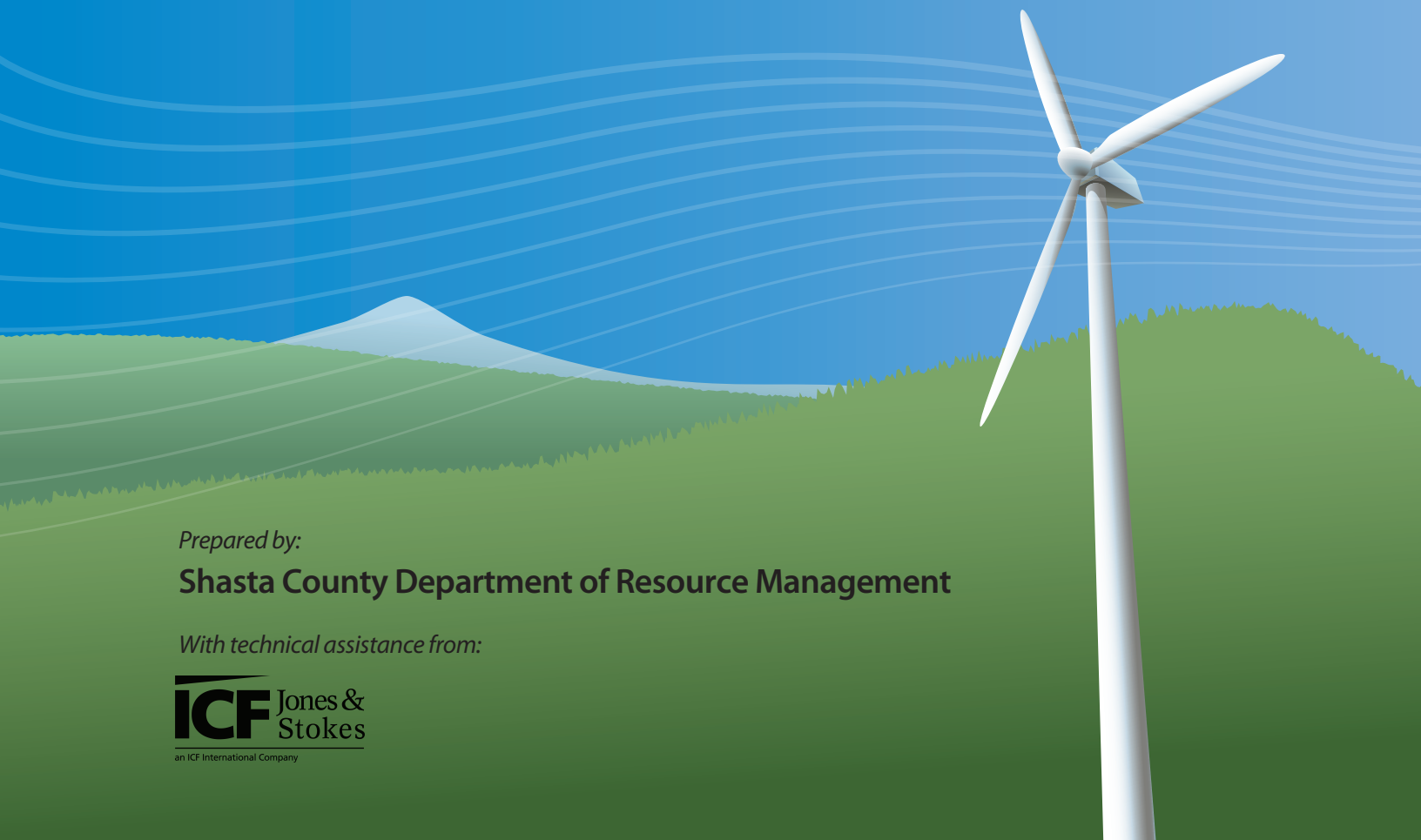
Final
Environmental Impact Report
for the

Hatchet Ridge Wind Project

June 2008



Prepared by:

Shasta County Department of Resource Management

With technical assistance from:

ICF Jones & Stokes
an ICF International Company

Final Environmental Impact Report for the Hatchet Ridge Wind Project

Prepared by:

Shasta County Department of Resource Management
1855 Placer Street, Suite 103
Redding, CA 96001
Contact: Bill Walker
530/225-5532

With Technical Assistance from:

ICF Jones & Stokes
630 K Street, Suite 400
Sacramento, CA 95814
Contact: John Forsythe
916/737-3000

June 2008

Shasta County Department of Resource Management. 2008. *Final Environmental Impact Report for the Hatchet Ridge Wind Project*. June. (ICF J&S 00024.07.) Redding, CA. Prepared with technical assistance from ICF Jones & Stokes, Sacramento, CA.

Contents

Chapter 1

Introduction

Purpose of the Final Environmental Impact Report

The Shasta County Department of Resource Management (County) is the lead agency under the California Environmental Quality Act (CEQA) for the environmental review of the Hatchet Ridge Wind Project and has principal responsibility for approving the project. This document, together with the draft environmental impact report (EIR) for the Hatchet Ridge Wind Project that was circulated in December 2007, constitutes the final EIR (FEIR) for the Hatchet Ridge Wind Project in Shasta County. The information presented in this document has been provided in accordance with the requirements of CEQA and the State CEQA Guidelines.

CEQA Requirements

The content and format of this final EIR meet the requirements of CEQA and the State CEQA Guidelines (Section 15132), which require that an final EIR comprise the components listed below.

- The draft EIR or a revision of the draft EIR (the draft EIR is hereby incorporated by reference).
- Comments and recommendations received on the draft EIR (Chapter 3 contains the 35 comment letters received).
- A list of persons, organizations, and public agencies who commented on the draft EIR (see Chapter 3).
- The responses of the lead agency to significant environmental points raised in the review and consultation process (see Chapters 2 and 3).
- Any other information added by the lead agency.

Recirculation of an EIR prior to certification is guided by State CEQA Guidelines (Section 15088.5). For example, a lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the DEIR for public review but before the EIR is certified. Such information can include changes to the project or environmental setting, as well as substantive additional data. New information added to an EIR is not considered significant unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment on a substantial adverse environmental effect of the project or a feasible way to mitigation or avoid such an effect, including a feasible project alternative that the project proponents have declined to implement.

In connection with the standards for adequacy of an EIR, State CEQA Guidelines (Section 15151) states that:

> An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.

No new significant information was added to the EIR on the basis of the comments and information received and the revisions to the EIR presented in Chapters 2, and 3. Accordingly, it is not necessary to recirculate the EIR.

The County will review and consider the final EIR. If the County finds that the final EIR is "adequate and complete," the County may certify the final EIR at a public hearing. The rule of adequacy generally holds that the EIR can be certified if: (1) it shows good faith effort at full disclosure of environmental information; and (2) it provides sufficient analysis to allow decisions to be made regarding the project in contemplation of its environmental consequences.

Upon review and consideration of the final EIR, the County may take action to approve, revise, or reject the project. A decision to approve the project would be accompanied by written findings in accordance with State CEQA Guidelines Sections 15091 and 15093. Public Resources Code Section 21081.6 requires that lead agencies adopt a mitigation monitoring and reporting program (MMRP) to describe measures that have been adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. The final MMRP is presented in Chapter 4.

Public Review and Consultation Process

The County distributed a notice of preparation (NOP) of a draft EIR for the proposed project on April 11, 2007. The NOP was distributed for a 30-day comment period that ended on May 14, 2007. The County held an agency and public scoping meeting on the proposed project on April 27, 2007. The scoping meeting was an opportunity for agencies and the public to obtain information about the proposed project and to provide input regarding the issues they wanted addressed in the draft EIR. Comments about the NOP were considered in the preparation of the draft EIR.

The draft EIR was distributed to various public agencies, citizen groups, and interested individuals for a 45-day public review period, from December 13, 2007, through January 28, 2008. The draft EIR was circulated to state agencies for review through the State Clearinghouse of the Governor's Office of Planning and Research. The draft EIR was made available for review on the County's website (http://www.co.shasta.ca.us/departments/resourcemgmt/drm/Hatchet%20Ridge/Hatchet%20Ridge.htm) as well as in the County's offices.

The public was asked to provide oral or written comments during the meeting or provide written comments before closure of the public review period.

Document Organization

The final EIR for the Hatchet Ridge Wind Project is organized as shown below.

- Chapter 1, *Introduction*, identifies the purpose of this document.
- Chapter 2, *Comments and Responses*, contains the written comments submitted to the County of Shasta (County) during the public comment period. Responses are provided to significant environmental points raised during the public review process on the draft EIR. Each comment letter is included in this chapter, followed by responses to comments contained in that letter.
- Chapter 3, *Revisions to the Draft EIR*, presents the revisions to the text of the draft EIR made in response to the comments received. This chapter presents all text, tables, and graphics that were revised; in the case of text and tables, excerpted passages are shown in strikeout and underline.
- Chapter 4, *Mitigation and Monitoring Reporting Program*, presents the MMRP and summarizes all the mitigation measures associated with the proposed project.
- Appendix A, *Applicant's Supplemental Information*, reproduces comments and additional information submitted by RES Americas Inc. subsequent to the end of the public comment period.
- Appendix B, *Nocturnal Radar Study*, is the complete report prepared by ABR Inc. presenting the results of the study prepared for HRW and WEST Inc. This report was completed subsequent to publication of the draft EIR.
- Appendix C, *Evaluation of Nocturnal Radar Study*, was prepared by Kenneth P. Able for the Wintu Audubon Society and submitted to the County. Professor Able's Curriculum Vitae is attached to the appendix.
- Appendix D, *Fire Safety Requirements*, contains the letters from the Shasta County Fire Department and the California Department of Forestry and Fire Protection detailing the fire-related requirements those agencies have agreed upon with the Shasta County Department of Resource Management.

Chapter 2
Comments and Responses

This chapter presents the responses to all comments received on the Draft EIR for the proposed project. They are organized into four categories: General Public Comments, Public Agency Comments, Utility Agency Comments, and Other Groups Comments. Within each group, the letters have been numbered sequentially in alphabetical order.

Comment letters are reproduced preceding the responses to each. Individual comments are annotated in the margins of the comment letters. Where comments have warranted revisions to the text of the Draft EIR, those revisions are shown in strikeout/underline format in Chapter 3, *Revisions to the EIR*, with page numbers referencing the original text's location in the Draft EIR.

Table 2-1. List of Commenters

Letter	Name	Affiliation	Date Received
General Public Comments			
GP1	Adams, Dennis and Carol	Resident	1/24/2008
GP2	Alvina, Vernon	Resident	1/28/2008
GP3	Beaudet, Philip	Resident	1/24/2008
GP4	Burns, Larry	Resident	1/28/2008
GP5	Carlson, William H.	Resident	1/28/2008
GP6	Citizen, Concerned	Resident	1/23/2008
GP7	Evans, Michael	Resident	1/28/2008
GP8	Fidman, Erik	Resident	1/24/2008
GP9	Fitch, Stephen A.	Resident	1/22/2008
GP10	Fritz, Tom	Resident	12/27/2007
GP11	Funk, Stephen L.	Resident	1/18/2008
GP12	Giacomini, Pam	Resident	1/12/2008
GP13	Hogan, Marvin	Resident	1/25/2008
GP14	McDonald, Kathryn	Resident	1/28/2008
GP15	Morris, Richard B.	Resident	1/28/2008
GP16	Sardoc, Dee	Resident	1/27/2008
GP17	Schneider, Virginia	Resident	12/28/2007
GP18	Sleight, Roger	Resident	1/23/2008
GP19	Sullivan, Marta	Resident	1/7/2008
GP20	Torgrimson, Rocky	Resident	1/25/2008
GP21	Urlie, Andrew	Resident	1/28/2008
Public Agency Comments			
PA1	Stacy, Gary B.	California Department of Fish and Game, Northern Region	1/14/2008

Letter	Name	Affiliation	Date Received
PA2	Rowe, Benjamin C.	California Department of Forestry and Fire Protection	1/29/2008
PA3	Gonzalez, Marcelino	California Department of Transportation, District 2	1/7/2008
PA4	Diehl, Jim	Shasta County Fire Department	1/21/2008
Utility Agency Comments			
UT1	Uchida, Jensen	California Public Utilities Commission	1/28/2008
UT2	Momber, Michael J.	Pacific Gas and Electric Company	1/23/2008
UT3	Beck, James W.	Transmission Agency of Northern California	1/28/2008
Other Groups Comments			
OG1	Giacomini, Pam	Burney Chamber of Commerce	1/14/2007
OG2	Limon, Ramona	Pit River Tribe	1/28/2008
OG3	Teller, Sabrina	Remy,Thomas, Moose and Manley, LLP	1/28/2008
OG4	Hughes, Nicole S.	RES America Developments, Inc.	1/28/2008
OG5	Hughes, Nicole S.	RES America Developments, Inc.	1/28/2008
OG6	Young, David	WEST, Inc.	1/28/2008
OG-7	Oliver, William W.	Wintu Audubon Society	1/22/2008

General Public Comments

Letter GP1

From: Dennis & Annie [mailto:denandannie@frontiernet.net]

Sent: Thursday, January 24, 2008 1:40 AM

To: Bill Walker

Subject: wind turbines

Hi

My wife and I are not in favor of the wind turbine project. We believe it will destroy the beauty of this area. **GP1-1**

Dennis & Carolyn Adams

20486 Camas Rd, Burney, CA 96013

335 2242

Letter GP1 Dennis and Carol Adams

Response to Comment GP1-1

It is noted that the commenter opposes approval of the proposed project. This information will be provided to the Shasta County Planning Commission.

Letter GP2

VERNON ALVINA
P.O. BOX 194
ROUND MT., CA. 96084
1/28/08

RECEIVED
JAN 28 2008
COUNTY OF SHASTA
PERMIT CENTER

TO WHO IT MAY CONCERN,

I AM A MULTIPLE PROPERTY OWNER IN THE INTER MOUNTAIN AREA. I AM WRITING TO EXPRESS MY CONCERNS ABOUT THE HATCHET RIDGE WIND PROJECT.

AS I MENTIONED AT THE APRIL 25, 2007 MEETING IN BURNEY, THIS PROJECT APPEARS TO BE A DONE DEAL. PUBLIC MEETINGS AND ENVIRONMENTAL REPORTS WILL APPARENTLY HAVE NO EFFECT ON WHETHER OR NOT THE PROJECT WILL GO FORWARD. I REALIZE THE PROPERTY BEING DEVELOPED IS PRIVATE AND AS A LAND OWNER MYSELF CAN SYMPATHIZE WITH THE OWNERS DESIRE TO PROFIT FROM THEIR HOLDINGS. GP2-1

THE PERMANENT NATURE OF THIS PROJECT PROMPTS ME TO QUESTION HOW IT CAN BENEFIT THE LOCAL COMMUNITY. IN TRADE FOR THE DISRUPTION OF THE NATURAL BEAUTY OF THE AREA, THE DAMAGE TO THE WILD LIFE AND OUTDOOR SPORTS THAT IT MAY CAUSE, WHAT CONCESSIONS COULD THE LOCAL COMMUNITY GET? GP2-2

FURTHER TALKS SHOULD BE HELD TO SET ASIDE SOME OF THE PROFITS FROM THIS VENTURE TO RECTIFY ITS EFFECTS AND POSSIBLY ESTABLISH A FUND TO HELP LOCALS DEVELOP SIMILAR TECHNOLOGY. GP2-3

VERNON ALVINA

Letter GP2 Vernon Alvina

Response to Comment GP2-1

It is noted that the commenter is a property owner in the area and has concerns about the proposed project. As stated in the introduction to the Draft EIR, the CEQA compliance process is only one step of the approval process for the project. Shasta County has not approved the proposed project, nor has it entered into any agreements related to the project with the project applicant. .

Response to Comment GP2-2

The commenter inquires regarding the benefits of the project for the local community. While the applicant has indicated that local communities will benefit indirectly through increased renewable energy capacity in the local electric grid, CEQA does not require a detailed analysis of the socioeconomic effects (either positive or negative) on the local community, nor does it require an analysis of the potential "concessions" that may or may not be made on the part of the applicant (State CEQA Guidelines Section 15131).

The aesthetic and wildlife impacts of the projects are addressed in detail in the Draft EIR (Sections 3.1 and 3.4, respectively). The initial study analysis prepared for the proposed project concluded that there would be no impact on public recreational resources. As discussed in Section 3.9.2 of the Draft EIR, impacts on recreation resources would be less than significant.

Response to Comment GP2-3

It is not within the purview of CEQA to analyze the distribution of profits from any particular proposed project. The comment is noted and will become part of the record presented to the Shasta County Board of Supervisors for consideration.

Letter GP3

From: Philip Beaudet [mailto:pbeaudet@mac.com]

Sent: Thursday, January 24, 2008 2:18 PM

To: Bill Walker

Subject: Hatchet Win Power Project

I will have a view of the project. It will not detract from my view. I am in full support of the project. **GP3-1**

Philip Beaudet

37268 Vedder Road

Burney, CA 96013

530-335-3261

530-355-0589

http://www.pbeaudet.us

One cannot have one's photon and wave it too.

http://www.lulu.com/pbeaudet

Letter GP3 Philip Beaudet

Response to Comment GP3-1

It is noted that commenter supports approval of the proposed project.

