steam and heat (geothermal), plant and animal waste (biomass), and water (hydropower).

To reduce our dependence on nonrenewable energy sources, the United States has promoted the development of renewable resources, such as wind. A key federal program supporting the development of such sources is the federal production tax credit established by the Energy Policy Act of 1992.² This law provides a tax credit for electricity generated by renewable

²26 U.S.C. § 45. Section 1301 of the Energy Policy Act of 2005, Pub. L. No. 109-58, extended the tax credit through January 1, 2008.

energy sources, such as wind turbines. The Economic Recovery Tax Act of 1981 provides an additional incentive for wind power growth.³ In some cases, this law allows a 5-year depreciation schedule for renewable energy systems. In conjunction with the tax credit, this accelerated depreciation allows an even greater tax break for renewable energy projects, such as wind projects, that have high initial capital costs.⁴

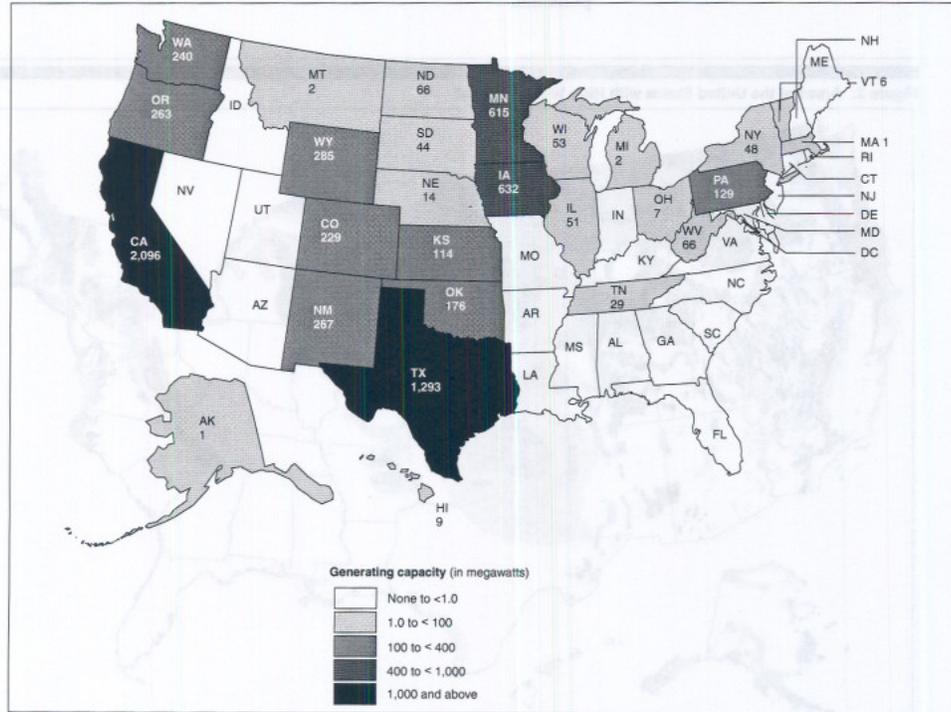
Some states also provide incentives for wind power development. One of the strongest drivers is a renewable portfolio standard. Generally, a renewable portfolio standard requires utilities operating in a state to acquire a minimum amount of their electricity supply from renewable energy sources. As of June 2005, 18 states had some form of renewable power requirements capable of being met by wind power. Other common types of incentives for renewable energy development provided by several state and local governments are income tax incentives and property and sales tax exemptions. Many states provide more than one type of incentive. In addition, 25 states have statewide wind working groups that are funded (at least partially) through grants from the Department of Energy (DOE). The purpose of these working groups is to promote more widespread development of wind power.

These federal and state programs have helped spur significant wind power development in the last 5 years. At the end of 2004, the total installed capacity from wind power in the United States was 6,740 megawatts (MW), or enough capacity to meet the electricity demand of between 1.5 and 2.0 million average American households (see fig. 1).

³26 U.S.C. § 168(e)(3)(B)(vi).

⁴See GAO, *Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Rural Communities*, GAO-04-756 (Washington, D.C.: Sept. 3, 2004) for prior work related to this issue.

Figure 1: Installed Wind Power-Generating Capacity in Megawatts, by State, as of January 24, 2005

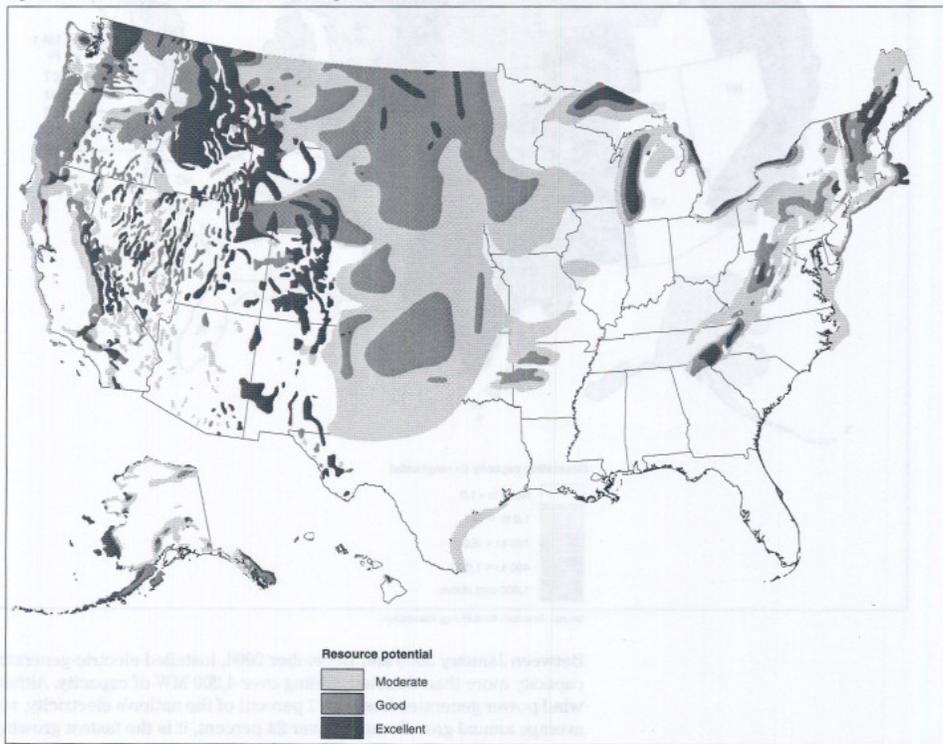


Source: American Wind Energy Association.

Between January 2000 and December 2004, installed electric-generating capacity more than doubled, adding over 4,200 MW of capacity. Although wind power generates less than 1 percent of the nation's electricity, with an average annual growth rate of over 24 percent, it is the fastest growing source of electricity generation on a percentage basis. Because wind energy is a function of wind speed, the best locations for turbines are areas

that have frequent strong winds to turn the blades of the power-generating turbines. See figure 2 for areas of the United States with high wind potential.

Figure 2: Areas of the United States with High Wind Potential



Source: Department of Energy, National Renewable Energy Laboratory.

According to DOE, 36 of the 48 continental states have wind resources that would support utility-scale wind power projects (i.e., projects that generate at least 1 MW of electric power from 1 or more turbines annually for sale to a local utility). A DOE goal for wind power is to generate 5 percent of the electricity generated in the United States by 2020; the American Wind Energy Association has a similar goal.⁵ To reach this goal, the association estimates that about 100,000 MW of installed capacity will be needed—approximately 15 times the current installed capacity. On the basis of the average MW size of wind turbines commonly being installed today (1.5 MW), more than 62,000 additional turbines will need to be added to the existing 16,000 turbines already constructed in the United States to meet such a goal.

Most of the wind power development in the United States has occurred in 10 western and midwestern states—California, Colorado, Iowa, Minnesota, New Mexico, Oklahoma, Oregon, Texas, Washington, and Wyoming. In fact, these 10 states have over 90 percent of the total installed wind power capacity nationwide. Only recently have developers begun to build wind energy facilities in the eastern United States. As shown in figure 2, wind power potential in this geographic area is best along mountain ridges, primarily the Appalachian Mountains, and along the coast of the northeastern United States.

Wind power is considered a “green” technology because, unlike fossil fuel power plants, it does not produce harmful emissions, such as carbon dioxide, nitrogen oxides, sulfur dioxide, mercury, and particulate matter, which can pose human health and environmental risks such as acid rain. However, it is now recognized that wind power facilities can adversely affect the environment in other ways, specifically in impacting wildlife such as birds and bats. Wind power facilities located in migratory pathways or important habitats may harm the wildlife living or passing through the area by killing or injuring them or by disrupting feeding or breeding behaviors. But wind power is not alone in its impacts on wildlife. Millions, or perhaps billions, of wildlife are killed every year in the United States through a myriad of human activities. While sources of bat mortality are not as well known, FWS estimates that some of the leading sources of bird mortality, per year, are collisions with building windows—97 million to 976

⁵The American Wind Energy Association is a national trade association that represents wind power plant developers, wind turbine manufacturers, utilities, consultants, insurers, financiers, researchers, and others involved in the wind industry.

million bird deaths, collisions with communication towers—4 million to 50 million bird deaths, poisoning from pesticides—at least 72 million birds, and attacks by domestic and feral cats—hundreds of millions of bird deaths. Human activities also result in the destruction or modification of wildlife habitat; habitat loss and fragmentation are leading threats to the continued survival of many species.

Studies Show Wind Power Facility Impacts on Wildlife Vary, Although Notable Gaps in the Literature Remain and Few Studies Address Mitigation

Recent studies and interviews with experts reveal that the impacts of wind power facilities on birds and other wildlife vary by region and by species. Specifically, studies showing raptor mortality in California and bat mortality in Appalachia have elicited concerns from scientists, environmental groups, and regulators because of the large number of kills in these areas and the potential cumulative impact on some species. Thus far, documented bird and bat mortality from wind power in other parts of the country has not occurred in numbers high enough to raise concerns. However, gaps in the literature make it difficult to develop definitive conclusions about the impacts of wind power on birds and other wildlife. Notably, only a few studies have been conducted on strategies to address the potential risks wind power facilities pose to wildlife.

Wildlife Mortality Varies by Region and by Species

Our review of the literature and discussions with experts revealed that, thus far, concerns over direct impacts to wildlife from wind power facilities have been concentrated in two geographic areas—northern California and Appalachia.⁶ (For a discussion on how we selected these studies, see app. I.) While bird and bat kills have been documented in many locations, biologists are primarily concerned about mortality in these two regions because of the numbers of wildlife killed and the species affected.

Studies Have Found Large Numbers of Raptors Killed by Wind Turbines in California

Wind power facilities in northern California, specifically in the Altamont Pass Wind Resource Area about 50 miles east of San Francisco, have been responsible for the deaths of numerous raptors, or birds of prey, such as hawks and golden eagles, and, as a result, these deaths have elicited concern from wildlife protection groups, biologists, and regulators. Studies conducted in the last two decades have documented large numbers of raptor deaths in this area. One study in our review found estimates as high

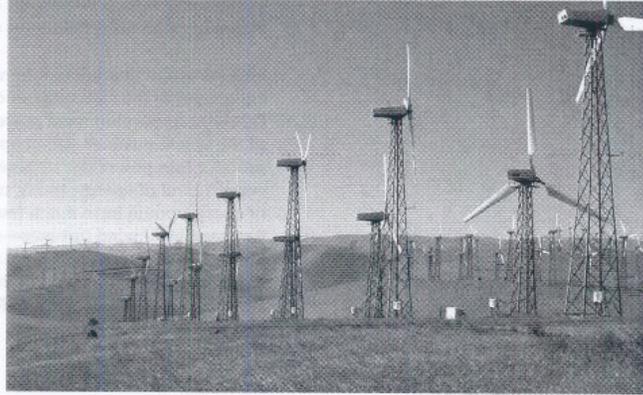
⁶Many of these studies were conducted by consultants for wind power companies and were not scientifically peer-reviewed. In addition, protocols used in these studies may vary.

as over 1,000 raptor deaths per year. Such large numbers of raptor kills due to wind power are not seen elsewhere in the United States. A 2001 summary that examined raptor mortality rates from studies in 10 states estimated that over 90 percent of the raptors killed annually in the United States by wind power turbines occurred in California.⁷

Several unique features of the wind resource area at Altamont Pass contribute to the high number of raptor deaths. First, California was the first area to develop wind power in significant numbers and thus has some of the oldest turbines still in operation in the United States. Older turbines produce less power per turbine, so it took many turbines to produce a certain level of energy; today, newer facilities producing the same amount of energy would have much fewer turbines. For example, Altamont Pass has over 5,000 wind turbines—many of which are older models—whereas, newer facilities generally have significantly fewer turbines (see figs. 3 and 4). Some experts told us that the sheer number of turbines in Altamont Pass has been a major reason for the high number of fatalities in the area.

⁷Erickson, Wallace P., Gregory D. Johnson, M. Dale Strickland, David P. Young Jr., Karyn J. Sernka, and Rhett E. Good. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. A National Wind Coordinating Committee Resource Document, August 2001. Because summaries of studies generally do not present detailed information about the methodologies of the studies they include, these results should be considered with caution.

Figure 3: Example of Older Generation Wind Turbines in Altamont Pass, Northern California



Source: California Energy Commission.

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Figure 4: Example of a Newer Generation Wind Power Facility



Source: Department of Energy, National Renewable Energy Laboratory.

Secondly, some scientists believe that the design of older generation turbines, like those found in Altamont Pass, are more fatal to raptors. Specifically, early turbines were mounted on towers 60 feet to 80 feet in height, while today's turbines are mounted on towers 200 feet to 260 feet in height. Experts told us that the older turbines at Altamont Pass have blades that reach lower to the ground, and thus can be more hazardous to raptors as they swoop down to catch prey. Experts also reasoned that the relative absence of raptor kills at newer facilities with generally taller turbines supports the notion that these turbines are less lethal to raptors. Third, the location of the wind turbine facilities at Altamont Pass may have contributed to the high number of raptor deaths. Studies show that there are a high number of raptors that pass through the area, as well as an abundance of raptor prey at the base of the turbines. In addition, the location of wind turbines on ridge tops and canyons may increase the likelihood that raptors will collide with turbines. Some experts note that one reason why other parts of the country may not be experiencing high levels of raptor mortality is partly because wind developers have used information from Altamont Pass to site new turbines in hopes of avoiding similar situations.

Studies Have Found Large Numbers of Bats Killed by Wind Turbines in Appalachia



Recent studies conducted in the eastern United States in the Appalachian Mountains have found large numbers of bats killed by wind power turbines. A 2004 study conducted in West Virginia estimated that slightly over 2,000 bats were killed during a 7-month study at a location with 44 turbines. More recently, a 2005 report that examined wind resource areas both in West Virginia and Pennsylvania estimated that about 2,000 bats were killed during a much shorter 6-week study period at 64 turbines. Lastly, a study conducted of a small 3-turbine wind facility in Tennessee estimated that bat mortality was about 21 bats per turbine, per year, raising concerns about the potential impact on bats if more turbines are built in this area.

Various species of bats have been killed at these wind power facilities and experts are concerned about impacts to bat populations if large numbers of deaths continue. For example, one expert noted that “it is alarming to see the number of bats currently being killed coupled with the proposed number of wind power developments” in these areas. He explained that bats live longer and have lower reproductive rates than birds, and, therefore, bat populations may be more vulnerable to impacts. In addition, there are proposals for hundreds of new wind turbines along the Appalachian Mountains. A recent report from Bat Conservation International estimated that if all ridge-top turbines are approved and the mortality rates continue at their current rate, these turbines might kill tens of thousands of bats in a single season. Although none of the bats killed by wind power to date have been listed as endangered species, FWS—recognizing the seriousness of the problem—has initiated a study with the U.S. Geological Survey to study bat migration and to develop decision tools to provide assistance in identifying locations for wind turbines and communication towers.

Studies Show That Bird and Bat Mortality from Wind Power in Other Parts of the Country Is Comparatively Lower Than in California and Appalachia

Results from studies on bird and bat mortality from wind power conducted in areas other than northern California and Appalachia have not caused the same degree of concern as in these two locations. Our review of studies conducted in areas other than the Appalachian Mountains showed bat fatality rates ranging from 0 to 4.3 bats per turbine, per year—compared with rates as high as 38 bats per turbine, per a 6-week study period, in the Appalachian Mountains (see app. II). Raptor fatalities outside Altamont Pass ranged from 0 to 0.07 raptors per turbine, per year, whereas, rates in Altamont Pass ranged from 0.05 to 0.24. Our review of studies found that overall bird fatalities from wind power ranged from 0 to 7.28 birds per turbine, per year. In addition, a 2004 National Wind Coordinating Committee fact sheet shows that an average of 2.3 birds per turbine, per

year are killed at facilities outside of California.⁸ However, it is important to also look at the number of turbines and the vulnerability of the species affected when interpreting these rates. For example, the high rate of 7.28 overall bird fatalities per turbine was found at a facility of only 3 wind turbines. Therefore, if no additional turbines are built in this area, the overall impact to the bird populations may be minimal; whereas, a lower fatality rate may cause impacts if there are many turbines in that particular area. In addition, comparing study findings can be difficult because researchers may use differing metrics and many areas of the country remain unstudied with regard to avian and bat impacts from wind power. While interpreting these statistics can be complicated, the experts we spoke with agreed that outside of California and Appalachia at the current level of wind power development, the research to date has not shown bird or bat kills in alarming numbers.

While the studies we reviewed showed relatively low levels of mortality in many locations, there are also indirect impacts to wildlife from wind power facilities. For example, construction of wind power facilities may fragment habitat and disrupt feeding or breeding behaviors. According to FWS, the loss of habitat quantity and quality is the primary cause of declines in most assessed bird populations and many other wildlife species. However, this review focuses on the direct impacts of avian and bat mortality.

Several Gaps Exist in Research on Wind Power Facility Impacts on Wildlife

While experts told us that the impact of wind power facilities on wildlife is more studied than other comparable infrastructure, such as communication towers, important gaps in the research remain. First, relatively few postconstruction monitoring studies have been conducted and made publicly available. It appears that many wind power facilities and geographic areas in the United States have not been studied at all. For example, a bird advocacy group expressed concern at a recent National Wind Coordinating Committee meeting that most of the wind projects that have been monitored for bird impacts are in the west. The American Wind Energy Association reports that there are hundreds of wind power facilities currently operating elsewhere in the country. However, we were able to

⁸National Wind Coordinating Committee, *Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions*. Fact sheet: Second Edition. November 2004. Because summaries of studies generally do not present detailed information about the methodologies of the studies that they include, these results should be considered with caution.

locate only 19 postconstruction studies that were conducted to assess direct impacts to birds or bats in 11 states.⁹ Texas, for example, is second only to California in installed wind power capacity, but we were unable to find a single, publicly available study investigating bird or bat mortality in that state.

Lack of comprehensive data on bird and bat fatalities from wind turbines makes it difficult to make national assessments of the impact of wind turbines on wildlife. A 2001 analysis of studies estimated that wind turbines in the United States cause roughly 33,000 avian deaths per year.¹⁰ However, the authors noted that making projections of the potential magnitude of wind power-related avian fatalities is problematic, in part, because of the lack of long-term data. The authors further noted that the data collected at older sites may not be representative of newer facilities with more modern turbine technology. In addition, FWS considers this estimate to be a “minimum” to “conservative” estimate due to problems of data collection and uneven regional representation. In addition to limiting assessments of national impacts, a lack of data on actual mortality impacts siting decisions for new facilities. Specifically, the conclusions of postconstruction studies are often used when making preconstruction predictions about the degree of harm to wildlife that is likely expected from proposed facilities. If there are no local postconstruction studies available, predictions of future mortality at a proposed site must be based on information from studies conducted in areas that may have different wildlife species, topography, weather conditions, climate, soil types, and vegetative cover.

A second important research gap is in understanding what factors increase the chances that turbines will be hazardous to wildlife. For example, it can be difficult to discern, among other things, how the number, location, and type of turbine; the number and type of species in an area; species behavior; topography; and weather affect mortality and why. Drawing conclusions about the degree of risk posed by certain factors—such as terrain, weather, or type of turbine—is difficult because sites differ in their combination of factors. For example, according to experts, data are inadequate about what turbine types are most hazardous and to what species. This is partly because most wind power facilities use only one

⁹See appendix I for the criteria we used for including studies in our review.

¹⁰Erickson, Wallace P., Gregory D. Johnson, M. Dale Strickland, David P. Young Jr., Karyn J. Sernka, and Rhett E. *Avian Collisions with Wind Turbines*.

turbine type. Therefore, even if one facility proved more hazardous than another, it would be difficult to attribute the difference to turbine type alone because other variables, such as topography or migratory patterns, are also likely to vary among the sites. Additionally, comparisons between studies are difficult because researchers may use different study methodologies. Therefore, even if two sites had similar bird populations, topography, and weather characteristics but different turbines, it would be difficult to isolate the effect of the turbine if the scientists collecting the information used differing methodologies.

Altamont Pass, however, has the potential to allow researchers to determine which turbines are more hazardous because it contains many different types of turbines in one place. However, even this analysis has been complicated by confounding variables. For example, according to experts, at one time it was commonly thought that turbines with lattice towers killed more birds than turbines with tubular towers in Altamont Pass; however, some studies have reached the opposite conclusion. One study noted that although the authors found higher mortality associated with lattice towers, this relationship might be explained by factors such as the fact that lattice towers were found to be in operation more frequently than were other towers, including tubular towers, rather than the difference in the design of the towers. Complicating matters still, some factors may be more hazardous for some species than others. One study found that red-tailed hawk fatalities occurred more frequently than expected at turbines located on ridgelines than on hillsides. The authors found the reverse to be true for golden eagles, demonstrating the difficulty of understanding interactions between turbines and bird mortality from bird mortality estimates alone.

A third research gap is the lack of complete and definitive information on the interaction of bats with wind turbines. As previously noted, bats have collided with wind turbines in significant numbers in some parts of the United States, but scientists do not have a complete understanding regarding why these collisions occur. Bats are known to have the ability to echolocate to avoid collision with objects, and they have been able to avoid colliding with comparable structures such as meteorological towers.¹¹ Therefore, their collision with wind turbines remains a mystery. The few studies that have been conducted show that most of the kills have taken

¹¹Meteorological towers are used to assess weather conditions, including wind speed and direction.

place during the migratory season (July through September), and this suggests that migrating bats are involved in most of the fatalities. In addition, one study showed that lower wind speeds were associated with higher fatality rates. However, experts admit that much remains unknown about why bats are attracted to and killed by turbines and about what conditions increase the chances that bats will be killed. One expert noted that there is still very little known about bat migration in general and about the way in which bat interactions with turbines are affected by weather patterns. This expert further noted that there still has not been a full season of monitoring bat mortality from which patterns can be identified.