Jan 28 08 04:21p Larry Burns 530-336-6876 p.1

Letter GP4

LARRY BURNS
P.O. Box 95, McArthur, CA 96056 (530) 336-6876

FAX TRANSMITTAL COVER SHEET

Date: 28 JAN 2008

To: Shasta County Resource Management

Attn: Mr. Bill Walker

Fax No.: 530-245-6468

Subject: Hatchet Ridge Wind Project DEIR

Pages: 1 (including this cover sheet)

My comments on the DEIR for the above project are as follows. I support the project, but the simulated views of the completed project, figs. 3.1-12 and 3.1-13, leave no doubt the project will be a significant eyesore for everyone in visual range. The DEIR does not mention that the wind turbines will probably be more visible from Burney in the morning while directly illuminated by the sun and in the evening when they will be silhouetted against the sunset. The DEIR states that the adverse visual impact cannot be avoided or mitigated. This is only partly true. GP4-1

The wind turbines could be limited in their size and height as well as the overall number. The turbines could also be placed on the westward slope below the ridge line so that they are less visible above the ridge horizon from both directions. The lower placement of the turbines may help mitigate the expected bird mortality, particularly for the sandhill cranes and possibly for the eagles. The cranes and eagles are migrating through the area and probably do not fly as low to the ground before reaching the ridge top as they do while crossing the highest point of the ridge. A lower placement on the slope would also benefit pilots' safety. GP4-2

I know that the lower placement of the turbines would put them in a less efficient, less profitable position. I also know that it is windy almost all the way to Montgomery Creek. Typical wind farms coat the hills on both sides of the ridge top, examples are the Tejon Pass and Livermore wind farms. This means that a commercially feasible wind project could be constructed in the areas that are less efficient energy-wise but more acceptable visually and possibly environmentally. The only reason I can think of that the adverse visual impact could not be mitigated as described is Hatchet Ridge Wind LLC's unwillingness to accept a less than maximum profit. GP4-3

Please call me at the telephone number above if you have any questions.

Thank you for your time and attention - Larry Burns Larry Burns

Letter GP4 Larry Burns

Response to Comment GP4-1

Discussion has been added to the analysis in Section 3.1.2 to address morning illumination and silhouetting against the sunset.

Response to Comment GP4-2

The commenter proposes a variety of turbine layout options with the goal of reducing the visual impact of the project. During the Draft EIR review period, the County requested information from the applicant regarding turbine placement and arrangement and the potential to reduce visual impacts. The applicant provided a response, dated February 11, 2008; this letter is reproduced in Appendix A. The applicant states the following siting constraints in its response: (1) existing wind resource and wind speed, (2) leased area boundaries, (3) setback from neighboring landowners and existing transmission lines, (4) microwave paths, and (5) turbine spacing requirements. The applicant explains in some detail that even slight modification of turbine locations could reduce the generating capacity of the turbines, thereby rendering the project economically infeasible. The applicant concludes that, "when combined, the constraints provide virtually no flexibility for moving upwind from their proposed locations." Moving the towers away from the ridgeline would reduce the wind speed at the turbine locations (and therefore the wind power) to a level that would render the project nonviable. See Section 2.4 of the Draft EIR for a discussion of wind turbine siting considerations, and the *Zone of Visual Influence Assessment* at the end of Appendix A.

Response to Comment GP4-3

Refer to the response to Comment GP4-2. It is noted that the impact on aesthetics and visual resources is considered significant and unavoidable. See Section 3.1.2 of the Draft EIR for a disclosure of this impact.

Letter GP5

Bill Walker, Senior Planner
Shasta County Department of Resource Management
Planning Division
1855 Placer Street
Redding, California 96001

Dear Mr. Walker:

Re: Hatchet Ridge Wind Project EIR

The EIR for the proposed Hatchet Ridge Wind Project describes a visual impact that is simply too intrusive for this rural location in Eastern Shasta County. If instead of a 420 foot tall wind turbine, a 40 story office building had been proposed to the same location, the public uproar would be deafening. That building would be accused of being out of place in that location and out of scale with its surroundings. So too is the wind project. **GP5-1**

The EIR is also too nebulous regarding what will be built. Will the turbines be tall or shorter; 2.4 mw each or half that; 68 in number or more, located in this exact location or elsewhere on the ridge; and will the collector transmission line be above ground or below? The EIR is supposed to answer all these questions definitively, not leave them to the interpretation of the developer at some later date. **GP5-2**

The environmental and energy benefits of wind projects have consistently been oversold, particularly in California. In actuality, the addition of more wind turbines in California actually displaces no new needed electrical generating capacity in California. The unreliability of wind energy forces other generation to still be built to displace it when the wind does not blow. The wind turbines will indeed displace the burning of fossil fuels when running, but that will be a small fraction of the time. **GP5-3**

By contrast, the Burney Forest Power biomass power facility located directly east of Hatchet Ridge along Highway 299 is a much smaller facility in terms of megawatt output (31 vs 102 mw), but will produce an equal or larger amount of renewable energy on an annual basis. And, it does so without spreading its footprint over several miles of ridgeline visible for miles in every direction.

I have visited all the major wind generation areas in California, and find them to be uniformly over done, out of place and just plain ugly. But none (Altamont, Tehachapi or Palm Springs) are nearly as out of place relative to the setting as those proposed for Hatchet Ridge. None of the others are in an area so scenic as to be a tourist attraction just by driving through. The EIR does not come close to adequately addressing what a disruption these massive wind machines will be to an area as remote, scenic and undisturbed as Hatchet Ridge. **GP5-4**

Sincerely,

William H. Carlson
13395 Tierra Heights Road
Redding, CA 96003

Letter GP5 William H. Carlson

Response to Comment GP5-1

Comment noted. The analysis in the Section 3.1.2 of the Draft EIR determined that the proposed project's visual impacts on the existing visual character would be significant and unavoidable.

Response to Comment GP5-2

As discussed in Chapter 2, *Project Description*, of the Draft EIR, a range of three turbine sizes and locations were considered to allow for fluctuating turbine market availability. However, because of the reasonable certainty of the project applicant that the configuration selected would comprise forty-four 2.3-MW turbines, and because the relative severity of impacts associated with each of the three options would be similar (i.e., none of the three options would entail a change in the significance finding for any resource area), the analysis focused on the 44-turbine configuration. The County maintains that the Draft EIR adequately analyzes the potential environmental impacts of the proposed project regardless of the turbine model ultimately selected, so long as the final project is within the range of options summarized in the project description.

Response to Comment GP5-3

The commenter's opinion about electrical energy generation in California is noted. It should be noted, however, that energy reliability in California requires a mix of baseload and peaking capacity sources, and wind energy is a growing and important resource within that portfolio. As duly noted by the commenter, wind energy facilities require a larger overall footprint than do biomass facilities; however, wind facilities generate no pollutant emissions, whereas biomass facilities do.

Response to Comment GP5-4

Comment noted. Section 3.1 of the Draft EIR addresses the existing scenic resources of the area, including tourist attractions such as local parks and the natural environment. The analysis evaluates impacts associated with views from these areas, as well as from local roadways including the Volcanic Legacy Scenic Byway. While Hatchet Mountain and the areas surrounding it are in a scenic and mountainous rural area, the ridge and surrounding areas do exhibit human-made disruptions of the viewshed such as the clearcut utility corridor that traverses the ridge, timber harvest clearcuts, cell phone towers, and wooden utility poles alongside and traversing roadways. The analysis adequately discloses all these factors in an unbiased manner and with an appropriate level of detail and addresses the significant and unavoidable impacts on the existing visual character of the area that would result from implementation of the proposed project.

Letter GP6

DEPARTMENT OF RESOURCE MANAGEMENT RECEIVED
JAN 23 2008
PLANNING/BUILDING DIVISION

The rest of California is being paved over - the Central Valley, the Bay Area and all of Southern California.

We need electricity - but not at the expense of obliterating a very scenic and irreplacable area. GP6-1

The windmill project developers have no concern about the negative effects this project will have for those of us who live in the inter-mountain area. Their only concern is profits. If they want to promote this kind of endeavor let them do it in Texas - that is where they are from. I'll bet these Texans don't have these kinds of windmills in their backyards! GP6-2

The jobs created during the construction process will last only about a year. At the completion of the project there will be about half a dozen permanent jobs. These windmills are not temporary - they are permanent. The long term effect will be a colossal eye sore on the ridge of Hatchett Mountain. GP6-3

These windmills are gargantuan in size - about 250 feet high plus the propeller blades! Just imagine 49 twenty-five story buildings on the ridge of Hatchett Mountain. It is ironic that there is a scenic turnout on Hatchett Mountain as you decend toward Burney. GP6-4

The Fountain Fire of 1992 incinerated over 60,000 acres in the same general area. It has taken years and enormous effort by the Forrestry Service and others to restore these mountain sides. It will take many more years for this area to look as it did before the fire. The windmill project will be a major intrusion into this restoration work.

This project had very little publicity. In fact, if you do not subscribe to the local newspaper there is little. GP6-5

chance you would have ever heard about it. The windmill project was announced on Dec. 13, right before the holidays hardly a time when people would be reading a lengthy Environmental Impact Report. This tactic seems to have worked very well for these Texas developers since there have been only 5 letters to the county regarding this project. It also seems calculating and sneakey.

The people of the Pit River Tribe consider the Hatchett Mountain area to have special sacred and traditional meaning. How can their concerns be downplayed or ignored? Their ancestors have lived in this area for thousands of years. GP6-5 cont.

Unfortunately, they have the same problem as the other ordinary people living in Burney. They do not have the money, organization and political connections to make any difference in projects such as these.

The Altamont Pass near Tracy is certainly not as scenically blessed as Hatchett Mountain and the Burney Basin. There are hundreds of windmills scattered on the barren, open hills at Altamont. Those bleak mountains are certainly not enhanced by those windmills. Those who will eventually make the decision to go ahead or reject this project should go to Altamont to see for themselves the impact of a windmill project. GP6-6

Being only an ordinary resident in Burney and not convinced that my voice will be heard by anyone making the decisions I feel that we might as well get used to seeing these un-natural and out-of-place structures every time we look west from Main Street toward Hatchett Mountain. Sincerely, GP6-7

Letter GP6 Concerned Citizen

Response to Comment GP6-1

It is noted that the commenter opposes approval of the proposed project. No CEQA-related issues are raised.

Response to Comment GP6-2

It is noted that the commenter opposes approval of the proposed project. No CEQA-related issues are raised.

Response to Comment GP6-3

It is noted that the commenter opposes approval of the proposed project. Aesthetic impacts are disclosed in Section 3.1 of the Draft EIR.

Response to Comment GP6-4

It is noted that the commenter opposes approval of the proposed project. Aesthetic impacts are disclosed in Section 3.1 of the Draft EIR. The analysis in Section 3.2.2 of the Draft EIR concluded that the proposed project would have a less-than-significant impact on forest resources and forest restoration work.

Response to Comment GP6-5

It is noted that the commenter opposes approval of the proposed project. A list of all the comment letters received on the project is included in Table 2-1 of the Final EIR. All CEQA-mandated notices, timeframes, and provisions for public involvement have been rigorously observed. Impacts on cultural resources are addressed in Section 3.5 of the Draft EIR.

Response to Comment GP6-6

It is noted that the commenter opposes approval of the proposed project.

Response to Comment GP6-7

It is noted that the commenter opposes approval of the proposed project. All comments received on the Draft EIR will be provided to the County decision makers.

Letter GP7

From: Michael Evans [mailto:mevans@cwo.com]

Sent: Monday, January 28, 2008 3:55 PM

To: Bill Walker**Cc:** Rick Evans

Subject: Hatchet Wind Project

Dear Mr. Walker

My name is Michael Evans and together with my brother Richard Evans am joint owner of a ten acre parcel located on SH299 about 3 miles west of the Hatchet Mountain summit. The parcel number is 030-080-004-000. This pacel is something of a family heirloom as it was acquired by my great grandfather Thomas Hays early in the last century and has passed down through generations to my brother and I. My great grandfather was a school teacher in Fall River Mills and he spent his summers on the land on Hatchet Mountain. In the course of time he built 3 cabins on the property which were all lost during the Fountain Fire. My grandfather, Harold Hays leased Hatchet and Bunchgrass Mountains and ran sheep herds there during the 1920's and 10930's. At the time of the fire, the property was owned by my parents, Robert and Betty Hays Evans. Afterward, they deeded the land to my brother and I. **GP7-1**

Since then, we have cleared the fire debris, and used the timber harvested from the property to built a new cabin. We've recently begum re-forestation activities and we have invested a lot of money to rehab the land and the environment there. It is with dismay that I have belatedly become aware of the magnitude of the Hatchet Wind Project. I have just reviewed the EIR and I must register my alarm. Despite assertions in the EIR, 60 towers over 400ft tall is going to have a horrific impact on the mountain, and it's denizes, human and animal. The visual impart alone will be devastating forever ruining the ridge's appearance that is only now beginning to recover from the fire. The noise alone could easily render my home uninhabitable and the effect on wildlife in the area, also just recovering from the fire, will be terrible. Outside of another fire, I can't imagine a more despoiling event than the approval of this project. **GP7-2** **GP7-3**

Speaking quite personally and selfishly, I am fearful that this project if approved will render my property valueless. Over the years we've resisted efforts by various companies to acquire our land including The Red River Company, Ralph L. Smith, Kimberley Clark and Roseberg. In the summer after the fire, Roseberg offered us $2000/acre for the property. In the last 15 yers or so, we've invested over $300,000 to rebuild and rehabilitate. I realize that as possibly the only private landowner between Moose Camp and the project, my protest doesn't count for much but as someone who treasures the land and pays homage to it's history I must argue that Hatchet Mountain Wind Project not be approved. **GP7-4**

Letter GP7 Michael Evans

Response to Comment GP7-1

It is noted that the commenter is a property owner with family roots in the vicinity of the proposed project.

Response to Comment GP7-2

Comment noted. The analysis in Section 3.1.2 of the Draft EIR disclosed that the proposed project's visual impacts on the existing visual character would be significant and unavoidable.

Response to Comment GP7-3

The effects on wildlife and noise impacts associated with the proposed project are disclosed in Sections 3.4 .2 and 3.10.2 of the Draft EIR, respectively.

Response to Comment GP7-4

CEQA does not require a detailed analysis of the socioeconomic impacts of a proposed project, nor does it require an analysis of a project's impacts on property values (State CEQA Guidelines Section 15131). All comments will, however, be provided to the County decision makers.

Letter GP8

Erik Fidman
PO Box 1166
Mount Shasta, CA 96067
(530) 261-2120
Fidman@gmail.com

Attn: Bill Walker - bwalker@co.shasta.ca.us.

Dear Mr. Walker:

As a concerned electricity-consuming citizen of northern California, I strongly urge the rational use of the, clean, and much needed wind-generated power that the Hatchet Ridge Wind Farm would provide. We are living in an era of significant confusion in energy matters, however I believe that a little straight thinking is in order. **GP8-1**

The arguments against the use of the windmill farm are purely opinion and not back by conclusive evidence:

- Eagles - There is little evidence to suggest that birds, especially endangered eagles are unconscious enough to commit suicide by flying into the spinning wheels of the new generation of highly visible, larger and slower spinning windmills. The EIR biologist's estimate of one Eagle killed every two to three years is only an educated guess. It is highly probable that no Eagles will ever be killed by these slower wheels. Eagles are renowned for their vision… The term "eagle eye" referring to the eagles profound eyesight. The eagle argument is simply the weakest argument; hypothetical and unproven in any scientific manner designed to appeal to one's emotions. This base argument is designed to label and control those who oppose. Society only advances from the exercise of clear and unbiased decision-making. **GP8-2**

- Visual "eye sore" objection - This objection is purely stated opinion designed to manipulate a negative decision on the advancement of potentially significant move to develop energy independence. I wonder if any financially interested parties are involved manipulating outcomes by supporting surrogate interests? My opinion is that the windmills are exciting. They are "dancing with the wind", visually displaying its power. I actually look forward to seeing the windmills as I enter into the Palm Springs area. The investment in those windmills has been providing needed power for many years! **GP8-3**

- Sacred sites - The word sacred is relative. All things can be considered sacred to someone. There is a method of determining which is opinion of values should be applied. Land ownership. There is a Constitutional-based right that land ownership is rationally in favor of reasonable use by the landowner. Governmental usurpation of this right leads down a dangerous road of unreasonable abuse of power. This "sacred" document by default should therefore be given the upper hand when ever reasonably possible! **GP8-4**

The arguments for the Windmills, I hardly need to make:

- Energy independence
- Needed use of clean energy resources.
- Developing cost effective means of providing electricity to a growing and productive population.

Additionally it should be noted that the development and use of all other viable energy resources (hydro-electrical, coal, nuclear) all contain significant negative impact "costs". It seems to me that the development and use of Windmill energy is by far one of the easiest and best choices we can make as a society.

GP8-5

Please consider my arguments in favor of developing wind energy via the Hatchet Ridge Wind Farm. I greatly appreciate your time and consideration in this matter and I urge your wisest societal decision.

Thank You,

Erik Fidman

Letter GP8 Erik Fidman

Response to Comment GP8-1

It is noted that the commenter supports rational use of the energy the project would provide, if approved.

Response to Comment GP8-2

Impacts on biological resources are disclosed in Section 3.4 of the Draft EIR.

Response to Comment GP8-3

Impacts on aesthetic resources are disclosed in Section 3.1 of the Draft EIR.

Response to Comment GP8-4

Impacts on cultural resources are disclosed in Section 3.5 of the Draft EIR.

Response to Comment GP8-5

The project objectives are discussed in Chapter 2 of the Draft EIR. All comments received on the Draft EIR will be provided to the County decision makers.

Letter GP9

1-22-08

DEPARTMENT OF RESOURCE MANAGEMENT RECEIVED
JAN 23 2008
PLANNING/BUILDING DIVISIONS

Shasta County Department of Resources Management
Planning Division
1855 Placer St. Suite 103
Redding California, 96001

Attention: Bill Walker

Dear Bill:

As the former District Ranger and Forest Supervisor responsible for the area adjacent to the area of the Hatchet Ridge Wind Project I am very familiar with the area and potential impacts of this project.

I strongly urge you to deny this project and similar projects because the towers, the revolving blades and attendant powerlines will degrade the scenic qualities of one of the outstanding travel corridors in Shasta County. GP9-1

Preserving the scenic qualities of Shasta County is a cornerstone to preserving the most important and enduring economic base that the county has--outdoor recreation. GP9-2

Further, while the National Forest and National Parks in the county have work hard to provide outstanding recreation opportunities, they must have the cooperation of their partner, Shasta County, in protecting the views to and from the Forest. The Bunchgrass Mtn./Hatchet ridge is such an area with hundreds of thousands of visitors to the county passing by anticipating a quality experience in adjacent forests, state, and federal parks. GP9-3

Thank you for your consideration in this matter.

Sincerely,

Stephen A. Fitch
19012 Shoreline Dr.
Cottonwood, CA 96022
Phone-530-347-0071

Letter GP9 Stephen A. Fitch

Response to Comment GP9-1

Comment noted. The analysis in Section 3.1.2 of the Draft EIR disclosed that the proposed project's visual impacts on the existing visual character would be significant and unavoidable. Impacts related to scenic travel corridors are also discussed in Sections 3.1.1 and 3.1.2.

Response to Comment GP9-2

The visual and aesthetic impacts associated with the proposed project are addressed in Section 3.1 of the Draft EIR. CEQA does not specifically require addressing the economic impacts of a proposed project (State CEQA Guidelines Section 15131). Impacts related to recreation are discussed in Section 3.9.2.

Response to Comment GP9-3

Comment noted. Please refer to the response to Comment GP9-2.

Letter GP10

DEPARTMENT OF
RESOURCE MANAGEMENT
RECEIVED

DEC 3 1 2007

PLANNING/BUILDING
DIVISIONS

December 27, 2007

Bill Walker
Shasta Co Dept of Resource Management

Re: Hatchet Ridge turbines

Day afer day we see and read articles in the media about global warming, about "going green" and about sacrifices that we should all make.
I agree, and I think that most Americans do also. Most of us are willing to do our part. Of course there are always those that are not.

In the article, an advocate for the Pit River Tribe describes the turbines as "ugly". Well, if as the saying goes, beauty is in the eye of the beholder, then it's probably fair to say that ugliness is too. And, to go one step further, all too often this perception is linked to some personal or group agenda or finincaial bottom line. My personal "perception" is that casinos are ugly. They certainly have an ugly effect on the community. (See Searchlight article on Dec 26th, pg B2) Yet they continue to build them . Maybe the turbines would get a lot prettier if they were tied to some financial gain for the Pit River Tribe.

GP10-1

Certainly the visual effect that the turbines have would be minimal. Contrast that with the visual effect of a coal or oil fired generator
which spues thousands of pounds of pollutants into the air and it's a no-brainer. Of course, I suppose it depends on whose backyard these
facilities are in, but electrical power has to come from somewhere. Once again, sacrifices have to made.

Tom Fritz
Anderson

Tom Fritz
3401 Riverside Dr.
Anderson, CA 96007-3823

Letter GP10 Tom Fritz

Response to Comment GP10-1

It is noted that commenter supports approval of the proposed project. Aesthetics and visual resources are addressed in Section 3.1 of the Draft EIR; cultural resources are addressed in Section 3.5.

Letter GP11

Bill Walker

From: Steve Funk [funk@snowcrest.net]
Sent: Friday, January 18, 2008 4:53 PM
To: Bill Walker
Subject: Hatchet Ridge Wind Farm

PO Box 1268
Mt. Shasta, Ca. 96067
530 926-3776

Dear Mr. Walker,
I would like to offer comments on the Hatchet Ridge Wind Farm EIR. I am a northern California resident and a consumer of electricity.

The EIR does not adequately explain the critical need for this project (and many others like it). This country faces a coming energy crisis. Coal, which supplies 50% of our electricity nationwide, is in disfavor because it is the worst fuel for potentially creating climate change. If a capture and sequester system can be initiated, it would reduce the energy available from coal by at least 20%. The supply of natural gas, which supplies 17% of our electricity nationwide likely to begin an inevitable decline very shortly. See this report: http://www.theoildrum.com/story/2006/11/27/61031/618. Nuclear power supplies 20% of our electricity, but our nuclear plants are mostly near the end of their projected life. Nobody seems to want a nuclear plant anywhere near them, and many of these plants may not be rebuilt. Hydroelectric generation supplies 8% of our electricity, but the supply of hydroelectric power is likely to decrease due to increased concern for anadromous fish, and due to irregular flows caused by climate change. The worldwide supply of oil is likely to peak and then decline within 10 years. http://www.peak-oil-crisis.com/Hirsch_PeakOilReportFeb2005.pdf Although oil only produces 3% of our electricity, a reduced supply of oil will create an additional demand for electricity to charge electric vehicles, replacing liquid fuels. **GP11-1**

The need for electrical generating capacity is critical. No source of electricity is completely free of impacts. This project does have adverse impacts, but the critical need for adequate supply of electricity should dictate that it be built.

Sacred sites:
The United States constitution, in the first amendment, guarantees freedom of religion. This means not only that citizens are free to practice their religious beliefs, but that nobody else can impose their religion on you. The members of the Pit River tribe are trying to impose their religion on everyone else, by attempting to restrict the use of land which they do not own, and which is not public land, because of their religous beliefs. It would be a violation of the first amendment rights of the land owners to deny this project just because others have habitually trespassed on the land and used it for religious purposes. **GP11-2**

01/22/2008

Visual impacts:
I don't mind looking at windmills. They are very graceful structures. This is not a wilderness area. When I see a windmill, it reminds me of this poem:
http://www.redhousebooks.com/galleries/freePoems/allWatchedOver.htm

GP11-3

Bird Kills:
The potential to kill eagles is an unfortunate adverse impact. I commend the EIR authors for making their honest best estimate instead of trying to gloss over this issue. As I said above, I believe that the critical need for this project is more important than the small number of eagles that might be killed.
The EIR lists two possible sizes of tower. To mitigate the impact on eagles only the largest size should be used. The largest size will have blades rotating a little slower, so that eagles are more likely to see it, and less likely to get caught if they do try to fly through it.
Another possible mitigation would be to give the remains of any eagles to local native Americans for ceremonial use.

GP11-4

Hydroelectric Impacts:
The EIR does not address the potential impact of the project on hydroelectric operations in the Pit River. In order to provide a steady flow of power, it is likely that the hydroelectric generators will hold back more water when the wind generators are operating at capacity, and release water more quickly when the wind is not blowing. This could have both favorable and unfavorable impacts. It probably is not a project stopper, but needs to be analyzed.

GP11-5

Sincerely,
Stephen L. Funk

01/22/2008

Letter GP11 Stephen L. Funk

Response to Comment GP11-1

The County appreciates the additional information regarding fuel supply provided by the commenter. It will be duly noted in the administrative record for this project.

Response to Comment GP11-2

Impacts on cultural resources are addressed in Section 3.5 of the Draft EIR.

Response to Comment GP11-3

Impacts on aesthetics and visual resources are addressed in Section 3.1 of the Draft EIR.

Response to Comment GP11-4

Most studies conducted to date have not found a relationship between turbine height and bird mortality or between rotor diameter and bird fatality (Barclay et al. 2007). The presumed reduction in bird mortality resulting from larger turbines is associated with the idea that one would need fewer turbines if they are larger, but that would not apply to this project because the number of turbines is fixed. Although there are legal avenues to distribute eagle feathers to Native Americans, there is no nexus to require such distribution as mitigation for eagle mortality.

Response to Comment GP11-5

The Draft EIR does not address the potential impact of the project on hydroelectric operations in the Pit River because it is highly unlikely that the proposed project would have any effect on PG&E's hydroelectric facilities in the area. Hydroelectric projects are regulated by the Federal Energy Regulatory Commission (FERC), and operational changes require FERC approval as well as compliance with the National Environmental Policy Act (NEPA). Issues such as potential impacts on fish, wildlife, recreation and other environmental resources would be studied in great detail prior to approval of any operational changes to the Pit River hydroelectric facilities. At this point, such changes are not reasonably foreseeable.

Letter GP12

January 12, 2008

Shasta County Department of Resource Management
Planning Division
Attn: Mr. Bill Walker
1855 Placer Street, #103
Redding, CA 96001

Dear Mr. Walker:

I am writing to express my support for the Hatchet Ridge Wind Project. Key Points:

--Project will exist on private lands, so access issues raised in the DEIR really are not significant, access will not change due to this project. **GP12-1**

--While any loss of Bald Eagles and other avians is sad, the DEIR mentions a "possibility" of one Bald Eagle every two years. It's possible there will be no loss as well. Further, with the operation of only 44 turbines across a six and one-half mile area the foot print is small enough that adequate habitat remains so the avians may simply avoid the turbines altogether. **GP12-2**

--The largest impact that can not be mitigated is the viewshed impact to the community of Burney. While that is significant, by limiting the project to 44 turbines and laying them out in the semi-linear fashion along the ridgeline it appears that only 14 or so will be highly visible. I believe that with this appropriate sizing of the project the community will come to accept this addition to their viewshed. **GP12-3**

Not addressed in the DEIR are the economic issues which are significant. There are two points that must be recognized:

--Tax revenues from the operations phase of the project will be over one million dollars to Shasta County alone. This increased influx into the county's general fund is necessary and can greatly help to support our local growing needs for infrastructure. A portion of those funds should be shared with the greater community of Burney for our fire departments, hospitals, schools and other local districts. **GP12-4**

--Finally, the greater view that is key in my mind is the ability to generate more power within this country to support our needs and reduce our reliance upon foreign sources of power. This clean and relatively light environmental impact project is a step in the right direction. **GP12-5**

Sincerely,

Pam Giacomini

Pam Giacomini
41363 Opdyke Lane
Hat Creek, CA 96040

Letter GP12 Pam Giacomini

Response to Comment GP12-1

As disclosed in Section 3.9.2 of the Draft EIR, issues related to access of the private land are considered less than significant.

Response to Comment GP12-2

Impacts on biological resources are addressed in Section 3.4 of the Draft EIR.

Response to Comment GP12-3

Impacts on aesthetics and visual resources are addressed in Section 3.1 of the Draft EIR.

Response to Comment GP12-4

Comment noted. Along with the environmental impacts considered in the Draft EIR under CEQA, the economic consequences should be considered by the County as part of its decision-making process. CEQA does not specifically require addressing the economic impacts of a proposed project (State CEQA Guidelines Section 15131).

Response to Comment GP12-5

It is noted that the commenter supports approval of the proposed project.

Letter GP13

From: Marvan Hogan [mailto:marvanhogan@yahoo.com]

Sent: Friday, January 25, 2008 7:53 PM

To: Bill Walker

Subject: Burney wind project is poison in present location

I just hope the people in charge of making decisions for our county's future know that a good idea in a bad location is a bad idea.

Mutilating the mountain charm of this sweetly blossoming art and nature-lovers community with an industrial monstrosity replacing this darling little town's mountainscape would be an amateur move, a backwoods concession to unconcerned, hustling hucksters and would be forever condemned by the locals and beyond.

Getting the developers to bring some benefit to our county's tax revenues and make a marginal contribution to green energy, while abstaining from brutal, unsightly pollution of our county's eastern hub of charm and its irreplaceable resource for tourism and monied retiree investment, would be best.

Turning them away and awaiting other developers who really care for the places they seek to resculpt forever would be the next best option.

GP13-1

I moved my home and law practice here for the tree and mountain views. I take great pains to travel to my home here and spend my money in this county's most wild but comfortable resort community for those rare features, located in a full-service township that still exudes simplicities of a century ago. If you take them away, I and others will no longer be able to fulfill those needs here.

Make them choose another site that respects the people and unique treasures of this county.

GP13-2

Marvan Hogan

(530) 242-8756

Letter GP13 Marvin Hogan

Response to Comment GP13-1

It is noted that the commenter opposes approval of the proposed project. Impacts on aesthetics and visual resources are disclosed in Section 3.1.2 of the Draft EIR. It is noted that the commenter prefers green energy development, but not at the expense of visual impacts in areas where tourism resources exist. Although CEQA does not require analysis of tax revenues in an EIR, the County decision makers will be provided with all comments received on the Draft EIR.

Response to Comment GP13-2

It is noted that the commenter opposes approval of the proposed project. Impacts on aesthetics and visual resources are disclosed in Section 3.1.2 of the Draft EIR.

Letter GP14

January 28, 2008

Shasta County Department of Resource Management
Planning Division
1855 Placer Street, Suite 103
Redding, California 96001
Attn: Bill Walker, Senior Planner

Re: Comments on Hatchet Ridge Wind Project Draft EIR

Dear Mr. Walker:

Thank you for the opportunity to comment on the Draft Environmental Impact Report for the proposed Hatchet Ridge Wind Project.

I am concerned about the effects of the proposed project on avian species in general and on listed and protected avian species in particular. Please disclose in the Final Environmental Impact Report the authority under which Shasta County and/or the Project Proponent could "take" bald eagle, golden eagle, and sandhill crane, given that the California Department of Fish and Game cannot issue incidental take permits for these fully protected species (Draft EIR, p. 3.4-12). **GP14-1**

Sincerely,

Kathryn McDonald
824 Yuba Street
Redding, California 96001

Letter GP14 Kathryn McDonald

Response to Comment GP14-1

Neither the County nor the project applicant will be authorized to "take" fully protected species. As discussed in Section 3.4 of the Draft EIR, impacts on listed species would be minimized to the greatest extent possible in accordance with U.S. Fish and Wildlife Service and California Department of Fish and Game guidelines.

Letter GP15

Richard J. Morris
Shasta County Department of Resource Management
Planning Division
Attn: Mr. Bill Walker
1855 Placer Street, #103

The following is submitted in response to the Draft Environmental Impact Report for the Hatchet Ridge Wind Project. Over the past 30 years I have served on number of tourism related committees and have donated hundreds of hours to improve our community. Projects I have initiated have included community murals, landscaping, school beautification, storefront redesign, and annual kite festivals. I feel qualified to speak to the aesthetics of our area.

First of all I would like to say that I support the basic concept of this project. My concern is for the positioning of the wind generators so that they have the maximum negative impact on the community of Burney. Photos in Figures 3.1-1-13, 3.1-3 and 3.1-4 begin to illustrate the dominance of Hatchet Mountain in the Burney "viewshed". There are very few locations along Main Street in Burney where this ridge isn't the dominant natural feature. A video might be more successful in establishing this point. GP15-1

Photos 3.1-13 suggests the complete transformation of this ridge with the current positioning of the towers. As stated in the Impact AES-2, "the turbines become prominent visual features on the ridgeline and alter the visual character and quality for all viewer groups. In addition to the size, movement of the turbines would likely draw more . . . attention . . . ." My concern with the "simulated view" is the unrealistic contrast of the white towers against an unnaturally light blue sky. A more typical deep blue Burney sky would provide a more realistic image of the visual impact of these towers. GP15-2

Historically, the community of Burney has had an employment base largely dependent upon forestry related industries. With recent changes in these jobs, the community has had to become more reliant upon the money generated by the tourism industry. Upon questioning several business owners, it appears common for summer increases in revenue to be in the range of 20%-60%. With the establishment of Route 89 as a portion of the Volcanic Scenic Highway, it is anticipated that this source of income will only became greater. With the decline of the other employment options, this is a welcomed and critical change in the Burney economy. GP15-3

With this increase in the reliance upon tourism it is important to focus on the interests of those who visit this area. In conversations with personnel at the Burney Chamber of Commerce and McArthur Burney Falls State Park, it becomes obvious that most tourists are from urban communities and are attracted by the scenic beauty of the area. More often than not they are young families who are trying to reconnect with the natural world. Hatchet Mountain has served as the "Gateway" to this world for many. The impact of the wind turbines is indeed "significant" as outlined in Impact AES-2 of the EIR report. My contention is that it is not "unavoidable".