Although scientists still do not know why bats are being killed in large numbers by wind power turbines in some areas, several hypotheses have been offered. One hypothesis states that the lighting on turbines attracts insects, which in turn attracts bats, but studies have not demonstrated differences in fatalities between lit turbines and unlit turbines. Other hypotheses include the notions that bats may be investigating wind turbines as potential roosting sites, that open spaces around turbines create favorable foraging habitats, and that migrating bats do not echolocate and thus are less able to avoid collision. One thing bat experts agree on is the need for more research.

In addition to these research gaps regarding bird and bat interactions with turbines, very little is known about bird and bat populations in general, such as their size and migratory pathways. An FWS official told us that data are available regarding the migration routes and habitat needs of only about one-third of the more than 800 bird species that live in or pass through the United States each year. In addition, bat researchers stressed to us that very little is known about the pathways and behavior of migratory bats. This lack of information, among other factors, makes it difficult to assess the cumulative impacts from wind power on species populations. One expert noted that many bird populations are in decline in general and additional losses due to wind power may exacerbate this trend. However, it is very difficult to attribute a decline in bird populations to wind power specifically or to get good data on overall populations that span international borders. Our literature search was only able to find one study in the United States that examined the impact of fatalities from wind power on a particular species population—golden eagles—and those results have been described as relatively inconclusive, or mixed, by other scientists. Without this kind of information, it can be difficult to determine the appropriate public policy responses to wildlife impacts due to wind power.

Although there are currently several gaps in the study of wind power's direct impacts on birds and bats, FWS and the U.S. Geological Survey have recently initiated a study of bird and bat migration behaviors to address some of these data gaps. This study will use radar technology to characterize daily and seasonal movements and habitat and landform associations of migrating birds and bats, and will seek to develop decision support tools to provide assistance in identifying locations for wind turbines and communication towers. In addition, Congress has appropriated funds for a National Academy of Sciences study on the environmental impacts of wind power development in the Mid-Atlantic Highlands that will include developing criteria for the siting of wind turbines in this area. Finally, the Bats and Wind Energy Cooperative, a partnership of Bat Conservation International, the American Wind Energy Association, FWS, and the National Renewable Energy Laboratory, continues to sponsor research on bats and wind turbines focusing on acoustic deterrence methods and pre- and postconstruction risk assessment at a planned wind farm in the Appalachian region.

Few Studies Have Been Conducted on Mitigation Measures

Overall, there is much to be learned about mitigation strategies for reducing impacts from wind power facilities on birds and bats, and some strategies that once looked promising are now proving ineffective. Specifically, we found that relatively few studies have examined strategies for reducing the potential impacts of wind power on birds and bats. Some of these studies were based on information collected from birds in a laboratory setting, and, therefore, their conclusions still need to be verified by conducting studies at actual wind power facilities. One study examined the idea of addressing motion smear—the inability of birds to see moving blades—by painting turbine blades to make them more visible. This study indicated that color contrast was a critical variable in helping birds to see objects like moving turbine blades and recommended painting stripes on blades as a way to test whether this could be an effective deterrent. Some developers adopted this strategy; however, a recent study found that turbines with painted blades were ineffective in reducing bird kills. Another laboratory-based study tested bird reactions to noise and sound pressure and suggested that whistles could make blades more audible to birds, while making no measurable contribution to overall noise levels. However, the authors of this study made no predictions about changes in bird flight in response to hearing the noise and noted that field tests would be required to test this hypothesis.

Although there have been relatively few laboratory-based experiments on mitigation strategies, some strategies have already been attempted in Altamont Pass. A recent 4-year study conducted by the California Energy Commission in Altamont Pass tested some of these mitigation efforts attempted by industry and suggested possible future mitigation strategies. This study found that some of the strategies adopted by industry, such as perch guards on turbines and rodent control programs that reduce prey availability, were ineffective in reducing kills. Another study compared the differences between turbines painted with ultraviolet reflectant or nonultraviolet reflectant to see whether one would act as a visual deterrent, but the study found no evidence of a difference in mortality between the two treatments.

While there is less than adequate information on the effectiveness of mitigation strategies from existing scientific research, the experts with whom we spoke were hopeful about several strategies on the basis of their experience in the field. Some of these experts noted that because birds have been found to collide with electrical wires, wind facilities should bury their transmission lines under ground and avoid using guywires on their meteorological towers; such fixes have generally been adopted. Although some studies have shown that there are no differences in mortality rates for lit turbines versus unlit turbines, some experts argue that, regardless, it is best to use low lighting to avoid attracting birds that migrate at night. In addition, researchers recommended that sodium vapor lights should never be used at or near wind power facilities because they have commonly been shown to attract birds to other structures. They noted that the largest number of birds killed at one time near wind turbines was found adjacent to sodium lights after a night of dense fog. No fatalities have been discovered near these turbines since the lights were subsequently turned off. Some researchers have observed that many bird and bat kills occur during the time of year that has the lowest wind production. For example, most bats are killed during the fall migration season on low wind nights. Consequently, researchers suggested turning off some turbines during these times in order to reduce kills. Perhaps most importantly, many experts have noted that using preconstruction studies on wildlife and their habitats can help identify locations for wind turbines that are less likely to have adverse impacts.

Regulating Wind Power Facilities on Nonfederal Land Is Largely the Responsibility of State and Local Governments

Since most wind power development has occurred on nonfederal land, regulating wind power facilities is largely a state and local government responsibility. In the six states we reviewed, wind power development is subject to local-level processes, state-level processes, or a combination of the two. For example, in three of the six states, local governments regulate the development of wind power and generally require wind developers to adhere to local zoning ordinances and to obtain special use permits before construction. The federal role in regulating wind power development is limited to projects occurring on federal lands or those that have some form of federal involvement, such as projects that receive federal funding; to date, there have been relatively few wind power projects on federal land. In these cases, wind power projects must comply with federal laws as well as any relevant state and local laws.

State and/or Local Governments Regulate Wind Power on Nonfederal Lands

State and/or local governments regulate the development and operation of wind power facilities on nonfederal lands. The primary permitting jurisdiction for wind power facilities in many states is a local planning commission, zoning board, city council, or county board of supervisors or commissioners. Typically, these local jurisdictional entities regulate wind projects under zoning ordinances and building codes. In some states, one or more state agencies play a role in regulating wind power development, such as natural resource and environmental protection agencies, state historic preservation offices, industrial development and regulation agencies, public utility commissions, or siting boards. In addition, some states have environmental laws that impose requirements on many types of construction and development, including wind power, that state and local agencies must follow. The regulatory scheme for wind power in the six states we reviewed included all of these scenarios (see table 1).

Table 1: Type of Regulatory Process and Responsible Agency in Select States

State	State/Local processes	Regulatory agency/authority
California	Local-only	Local governments (are subject to the state's environmental quality act, which requires assessment of environmental impacts of proposed actions)
Minnesota	State and local	Local governments regulate facilities under 5 megawatts, Minnesota Public Utility Commission regulates facilities 5 megawatts or larger
New York	Local-only	Local governments (are subject to the state's environmental quality review act, which requires assessment of environmental impacts of proposed actions)
Oregon	State and local	Local governments regulate facilities under 105 megawatts (peak capacity), Oregon Energy Facility Siting Council regulates facilities 105 megawatts or larger
Pennsylvania	Local-only	Local governments
West Virginia	State-only	Public Service Commission (though local authorities could have some regulatory impact through zoning and subsidies)

Source: GAO analysis of state and local data.

In the six states we reviewed, we found that approval for the construction and operation of a wind power facility is typically provided in permits that are often referred to as site, special use, or conditional use permits or certificates. Such permits often include various requirements, such as “setback” provisions—which stipulate how far wind power turbines must be from other structures, such as roads and residences—and decommissioning requirements that are intended to ensure that once a wind power facility ceases operation, its structures are removed and the landscape is restored according to a specific standard. State and local regulations may require postconstruction monitoring studies to assess a facility’s impact on the environment. In one state we reviewed, facilities are required to submit periodic reports on issues related to its operation and impact on the surrounding area.

In most of the six states we reviewed, state and local regulations related to wind power are evolving as the industry has developed in the states because government agencies realized that their existing authorities were not applicable to wind power. For example, when wind power began to emerge in Minnesota, an advisory task force held public meetings to determine how to proceed in permitting development. In part based on concerns raised from counties during these meetings, responsibility for permitting larger facilities was given to the state. In addition, West Virginia finalized new regulations for electric-generating facilities in May 2005 that include provisions specific to wind power facilities. Prior to this, the state made decisions on a case-by-case basis. Similarly, the Pennsylvania Game

Commission is developing a policy for wind power development on its lands in response to private interest in promoting renewable energy sources on state property. Officials with the state's Department of Environmental Protection also told us that they are examining a number of options, including developing statewide rules and model ordinances that could be adopted by local authorities.

Some state and local regulatory agencies we reviewed generally had little experience or expertise in addressing environmental and wildlife impacts from wind power. For example, officials in West Virginia told us that they did not have the expertise to evaluate wildlife impacts and review studies prior to construction, although such studies are required. Instead, they said they rely on the public comment period while permits are pending for concerns to be identified by others, such as FWS and the state Division of Natural Resources. In addition, Alameda County officials in California told us that they did not have the expertise to assess the impacts of wind facility construction but rely on technical consultants during the permitting stage, and that they are planning to form a technical advisory committee for assistance with postapproval monitoring. In some of the states we reviewed, state agencies were conducting outreach efforts with local governments since wind power development is still a relatively new industry for regulators. These efforts typically focus on educating local regulators about the issues that are often encountered during wind power development and about how permitting can be handled. These efforts may also include providing sample zoning ordinances and permits.

California

California had the most installed wind power in the country, with 2,096 MW of generating capacity as of April 2005 and an additional planned capacity of 365 MW. California was the first state in which large wind farms were developed, beginning in the early 1980s. It is also one of the few states with significant wind power development on federal land, with over 250 MW on land owned by the Bureau of Land Management (BLM). Aside from the facilities on BLM land, the state relies on local governments to regulate wind power. In addition to the local permitting process, the California Environmental Quality Act requires all state and local government agencies to assess the environmental impacts of proposed actions they undertake or permit.¹² This law requires agencies to identify significant environmental effects of a proposed action and either avoid or mitigate significant environmental effects, where feasible.

¹²California Environmental Quality Act, Cal. Pub. Res. Code § 21100.