I would like to propose that the wind turbines be moved west out of the view of those in the Burney Basin. This would drop them so that their visual impact on the Burney Basin would be minimized. There would also be less sound transference (3.10.2) and the towers would pose less threat to low flying aircraft. (Even though the EIR Report states that there is "no aviation facilities located within the project vicinity" this ridge is on a major route used by aircraft operated by PG&E, Redding medical facilities, law enforcement, and private individuals flying to the Fall River Airport.) GP15-3

The movement of these towers will likely reduce the maximum power developed but will lessen negative impact on surrounding communities. We have in recent years seen the result of placing corporate profits above the welfare of the majority. This minor change in position of the towers will be a compromise that I believe will create a "Win-Win" situation for all.

In closing I would like to suggest a review of alternatives considered in Section 4.5.1 of the EIR Report. Wind generation offers us an opportunity to become "less reliant upon foreign oil" and have less negative impact on the natural world. The challenge is to use this technology in such a way that we don't destroy the very qualities of life we seek to preserve. The community of Burney deserves the chance to develop its tourism and enjoy the natural beauty which is its biggest asset. GP15-4

Respectfully,

Richard J. Morris

Richard J. Morris
Burney, CA

Letter GP15 Richard B. Morris

Response to Comment GP15-1

Section 3.1 of the Draft EIR presents an assessment of the potential visual and aesthetic impacts of the proposed project. In the Draft EIR, the County has provided a reasonable estimation of the environmental impacts of the proposed project; this analysis includes a variety of still-shot photo simulations. While other methods of demonstrating these effects (e.g., video tape) are possible, the County believes that the visual simulations in the document present an accurate portrayal of the visual impacts and satisfy the requirements of CEQA. CEQA does not require a thoroughly exhaustive analysis; rather, the intent of CEQA is to provide enough information to allow the County decision makers to make an informed decision about the proposed project. Use of video simulations in the analysis would not change the conclusions presented in Section 3.1.2 of the Draft EIR.

Response to Comment GP15-2

The commenter points out the potential difference between the visual simulations presented in the Draft EIR (using partially overcast sky) and a simulation of the proposed project using a clear blue sky. While a simulation using a blue sky might portray the project as being more prominent (white turbines against blue sky), the visual analysis included research regarding average annual meteorological conditions; this research indicated that a partially overcast sky is common in the project area. CEQA requires an analysis that reasonably predicts the potential environmental impacts of the proposed project. While many different viewpoints and sky conditions could be depicted, the simulation views presented in the Draft EIR are a suitable representation of the projects visual impacts.

Response to Comment GP15-3

It is noted that tourism is an important component of the local economy; however, CEQA does not require analysis of economic effects in an EIR. Impacts on aesthetics and visual resources are addressed in Section 3.1 of the Draft EIR. Refer to the response to Comments GP4-2 and OG7-53. Also, see the *Zone of Visual Influence Assessment* at the end of Appendix A. Although the proposed project would not be within 5 miles of any general aviation airport, it could potentially interfere with air navigation, as disclosed on page 3.7-14 in Section 3.7, *Hazards and Hazardous Materials*, of the Draft EIR. Accordingly, the project would be required to comply with the requirements of the Caltrans Division of Aeronautics and the Federal Aviation Administration for air navigation safety. Refer to Mitigation Measures HAZ-4a and 4b on page 3.7-15 of the Draft EIR.

Response to Comment GP15-4

A discussion of the alternatives analysis is provided in Section 4.5 of the Draft EIR. The County feels that this analysis is thorough, objective, and in keeping with CEQA requirements. See also the response to Comment GP4-2.

Letter GP16

-----Original Message-----
From: Dee Sardoc [mailto:deesar@frontiernet.net]
Sent: Sunday, January 27, 2008 2:28 PM
To: Bill Walker
Subject: Hatchet Ridge Wind project comment

Greetings,

I am writing about the proposed Hatchet Ridge Wind project. I wanted to point out a couple of things pertaining to the EIR, especially as it has to do with birds.

First of all, the EIR seemed fairly done, except that, in my humble opinion, a truly fair bird study would have been conducted over an entire year. I know that may seem unrealistic, but the movements of the birds can only be truly studied if done in all seasons. I have personally seen many more birds (including the threatened Sandhill
Cranes) than the EIR indicates, flying through the project zone at various times.

GP16-1

There are 2 points that, to me, the EIR didn't really address. Firstly, Bald Eagles are very opportunistic feeders - they often scavenge dead carcasses of birds. I've personally seen Baldies feeding on dead Canada Geese in the wetland near my house - not geese they've killed, but that were already dead. This opportunistic, scavenging, feeding behavior of Bald Eagles is widely documented. I believe that the wind mills will kill all kinds of birds and I believe the Bald Eagles will be lured to the vicinity by the free food made available by the wind mills, and then will meet their demise. I realize this is conjecture, but I believe it to be well founded.

GP16-2

My other point is this - nothing was brought up in the EIR about the visibility of the wind mills to flying birds. I don't know how often you folks down in Redding drive over Hatchet Pass, but fog is a very big issue in that area. At times, the fog is so thick you can hardly see 20 feet in front of you. I know of many people who have started out to drive over Hatchet Pass, only to turn back, due to the poor visibility.
The company proposing to build the windmills says that the slower rotation of the blades will cause the birds to be able to see them and avoid them. I believe that there will be a vast amount of time that the birds will not be able to see the spinning blades, due to the fog.

GP16-3

I also know of an official of the local Audubon society who has heard thousands of geese flying through that area while the fog was so thick you couldn't see the geese. This fellow knows his birds & he says that in Nov. 2003, he heard thousands of Snow Geese & Greater White Fronted Geese flying through the exact area the windmills are proposed for. He notes that if the windmills had been up & running, the thousands of birds would not have stood a chance, as they never would have seen the spinning blades until too late and they were barely skimming the ridge.
(see
<http://groups.yahoo.com/group/shasta_birders/message/2951>http://groups
.yahoo.com/group/shasta_birders/message/2951)

I noticed in the newspaper that you were quoted as saying you had only received positive comments on the windmill project. Personally, I have been

GP16-4

out of town for the greater part of January & have only recently returned, or I would have written this sooner. In addition, I know for a fact that the company, RES, has gone to great lengths to 'buy off' the community of Burney, so that they would be looked on favorably. The folks who have had their pet projects benefit from RES's 'generosity'
(which I believe will quickly disappear if the windmills are allowed to be built) are the folks most in favor of the project.

GP16-4 cont.

In conclusion, after reading the EIR, I cannot see how the county could possibly allow this project to continue - it says that the death of Bald Eagles and Sandhill Cranes will be unavoidable and the only mitigation would be to count the dead birds & try to get the company to shut down during peak migration periods. Well, if you look at the Altamont Pass project, you can see that they are having a great deal of difficulty in getting the company there to shut down. If these windmills are allowed to be built, the company will not want to shut down, as it will hurt their bottom line.

How can you possibly allow this project to go through, when the EIR plainly says that threatened species will die due to the project?

GP16-5

Thank you for the opportunity to address my concerns about the proposed project.
Dee Sardoch
Burney, CA

Letter GP16 Dee Sardoc

Response to Comment GP16-1

The bird monitoring study was conducted for an entire year, from November 15, 2005, to November 9, 2006. The study is included in Appendix C of the Draft EIR.

Response to Comment GP16-2

Based on results of the bird monitoring study, the number of waterfowl mortalities is expected to be low. Waterfowl mortalities at other large wind farms are very low, even when large numbers of waterfowl are present, presumably because they do not typically fly within the height of the rotor-swept area. It is therefore unlikely that large numbers of waterfowl or other large species would be killed and subsequently serve as an attractant to scavenging bald eagles. Accumulations of bird mortalities significant enough to attract scavengers other than individual coyotes have not been observed at Altamont, the wind farm with the highest mortality rates.

Response to Comment GP16-3

Thick fog is a factor that would increase the vulnerability of birds to rotating turbines on days when it occurs. However, as noted in the avian study, large waterfowl are generally known to fly above the rotor-swept height of the turbines, and the estimated exposure risk was low. The WEST report (Appendix C of the Draft EIR) also notes that mortalities at existing wind farms where waterfowl are present in large numbers are very low. Also, rotating turbine blades make noise and can be heard, even in thick fog. Finally, foggy days are usually not windy, and operations may not be feasible in such conditions.

Response to Comment GP16-4

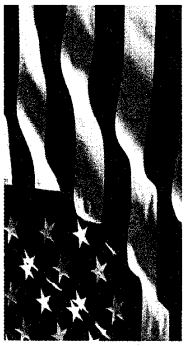
Comment noted. CEQA only requires that responses be provided to substantive comments on the content of the Draft EIR. Comments on the project applicant or the merits of the project itself are not within the purview of issues required for review by CEQA (CEQA Section 15088[c]).

Response to Comment GP16-5

CEQA requires that the environmental impacts, along with feasible mitigation, be presented in an EIR. CEQA also allows for a lead agency to override impacts determined to be significant and unavoidable with a Statement of Overriding Considerations. In order to override any significant and unavoidable impacts associated with a proposed project (in this case, avian mortality), a finding indicating that the benefits of the project outweigh any unavoidable impacts would have to be issued. The County would be required to make such a finding should the proposed project be approved.

GP17-1

Letter GP17



Dec. 28 2007

Dear Bill Walker,

I am all for the Turbines on Hatchet Ridge. I hope and pray this wire be the beginning that a day soon, the United States will no longer import oil from any country. The oil spill is, Kill our beautiful Birds, and spoil our Beautiful beaches and area. Do your best. Thank you. God Bless you.

Virginia Schneider

Support Our Troops ~ Remember Our Veterans

We have lived in Burney since 1948.

Frank & Virginia Schneider
36766 Highway 299 E Spc 50
Burney CA 96013

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DEPARTMENT OF RESOURCE MANAGEMENT RECEIVED

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PLANNING/BUILDING DIVISIONS

Bill Walker
Senior planner Shasta County
Resource management
Planning Division
1855 Placer St.
Redding, CA 96001

3600141733

Letter GP17 Virginia Schneider

Response to Comment GP17-1

It is noted that the commenter supports approval of the proposed project and alternatives to peteroleum-based power generation.

Letter GP18

-----Original Message-----
From: Sleight [mailto:fluttrby@citlink.net]
Sent: Wednesday, January 23, 2008 7:04 PM
To: Bill Walker
Subject: Hatchet Ridge Windmill Project

Dear Mr.Walker,
I would like to express my feelings in favor of the windmill project. It would make a positive impact on the economy of the area as well as showing
a willingness to promote clean energy which helps to protect the environment.
I do not believe that it would be an eyesore, nor do I believe it to be harmful to wildlife. I think, also, that the Indian tribes involved should give some consideration to joining the rest of us in constructive progress rather than maintaining their attitude of separateness and questionable reverence of the natural landscape. Thank you.
Roger Sleight
Resident of Hat Creek

GP18-1

Letter GP18 Roger Sleight

Response to Comment GP18-1

It is noted that the commenter supports approval of the proposed project. Impacts on aesthetics and visual resources are addressed in Section 3.1of the Draft EIR; impacts on biological resources are addressed in Section 3.4.

01/22/2008 16:46 15303366202 J AND M SULLIVAN PAGE 01

Letter GP19

P.O. Box 276
McArthur, CA 96056

January 22, 2008

Shasta County Department of Resource Management
Planning Division
1855 Placer Street, Suite 103
Redding, CA 96001

Attn: Bill Walker, Senior Planner
Re: Comments on DEIR for the Proposed Hatchet Ridge Wind Project

Attached are my comments on your DEIR for the proposed Hatchet Ridge Wind Project. **GP19-1**

I would appreciate receiving notification of further hearings on this project and would like to obtain the final EIR when it is available.

Sincerely,

Marta Sullivan

Marta Sullivan

01/22/2008 16:46 15303366202 J AND M SULLIVAN PAGE 02

COMMENTS ON THE DEIR FOR THE HATCHET RIDGE WIND PROJECT

Biological Resources, Impact Bio-1,

The impact on Butte County morning glory is listed as "Less Than Significant" in this report, yet 6 turbines are scheduled to be built upon the main area where these rare plants are growing. Hatchet Ridge is listed as the third largest locality for Butte County morning glory in California and this location is therefore important to the continuation and success of this native plant..

Mitigation Measure BIO 2, page 3.4-16, paragraph 2, discusses "successful reestablishment" of these plants. It does not say how. Has this been achieved before? Plants become rare and/or endangered for a reason. How will invasive species be prevented from moving into its territory once the ground has been disturbed during the construction process. Prostate Knotweed is noted in one of the studies in the appendices as being present on the site. This plant is very invasive and the seeds are probably already present in the soil. A more appropriate mitigation should be to eliminate or move these 6 turbines. GP19-2

Biological Resources, Impact Bio-2.

This impact relates to wetlands on the site. In the report, "Wetlands and Other Surface Waters Report" by Western EcoSystems Technology, Inc., it is stated that there are no wetlands on the site (page 3, paragraph 5). However, there are four "spring wetlands" and one ephemeral pool listed in the body of the DEIR, and on the maps included. The plants seen and listed are riparian in nature and indicative of wetlands present.

Mitigation BIO-3, page 3.4-17 contains a long list of mitigation measures to be taken to preserve these wetlands and make this impact "less than significant." This mitigation needs strengthening and should be written for the specific project site with these wetlands in mind. One of the mitigation measures proposed is to do the construction during the dry season. Our dry season is when the plants are flowering. The wet season is in the winter. If heavy equipment goes through these springs and damages their fragile ecology in the summer, the riparian plants may not come back the following year. The only preservation for these wetlands is to keep construction equipment off of them. GP19-3

Elderberries are also listed throughout the report as being present on the site. On page 1 of 8, Table 3.4-3 (invertebrates), it is stated that there is no potential for the Valley Elderberry Longhorn Beetle on the site due to the lack of Elderberries. This is a curious statement in that Elderberries have been listed as being present on the site. The Valley Elderberry Longhorn Beetle is a protected invertebrate and its presence, or lack of, needs to be established. GP19-4

Biological Resources, Impact Bio-12.

This impact deals with bats and their migrations. It was interesting to read about the Anabat II Bat detector technology used. However, this information did not reveal whether the bats would strike the turbines or not. Detectors were placed on the ground level and 50 m high. It was determined that bat migrations occur from August 5 to October 18. This may be weather dependent and migration probably goes into November. The study was unable to determine the exact species of many of the bats 'heard.' Until more study determines which bats use the area, this impact should not be considered "less than significant." GP19-5

Ecological Resource, Impact Bio-13.

On page 3.14-24, it is stated that the majority of birds flew in migratory paths over the ridge and not along it. Thus, it is supposed, that they would not come into contact with the turbines located along the ridge. It is necessary for birds, and bats, to cross over the ridge to leave this intermountain area. I don't see the logic in the statement that they will not be affected by the turbines. More information is needed on the migration paths of birds, and bats, using this corridor for migrations purposes. Often the area has low clouds and visibility is greatly impaired. Also, many migrate at night and in darkness. There were no studies to determine these patterns in the report. This impact should not be considered "less than significant." GP19-6

Finally, in the DEIR, there was a statement that 63% of the 1581 birds observed (1002 individuals) were seen at "rotor swept height." The teams which did the observing did not spend a long time at this and they still saw this very large number of birds which potentially had the probability of getting caught in the blades of the turbines. This is an extremely large impact and should be noted as this. GP19-7

by Marta Sullivan
January 7, 2008

Letter GP19 Marta Sullivan

Response to Comment GP19-1

This is a cover letter to the comments prepared by Marta Sullivan. As requested, Ms. Sullivan has been placed on the mailing list for this project and will receive notification of future public hearings on the project.

Response to Comment GP19-2

Section 3.4.2 of the Draft EIR sets forth two options for reducing effects on Butte County morning-glory. Mitigation Measure BIO-1 calls for redesigning the turbine layout to avoid Butte County morning-glory habitat if feasible. If full avoidance is not possible, Mitigation Measure BIO-2 provides feasible measures to avoid and minimize effects on Butte County morning-glory. As discussed in the response to Comment OG6-8 and OG6-9, current knowledge indicates that Butte County morning-glory responds favorably to certain types of soil disturbance. Mitigation Measure BIO-2 calls for measures to control invasive nonnative plants.

Response to Comment GP19-3

Mitigation Measure BIO-3 in Section 3.4.2 of the Draft EIR is a comprehensive array of measures to avoid and minimize effects on wetlands.

Response to Comment GP19-4

Elderberries are present in the project area. However, the lowest elevation of the project area is approximately 4,300 feet, and the current range of valley elderberry longhorn beetle does not encompass areas above 3,000 feet.

Response to Comment GP19-5

Comment noted. The number of bat detections in the project area was not unusually high. However, the text in Impact BIO-12 has been revised to reflect the fact that the project area does not contain habitat suitable to support large concentrations of bats (i.e., communal roosting or nursery sites). All bats with potential to occur in the project area are listed in the document; none of these are state- or federally listed species.