We met with officials from Alameda County and Contra Costa County, which are home to the Altamont Pass Wind Resource Area—at one time the largest wind energy facility in the world. In both counties, local land use ordinances allow wind power development on agricultural lands. These counties originally issued conditional or land use permits to various wind power developers in the 1980s that contained approval conditions, including requirements for setbacks from property lines and noise limits. As previously discussed, the Altamont Pass Wind Resource Area was subsequently found to be responsible for the deaths of numerous raptor species. The counties are currently renewing or amending some of the permits for facilities in this area and will add permit conditions in an attempt to reduce avian mortality. Alameda County officials were working with various federal and state agencies, environmental groups, and wind energy companies to agree on specific permit conditions. At the time of this report, Alameda County has recently approved a plan that is aimed at reducing bird deaths at Altamont Pass by removing some existing turbines, turning off selected turbines at certain times, implementing other habitat modification and compensations measures, and gradually replacing existing turbines with newer turbines. In addition, Contra Costa County had completed the permitting for a wind power facility that included a number of conditions to reduce avian mortality.

Minnesota

Minnesota had 615 MW of installed wind generating capacity as of April 2005 and an additional planned capacity of 213 MW. Wind power development in Minnesota is subject to either local or state permitting procedures, depending on the size of the project. Local governments generally issue conditional use permits or building permits to wind power developers for facilities under 5 MW. We spoke with officials in Pipestone County, which was the first in the state to adopt a wind power ordinance. This ordinance focuses mainly on setbacks and decommissioning requirements. In southwestern Minnesota—which includes Pipestone County and most of the wind power development in the state—a 14-county renewable energy board is working to adopt a “model” wind power permitting ordinance that would provide uniformity for regulating development in the region. Two factors that officials cited in pursuing such guidance is the recognition that development is likely to occur under the 5 MW threshold for state permitting, and that wind power developers would benefit from uniform regulations.

Between 1995 and the first half of 2005, the Minnesota Environmental Quality Board—comprised of 1 representative from the governor’s office, 5 citizens, and the heads of 10 state agencies—was responsible for regulating

large wind energy systems that are 5 MW or larger, studying environmental issues, and ensuring state agency compliance with state environmental policy.¹³ Effective July 1, 2005, authority for permitting these large wind energy systems was transferred to the Minnesota Public Utilities Commission. The commission requires, among other things, an analysis of the proposed facility's potential environmental and wildlife impacts, proposed mitigative measures, and any adverse environmental effects that cannot be avoided. Instead of requiring individual wind developers to conduct their own assessments of impacts to wildlife, Minnesota took a different approach. Since much of the wind power development is concentrated in the southwestern part of the state, the state determined that it would be more efficient to conduct one large-scale study, rather than requiring each developer to conduct individual studies. Thus, the state required wind developers to participate in a 4-year avian impact study at a cost of about \$800,000 as well as a subsequent 2-year bat study. The studies concluded that the impacts to birds and bats from wind power are minimal. Therefore, on the basis of the results of the state-required studies, state and local agencies in Minnesota are not requiring postconstruction studies for wind power development in this portion of the state. The costs for these studies were charged back to individual wind developers on the basis of the number of megawatts built or permitted within a specified time frame.

New York

New York had three operating wind power facilities, with 49 MW of installed wind generating capacity as of April 2005. An additional 350 MW of wind power capacity is planned for the state. According to state officials, local governments permit the development of wind power in the state using their zoning authorities. In addition to this local permitting, the state has an environmental quality review act that requires all state and local government agencies to assess the environmental impacts of proposed actions, including issuing permits to wind power facilities.¹⁴ This law requires that an environmental impact statement be conducted if a proposed action is determined to have a potentially significant adverse environmental impact. Because wind power is still new to the state and there are a significant number of proposed facilities, a state agency focused on promoting energy development is beginning a program for educating local communities about regulating wind power. This program includes examples of zoning ordinances that have been used in other counties.

¹³Minn. Stat. §§ 116C.691 - 116C.697.

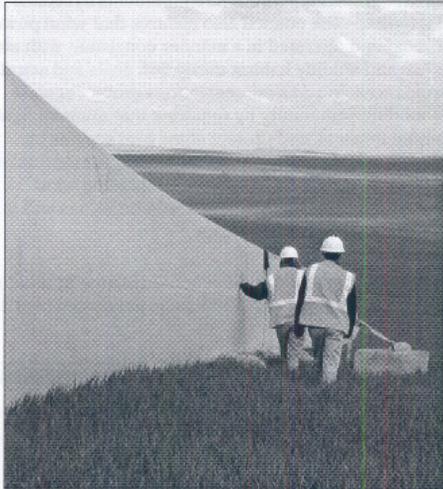
¹⁴State Environmental Quality Review Act, N.Y. Env'tl. Conserv. Law § 8-0109.

We met with officials from the Town of Fenner—in north-central New York—which has the largest wind power facility in the state. On the basis of complaints about noise from the first facility permitted by the town, the local planning board now requires that turbines be located a certain distance from residences. In order to comply with the state's environmental law, the town conducted an environmental assessment to determine the potential impacts of the proposed facility and determined that the project would not have any significant adverse environmental impacts or pose a significant risk to birds. However, elsewhere in New York, approval of one wind power project is under review given concerns expressed by environmental groups and the state environmental and conservation agency about potential impacts to migratory birds.

Oregon

Oregon had five large wind projects, with a total of 263 MW of installed wind power generating capacity as of April 2005 (see fig. 5).

Figure 5: Wind Power Facility in Sherman County, Oregon



Source: GAO.

Wind turbine blade prior to being installed at expansion of the facility in Sherman County (left) and the wind power facility in Sherman County (right).

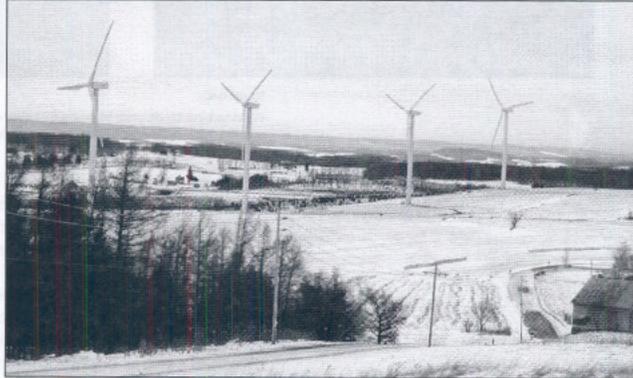
Several new wind projects and expansions are under way or being planned that would take total capacity in Oregon to more than 700 MW. Similar to Minnesota, wind power regulation in Oregon is subject to either local or state permitting procedures, depending on the size of the project. Local governments issue conditional use permits for facilities capable of generating up to 105 MW peak capacity. For example, in Sherman County, the planning commission approved a 24 MW wind power project near Klondike in north-central Oregon. Under its zoning authority, the county attached various conditions to the project's permit, including an avian postconstruction study, and decommissioning and removal requirements. If projects exceed 105 MW peak capacity, they are permitted by the Oregon Energy Facility Siting Council, which makes decisions about issuing site certificates for energy facilities. The siting council is a seven-member citizen commission that is appointed by the governor. Wind power projects

Pennsylvania

that are subject to the council's jurisdiction must comply with the council's standards and applicable statutes. Some of the standards are specific to wind power, such as design and construction requirements to reduce visual and environmental impacts.¹⁵ The council also ensures that wind power facilities are constructed and operated in a manner consistent with state rules, such as state fish and wildlife habitat mitigation goals and standards, and local agency ordinances. In addition, regulations protect against impacts on the surrounding community by requiring that minimal lighting be used to reduce visual impacts, and protect some bird species by requiring that developers avoid creating artificial habitat for raptors or raptor prey. Also in Oregon, energy development—including wind power—must not adversely impact scenic and aesthetic values and is prohibited in certain areas, such as state parks.

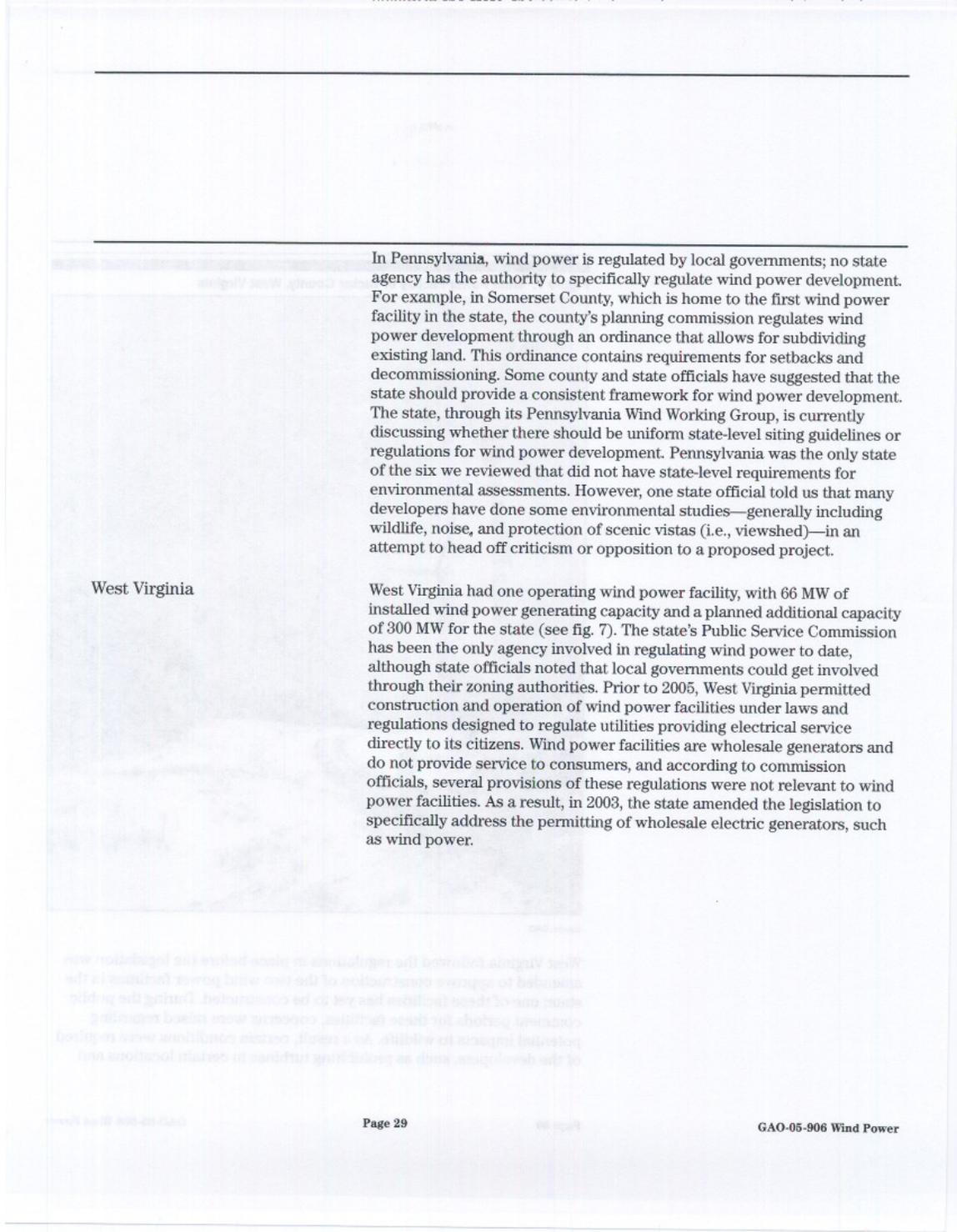
Pennsylvania had 129 MW of installed wind generating capacity as of April 2005 and applications for an additional 145 MW to be developed (see fig. 6).