Response to Comment GP19-6

Migrating birds often follow ridgelines which, under the right conditions, create updrafts that make long-distance flights easier. The fact that birds passed through the area perpendicular to the ridge indicates that the mountain is not used for this purpose and therefore that birds are not likely to be unduly concentrated along the ridgeline. Nowhere does the document suggest that birds will not come into contact with the turbines or will not be affected. Low clouds and visibility are typically associated with atmospheric inversions, during which there is little to no wind; consequently, the turbines are unlikely to be rotating during these conditions. Subsequent to publication of the Draft EIR, a nocturnal migration study using radar was conducted. The reports detailing the finding of this study and an evaluation of the study conducted on behalf of the Wintu Audubon Society are provided as Appendices B and C of the Final EIR. The results of the study indicate that the mean passage rates of "targets" (individual birds cannot be distinguished using radar) was approximately 1.1–23 nocturnal migrants/turbine/day within the area that would be occupied by turbines. Although very few similar studies have been conducted, and comparisons thus provide very little information, the passage rates were generally within the range of values reported at other study sites.

Response to Comment GP19-7

Although 1,581 birds were observed within the rotor-swept height, the number that would actually be affected is far less than this, as demonstrated in the West report (Appendix C-1 of the Draft EIR). To put it simply, the number of birds observed at rotor-swept height is not equivalent to the number of birds that would be struck by turbines for several reasons. For example; theoretical rotor-swept height over the project area constitutes a far larger area than actual rotor-swept area. Additionally, most individual birds are able to avoid turbines most of the time. Finally, only a fraction of the birds that fly through the actual rotor-swept area would suffer a bird strike.

Letter GP20

From: Rocky Torgrimson [mailto:rtorgrimson@dicalite-dicaperl.com]
Sent: Friday, January 25, 2008 4:35 PM
To: Bill Walker

Subject: Hatchet Ridge Draft EIR

Dear Mr. Walker:

I have reviewed the draft EIR for the Hatchet Ridge Wind project, and would like to offer these comments. This draft addressed most of the impacts. However, these following need further comments:

1. The mitigations for the visual impact of the project have not been fully addressed. Requiring the adjacent forest companies to allow the conifer trees achieve full maturity with heights exceeding 100 feet would help shield the visual impacts. I realize this will require a very long time, and the forest companies to stop clear cutting nearby. **GP20-1**

2. The transportation issue of transporting the long turbine blades was not addressed. The stated blade lengths of 126 to 156 feet, coupled with the length of the truck equipment used to haul them, would exceed 180 feet, over 2.5 times of the legal length of regular trucks. **GP20-2**

I don't think Hwy. 299 can accommodate loads of this length.

The benefits of this project far outweigh the negative impacts. With the population of California rapidly approaching 40 million, we need many more green energy producing projects like this one. **GP20-3**

I am generally in favor of this project. I was born and raised in Burney, and

have continued to work here my entire adult life.

Rocky Torgrimson

Ph. 530-335-5451x102
rtorgrimson@dicalite-dicaperl.com

Letter GP20 Rocky Torgrimson

Response to Comment GP20-1

Comment noted. Timber management on properties adjacent to the project area was not considered in the Draft EIR; moreover, the County has no authority to regulate timber management on those properties. Finally, the towers would be so much taller than mature forest on the ridge that the visual consequences of retaining mature trees would not serve to reduce this impact to a less-than-significant level.

Response to Comment GP20-2

The transportation and traffic impacts associated with the proposed project are addressed in Section 3.12 .2 of the Draft EIR. Transportation of equipment of unusual size or shape is regulated by Caltrans. Discussion on page 3.12-7 of the Draft EIR discloses that approximately 352 trucks would carry oversized loads. The size, weight, and configuration of these loads would be subject to Caltrans regulations. Safety hazards associated with the proposed project are addressed on page 3.12-10 (Impact TRA-2) of the Draft EIR.

Response to Comment GP20-3

It is noted that the commenter supports approval of the proposed project.

Letter GP21

Mr. Walker,

I am expressing my concerns regarding the proposed wind-generation project on Hatchet Mountain. I am a private citizen; I live and work in Burney; and I am a member of the Burney Community.

I am opposed to this project because of the negative visual impact on the landscape and the destruction of native wildlife. I have attended all the public meetings on this project. The wind towers are huge and prominently visible from the entire town of Burney. The proposed site is in direct line with Main Street, and every citizen of this town will look at these monstrosities every time he or she drives down Main Street. **GP21-1**

I work in the recreation industry. There are over 250,000 people who come to this area each year just to visit Burney Falls. There are probably an equal number of people who visit this area for the fishing, hiking, camping, and hunting that are not included in this visitation figure. The visitors who support this community with their recreation dollars come to this area because of the unobstructed natural beauty of the area. **GP21-2**

I moved here to live and work in this area to see the beautiful forests and spectacular birds of prey – especially the bald eagles. This project threatens to mar the beauty of the forest and kill the birds of prey. This project would change the visual landscape and could inhibit recreational visitors from coming here to see the forests and the wildlife. This would result in a drop in visitation, less money spent in this area, and a hardship on the business community. The short-term construction gains are not worth the potential long-term losses. **GP21-3**

I know these are "newer" style turbines and they kill fewer birds than the old turbines, but even one death of a bald eagle is unacceptable. This bird is our national symbol. Most people in our nation have never seen a bald eagle in the wild, and this project proposes to ruin one of the last places in California where viewing a bald eagle is still possible. **GP21-4**

I am not opposed to wind-generated energy. When the technology is improved enough to not kill wildlife, these types of projects should be pursued. At that time they should be moved to areas that are not inhabited. This proposed project would be a visual eyesore to 5000 people that live in the Burney Basin Community (Burney and Johnson Park) and everyone who visits this area. **GP21-5**

The proposed site for this project is not acceptable. Please address these concerns before continuing forward with this project. **GP21-6**

Thank you for accepting public comments.

Andrew Urlie, Concerned Burney Community Member

Letter GP21 Andrew Urlie

Response to Comment GP21-1

Comment noted. The analysis in Section 3.1.2 of the Draft EIR concluded that the proposed project's visual impacts on the existing visual character would be significant and unavoidable.

Response to Comment GP21-2

The commenter provides information regarding recreational activities and their contribution to local economies. Visual impacts of the proposed project are disclosed in Section 3.1.2 of the Draft EIR.

Response to Comment GP21-3

Impacts on aesthetics and visual resources are disclosed in Section 3.1 of the Draft EIR. Impacts related to biological resources, including bald eagles, are disclosed in Section 3.4.2 of the Draft EIR.

Response to Comment GP21-4

Impacts on biological resources are disclosed in Section 3.4 of the Draft EIR.

Response to Comment GP21-5

Potential impacts on visual resources and wildlife are disclosed in Sections 3.4.2 and 3.1.2 of the Draft EIR, respectively.

Response to Comment GP21-6

It is noted that commenter opposes approval of the proposed project. Evaluation of an alternative location for the project is presented in Section 4.5.1 of the Draft EIR.

Public Agency Comments

Letter PA1

State of California – The Resources Agency
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
Northern Region
601 Locust Street
Redding, California 96001
(530) 225-2300

ARNOLD SCHWARZENEGGER, Governor

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STATE CLEARING HOUSE

January 25, 2008

Mr. Bill Walker, Senior Planner
Shasta County Department of Resource Management
1855 Placer Street
Redding, California 96001

Dear Mr. Walker:

Hatchet Ridge Wind Project Draft Environmental Impact Report (DEIR)
State Clearinghouse Number 2007042078

The Department of Fish and Game (DFG) has reviewed Shasta County's (County) DEIR for the subject project. Hatchet Ridge Wind, LLC, proposes the construction of up to 68 wind turbines along a 6.5 mile corridor on Hatchet Ridge, extending north from a point approximately 0.5 mile north of State Route 299. The turbine towers will have a maximu PA1-1 ıt of 262-feet, and the turbine blades will be a maximum of 418-feet high to blade tip. The project will generate a maximum of 102 megawatts of electricity. A 230 kilo-volt overhead transmission line and tower system up to 5 miles in length will be constructed to connect the turbine system to the existing PG&E transmission system. Pursuant to Section 15082(b) of the California Environmental Quality Act (CEQA) Guidelines, the DFG offers the following comments on the DEIR in our roles both as a trustee agency and as a responsible agency. PA1-1

Operational Impacts on Avian Species

As noted in its response to the Notice of Preparation (NOP), DFG believes that this project has the potential for substantial adverse operational impacts on birds, including species which are listed as endangered or threatened under the California Endangered Species Act (CESA), and species which are fully protected by law (Fish and Game Code (Code) Section 3511). The DEIR states the project has the potential for take of the following special status bird species due to wind turbine operations, resulting in potentially significant adverse impacts: PA1-2

Greater sandhill crane *(Grus canadensis tabida)* - State listed as threatened and fully protected.
Bald eagle *(Haliaeetus leucocephalus)* - State listed as endangered and fully protected.

Conserving California's Wildlife Since 1870

Northern spotted owl *(Strix occidentalis caurina)* - State species of special concern (SSC).
California spotted owl *(Strix occidentalis occidentalis)* - SSC
Cooper's hawk *(Accipiter cooperii)* - SSC
Ferruginous hawk *(Buteo regalis)* - SSC
Sharp-shinned hawk *(Accipiter striatus)* - SSC
Osprey *(Pandeon haliaetus)* -SSC
American peregrine falcon *(Falco peregrinus anatum)* - State listed as endangered and fully protected.

PA1-2 cont.

The DEIR concludes that significant operational impacts to sandhill crane, bald eagle and various raptor and other avian species will occur (Impacts BIO-8, 9 and 11), due to turbine blade collisions. The DEIR proposes Mitigation Measure (MM) BIO-6 as mitigation for these impacts. MM BIO-6 proposes that mortality monitoring reports in conformance with the California Energy Commission's ***California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*** (CEC Guidelines) be conducted, and operational avoidance measures be implemented should annual mortality exceed certain species specific levels. DFG recommends the applicant be required to provide these reports to DFG by December 31 of any year in which turbines operate.

PA1-3

The DEIR correctly concludes that this mitigation measure will not fully avoid or adequately compensate for these impacts, and thus the impacts are still significant after mitigation. The DEIR establishes a standard of significance under which 5 sandhill crane mortalities per year or 3 bald eagle mortalities per year would be a significant impact. The DEIR also state that mortality of fewer than 5 sandhill cranes per year or 3 bald eagles per year due to wind turbine operations would result in no significant impact (respectively for these species) and no further need for continued mitigation pursuant to MM BIO-6.

Bald eagles, greater sandhill cranes and American peregrine falcons are State listed as threatened or endangered, and are fully protected. DFG cannot agree with an approach to mitigation that results in take of State listed bird species and does not fully mitigate all impacts on those listed species. It is unlawful pursuant to CESA (Code Section 2081) to take State listed species without a take permit. It is furthermore unlawful to take fully protected species pursuant to Code Section 3511, and no take permit for such species may be issued by DFG.

PA1-4

DFG believes the threshold for the prevention of take should not be arbitrarily set as proposed in the DEIR. Due to the prohibition on the take of these bird species, DFG believes that the implementation of measures to avoid take must occur at any time monitoring efforts indicate mortality due to turbine operations of any birds protected under State law has occurred. (Take is defined as "hunt, pursue, catch, capture or kill, or attempt to hunt, pursue, catch, capture or kill".)

The above referenced MM BIO-6 calls for bird mortality monitoring efforts to be conducted for 5 years. It does not require that monitoring continue after 5 years regardless of the number of bird mortalities that are recorded. Public Resources Code (PRC) Section 21081.6(a)(1) requires that the County prepare and implement a Mitigation Monitoring and Reporting Program to assure compliance with and monitor success of all required mitigation "during implementation". Allowing the mortality monitoring per MM BIO-6 to cease after 5 years will not be consistent with CEQA because mortality of protected bird species requiring mitigation may occur beyond that 5 year time frame. Furthermore, since the project phasing plan does not clearly establish the degree to which the project will be built out within 5 years, the mortality monitoring effort should not be limited to that time frame. In order to determine that take does not occur, and that avoidance measures are implemented promptly to avoid take, monitoring efforts must continue until it can be demonstrated that take has not occurred and is unlikely to occur for an extended period of time. DFG suggests that the time frame for mortality monitoring must be established as the operational period for the project.

PA1-5

The forest surrounding the project is in an early seral successional stage. Information provided by the applicant to Shasta County indicates the primary land owner, Sierra Pacific Industries, replanted its holdings on Hatchet Ridge with a wide variety of conifer species. (Please see the plantation map provided by the applicant to Shasta County on September 18, 2007; a copy is enclosed.) As these plantation trees eventually mature into a conifer forest similar to surrounding lands, the attractiveness of the project site as habitat for a wider variety and greater number of birds than were discovered during avian counts in 2006 is likely to increase. Monitoring per the CEC Guidelines must continue as this plantation forest matures to assure that increased bird use of the site does not result in mortality of protected bird species.

PA1-6

The DEIR does not discuss a full range of options for mitigation of significant impacts due to turbine collisions as required by CEQA. Instead, MM BIO-6 proposes several avoidance measures designed to minimize the number of bird mortalities, including operational timing restrictions and permanent shutdown or relocation of one or more turbines. The DEIR correctly concludes that the avoidance measures cited in MM BIO-6 are not expected to reduce impacts below potentially significant levels. CEQA requires that an impact which is considered significant must be mitigated either below the level of significance, or to the maximum extent practical. DFG suggests that other forms of mitigation including other minimization schemes and compensatory mitigation may be available. For example, the option of redesigning turbine placement for any turbines not yet constructed is not discussed. Additionally, repowering using latest technology may be a future option, as well as utilizing alternative designs or adjusting the height or rotor sweep of constructed or yet-to-be constructed turbines. Also, the DEIR does not discuss lighting schemes which may reduce attraction of birds at night, and does not discuss options for compensatory mitigation. The CEC Guidelines provide that compensatory mitigation for mortality at wind farms could include offsite conservation, protection, restoration or enhancement of essential habitat, or some combination of these. DFG staff is available to discuss with the County and the applicant the options for additional mitigation which may further reduce significant impacts on protected avian species.

PA1-7

PA1-8

PA1-9

The DEIR does not propose any additional avian use studies after project operations commence. The CEC Guidelines recommend that wind projects located within areas where mortality of protected species is expected due to turbine collisions should include at least one year of bird use counts during project operation, to provide a context for interpretation of fatality data, to provide insight into turbine-specific fatality patterns and to understand effects of turbines on bird behavior and distribution. DFG recommends a requirement for avian use surveys during early project operations be added to MM BIO-6.

PA1-10

Impact BIO-11 on page 3.4-22 states the project could result in direct mortality of special status raptors and other common and special status avian species. The discussion for this impact should specifically list all bird species for which mortality may potentially occur resulting in significant impacts. It is proposed that MM BIO-6 be implemented to mitigate for this impact. However, MM BIO-6 does not include any criteria for implementation specific to the species summarized in Impact BIO-11. No mortality thresholds for species other than bald eagle and sandhill crane are proposed by MM BIO-6. Consistent with the arguments provided in preceding paragraphs, DFG believes that any mortality of special status raptors should result in implementation of avoidance measures pursuant to MM BIO-6.

PA1-11

The DEIR concludes that potential impacts to golden eagle *(Aquila chrysaetos)* (SSC and fully protected) are less than significant, because during the one year of avian surveys only one golden eagle was detected. However, we note that Table 3.4-3 predicts a high potential for occurrence of golden eagle, and that golden eagle are known to pass through the project area during migration. Consequently, DFG believes that take of golden eagle due to turbine operations is likely, and that impacts to golden eagle should be considered potentially significant. **PA1-12**

A new overhead power transmission line up to 5 miles in length to deliver generated power to existing Pacific Gas and Electric transmission lines located near SR299 is planned. In its response to the NOP, DFG requested that the potential direct and indirect effects on birds and bats of power line conductors, towers and guy wires be examined by the EIR, and mitigation measures for any identified potentially significant impacts be designed and described. DFG finds that there is no specific discussion of the potential for operational impacts on birds from this power line. Impacts on sandhill crane migrations could be significant, since cranes are known to have particular difficulty in avoiding collisions with high voltage power lines. Sandhill cranes are known to migrate in large groups across Hatchet Ridge, as evidenced by the avian studies commissioned by the applicant (group of 30 birds) and by observances listed by Shasta Birders Association (www.Birdersonthe.Net) (group of 50-60 birds, copy attached). Options for design mitigation may include wire spacing and tower and guy wire design, and additional mitigation should include the use of flight diverter devices installed on the conductors and guy wires to prevent bird collisions. **PA1-13**

Protection of Riparian Areas to Prevent Construction Impacts

Impact BIO-6 on page 3.4-19 states that construction impacts to Cascades frog *(Rana cascadae)*, yellow warbler *(Dendroica petechia brewsteri)* and willow flycatcher *(Empidonax traillii)* may be significant unless riparian areas are protected with an adequate construction buffer. MM BIO-3 is proposed to mitigate for this impact. However, MM BIO-3 contains no mitigation buffer requirement for riparian areas. DFG recommends that MM BIO-3 be amended to provide that all measures therein listed be applicable to riparian areas as well as wetlands and streams. DFG also typically recommends a minimum of 200 foot buffer from construction activities for nesting willow flycatchers and yellow warblers rather than the 100-feet suggested by MM BIO-5. If the appropriate buffer cannot be provided and impacts to willow flycatcher may result, an incidental take permit pursuant to Code Section 2081 will be required. **PA1-14**

Mr. Bill Walker
January 25, 2008
Page Six

Notification Pursuant to Fish and Game Code Section 1602

In its response to the NOP, DFG noted that the project proponent will be required to notify DFG under Division 2, Chapter 6, §1602 of the Fish and Game Code due to project activities associated with multiple stream crossings and roadway construction. DFG pointed out that the EIR must address the potential biological streambed alteration impacts and propose feasible mitigation. The DEIR does not provide details on the number or locations of these crossings. These details should be added to the DEIR and a description of the manner in which streams will be altered to accommodate road crossings should be included. If this information is not added to the DEIR, subsequent environmental review may be necessary prior to issuance of any Streambed Alteration Agreement pursuant to Code Section 1602. Additionally, Code Section 1613 provides that the DFG may suspend processing of a streambed alteration agreement if the project to which it pertains will violate any other section of the Code.

PA1-15

Peer Review of Baseline Ecological Studies

The "Peer Review of: Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project" (Peer Review, copy enclosed) was prepared by Jones and Stokes, Inc. and was forwarded to DFG staff on June 21, 2007. The Peer Review was intended to provide a second professional opinion on the avian surveys and other biological documentation prepared to date by the applicant, for the benefit of the County. The Peer Review Report was forwarded to DFG for comment by the County. In its response to the NOP, DFG concurred with the recommendations of this report. The Peer Review's recommendations of particular relevance to those made elsewhere in this letter are the recommendation to conduct pre-project auditory nocturnal surveys for owls, the recommendation to develop additional information to determine if migration corridors of various migratory species may pass over the project area, and the recommendation to more fully analyze the potential long term effects on bird use of plantation forest maturation on Hatchet Ridge. DFG finds that this report is not mentioned in the DEIR and the recommendations of the report are not addressed by the DEIR. DFG continues to believe that nocturnal surveys for owls should be conducted to determine the potential for night time owl use of the project area which was not revealed by the avian use surveys.

PA1-16

We note that responses to the NOP are not included with or cited as an appendix to the DEIR. Inasmuch as DFG's response to the NOP contained additional information on the regulatory status of species potentially affected by the project, and recommended additional migratory and nocturnal bird surveys which have not been completed or addressed by the DEIR, DFG's NOP response letter is included as an attachment to this letter.

Mr. Bill Walker
January 25, 2008
Page Seven

Please note that when filing a Notice of Determination in conformance with Public Resources Code Section 21152, environmental filing fees will be payable pursuant to Fish and Game Code Section 711.4 because the project will have an effect on fish and wildlife resources due to habitat alterations from turbine, road and power line construction, and turbine operation. **PA1-17**

DFG anticipates that it will provide additional written and verbal comments during the public hearing process for this project, and will review the Final EIR during its review period. Thank you for the opportunity to comment on this project. If you have any questions regarding this information, please contact Staff Environmental Scientist Bruce Webb at (530) 225-2675. **PA1-18**

Sincerely,

GARY B. STACEY
Regional Manager

cc: Shasta County Planning Commission
1855 Placer Street
Redding, CA 96001

State Clearinghouse
Post Office Box 3044
Sacramento, CA 95812-3044

Ms. Amy Fesnock
U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825

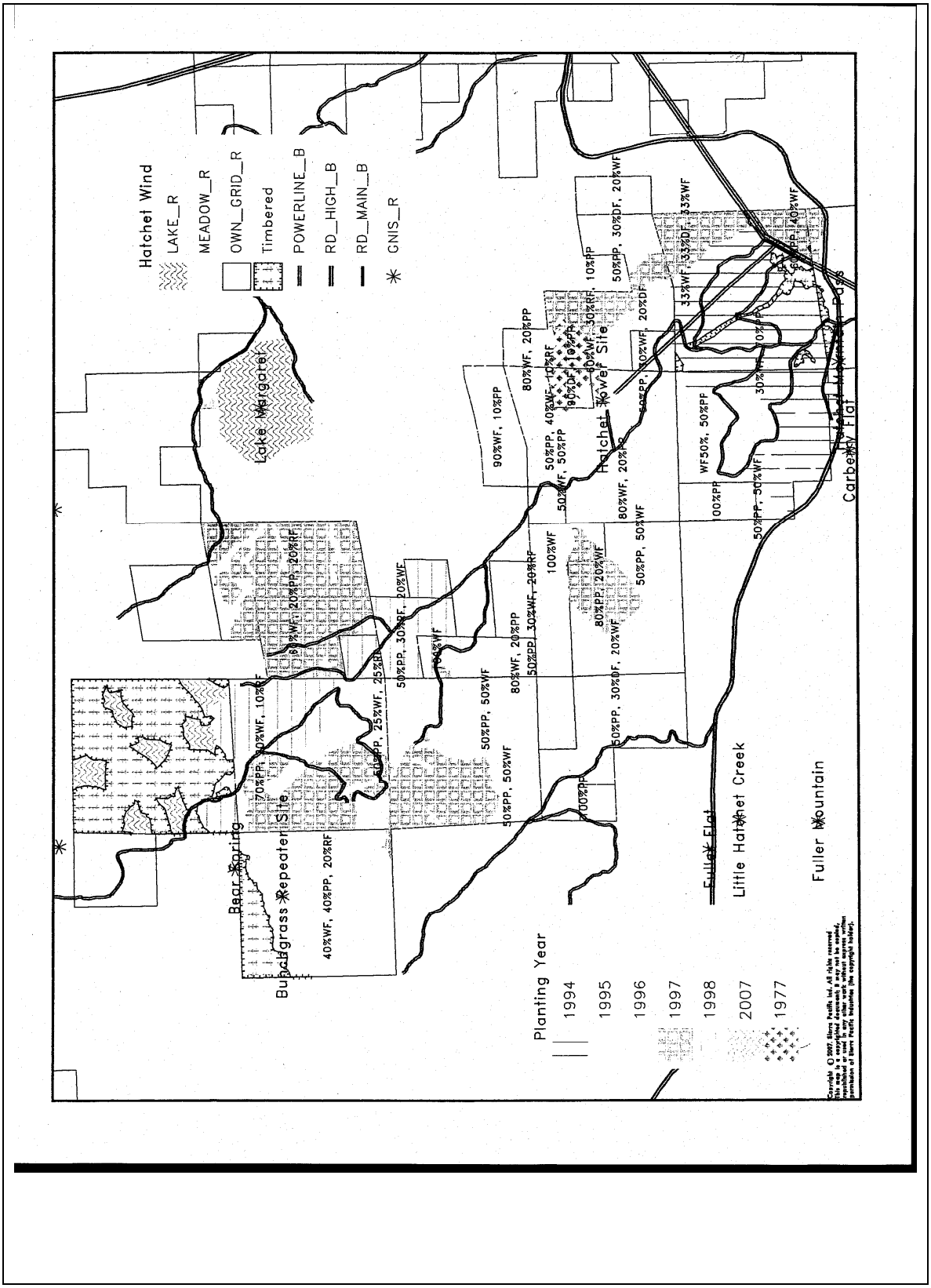
Mr. John Mattox
Office of General Counsel
1416 Ninth Street
Sacramento, CA 95814

Mr. Scott Flint
Habitat Conservation Planning Branch
Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

Mr. Bill Walker
January 25, 2008
Page Eight

cc: Mr. Bruce Webb and Dr. Richard Lis
Department of Fish and Game
601 Locust Street
Redding, CA 96001

ec: Messrs. Mark Stopher, Eric Haney, William Condon, Curt Babcock,
Gordon Leppig, Rich Callas, Pete Figura and Scott Hill
California Department of Fish & Game
mstopher@dfg.ca.gov, ehaney@dfg.ca.gov, wcondon@dfg.ca.gov,
cbabcock@dfg.ca.gov, gleppig@dfg.ca.gov, rcallas@dfg.ca.gov,
pfigura@dfg.ca.gov, shill@dfg.ca.gov


Hatchet Wind
LAKE_R
MEADOW_R
OWN_GRID_R
Timbered
POWERLINE_B
RD_HIGH_B
RD_MAIN_B
GNIS_R
Lake Margaret
Hatchet Tower Site
Carberry Flat
Bear Spring
Buckbrush Repeater Site
Fuller Flat
Little Hatchet Creek
Fuller Mountain
Planting Year
1994
1995
1996
1997
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2007
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Peer Review of:

Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project, Shasta County, California

Prepared for:

Hatchet Ridge Wind, LLC
Portland, Oregon

Prepared by:

Jones & Stokes
2600 V Street
Sacramento, California
Contact: Ed West, Ph.D.

Introduction

Hatchet Ridge Wind, LLC (HRW) is evaluating the feasibility of developing a wind energy resource area on Hatched Ridge in Shasta County, California. In support of environmental impact evaluation for the project, HRW contracted with Western Ecosystems Technology, Inc (WEST) to design and implement a 12-month baseline study of ecological resources at the project site and vicinity. Field surveys were conducted to: 1) describe and quantify seasonal avian use of the proposed project area; 2) describe and quantify raptor use of the proposed project; 3) describe and quantify seasonal bat use of the proposed project; and 4) describe vegetation types and rate plant occurrences in the propose project area. The objectives of this study were to provide data that would be useful in evaluating potential impacts from the proposed project and assist in siting of the project facilities. The results of the study were presented in the West (2007) report: *Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project, Shasta County, California*

This report provides a peer review of the WEST report in meeting the stated objectives for the study. Three levels of analysis are included:

- Study design and success of implementation
- Scientific content and validity of conclusions based on available information and results, and
- Additional information needed to fully evaluate potential impacts.

This report first provides a general summary assessment of the report with regard to these factors. Detailed analyses and recommendations follow.

General Assessment

The WEST studies were well designed, follow standard survey protocols and provide good baseline data for evaluating potential impacts that could arise from implementation and operation of the Hatchet Ridge wind resource facilities. The report is well written and logically structured. The figures and tables are well presented and provide essential data that support the text analysis. However, the conclusions regarding potential impact levels are fairly general, using relative comparisons (relatively low, some mortality, small numbers, minor effects, etc.), without range values needed to provide a clear picture of the potential magnitude of effects (e.g. seasonal and cumulative). Expanded analysis of these data are needed to more critically assess the validity of the conclusions made regarding the levels of potential impacts on the birds and bats that use the area. Fuller, more precise analysis of the seasonality, range and variability of use of the project area by potentially affected species is also needed to identify peak use periods and the magnitude of effect during which species are at highest risk. Additionally, assessment of ecological and species use changes that will occur during succession of the planted forest needs to be completed to evaluate future impacts that could occur to these and/or other species that are likely to be using the area then. Owls, particularly the California spotted

owl, need to be included in these analyses. Finally, more focused evaluation of known behaviors of species using the project area is recommended to more critically assess the probability of impacts to these species and/or species groups (e.g. flight patterns, migration behavior).

Detailed Analysis and Recommendations

The following review identifies specific aspects of the report that would benefit from expanded and/or more detailed analyses relevant to evaluating the potential impacts to the birds and bats using Hatchet Ridge.

Species Use Comparisons

Statistical Analysis

Numerous comparisons of bird and bat use of the Hatchet Ridge area are made in the report for analysis of differences between seasons (Figure 4), survey points (Figure 5) other wind resource areas (e.g. Figures 9, 11). However, these comparisons are based simply on mean values of species use without ranges (max, min.), standard error measures or sample size. This limited analysis is insufficient to allow rigorous statistical comparisons of the data sets. The conclusions drawn from the visual trends of the means may be correct, but measures of variability in the data no level of confidence can be established for the results. If the variability in the data is high, apparent differences between the means may not be significant and inferences regarding relative impact levels may not be valid, at least to the level stated in the report.

Recommendation: Provide more rigorous statistical analysis for these comparisons, using either with parametric or non-parametric statistics, as the data dictate. Use box and whisker plots (with mean, range and standard deviation) instead of histograms to compare data sets. This will allow rapid visual determination of the level of variability and actual overlap (similarity/difference) in data sets and potential for significance differences. Provide summary table of levels of significance in differences between mean use values. Re-evaluate and qualify conclusions on differences in species use between seasons, sites and WRAs based on these results.

Between Site Variability

Hatchet Ridge is unique in location, habitats, ecological and meteorological conditions, and species use compared to the other WRA identified in the report. Sufficient information detailing the differences between the other WRAs is currently not available in the report that would allow the reader to determine the actual level of "similarity" between sites and evaluate whether these sites are reasonably comparable without undue site-specific biases. Also no information is available in the report comparing the survey methods used in the different studies or whether they are consistent enough to allow unbiased comparisons.

Recommendation: Provide sufficient information on the different WRAs and methods of species use analysis at each site to validate the comparisons and conclusions made in the report. Provide the EIR team with copies of all cited references from which site specific data was obtained to allow independent analysis.

Precision of Seasonal Data

The true level of risk (potential impact) to different species using Hatchet Ridge is likely to be strongly correlated with species abundance, species-specific risk prone behaviors, and the frequency of use of the area. Peak use periods of species that could move within the turbine rotor sweep area are likely to represent the periods of greatest impact to each species. These periods are commonly episodic, of short duration and are correlated with the prevailing movement dynamics (i.e. daily foraging pattern; migration) of each species. For example, both birds and bats can move through an area in large numbers over short periods during migration when favorable weather fronts occur. In evaluating the potential magnitude of turbines collision impacts to these species it is important to know when these peak use periods occur and what the approximate maximum numbers of birds or bats present are. Much of this information is currently masked (lost) in the report in that the authors use 3-month averages to determine seasonal use patterns. A finer tuned analysis (e.g. weekly) would allow greater precision in determination of these peak periods and impacts to each species. This information could be valuable in evaluating alternate seasonal operation schedules that would minimize impacts to migrating species, if justified.

Recommendation: Fine-tune the analysis of seasonal use by the different species to allow more precise determination of peak use periods. This information will also allow a more accurate assessment of the migration patterns in the different species/species groups using the Hatchet Ridge area (see below).

Migration

The report states that Hatchet Ridge is not within a major migratory pathway and no obvious flyways or concentration areas were observed. However, available information suggests that Hatched Ridge may be within a bird and bat movement/migration corridor between the Modoc Plateau to the Sacramento Valley. Wind rose data show the prevailing winds in the area flow along this corridor. The flight path data for raptors and other large birds (Figure 6) show cross-ridge movement of many birds consistent with movement along this corridor. Seasonal variance in the species occurrence data at Hatchet Ridge shows population shifts consistent with migration. The majority of bird and bat species using the project area are migratory. These data suggest closer analysis of seasonal bird and bat movement patterns in the area is warranted to more fully evaluate the levels of migratory passage of these species across Hatchet Ridge.

Recommendation: Use the fine-tuned seasonal use data recommended above to assess movement patterns consistent with migration behavior. Review available published literature to assess whether species using Hatched Ridge are nocturnal migrants. Assess the potential for turbine collision impacts to nocturnal migrants.

Succession

The vegetation community of project area consists primarily of an early stage plantation forest. The bird and bat species associated with this community are likely to change as the forest matures. It is important to know how the level and dynamics of collision impacts of different species may change over time as the forest matures.

Recommendation: Available published information on ecological succession in plantation forests similar to that on Hatchet Ridge should be used to determine potential changes in projected impacts over time. This would be particularly important for such special-status species as the California spotted owl that may use the forest with increasing frequency as the forest matures.

Owls

Aside from one record of a northern pygmy-owl, no information on use of the Hatchet Ridge project area by owls is provided. Other species that could potentially use the area at night include the northern saw-whet owl, flammulated owl, great horned owl, long-eared owl and western screech owl. Use of the project area by these species is likely to change as the forest matures. High rodent density during the younger stages of forest development may favor high owl use. Use of the area by owls should be more fully evaluated.

Recommendation: Review available published literature on owl use of similar plantation forests at different stages of development. Conduct owl surveys of the area if possible.

Species-specific Behaviors

It is stated in the report that turkey vultures show very low susceptibility to turbine collision in other WRAs in California, inferring that the same conditions would occur at Hatchet Ridge. However, despite 50% of raptors use data is comprised of turkey vulture observations, no flight patterns for this species are shown in Figure 6. Because each WRA is different, such site-specific information is needed to critically evaluate local impact potential for such species. Orloff and Flannery (1992) describe conditions for rolling hills, open field habitats, which are quite different from the forested ridgeline habitats of Hatchet Ridge. Frequent cross-ridge or along-ridge movement of this species due to differences in the distribution of thermals required for soaring could result in different levels of collision susceptibility at different WRAs.

Recommendation: More critical analysis of species-specific behaviors of this species, and others, that relate to impact susceptibility, should be provided where available. For example, Figure 6 shows frequent use of the Hatchet Ridge area by bald eagles, a special-status species. Also, recent studies indicate that bats may be attracted to ridgeline turbines as roosting sites, possibly due to a tendency to use natural snags for similar

purposes. These behaviors should be more fully evaluated relative to the potential for collision impacts of these and other species, as appropriate.

Bat Use Analysis

The bat use data for Hatchet Ridge is limited to one location, at the met tower between bird survey stations 2 and 3 (Figure 2). This data may not be representative of the whole project area in that areas associated with riparian habitat (Figure 8) could attract greater numbers of bats (and different species?) that would forage there. Areas of lower elevation along the ridge may also favor movement of bats using orographic winds to reduce flight energy requirements.

Recommendation: The riparian areas and other areas along the ridge should be surveyed for bat use, if possible.