Figure 6: Wind Power Facility in Somerset County, Pennsylvania



Source: GAO.

¹⁵Oregon Revised Statutes (ORS) § 469.300 et seq.; Oregon Administrative Rules (OAR) Chapter 345, Divisions 1, 15, 20-23, 26, 27, and 29.



In Pennsylvania, wind power is regulated by local governments; no state agency has the authority to specifically regulate wind power development. For example, in Somerset County, which is home to the first wind power facility in the state, the county's planning commission regulates wind power development through an ordinance that allows for subdividing existing land. This ordinance contains requirements for setbacks and decommissioning. Some county and state officials have suggested that the state should provide a consistent framework for wind power development. The state, through its Pennsylvania Wind Working Group, is currently discussing whether there should be uniform state-level siting guidelines or regulations for wind power development. Pennsylvania was the only state of the six we reviewed that did not have state-level requirements for environmental assessments. However, one state official told us that many developers have done some environmental studies—generally including wildlife, noise, and protection of scenic vistas (i.e., viewshed)—in an attempt to head off criticism or opposition to a proposed project.

West Virginia

West Virginia had one operating wind power facility, with 66 MW of installed wind power generating capacity and a planned additional capacity of 300 MW for the state (see fig. 7). The state's Public Service Commission has been the only agency involved in regulating wind power to date, although state officials noted that local governments could get involved through their zoning authorities. Prior to 2005, West Virginia permitted construction and operation of wind power facilities under laws and regulations designed to regulate utilities providing electrical service directly to its citizens. Wind power facilities are wholesale generators and do not provide service to consumers, and according to commission officials, several provisions of these regulations were not relevant to wind power facilities. As a result, in 2003, the state amended the legislation to specifically address the permitting of wholesale electric generators, such as wind power.

Figure 7: Wind Power Facility in Tucker County, West Virginia



Source: GAO.

West Virginia followed the regulations in place before the legislation was amended to approve construction of the two wind power facilities in the state; one of these facilities has yet to be constructed. During the public comment periods for these facilities, concerns were raised regarding potential impacts to wildlife. As a result, certain conditions were required of the developers, such as prohibiting turbines in certain locations and

requiring postconstruction wildlife studies.¹⁶ In May 2005, the state finalized new regulations for wholesale electric-generating facilities that include provisions specific to wind power facilities.¹⁷ For permitting wind power facilities, West Virginia regulations now require spring and fall avian migration studies, avian and bat risk assessments, and avian and bat lighting studies.

Federal Government's Role in Regulating Wind Power Is Generally Limited to Facilities on Federal Land

The federal government's role in regulating wind power development is limited to projects occurring on federal lands or projects that have some form of federal involvement. While the Federal Energy Regulatory Commission regulates the interstate transmission of electricity, natural gas, and oil, it does not approve the physical construction of electric generation, transmission, or distribution facilities; such approval is left for state and local governments. Certain standards issued by the Federal Aviation Administration apply to wind power facilities and other tall structures, on all lands. These standards are intended to protect aircraft and specify the type of lighting that should be used for structures of a certain height.

Since the majority of wind development to date has been on nonfederal land or has not required federal funding or permits, the federal government has had a limited role in regulating wind power facilities. In those cases where federal agencies do regulate wind power, projects must comply both with state and local requirements and with any applicable federal law. At a minimum, these laws will include the National Environmental Policy Act and the Endangered Species Act.¹⁸ These laws often require preconstruction studies or analyses of proposed projects, and possibly project modifications to avoid adverse environmental effects. For example, if the development of a proposed wind power project on federal land could impact wildlife habitat and/or species protected under the Endangered Species Act, permitting of the project would involve coordination and consultation with FWS and/or the National Marine Fisheries Service to

¹⁶Developers of these two facilities voluntarily conducted some preconstruction wildlife studies.

¹⁷The West Virginia Public Service Commission adopted *Rules Governing Siting Certificates for Exempt Wholesale Generators* (WV 150 C.S.R. 30) on May 25, 2005, effective July 25, 2005.

¹⁸Other federal laws may apply to wind power development on federal land, such as the Federal Land Policy and Management Act, which provides BLM with a framework for managing its land.

determine the potential harm to species and the steps that may be necessary to avoid or offset the harm.

To date, BLM has been the only federal agency with wind energy production, with about 500 MW of installed wind power capacity.¹⁹ This wind energy development is located in Southern California in the San Geronio Pass and Tehachapi Pass areas, and in the Foote Creek Rim and Simpson Ridge areas of Wyoming.²⁰ According to BLM officials, as of June 2005, they had authorized 88 applications for wind energy development on their land and had 68 pending applications—most of which are in California and Nevada. Energy development on BLM-administered lands is regulated through its process for granting private parties access to federal lands, which is referred to as granting a “right-of-way authorization.” BLM’s Interim Wind Energy Development Policy establishes the requirements for granting these authorizations to wind energy facilities. This policy requires that all proposed facilities conduct the necessary assessments and analyses required by the National Environmental Policy Act, the Endangered Species Act, and other appropriate laws. In one case, some changes have been made to the location of some wind power turbines because of potential impacts to avian species that were identified during these preconstruction studies.

Because of an increased focus on developing energy sources on public lands, BLM has proposed revising their interim policy by developing a wind energy development program that would establish comprehensive policies and best management practices for addressing wind energy development. As a part of this effort, BLM issued a programmatic environmental impact statement in June 2005 that assesses the social, environmental, and economic impacts of wind power development on BLM land. This document also identifies best management practices for ensuring that the impacts of wind energy development on BLM lands are kept to a minimum. While subsequent proposed wind power facilities will still need to conduct some environmental assessments, they can rely on BLM’s programmatic assessment for much of the needed analyses. BLM hopes that the availability of this assessment will enable wind power development to

¹⁹At the time of this report, a developer had submitted an application to build what would be the first wind power project on U.S. Forest Service land.

²⁰Postconstruction wildlife studies in these areas of California and Wyoming found low avian mortality. The California study in Tehachapi Pass was not included in appendix II because estimating fatality rates was not a primary goal of that study.

proceed more quickly on its lands, assuming that such development complies with needed requirements.

Federal and State Laws Protect Wildlife

As with any other activity, federal and state laws afford protections to wildlife from wind power. Three federal laws—the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act—generally forbid harm to various species of wildlife. While each of the laws allows some exceptions to this, only the Endangered Species Act includes provisions that would permit a wind power facility to kill a protected species under certain circumstances. While wildlife mortality events have occurred at wind power facilities, the federal government has not prosecuted any cases against wind power companies under these wildlife laws, preferring instead to encourage companies to take mitigation steps to avoid future harm. Regarding state wildlife protections, all of the six states we reviewed had statutes that can be used to protect some wildlife from wind power impacts. However, similar to FWS, no states have taken any prosecutorial actions against wind power facilities where mortalities have occurred.

Various Wildlife Protections Are Provided by Three Federal Laws

The primary federal regulatory framework for protecting wildlife from impacts from wind power includes three laws—the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act. (See table 2.)

Table 2: Federal Wildlife Protection Laws

Federal wildlife law	Protections	Permits	Penalties for violations
Migratory Bird Treaty Act	Prohibits the taking, killing, possession, transportation, and importation of over 860 migratory birds, their eggs, parts, and nests, except when specifically authorized by FWS	Authorizes permits for some activities, including but not limited to, scientific collecting, depredation, propagation, and falconry No permit provisions for "incidental take"	Only criminal penalties are possible, with violators subject to fine and/or imprisonment
Bald and Golden Eagle Protection Act	Prohibits the taking and sale of bald and golden eagles and their eggs, parts, and nests, except when specifically authorized by FWS	Authorizes permits for scientific or exhibition purposes, or religious purposes by Indian tribes; and for other purposes No permit provisions for "incidental take"	Civil and criminal penalties are possible, with violators subject to civil penalties, fines, and/or imprisonment
Endangered Species Act	Protects about 1,265 species that have been determined to be at risk for extinction, referred to as threatened or endangered species; prohibits the taking of protected animal species, including actions that "harm" or "harass"; federal actions may not jeopardize listed species or adversely modify habitat designated as critical	Authorizes permits for the "taking" of protected species if the permitted activity is for scientific purposes, is to establish experimental populations, or is incidental to an otherwise legal activity, such as construction of wind turbines	Civil and criminal penalties are possible, with violators subject to civil penalties, fines, and/or imprisonment

Source: GAO analysis of federal laws.

FWS is primarily responsible for ensuring the implementation and enforcement of these laws.²¹ In general, these laws prohibit various actions that are deemed harmful to certain species. For example, each law prohibits killing or "taking" a protected species, unless done under circumstances that are expressly allowed by statute and authorized via issuance of a federal permit. The Endangered Species Act may also prohibit actions that harm a protected species' habitat. In addition, each federal agency that takes actions that have or are likely to have negative impacts on migratory bird populations are directed by Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," to work with FWS to develop memorandums of understanding to conserve those species. While the executive order was signed on January 10, 2001, no memorandums have yet been signed. Wildlife species that fall outside the

²¹FWS shares responsibility for enforcing the Endangered Species Act with the National Marine Fisheries Service, which is responsible for protecting ocean-dwelling species and anadromous species, such as salmon.

scope of these three laws, such as many species of bats, are generally not protected under federal law. However, FWS is not only responsible for ensuring the survival of species protected by specific laws, but also for conserving and protecting all wildlife.

All three of the federal wildlife protection laws prohibit most instances of "take," although each law provides for some exceptions, such as scientific purposes. The Endangered Species Act is the least restrictive of these laws in that it authorizes FWS to permit some activities that take a protected species as long as the take meets several requirements, including a requirement that the take be incidental to an otherwise legal activity. Wind power facilities may seek an incidental take permit under this act for facilities sited on private land or where no federal funding is used or federal permit is required. The Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act also allow permits for take, but incidental take of migratory birds is not allowed. Under all three statutes, unauthorized takings may be penalized, even if the offender had no intent to harm a protected species.²²

Although not required by these federal laws, in some cases, state or local entities that regulate wind power, or wind power developers themselves, will consult with FWS for information on protected species or advice on how to ensure that wind power facilities will not harm wildlife. For example, in the Altamont Pass Wind Resource Area, Alameda County officials and the companies operating wind facilities there have asked FWS for technical assistance related to renewing permits for existing wind power facilities. FWS officials told us that their technical assistance in Altamont Pass is aimed at avoiding or minimizing potential impacts to threatened or endangered species under the Endangered Species Act. In addition, FWS officials from the New York field office told us that they are asked to provide input on wind power proposals during the state's environmental review process. These officials noted that they will likely not be able to review all of the wind power development proposals in the state due to staffing constraints. Similarly, FWS officials in five of the six states we reviewed told us that they have not conducted outreach to state or local regulators to inform them of the potential for wildlife impacts from wind power primarily because of workload constraints. If state and local regulators do not consult with FWS during the regulatory process, it can be

²²FWS identifies violations of federal wildlife laws in several ways, including by receiving citizen complaints and self-reporting by industry or individuals.

difficult for FWS to encourage actions that might reduce wildlife deaths before wind turbines are sited.

Federal Government Uses Prosecutorial Discretion in Dealing with Wildlife Mortality

Although FWS investigates all “take” of federal trust species, the government has elected not to prosecute wind energy companies for violations of wildlife laws at this time. In most of the states we reviewed, there were relatively few law enforcement officials, and they told us that they often had higher priority violations of federal wildlife laws than mortality events due to wind power, particularly given the relatively low levels of mortality that have occurred in most wind power locations. In West Virginia, the agent-in-charge told us that most of his time is spent on the commercialization of wildlife, such as the illegal import and export and interstate commerce of protected species; illegal hunting is also a major problem, particularly for bears and eagles. FWS law enforcement officials in all of the six states we reviewed told us that in cases of violations, they prefer to work cooperatively with the owners of wind power facilities to try to get them to take voluntary actions to address impacts on wildlife, rather than pursuing prosecution; however, other cases of wildlife violations, such as illegal trade in protected species, are pursued via prosecution.

FWS has been investigating and monitoring avian mortality at Altamont Pass for nearly 20 years, including the mortality of many protected species, such as golden eagles and other raptors.²³ Since that time, FWS has opened investigations and tried to work with the owners of wind power facilities to reduce the level of mortality. In the earlier years, some avian mortality was due to electrocutions along power lines. FWS had been working with electrical utility companies to resolve this problem elsewhere, and several relatively easy “fixes” were known to reduce electrocutions. As a result of official correspondence and conversations between FWS and company officials, many companies implemented these fixes, and avian mortality due to electrocutions has been reduced. However, large numbers of birds, particularly raptors, were still being killed due to actual collisions with wind turbines. On several occasions, FWS expressed concern about these mortalities to wind power companies and Alameda County—the county government with the most wind power development in California. In response, Alameda County and some wind power companies have conducted avian monitoring studies and tested several mitigation

²³Of all the species that have been killed, only two endangered species kills have been documented—a peregrine falcon in 1996 and a brown pelican in 2002.

measures, including painting turbine blades, installing perch guards on lattice-work towers, and conducting rodent control. However, these actions appear to have no significant impact on reducing avian mortality. Since January 2004, the wind power companies have worked together to develop an adaptive management plan for reducing avian mortality at Altamont Pass. The plan contains various mitigation measures, such as (1) removing old turbines and replacing them with fewer, new turbines and (2) implementing a partial seasonal shutdown of turbines.

Over the past 6 years, FWS has referred about 50 instances of golden eagles killed by 30 different companies in Altamont Pass either to the Interior Solicitor's office for civil prosecution or to the Department of Justice for criminal prosecution. Officials noted that, in general, prosecutions by both the Departments of the Interior and Justice focus on companies that kill birds with disregard for their actions and the law, especially when conservation measures are available but have not been implemented. Despite the recurring nature of the avian mortality in Altamont Pass and concerns from federal, state, and local officials, no prosecutions pursuant to federal wildlife laws have been taken against any wind power companies. Justice has not pursued prosecution in these cases, although they currently have an open investigation on avian mortality in Altamont Pass. As a matter of policy, Justice does not discuss the reasons behind specific case declinations, nor does it typically confirm or deny the existence of potential or actual investigations. However, Justice officials told us that, in general, when deciding to prosecute a case criminally, they consider a number of factors, including the history of civil or administrative enforcement, the evidence of criminal intent, and what steps have been taken to avoid future violations. Regarding the matters that FWS referred for civil enforcement, Interior's regional solicitor has also not pursued prosecution in any of these cases. Interior's Office of the Solicitor San Francisco field office declined to pursue the most recent civil referrals because Justice agreed to review turbine mortalities for possible criminal prosecution. Some citizen groups remain concerned about the lack of enforcement of federal and state wildlife protections. For example, in November 2004, the Center for Biological Diversity filed a lawsuit against the wind power companies in Altamont Pass to seek restitution for the killing of raptors.²⁴

²⁴Center for Biological Diversity v. FPL Group, No. RG04183113 (Calif. Super. Ct., Alameda County, filed Nov. 1, 2004).

In addition to the avian mortalities at Altamont Pass, significant wildlife mortality has also occurred at wind power locations in the Appalachian Mountains in West Virginia and Pennsylvania in 2003 and 2004. FWS has reviewed high numbers of bat kills; however, these bat species are not protected under federal law. Several studies have been completed or are under way in these regions to better determine the potential causes of the mortality events and how future events might be mitigated. The FWS law enforcement agent-in-charge in West Virginia told us that he has contacted wind power developers of some of the proposed facilities in the state about potential violations of federal wildlife laws should an endangered bat or other protected species be killed. The agent said that he prefers to have early involvement with wind power facilities, rather than wait for violations to occur.

FWS law enforcement officials told us that the way they have handled avian mortalities at wind power facilities is similar to how they deal with wildlife mortality caused by other industries. These officials explained that FWS recognizes that man-made structures will generally result in some level of unavoidable incidental take of wildlife and, as a result, FWS reserves a level of "enforcement discretion" in determining whether to pursue a violation of federal wildlife law. Law enforcement officials told us that before FWS pursues civil or criminal penalties, the agency prefers to work with a company to encourage them to take mitigation and conservation steps to avoid future harm. If a company shows a good-faith effort to reduce impacts, FWS will likely not refer such a case for prosecution. If, however, a company repeatedly refuses to take steps suggested by FWS, officials said they are likely to refer it for prosecution.

Work that FWS has done with the electric power industry illustrates this approach to resolving impacts to wildlife. FWS began working with the electric power industry in the early 1980s to reduce significant avian mortality due to collisions with and electrocutions at power lines, particularly mortality events involving eagles and other large birds. Pursuant to investigations of avian mortality at power lines and conversations with individual companies, solutions were identified that reduced mortality events. Because these solutions were relatively inexpensive and generally easy to install based on scientific testing—and were known to work—FWS law enforcement officials expected other electric line companies to install them. According to law enforcement officials, the threat of a potential conviction under the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act was generally enough to get companies to voluntarily install the fixes without FWS

prosecuting them. However, by the late 1980s, some electric companies were aware of mortalities due to electrocutions but were not taking actions to resolve the causes. The federal government in 1998 charged an electric utility cooperative—the Moon Lake Electric Association in Colorado and Utah—with criminal violations of these two laws. This is the first and only instance of a federal criminal prosecution of an electric power line company under any of the three federal wildlife protection laws. Civil cases have been filed and out-of-court agreements have been reached with other electric utilities for similar cases of wildlife mortalities.

FWS Has Taken Some Proactive Steps to Help Minimize the Impacts of Wind Power on Wildlife

Even though FWS does generally not have a direct role in determining whether and how wind power facilities are permitted, FWS has been involved for about 20 years with the wind power industry to help avoid and minimize impacts to wildlife from wind power development. FWS's work has been in the following three main areas—participating on a national wind working group and in technical workshops, and issuing guidance.

Working Group

An FWS senior management official has been a member of the National Wind Coordinating Committee since 1997. The wildlife workgroup serves as an advisory group for national research on wind-avian issues and a forum for defining, discussing, and addressing wind power-wildlife interaction issues. The workgroup has facilitated five national avian-wind power planning workshops to define needed research and explore current issues. The most recent workshop also included discussions of bat-wind turbine interactions. In addition, the working group released a report in December 1999, *Studying Wind Energy/Bird Interaction: A Guidance Document*, that includes metrics and methods for determining or monitoring potential impacts on birds at existing and proposed wind energy sites.

Workshops

FWS officials have participated in industry-sponsored workshops and conferences. For example, a senior FWS official presented information on cumulative impacts on wildlife from wind power at a 2004 workshop cosponsored by the American Wind Energy Association and the American Bird Conservancy. Another FWS official presented information on the agency's experience and expectations for regional wildlife issues at a national workshop on wind power siting sponsored by the wind association. FWS also helped to sponsor and organize, and participated in, a 2004 bats and wind power technical workshop attended by both wind industry representatives and researchers. As a result, FWS was

instrumental in establishing the Bats and Wind Energy Cooperative discussed elsewhere in the report.

Guidance

In July 2003, in an effort to inform wind power developers about the potential impacts to wildlife and encourage them to take mitigating actions before construction, FWS issued interim voluntary guidelines for industry to use in developing new projects. FWS developed the interim guidelines in response to the Department of the Interior's push to expand renewable energy development on public lands. The wind power interim guidelines are intended to assist FWS staff in providing technical assistance to the wind energy industry to avoid or minimize impacts to wildlife and their habitats through (1) proper evaluation of potential wind energy development sites, (2) proper location and design of turbines, and (3) pre- and postconstruction research and monitoring to identify and assess impacts to wildlife. The voluntary guidelines were open for public comment for a 2-year period that ended on July 10, 2005. At the time of this report, FWS had received numerous comments from the wind industry on the guidelines. In general, industry representatives thought that the guidelines were overly restrictive—to a degree not supported by the relative risk that wind power development poses to wildlife compared with other sources of mortality. FWS also had received comments from other groups—such as the Ripley Hawk Watch, the Clean Energy States Alliance, the Humane Society of the United States, the Massachusetts and Pennsylvania Audubon, the American Bird Conservancy, Defenders of Wildlife, and Chautauqua County Environmental Management Council—that were generally in support of the guidance or recommended that it be put into regulation. BLM also provided comments and expressed some concerns over the review process outlined in the guidelines. FWS will be reviewing and incorporating the public, industry, and agency comments received on the interim guidelines as appropriate in order to revise and improve them, and will solicit additional public input before disseminating a final version.

In addition, FWS recently began developing a template for a letter to be sent to wind power project applicants to alert them to federal wildlife protection laws, FWS's interim guidance, and FWS's role in protecting wildlife. FWS officials told us that they hope the letter will assist developers in making informed decisions regarding site selection, project design, and compliance with applicable laws. The availability of a ready-to-use template is important because most field officials told us that working with the wind power industry is just one of many responsibilities in FWS offices that often do not have enough staff, given their workloads.

Field officials also noted that if wind power developers, their consultants, or state or local regulatory agencies do not contact them, they may not know about wind power projects until there is a problem with an operating facility.

All Six States We Reviewed Have Wildlife Protections

Although federal jurisdiction for migratory birds has not been delegated to the states and primary responsibility for the protection of these birds resides with Interior, all states we reviewed had additional wildlife protections. Responsibility for protecting species and implementing wildlife laws and regulations is typically found in a state's natural resource protection agency. In some states, however, responsibility is assigned according to the type of species addressed. For example, in some states, agriculture departments address plant issues, while in other states, fish and boat commissions address fish, amphibian, and reptile issues; in these cases, wildlife agencies typically address the remaining species.

In all six states, the most common laws related to wildlife protection—and likely the most utilized wildlife laws—are those that govern hunting and fishing. These laws and regulations may include limits on the type and number of species that can be killed and the manner in which they can be taken. In addition to identifying the species that can be hunted or fished, the six states we reviewed identify as threatened or endangered specific species that are at risk for extinction or extirpation in their state. These states also identify "species of concern" or rare species. Such species are identified as a way to provide an early warning signal for species that are not yet endangered or threatened, but could become so in the future.