Species Displacement or Ecological Sink

It is unclear whether the purported reduced avian diversity associated with wind farms is due to behavioral displacement of species as described in the report or possibly due to chronic local mortality of birds in the vicinity of the turbines (e.g. an ecological sink). Apparently the displacement of breeding golden eagles at Altamont Pass is a result of, at least in part, high mortality in local nesting birds.

Recommendation: Further evaluation of these different hypotheses is warranted.

Comments and Questions

1. Provide more information on the location and extent of the overhead electrical collector cables that will be used to connect turbines along the ridge. These cables could potentially result in some level of collision mortality in addition to that from direct turbine collisions.
2. Is bird use correlated with topography (e.g. elevation, slope, aspect) of the survey stations, and if so would this relationship potentially result in higher mortality risk at different turbine sites along the ridge?
3. Ospreys and eagles commonly nest in exposed snags. Is there a potential for these species to be attracted to the turbines for this purpose?
4. What are the potential long-term cumulative mortality effects to species using Hatchet Ridge? Please provide approximate magnitude estimates (numbers, not percentages) based on comparable studies at other WRAs.
5. The report states that no impacts are expected to nesting raptors, yet an active bald eagle nest was documented at Lake Margaret in 2006 and Figure 6 shows frequent use of Hatchet Ridge by bald eagles that fly within the rotor-swept area. Given this information, is this definitive statement defensible?
6. The report states that the turbines that will be used at Hatchet Ridge will rotate at slower speeds than others used at other WRAs and this will reduce risk to some raptors. What is the actual tip speed of these larger turbines? Is it higher, lower, or

comparable to the turbines in other studies and what evidence is available that substantiates a reduced risk to raptors?

State of California – The Resources Agency
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
Northern Region
601 Locust Street
Redding, California 96001
(530) 225-2300

ARNOLD SCHWARZENEGGER, Governor

RECEIVED
JAN 29 2008
STATE CLEARING HOUSE

August 24, 2007

Mr. Bill Walker, Senior Planner
Shasta County Department of Resource Management
1855 Placer Street
Redding, California 96001

4-16-07

Dear Mr. Walker:

Notice of Preparation (NOP) and Related Documents
Hatchet Ridge Wind Farm Draft Environmental Impact Report (EIR)

The Department of Fish and Game (DFG) has reviewed Shasta County's (County) NOP for the subject project. Hatchet Ridge Wind, LLC, proposes the construction of up to 68 three-bladed wind turbines along a 6.5 mile corridor on Hatchet Ridge, extending north from a point approximately 0.5 mile north of State Route 299. The turbine towers would have a maximum height of 262 feet, and the turbine blades would be a maximum of 418 feet high to blade tip. The project would generate a maximum of 102 megawatts of electricity. An overhead transmission line and tower system up to 5 miles in length will be constructed to connect the turbine system to the existing PG&E transmission system. Pursuant to Section 15082(b) of the California Environmental Quality Act (CEQA) Guidelines, the DFG offers the following comments on the project in our roles both as a trustee agency and as a responsible agency.

The DFG has also reviewed the *"Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project"*, provided to the DFG on May 15, 2007, the *"Peer Review of Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project"*, provided to the DFG on June 22, 2007, and the *"Draft Biological Assessment Hatchet Ridge Wind Project"* provided to the DFG on June 25, 2007. Due to the reliance of the NOP and the County's environmental analysis on the data and conclusions drawn from these studies, the DFG has incorporated its comments on these studies into this response letter.

Notice of Preparation

The DFG agrees with the County's determination that an EIR should be prepared for this project. The project has the potential for substantial adverse impacts on birds, including migratory species, deer, bats, and may also adversely affect wetlands, streams, and sensitive plant species which may be present.

Conserving California's Wildlife Since 1870

The DFG's natural diversity database (NDDB) indicates that the special status plant species, Butte County morning glory *(Calystegia atriplicifolia ssp. buttensis)* and English peak greenbriar (*Smilax jamesii)* are present in the vicinity of the proposed project. Table 1 (enclosed) summarizes the typical habitat(s), geographic distribution, number of known occurrences in the NDDB, the NDDB State rank, the California Native Plant Society (CNPS) list status, and the CNPS list and threat code for these rare plants. Based on the existing scientific and factual information for these species, the DFG has concluded that they meet the criteria set out in Section 15380(b) of the CEQA Guidelines and, therefore, shall be considered rare or endangered species per Section 15380(d) of the CEQA Guidelines.

DFG recommends that field survey(s) be conducted in accordance with the DFG's *"Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities (revised May 8, 2000)"* to determine whether sensitive plant species are present. Species-specific mitigation recommendations for sensitive plant species present within the project area should be included in the EIR.

DFG's NDDB indicates the presence of bald eagle *(Haliaeetus leucocephalus)* nesting sites and territories. DFG's species occurrence information also indicates that northern spotted owl *(Strix occidentalis caurina)* critical habitat (per U.S. Fish and Wildlife Service) and northern spotted owl territories occur in the vicinity of the project. The bald eagle has been de-listed by the U.S. Fish and Wildlife Service; it is State listed as endangered, and is fully protected pursuant to Fish and Game Code (Code) Section 3511. As such, no take permit pursuant to the California Endangered Species Act (CESA) may be issued for bald eagle. The bald eagle also remains protected by the Federal Bald and Golden Eagle Protection Act. The bald eagle and northern spotted owl are also protected under the Federal Migratory Bird Treaty Act (MBTA). The northern spotted owl is federally listed as threatened. Additionally, take of any raptor or raptor nest or eggs is prohibited pursuant to Code Section 3503.5. The NOP also indicates that the project may have a potentially significant impact on avian and bat species moving through the turbine area. The short and long term effects on wildlife of the wind turbine construction and the effects of turbine operations over the life of the project must be examined by the EIR, and feasible mitigation through design modifications, operational restrictions or other means must be proposed to prevent mortality and injury to bald eagle, to minimize mortality and injury to all other avian species and bats and to prevent mortality or injury to fully protected species which may be present.

DFG's species conservation mapping indicates that the Hatchet Ridge area, extending north approximately 8 miles from a point approximately 0.5 miles north of State Route (SR) 299, is designated by DFG as critical deer fawning habitat. DFG understands that no perimeter fencing is planned for the project, but that security fencing will be required around maintenance and power substation control building sites. Any fences around these sites must be designed to exclude deer, including fawns, without injury and preclude jumping attempts.

The NOP does not provide detailed information on the extent of wetlands or riparian vegetation that may be affected by the project. However, the NOP states that project road work may impact existing seasonal and headwaters streams, including Little Hatchet, Roaring and Goose creeks and their associated riparian vegetation. The project also proposes 7 miles of buried communications cables and an unspecified length of buried power cables, which may also cross these streams and affect riparian vegetation. It is the DFG's policy to ensure that proposed projects will result in no net loss of wetland or riparian vegetation habitat values or acreage. Analysis of potential impacts to wetlands and sensitive wetland species should include an evaluation of the potential for direct, indirect, and cumulative impacts to these resources. The DFG requests that surveys be performed to evaluate potential losses of seasonal, intermittent or perennial streams and aquatic, wetland, or riparian habitats and sensitive species which depend on these habitats, which might result from project activities. Direct impacts to these features should be avoided to the greatest extent possible and secondary impacts reduced through implementation of adequate setbacks to protect these resources. Indirect impacts to wetlands may include hydrological changes, human intrusion into the wetlands (off-road vehicle use, dumping, spilling toxic substances) and the drainage of silt or petroleum products from project construction or operations into the wetland. All riparian habitats along these streams should be protected with adequate buffer zones and other measures necessary to prevent impacts to water quality and wildlife resources. Unavoidable impacts to these habitats should be quantified and appropriate mitigation measures adopted.

Project activities associated with multiple stream crossings and roadway construction will result in modifications to streambeds or banks. The project proponent is required to notify DFG under Division 2, Chapter 6, §1602 of the Fish and Game Code prior to undertaking any of these activities. When notified, DFG will determine whether or not a streambed alteration agreement (Agreement) is required. This Agreement will include conditions to protect fish and wildlife resources, habitat, and water quality that are mutually agreed to by DFG and the project proponent. In issuing an Agreement, DFG will be acting as a "Responsible Agency" under CEQA. DFG is required by CEQA Guidelines §15096 to review the CEQA document certified by the lead agency approving the project and, from that review, to make certain findings concerning the activities' potential to cause significant, adverse environmental effects. It is, therefore, important that the EIR address all of the potential biological streambed alteration impacts and propose feasible mitigation.

The NOP indicates that the project area is in part owned by Sierra Pacific Industries, and that their holdings were planted after the 1992 Fountain Fire with a ponderosa pine *(Pinus ponderosa)* plantation monoculture. During a field visit to the site accompanied by staff of the County's CEQA consultant, Jones and Stokes, Inc. (J. and S.), Staff Environmental Scientist Bruce Webb observed a diversity of conifer

species along the ridge line access roads, including incense cedar, white fir, Douglas fir, ponderosa pine, lodgepole pine and possibly other conifer species, in a variety of age classes. This diversity of conifer species appears to extend for most of the length of the ridge access roads, and extends an unknown distance up and downslope from the roads. It appears to be primarily volunteer trees but may also include planted stock. The Jones and Stokes representatives accompanying Mr. Webb corroborated these observations. DFG requests that the existing vegetation community within the project area, including but not limited to the forest community along the ridge line where the turbines will be located, be accurately described by maps in the EIR. This information must be used to complete the analysis of the potential for short and long term, direct and indirect effects on wildlife, rather than relying on the assumed ponderosa pine monoculture as the primary available habitat within the planned turbine corridor.

Project plans call for construction of a new overhead power transmission line extending approximately 1.25 miles along an existing power line route parallel to the ridge, and continuing in a new alignment up to an additional 3.5 miles to a new substation site (based on power line mapping plans provided by J. and S.). The new transmission line will collect generated turbine power and deliver it to existing Pacific Gas and Electric transmission lines located near SR299. DFG understands the alignment and length of the new transmission line have not been finalized. Construction of the new transmission line, and its long term operation, could cause injury and mortality to avian species. The potential direct and indirect effects on birds and bats of power line conductors, towers and guy wires must be examined by the EIR, and mitigation measures for any identified potentially significant impacts should be designed and described. Options for design mitigation may include wire spacing and tower and guy wire design, and additional mitigation could include the use of flight diverter devices installed on the conductors and guy wires to prevent bird collisions.

The California State Energy Commission (Commission), in cooperation with DFG, has prepared draft ***"California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development"*** (Guidelines). The Guidelines are intended to provide recommended methods to assess bird and bat activity at proposed wind energy sites, design pre- and post-construction monitoring and adaptive management plans, and develop and implement impact avoidance, minimization and mitigation measures. The Guidelines have been in final draft form and posted on the Commission's website since April 4, 2007, and have been circulated for comment and refinement to many cooperating agencies and experts in the wind energy field. A final citable version of the Guidelines dated July 2007 has been posted on the Commission's website on July 17, 2007, and is now intended for use by lead agencies and project planners. DFG recommends that the EIR include a comparative analysis of the bird and bat survey protocol recommendations in the Guidelines with those that have been conducted by the applicant to date, or are proposed to be conducted prior to construction. The EIR should disclose those survey activities conducted to date which are consistent in design

and scope with recommendations of the Guidelines, and should provide justification for omitting surveys which may be recommended by the Guidelines based on project specific criteria. The EIR should also discuss the potential applicability to the project of the Guideline's recommended adaptive management strategy options.

Please note that when filing a Notice of Determination in conformance with Public Resources Code Section 21152, environmental filing fees will be payable pursuant to Fish and Game Code Section 711.4 because the project will have an effect on fish and wildlife resources due to habitat alterations from turbine, road and power line construction, and turbine operation.

As noted above, the applicant has forwarded three additional documents which discuss potential impacts to birds and bats from operation of the turbines. DFG provides the following comments on these documents to assist the applicant and the County in determining their adequacy in supporting the necessary analysis of impacts to birds and bats from the turbine operations.

The Baseline Ecological Studies

The ***"Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project"*** dated March 2007 has been prepared by WEST, Inc. (WEST) at the request of the applicant. The report presents the results of a one year long bird and bat survey on Hatchet Ridge, commencing November 2005 and concluding November 2006. Point surveys were conducted at six (6) fixed locations. Observations were conducted once per week for 30 minutes at varying daytime hours. Observations were recorded, and an attempt was made to record vectors of flight paths when discernible. No nocturnal bird surveys were conducted. The day time surveys revealed the presence of a number of bird species, including a diversity of migratory birds and raptors.

DFG notes that during the one year of point survey observations only one owl sighting was recorded. Since owls are active typically only at night, it is inconclusive whether the surveys indicate the Hatchet Ridge area is unusually sparsely populated by owls, or they were simply not detected because the surveys were not conducted during periods when most owls are active. Owl species that may be present in the vicinity of Hatchet Ridge include saw-whet, flammulated, great horned, long-eared, western screech and as noted above, northern spotted. DFG recommends that nocturnal surveys for owls be conducted using standard recorded-call auditory techniques. DFG believes that these surveys should be commenced as soon as appropriate for the survey methodology, but can be undertaken independently of release of the EIR, provided the survey need and intended survey protocol is described in the EIR, the and recommended mitigation are

options for mitigation strategies are fully disclosed by the EIR and the survey results incorporated into the Final EIR and project design. DFG welcomes the opportunity to assist the applicant and the County to design an auditory survey effort for owls.

DFG notes that surveys conducted to date have provided incomplete information on potential flight patterns of migratory birds, and did not attempt to survey for night time migration using radar. However, DFG notes that many of the bird and bat species using the project area are migratory. Hatchet Ridge is uniquely located between the Sacramento Valley and the Modoc Plateau, suggesting that migration is likely across or in the vicinity of Hatchet Ridge. Additionally, data collected by WEST on flight paths of observed migratory species across Hatchet Ridge are consistent with migration. In order to determine if observed flight vectors represent prevalent migratory behavior, DFG recommends that additional studies be undertaken, including night time radar migration observations, to determine if existing migration corridors may place migrating species at risk of turbine collisions. These surveys should be commenced as soon as possible, but can be undertaken independently of release of the EIR, provided the survey need and intended survey protocol is described in the EIR, the options for mitigation strategies are fully disclosed by the EIR and the survey results and recommended mitigation are incorporated into the Final EIR and project design. DFG welcomes the opportunity to assist the applicant and the County to design a radar survey effort during night time hours for migratory birds.

The Peer Review of Baseline Ecological Studies

The ***"Peer Review of: Baseline Ecological Studies for the Proposed Hatchet Ridge Wind Project"*** (Peer Review) was prepared by J. and S., and is intended to provide a second professional opinion on the survey and other biological documentation prepared to date by the applicant. DFG has reviewed the document and concurs with all of its recommendations. The Peer Review's recommendations of particular relevance to those made elsewhere in this letter are the recommendation to conduct auditory nocturnal surveys for owls, and the recommendation to develop additional information to determine if migration corridors of various migratory species may pass over the project area.

The Draft Biological Assessment

The ***"Draft Biological Assessment Hatchet Ridge Wind Project"*** dated June 2007, was prepared by WEST at the request of the applicant. It was prepared to provide an analysis of whether the project may adversely affect species listed as threatened or endangered by the Federal Endangered Species Act (ESA). Although no apparent nexus with a permitting federal agency has been identified, the applicant chose to prepare the BA to analyze potential effects on species listed by the ESA.

Mr. Bill Walker
August 24, 2007
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The BA states that the bald eagle is federally listed and may be affected by the project. It should be noted that the bald eagle has been de-listed by the U.S. Fish and Wildlife Service; it is State listed as endangered, and is fully protected pursuant to Fish and Game Code (Code) Section 3511. As such, no take permit pursuant to the California Endangered Species Act (CESA) may be issued for bald eagle. The bald eagle also remains protected by the Federal Bald and Golden Eagle Protection Act. Two alternate bald eagle nest sites, representing one nest territory, are known to be recently active on and near Lake Margaret, approximately 1.75 miles and 1 mile east from the project site boundary, respectively. The BA also notes that during fixed point bird count surveys, 11 bald eagle sightings were made within the project area. Based on ratios of total raptor use, and mortality ratios from other similar wind farms currently in operation, the BA concludes that one bald eagle every 2-3 years may be killed by the turbines. The BA concludes that this is an insignificant number of fatalities, because it is immeasurable and is unlikely to occur. This conclusion is not adequately explained and does not appear to be supported by the data presented. Furthermore, one bald eagle fatality every 2-3 years could have a significant adverse impact balanced against the reproductive success of the local nest territory, and would be a violation both of the Bald and Golden Eagle Protection Act and CESA.

Thank you for the opportunity to comment on this project. If you have any questions regarding this information, please contact Staff Environmental Scientist Bruce Webb at (530) 225-2675.