All of the six states we reviewed have laws that provide at least some degree of protection for species that are at risk of extinction or extirpation in their state. These protections generally go beyond what the federal Endangered Species Act provides by protecting more species than are protected under the federal law, although the protections may not be as extensive. In the five states that have specific protections, protection is provided through prohibitions on taking a protected species. In some cases, these protections are only applicable under certain circumstances. For example, in Oregon, protections apply only to state actions or on state-owned or -managed lands. All of the state laws or regulations that include take prohibitions, also include exceptions for when permits can be issued in order to allow the take to occur. Such permits are issued according to prescribed conditions or on a case-by-case basis. Two of the six states also provide protections for habitat. In West Virginia, the primary

protection for wildlife, aside from hunting and fishing regulations, is a prohibition on the commercial sale of wildlife and specific protection for bald and golden eagles.

Most of the states' wildlife protection laws for threatened and endangered species include enforcement provisions. In some cases, these laws identify violations as misdemeanor crimes. Similar to FWS law enforcement's approach to wind power, we found that state agencies had not taken any prosecutorial actions in response to wildlife mortalities at wind power facilities. Instead, many state officials told us that they prefer—like FWS—to work with developers to try to identify solutions to the causes of mortality. For example, in Minnesota, after impacts to native prairie grass caused by a wind power facility were discovered, the state natural resource agency required the facility to purchase additional habitat elsewhere to compensate for the loss. In California, Alameda County has worked with wind power facilities and others, and recently approved a plan that is aimed at reducing bird deaths at Altamont Pass by having wind power companies turn off selected turbines at certain times and replace some turbines with newer turbines.

State natural heritage programs serve as key sources of information on wildlife for federal and state wildlife protection agencies. All six of the states we reviewed have natural heritage programs that manage information on natural resources, including threatened and endangered species (all 50 states have such programs). These programs are part of an international effort to gather and share information on biological resources. This effort has slightly different designations and criteria for identifying imperiled species and habitat than the federal Endangered Species Act. In five of the states we reviewed, the natural heritage program is run by the states' natural resource agencies; in the sixth state, Oregon, it is run by a university. Although West Virginia does not have a state endangered species law and protects only bald and golden eagles, it does identify other imperiled species through its natural heritage program.

State natural resource agencies—which typically house the natural heritage programs—are sometimes consulted by a state or local wind power regulator or a wind power developer during the permitting process for help in identifying potentially sensitive species or concerns about possible impacts to wildlife in general. For example, staff from West Virginia's natural resources agency were involved in reviewing wildlife monitoring studies conducted by the first wind power facility in the state. During the consultation process on another proposed facility in the state,

agency staff requested that certain studies be conducted because of concerns about impacts on bat populations. Similarly, in Minnesota, natural resource agency staff requested changes in the location, construction, and operation of certain proposed wind power turbines through the state's environmental review process. However, in some cases, the process for regulators or wind power developers to consult with natural resource agency staff on wildlife is often an informal one and is not necessarily required by states' species protections or laws and regulations used to permit wind power.

Conclusions

In the context of other sources of avian mortalities, it does not appear that wind power is responsible for a significant number of bird deaths. While we do not know a lot about the relative impacts of bat mortality from wind power relative to other sources, significant bat mortality from wind power has occurred in Appalachia. However, much work remains before scientists have a clear understanding of the true impacts to wildlife from wind power. Scientists, in particular, are concerned about the potential cumulative impacts of wind power on species populations if the industry expands as expected. Such concerns may be well-founded because significant development is proposed in areas that contain large numbers of species or are believed to be migratory flyways. Concerns are compounded by the fact that the regulation of wind power varies from location-to-location and some state and local regulatory agencies we reviewed generally had little experience or expertise in addressing the environmental and wildlife impacts from wind power. In addition, given the relatively narrow regulatory scope of state and local agencies, it appears that when new wind power facilities are permitted, no one is considering the impacts of wind power on a regional or "ecosystem" scale—a scale that often spans governmental jurisdictions. FWS, in its responsibility for protecting wildlife, is the appropriate agency for such a task and in fact does monitor the status of species populations, to the extent possible. However, because wildlife, federally protected birds in particular, face a multitude of threats, many of which are better understood than wind power, FWS officials told us that they generally spend a very small portion of their time assessing the impacts from wind power. Nonetheless, FWS has taken some steps to reach out to the wind power industry by, among other things, issuing voluntary guidelines to encourage conservation and mitigation actions at new wind power facilities. In addition, FWS and the U.S. Geological Survey are initiating some studies to capture data on migratory flyways to help determine where the most potential harm from wind power might occur and to gather data for use in assessing wind power's cumulative impacts on

species. Although these are valuable steps in educating industry and improving science, FWS has conducted only limited outreach to state and local regulators about minimizing impacts from wind power on wildlife and informing them about species that may be particularly vulnerable to impacts from wind power. Such outreach is important because these are the entities closest to the day-to-day decisions regarding where wind power will be allowed on nonfederal land.

Recommendations for Executive Action

Given the potential for future cumulative impacts to wildlife species due to wind power and the limited expertise or experience that local and state regulators may have in this area, we recommend that the Secretary of the Interior direct the Director of the FWS to develop consistent communication for state and local wind power regulators. This communication should alert regulators to (1) the potential wildlife impacts that can result from wind power development; (2) the various resources that are available to help them make decisions about permitting such facilities, including FWS state offices, states' natural resource agencies, and FWS's voluntary interim guidelines—and any subsequent revisions—on avoiding and minimizing wildlife impacts from wind turbines; and (3) any additional information that FWS deems appropriate.

Agency Comments and Our Evaluation

We provided copies of our draft report to the Department of the Interior and received written comments. (See app. III for the full text of the comments received and our responses.) Interior officials stated that they generally agree with our findings and our recommendation in the report. We also sent portions of the report to state and local regulators and state wildlife protection agencies. Many of these entities provided technical comments, which we incorporated as appropriate. Interior also provided technical comments, which we incorporated where appropriate.

Interior officials agreed in most part with our recommendation to develop consistent communication to deliver to state and local wind power regulators. However, they stated that because the comment period on the FWS voluntary interim guidelines has closed and final guidelines have yet to be developed, it would be inappropriate to include these in such communication. However, because FWS is currently disseminating the voluntary interim guidelines on wind power to its field offices to share with regulators and developers, we believe that it is appropriate to include reference to this document in communications to local and state

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regulators. As Interior noted, these voluntary guidelines are currently undergoing review and revision. Therefore, it would be appropriate to draw attention to this fact in any such communication and to provide information about how the most current version might be accessed.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of the Interior, as well as to appropriate congressional committees and other interested Members of Congress. We also will make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staffs have questions about this report, please contact me at (202) 512-3841. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix IV.

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Appendix I

Objectives, Scope, and Methodology

On the basis of a June 22, 2004, request from the Ranking Democratic Members—House Resources Committee and the House Appropriations Subcommittee on Science, the Departments of State, Justice, and Commerce and Related Agencies—and of subsequent discussions with their staffs, we reviewed wind energy development and impacts on wildlife. Specifically, we assessed (1) what available studies and experts have reported about the impacts of wind power facilities on wildlife in the United States and what can be done to mitigate or prevent such impacts, (2) the roles and responsibilities of government agencies in regulating wind power facilities, and (3) the roles and responsibilities of government agencies in protecting wildlife from the risks posed by wind power facilities.

To determine what available studies and experts have reported about the direct impacts of wind power facilities on wildlife, we reviewed scientific studies and reports on the subject that were conducted by government agencies, industry, and academics. Our review focused on wildlife mortality as opposed to indirect impacts, which include habitat modification and disruption of feeding or breeding behaviors due to wind power facilities. We used several criteria to select studies for review. We chose studies that included original data analyses (rather than summaries of existing literature) conducted in the United States since 1990, and we primarily focused on the impact of wind power on birds and bats and/or ways in which to mitigate those impacts. We did not include preconstruction assessments of wildlife impacts in our review. We excluded studies that had preliminary findings when there was a more recent version available. We located studies using a database search with keywords of “wind power” and “birds,” “bats,” or “wildlife” in the following databases: AGRICOLA, DOE Information Bridge, National Environmental Publications Information, Energy Citations Database, Energy Research Abstracts, Environmental Sciences and Pollution Management, and JSTOR. In addition, we located studies using bibliographies of other studies and through publicly available lists of studies from the National Wind Coordinating Committee, the California Energy Commission, the National Renewable Energy Laboratory, and Bat Conservation International. We shared our list of studies with experts and asked them to identify any studies missing from our list. When studies were not publicly available, we contacted the authors and attempted to obtain copies. Using these methods and criteria, we obtained 31 studies. We reviewed the studies’ methodology, assumptions, limitations, and conclusions for the purposes of excluding

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studies that did not ensure a minimal level of methodological rigor.¹ We excluded 1 study, leaving 30 studies that are used in this work. In addition to these studies, we also reviewed two summaries of studies produced by the National Wind Coordinating Committee. Generally, we did not directly use these two summary studies, we did use them as a check for our conclusions and findings in relation to the studies we reviewed.² We also interviewed experts and study authors from the Department of the Interior's U.S. Fish and Wildlife Service (FWS), state government agencies, academia, wind industry, and conservation groups and obtained their views on the risks of wind power facilities to migratory birds and other wildlife and on ways in which to minimize these risks.

To determine the roles and responsibilities of government agencies in regulating wind power facilities, we identified and evaluated relevant federal laws and regulations for wind power development. We reviewed a nonprobability sample of six states with wind power development—California, Minnesota, New York, Oregon, Pennsylvania, and West Virginia. We selected these states to reflect a range in installed capacity, different regulatory processes, a history of wind power development, and geographic distribution and to reflect our requesters' interests. For these states, we identified and evaluated relevant state and local laws and regulations for wind power development. We interviewed federal officials from FWS, Bureau of Land Management, and Interior's Office of the Solicitor as well as officials from the Department of Justice. We interviewed officials from FWS headquarters and from field office locations in the six states that we selected. We also interviewed officials from various state agencies, such as the Oregon State Siting Council and the West Virginia Public Service Commission, and from local and county governments that were responsible for issuing permits or certificates for the development of wind power facilities in their states. Finally, we visited wind power facilities in California, New York, Oregon, Pennsylvania, and West Virginia and interviewed wind industry company officials.

To determine the roles and responsibilities of government agencies in protecting wildlife from the risks posed by wind power facilities, we identified and evaluated relevant federal, environmental, and wildlife

¹Many of these studies have not been scientifically peer-reviewed, and the protocols in each study may vary.

²We referenced one of these studies in two places in this report. In each of these places, a source and associated caveat are presented in a footnote.

Appendix I
Objectives, Scope, and Methodology

protection laws and regulations. We interviewed FWS law enforcement officials from headquarters and the six states that we reviewed. For the six states that we selected, we identified and evaluated relevant state and local environmental and wildlife protection laws. We also interviewed officials from state environmental and wildlife agencies in California, Minnesota, New York, Oregon, Pennsylvania, and West Virginia.

We conducted our work between December 2004 and July 2005 in accordance with generally accepted government auditing standards, including an assessment of data reliability and internal controls.

Appendix II

Studies of Bird, Bat, and Raptor Fatality Rates, by Region

Table 3 includes only studies where calculating bird or bat mortality was a primary goal. Some studies may contain more than one study location.

Table 3: Studies of Bird, Bat, and Raptor Fatality Rates, by Region

Region	Location and year	Number of turbines	Fatalities per turbine, per year		
			Birds	Bats	Raptors
Pacific NW	Stateline, OR - 2003	181	1.93	1.12	0.06
	Nine Canyon, OR - 2003	37	3.59	3.21	0.07
	Klondike, OR - Phase I - 2003	16	1.16 ^a	1.16	0
	Vansycle, OR - 2000	38	0.63	0.74	0
West	Foote Creek Rim, WY - 2003	69	1.5	1.34	0.03
	National Wind Tech Center, CO - 2003	Varies	0	0	0
California	Altamont Pass, CA - (Thelander et al) - 2003	5,400	0.19 ^c	***	***
	Altamont Pass, CA - (CEC) - 2004	5,400	0.87	0.004	0.24
	Altamont Pass and Solano County, CA - 1992	7,340	***	***	0.058 (1989) 0.025 (1990)
	Altamont Pass, CA - 1991	3,000	***	***	0.047 ^b
	Montezuma Hills, CA - 1992	600	0.074 ^b	***	0.047 ^b
Midwest	Buffalo Ridge, MN - P1 - 2000	73	0.98	0.26	***
	Buffalo Ridge, MN - P2 - 2000	143	2.27	1.78	***
	Buffalo Ridge, MN - P3 - 2000	138	4.45	2.04	***
	Buffalo Ridge, MN - (Osborn et al) - 2000	73	0.33-0.66	***	***
	Buffalo Ridge, MN - (Bats) - 2004	281	***	3.02 (2001) 1.3 (2002)	***
	Northeastern, WI - 2002	31	1.29	4.26	0
	Top of Iowa - 2004	89	0.12 ^c	1.88 ^e	***
Northeast	Searsburg, VT - 2002	11	0	***	0
Appalachian Mt. Region	Mountaineer, WV - 2004	44	4.04 ^d	47.53 ^d	***
	Tennessee - 2005	3	7.28	20.8	***
	Mountaineer, WV - 2005	44	***	38.0 ^a	***
	Meyersdale, PA - 2005	20	***	23.0 ^a	***

Source: GAO analysis of various scientific studies and reports.

Notes:

*** indicates that the study authors did not calculate a mortality rate for that category.

Some of the studies that presented a bird/turbine/year mortality rate also included raptors in that calculation. With the exception of the studies conducted in the Appalachian region, most of the studies listed were designed and timed to focus on bird mortality. Bats were found only incidentally to the study

Appendix II
Studies of Bird, Bat, and Raptor Fatality Rates, by Region

objectives; therefore, rates of bat mortality reported from those studies may not represent a reliable measure.

*Fatality rate applies to small birds only.

*Fatality rate not adjusted for both searcher efficiency and scavenging rate.

*Fatality rate represents number of birds and bats killed per turbine per 8-month study period.

*Fatality rate represents number of bats killed per turbine per 7-month study period.

*Fatality rate represents number of birds and bats killed per turbine per 6-week study period; however, bat mortality has been shown to be concentrated in the season during which these study periods took place.

Region	Study	Study Period	Number of Turbines	Number of Birds/Bats Killed	Fatality Rate (per turbine per year)
West	California, CA - 2005	2005	10	10	1.0
	Idaho, ID - 2005	2005	10	10	1.0
	Montana, MT - 2005	2005	10	10	1.0
	North Dakota, ND - 2005	2005	10	10	1.0
	South Dakota, SD - 2005	2005	10	10	1.0
	Utah, UT - 2005	2005	10	10	1.0
	Washington, WA - 2005	2005	10	10	1.0
	Wyoming, WY - 2005	2005	10	10	1.0
	Arizona, AZ - 2005	2005	10	10	1.0
	Colorado, CO - 2005	2005	10	10	1.0
Central	Illinois, IL - 2005	2005	10	10	1.0
	Indiana, IN - 2005	2005	10	10	1.0
	Iowa, IA - 2005	2005	10	10	1.0
	Missouri, MO - 2005	2005	10	10	1.0
	Nebraska, NE - 2005	2005	10	10	1.0
	North Carolina, NC - 2005	2005	10	10	1.0
	Ohio, OH - 2005	2005	10	10	1.0
	South Carolina, SC - 2005	2005	10	10	1.0
	Tennessee, TN - 2005	2005	10	10	1.0
	Virginia, VA - 2005	2005	10	10	1.0
East	Alabama, AL - 2005	2005	10	10	1.0
	Arkansas, AR - 2005	2005	10	10	1.0
	Delaware, DE - 2005	2005	10	10	1.0
	Florida, FL - 2005	2005	10	10	1.0
	Georgia, GA - 2005	2005	10	10	1.0
	Kentucky, KY - 2005	2005	10	10	1.0
	Louisiana, LA - 2005	2005	10	10	1.0
	Michigan, MI - 2005	2005	10	10	1.0
	Minnesota, MN - 2005	2005	10	10	1.0
	Wisconsin, WI - 2005	2005	10	10	1.0

Appendix III

Comments from the Department of the Interior

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



United States Department of the Interior

OFFICE OF THE ASSISTANT SECRETARY
POLICY, MANAGEMENT AND BUDGET
Washington, DC 20240



SEP - 2 2005

Ms. Robin Nazzaro
Director, Natural Resources and the Environment
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Ms. Nazzaro:

Thank you for providing the Department of the Interior (Department) the opportunity to review and comment on the draft U.S. Government Accountability Office (GAO) report entitled, "Wind Power: Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife," GAO-05-906, dated July 28, 2005. In general, we agree with the findings and concur in part with the recommendation in the report.

See comment 1.

A number of the studies used by GAO in the report, investigating direct mortality impacts on migratory birds and bats, were conducted by consultants for companies developing the wind energy facilities being studied. These studies have not been scientifically peer-reviewed, and the protocols used have varied and are in some cases unknown. We believe that use of literature that has not been peer-reviewed should be noted in the report.

See comment 2.

We believe that the report accurately describes the Office of Law Enforcement (OLE) U.S. Fish and Wildlife Service (FWS), approach to addressing the impact of wind power facilities on protected wildlife. We would stress, however, that OLE has investigated and continues to investigate "take" of Federal trust species by wind turbines. Companies that violate the Migratory Bird Treaty Act (MBTA) by killing birds face fines of up to \$15,000.00 and/or imprisonment for up to six months. Higher penalties can be involved if the birds killed are bald or golden eagles or a species protected under the Endangered Species Act (ESA). Prosecutions by OLE and the Department Justice (DOJ) focus on companies that kill birds with disregard for their actions and the law, especially when conservation measures are available but have not been implemented. At this time, there have been no prosecutions of any wind energy development company for violations involving "take" of these species. The OLE protects migratory birds not only through investigating violations of the MBTA, but also by fostering relationships with individuals, companies, and industries that seek to eliminate impacts on these species. The OLE recognizes that some birds may be killed even if all reasonable measures to prevent such deaths are taken; however, it is important that industries continue to work toward eliminating these losses of migratory birds. While it is not possible under the MBTA to absolve individuals, companies, or agencies from liability if they follow recommended conservation practices, the

Appendix III
Comments from the Department of the
Interior

Ms. Robin Nazzaro

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OLE and DOJ have used enforcement and prosecutorial discretion in the past toward those who have made good faith efforts to avoid the take of migratory birds. These efforts are exemplified by the 25 years of work in collaboration with the electric power industry to identify ways to prevent bird electrocutions and power line collisions.

See comment 3.

The FWS's effort to assist in proper location and design of wind energy facilities through the voluntary Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines, released for public review and comment in July 2003, is adequately described in the report. The FWS stressed that the guidelines were interim in nature pending public review and comment, were voluntary, flexible, and were not intended to be used as a set of rigid requirements that should be applied in every situation. There has been some concern that local and State regulatory agencies were using the voluntary guidelines as regulatory requirements in their local permitting processes, creating unreasonable demands on developers. Several interested parties have requested that the Interim Guidelines be rescinded for this reason. GAO informed the FWS during the review that it had investigated these allegations during the development of the current report, and found no evidence of any local or State regulatory entity using the Interim Guidelines as regulation. We recommend that this finding be included in the report. We believe this would help to dispel the perception that inappropriate use of the voluntary Interim Guidelines has had a negative effect on the wind industry.

See comment 4.

The State-by-State-review of laws and regulations regarding wind power development is fairly complete for the States visited by GAO. However, we believe the report could better synthesize how well the various local controls provide for consistent treatment and protection of individual animals and species that are interjurisdictional in their life cycles and are protected under Federal law. The report would also benefit from a discussion of the difficulties deriving from inconsistencies in regulatory requirements and frameworks that now exist among States. We believe the report should address that the responsibility for the protection of migratory birds continues to reside with the Federal Government (DOI), even though State and local laws and regulations have also been established for the protection of migratory birds. It should also be clarified that Federal jurisdiction for migratory birds has not been delegated to the States

We concur with the recommendation that the FWS should develop consistent communication to deliver to State and local wind power regulators alerting them to potential wildlife impacts and to the resources that are available to assist them in decision-making. However, it would be inappropriate to include the FWS voluntary Interim Guidelines in such communication, as the comment period on the interim guidelines has closed and final guidelines have not yet been developed. The FWS will be reviewing and considering the public, industry, and agency comments received on the interim guidelines, and will solicit additional public input before making a decision on whether or how to finalize them.

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Ms. Robin Nazzaro

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The enclosure provides comments from the U.S. Fish and Wildlife Service and Bureau of Land Management. We hope these comments will assist you in preparing the final report.

Sincerely,



P. Lynn Scarlett
Assistant Secretary
Policy, Management and Budget

Enclosure

Appendix III
Comments from the Department of the
Interior

The following are GAO's comments on the Department of the Interior's letter dated September 2, 2005.

GAO Comments

The Department of the Interior raised one issue with our recommendation that we have addressed in the Agency Comment and Our Evaluation section in the report. We address below the four other points the department raised in its letter. In addition, the department provided technical comments that we have incorporated into the report, as appropriate.

1. We agree that it is important to point out that many of these studies were not scientifically peer-reviewed and have added a footnote to this effect in the body of the report. However, we disagree that in some cases protocols used in the studies were unknown. As we explain in appendix I, we only included studies that were determined to have reasonably sound methodologies. We did not include any study for which we were unable to assess the protocols or methodology.
2. We believe the section on law enforcement reflects continued investigation of "take" of federal trust species by wind turbines and FWS's and the Department of Justice's enforcement and prosecutorial discretion, although we have added some clarification on these points.
3. We did not find any instances where state or local agencies that regulate wind power included in our review had incorporated or adopted the interim guidelines into their own jurisdictional requirements for approving wind power facilities. We did, however, find agencies in two states that had used the guidelines to inform either their development of regulations or their monitoring of the wildlife impacts at operating wind power facilities.
4. We did not assess how various local controls provide for protection of individual animals that are interjurisdictional in their life cycles. The section of the report that pertains to state wildlife laws is descriptive in nature and serves to highlight the fact that state laws sometimes provide additional protections to species, beyond federal laws, that may be affected by wind power. We added language to highlight that federal jurisdiction for migratory birds has not been delegated to the states, and that primary responsibility for the protection of these birds resides with the federal government (Interior).

Appendix IV

GAO Contact and Staff Acknowledgments

GAO Contact

Robin Nazzaro (202) 512-3841

Staff Acknowledgments

In addition to the individual named above, Patricia McClure, Assistant Director; José Alfredo Gómez; Kimberly Siegal; and William Roach made key contributions to this report. Important contributions were also made by Judy Pagano, John Delicath, and Omari Norman.

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