Sincerely,

for GARY B. STACEY
Regional Manager

cc: See Page Eight

Mr. Bill Walker
August 24, 2007
Page Eight

cc: Ms. Amy Fesnock
U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, California 95825

Mr. Bruce Webb and Dr. Richard Lis
Department of Fish and Game
601 Locust Street
Redding, California 96001

ec: Messrs. Mark Stopher, Eric Haney, William Condon, Bruce Deuel,
Rich Callas and Scott Hill
California Department of Fish & Game
Mstopher@dfg.ca.gov, Ehaney@dfg.ca.gov, wcondon@dfg.ca.gov,
bdeuel@dfg.ca.gov, rcallas@dfg.ca.gov, shill@dfg.ca.gov

Table 1 – Disposition and Status of Rare, Threatened and Endangered Plants Occurring Near the Hatchet Ridge Wind Farm Project

Species	Habitat	California Distribution	Approximate Elevation	NDDB Occurrences	State Rank	CNPS List
Butte County morning glory *(Calystegia atriplicifolia ssp. buttensis)*	Lower montane coniferous forest /rocky, sometimes roadside	Butte, Contra Costa, Del Norte, Mendocino, Shasta, Tehama counties	1,950 to 4,950 Feet	50	S3.2	1B.2
English peak greenbriar *(Smilax jamesii)*	Lower/upper montane coniferous forests	Del Norte, Shasta, Siskiyou, Trinity counties	1,885 to 8,125 Feet	50	S3.2	1B.3

Cit:

1. California Native Plant Society (CNPS), 2007. Inventory of Rare and Endangered Plants (online edition, v7-07a). California Native Plant Society, Sacramento, CA. Accessed June 26, 2007 from http://www.cnps.org/inventory.

2. California Natural Diversity Database, "EnQuery 2".

TABLE 1 NOTES:

CNPS List

1A Plants presumed extinct in California.
1B Plants rare, threatened or endangered in California and elsewhere.
2 Plants rare, threatened, or endangered in California but more common elsewhere.
4 Limited distribution or infrequent throughout a broader area in California. Not rare but uncommon enough that status should be monitored regularly.

Modifications Associated with R-E-D Code Discontinuation

° A new Threat Code extension has been added following the CNPS List (e.g., 1B.1, 2.2 etc.). This extension replaces the E (Endangerment) value from the R-E-D Code. The main difference is that the number coding is now reversed to reduce confusion and represent this information in parallel with the threat rankings that the California Natural Diversity Database (CNDDB) uses. Therefore the logic is reversed so that the lower the number, the higher the corresponding threat level.

New Threat Code extensions and their meanings:

1 -- Seriously endangered in California.
2 -- Fairly endangered in California.
3 -- Not very endangered in California.

Note that all List 1A (presumed extinct in California) and some List 3 (need more information – a review list) plants lacking any threat information receive no threat code extension. Also, these Threat Code guidelines represent a starting point in the assessment of threat level. Other factors, such as habitat vulnerability and specificity, distribution, and condition of occurrences, are also considered in setting the Threat Code.

State Rank

S1 Less than 6 element occurrences or less than 1,000 individuals or less than 2,000 acres.
S2 6-20 element occurrences or 1,000-3,000 individuals or 2,000-10,000 acres.
S3 21-100 element occurrences or 3,000-10,000 individuals or 10,000-50,000 acres.

Threat Designation (attached to State rank as a second number)

1. Very threatened.
2. Threatened.
3. No current threats known.

Letter PA1 California Department of Fish and Game, Northern Region

Response to Comment PA1-1

This comment reiterates the project description presented in the Draft EIR and identifies the California Department of Fish and Game's role as both trustee and responsible agency under CEQA.

Response to Comment PA1-2

The California Department of Fish and Game's comments provided in response to the NOP are noted in this comment. The California Department of Fish and Game further identifies the avian species addressed in Section 3.4, *Biological Resources*, of the Draft EIR.

Response to Comment PA1-3

Mitigation measure BIO-6 has been revised. It now requires completion of annual reports, submittal of these reports to California Department of Fish and Game, and public availability of the data. Also, the measure now includes a requirement to establish a Technical Advisory Committee (TAC) with the California Department of Fish and Game as a participant.

Response to Comment PA1-4

Potential impacts are mitigated to the maximum extent practicable. Based on additional coordination with the California Department of Fish and Game and the project applicant subsequent to release of the Draft EIR, additional mitigation to reduce and compensate for this impact have been added. Additional mitigation items are listed below.

- Completion of annual monitoring reports to be submitted to the California Department of Fish and Game.
- Development and implementation of an avian mortality monitoring/adaptive management plan, including formation of a Technical Advisory Committee for making recommendations to the County.
- Revising the timeframe for monitoring to extend beyond the 2-year horizon recommended by CEC guidelines until mortality events remain below the thresholds.

In addition, the applicant has agreed to provide offsite compensatory mitigation. See the complete revised text of Mitigation Measure BIO-6 in Chapter 3 of this Final EIR.

Response to Comment PA1-5

Mitigation Measure BIO-6 has been revised to require that monitoring be conducted and continued beyond the 2-year horizon if mortality thresholds are exceeded.

Response to Comment PA1-6

Intensively managed conifer forest does not provide high-quality habitat for protected species; consequently, maturation of the forest surrounding the project area is not likely to result in an increase in bird use of the project area, although the relative abundance of some species may change. As long as the forest in the project area is managed for commercial timber harvest, it is very unlikely that the forest there will develop characteristics of older-aged forests that could provide habitat capable of supporting special-status wildlife species.

Response to Comment PA1-7

The project as currently designed does not anticipate "phasing" construction. Consequently, "redesigning turbine placement for any turbines not yet constructed" and several of the other example "minimization schemes" provided in the letter are not feasible. Repowering would constitute a separate project under CEQA and would require its own special use permit and environmental review. The revisions to the EIR include more options for mitigation. The potential impacts have been mitigated to the maximum extent practical without rendering the project infeasible.

Response to Comment PA1-8

Most studies to date have shown no relationship between lighting and bird and bat mortalities; accordingly, the suggested minimization measure is unlikely to have any effect. However, a new element has been added to Mitigation Measure BIO-6 to allow for implementation of these or other technologies if new information becomes available to the Technical Advisory Committee indicating that their use may have an appreciable beneficial effect.

For this project, the potentially significant impacts with a reasonably predictable probability of occurrence are impacts on bald eagle and sandhill crane, species that do not frequently occur in the project area but may pass through during the winter and migration. Because the species most likely to be significantly affected and the habitats capable of supporting them do not occur in the project area, it is extremely difficult to devise an onsite compensation scheme that can reasonably be linked to the specific population being affected. Accordingly, Mitigation Measure BIO-6 has been revised to include offsite compensatory mitigation as one component of the BIO-6 mitigation package for these species.

There is no existing program funded by mitigation fees that has been established by the County or the state. In the absence of such a program, the EIR must identify mitigation measures that can be "fully enforceable through permit conditions, agreements, or other legally binding instruments"; that can establish an "essential nexus (i.e., a connection) between the measure and a legitimate government interest"; and that are "roughly proportional to the impact of the project." In consultation with the California Department of Fish and Game, Mitigation Measure BIO-6 has been revised to include a mitigation measure decision framework to be used by the County and the Technical Advisory Committee for implementing compensatory mitigation.

Response to Comment PA1-9

Subsequent to release of the Draft EIR, the EIR preparers and the applicant coordinated with the California Department of Fish and Game to refine mitigation measures and add new mitigation measures to address avian impacts. See the response to Comment PA1-4.

Response to Comment PA1-10

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR. The revisions were made in consultation with the California Department of Fish and Game, the Shasta County Department of Resource Management, and the applicant. The mitigation program outlined in the mitigation measure may include avian use studies if the Technical Advisory Committee determines that such studies are necessary.

Response to Comment PA1-11

Mortality thresholds for diurnal raptors, owls, and yellow warbler have been added to Mitigation Measure BIO-6.

Response to Comment PA1-12

The characterization of golden eagle occurrence and use of the project area was an error in the Draft EIR that has been corrected in Table 3.4-3 from the Draft EIR (see Section 3.5.1 of the Final EIR for the revised table). There is no habitat capable of supporting golden eagle in the project area and only one golden eagle was observed during avian use studies, leading to the correct conclusion that impacts on golden eagles, if they occur, would likely be very low.

Response to Comment PA1-13

While it is true that sandhill cranes have been documented to suffer mortality from collision with transmission lines, these mortalities have been documented in areas containing habitat capable of supporting sandhill cranes—i.e., areas where they rest and forage. No such habitat exists in the immediate vicinity of the project area and there is nothing in the project area to attract sandhill cranes. Sandhill cranes only infrequently occur while migrating over the project area, typically at altitudes much higher than the height of the transmission lines. Consequently, this impact is unlikely to occur. However, upfront compensatory mitigation for sandhill cranes has been added to Mitigation Measure BIO-6.

Response to Comment PA1-14

Mitigation Measure BIO-3 has been amended to include a 250-foot setback in areas capable of supporting special-status species.

Response to Comment PA1-15

As currently designed, the roads associated with the proposed project do not entail any stream crossing subject to California Department of Fish and Game jurisdiction. Accordingly, such crossings were not addressed in the Draft EIR.

Response to Comment PA1-16

The project area is a commercial timber harvest area and is therefore unsuitable for most owl species. Conducting nocturnal owl surveys would be highly unlikely to provide any additional information on potential impacts on owls; such impacts are predicted to be minimal because of the type of habitat occurring in the project area. Subsequent to publication of the Draft EIR, a nocturnal migration study was conducted. The reports detailing the finding of this study and an evaluation of the study conducted on behalf of the Wintu Audubon Society are provided as Appendices B and C of the Final EIR. It is noted that the California Department of Fish and Game's responses to the NOP are included as an attachment to the letter.

Response to Comment PA1-17

The California Department of Fish and Game provides information regarding its environmental filing fees.

Response to Comment PA1-18

Shasta County acknowledges the California Department of Fish and Game's interest in participating in the public hearing process.

Letter PA2

STATE OF CALIFORNIA—THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

DEPARTMENT OF FORESTRY AND FIRE PROTECTION

875 Cypress Avenue
Redding, CA 96001
Website: www.fire.ca.gov
(530) 225-2418

January 29, 2008

Shasta County Department of Resource Management
1855 Placer Street, Suite 103
Redding, Ca. 96001

Dear Mr. Bill Walker,

In regard to the Hatchet Ridge Wind Project, SCH # 2007042078, the Department of Forestry and Fire Protection (CAL FIRE) has the following comments:

By policy, the Board of Forestry and CAL FIRE cannot support any project that will reduce the timberland base of California. Public Resources Code of the State of California (PRC) 4526 defines what timberland is. It is CAL FIRE's responsibility to maintain, protect and enhance long-term timber production and the associated preservation of the timberland base. However, CAL FIRE recognizes the need for non carbon producing energy sources and that if current zoning and the intended use are consistent with the county's general plan; and if, after review, no land other than timberland can be identified to suite the project; then CAL FIRE may choose not to oppose the project. **PA2-1**

After reviewing the EIR, CAL FIRE has developed the following list of concerns and recommendations:

Fire Protection

1. The project is located within an area designated as a "VERY HIGH" Fire Hazard Severity Zone under Section 4203 PRC. With this rating and the throw potential from the turbines being 550 feet, the applicant shall clear all trees and brush within 550 feet of all towers. This shall be maintained for the life of the facility. **PA2-2**
2. In accordance with PRC 4291 (a), the applicant shall provide "Defensible Space", by removing all flammable vegetation from around all buildings for a minimum of 100 feet or to the property line, whichever is closer. **PA2-3**
3. In accordance With PRC 4427 and 4428 the applicant shall have the required fire tools on site during operations and within all vehicles being used for operations. **PA2-4**

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PERMIT COUNTER

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Resource management

4. The existing roads system, the Bunchgrass Lookout Road and spurs, has been sufficient to accommodate several timber management entrees in the past. This includes the Fountain Fire salvage and the several entries needed to have successful regeneration and plantation of the burned area. With the adequacy of the road system in the past it appears that the additional new roads are not needed for timber management. Are any existing roads to be abandoned to mitigate the additional loss to timber growing acres? **PA2-5**

5. It is unclear which of the proposed roads are to be permanent and which are to be temporary. Are all of the proposed roads delineated on figure 2-1 permanent? **PA2-6**

6. Are the temporary (136 acres) and permanent (73 acres) calculated using the 44 turbine locations mapped on figure 2-1 or the 68 potential locations? Additionally is the total area of the footings calculated using the pier-type footings (256 square feet) or the spread footing foundations (1600 square feet)? **PA2-7**

7. The project proposes 209 acres (temporary and permanent conversion acres), that will have all the trees removed from a 12 year old plantation. Additionally substantial more acres (550 feet clearance around towers) will need fuels treatment. The material created will need to be treated for forest and fire protection reasons. How is all the material to be treated? Is it to be piled and burned, chipped in placed, or removed as biomass? Which ever treatment is to be used, the appropriate permits shall be required from the respective agencies (CAL FIRE, Air Quality). **PA2-8**

   If any commercial timber operations (as defined by PRC 4527) are involved with a project, they must be approved by CAL FIRE prior to undertaking operations. A Timber Harvesting Plan (THP) or equivalent may be required. No commercial operations may occur until the appropriate plans and permits are approved. **PA2-9**

8. The statement on page 3.2-5," The project area, or portions of the project area may be determined to be exempt from TCP requirements upon evaluation by Cal Fire under 14 CCR 1104.1(b) or (c), which allows for the "harvesting of trees in order to construct or maintain a right of way by a public agency, public or private utility that is exempt from the requirements to obtain a TCP or file a THP.", is correct and several portions of the project have defined right-of-way clearances established in 14 CCR 1104.1 (d), (e), **PA2-10**

Mr. Bill Walker
January 29, 2008
Page Three

(f), and (g). Other portions of the project do not have established right-of-way widths (the turbines), and some portions of the project may not be covered by the exemption (permanent roads outside the right-of-ways and the O&M building). A Timber Conversion Permit (TCP) may still be required.

PA2-10 cont.

PRC 4527. Timber operations. "Timber operations" means the cutting or removal or both of timber or other solid wood forest products, including Christmas trees, from timberlands for commercial purposes… "Commercial purposes" includes: (1) The cutting or removal of trees which are processed into logs, lumber, or other wood products and offered for sale, barter, exchange, or trade, or; (2) The cutting or removal of trees or other forest products during the conversion of timberlands to land uses other than the growing of timber which are subject to the provisions of Section 4621, including, but not limited to, residential or commercial developments, production of other agricultural crops, recreational developments, ski developments, water development projects, and transportation projects.

Prior to project construction, a Public Agency, Public and Private Utility Right-Of-Way Exemption and/or a TCP will need to be on file with CAL FIRE,

PA2-11

Thank you for the opportunity to comment on this project.

Sincerely,

Benjamin C. Rowe
Forester I, RPF 2686
CAL FIRE
Shasta -Trinity Unit
(530) 225-2508

Letter PA2 California Department of Forestry and Fire Protection

Response to Comment PA2-1

This comment presents California Department of Forestry and Fire Protection's (CAL FIRE's) duty to oppose projects that reduce timberland, but also expresses its support of non-carbon-producing energy sources.

Response to Comment PA2-2

CAL FIRE correctly identifies the project site's designation as a "Very High" Fire Hazard Severity Zone under 4203 PRC. The comment concludes that due to this designation, as well as a "throw potential of 550 feet," the applicant should be required to clear all trees and brush within an area of 550 feet of each turbine and maintain this clearance for the life of the project.

Section 3.7.2 of the Draft EIR (Impact HAZ-6 identifies the potential for turbine or meteorological tower failure and blade or ice throw. This impact discussion references a hazard zone analysis study conducted on another wind project in California. Based on the conclusions of the study, the maximum throw distance for a blade for a 2.4 MW turbine would be slightly more than 542 feet. This distance is estimated to demonstrate that there is no chance that blade throw could reach SR 299, located some 2,640 feet from the nearest turbine.

It is assumed that CAL FIRE's suggested clearance distance of 550 feet is based on this discussion in Section 3.7 of the Draft EIR. This discussion was included in the Draft EIR to address a potential public safety concern related to SR 299; it has no relevance to wildland fire hazard. The presence of trees would actually mitigate the public safety concern by providing a barrier/buffer in the case of blade or ice throw. In addition, Mitigation Measure HAZ-8 provides design and safety mechanisms to minimize this potential impact to a less-than-significant level.

Accordingly, based on the information provided in CAL FIRE's comment, there is not an adequate rationale for a 550-foot clear zone around turbines. In fact, if such a clear zone was required, it would conflict with the applicant's and lead agency's goal of minimizing wildlife habitat impacts and minimizing timberland conversion from increased acreage disturbance. The requested additional acreage disturbance would also increase the significant and unavoidable impact on aesthetics and visual resources.

As disclosed in Section 3.7.2 of the Draft EIR, any vegetation clearing (up to 100 feet around buildings and structures) and salvage activities may require approval from CAL FIRE.

Subsequent to the submittal of this January 29, 2008, comment letter by CAL FIRE and the January 21, 2008, letter from the Shasta County Fire Department, the applicant met with CAL FIRE and the Shasta County Fire Department to coordinate on fire safety requirements. Based on that coordination, these agencies have a better understanding of the project, and the Shasta County Fire Department and CAL FIRE have submitted letters (dated May 22, 2008, and May 27, 2008, respectively) revising their fire safety requirements for the project. These requirements will become conditions of approval if the proposed project is approved by the County. See Appendix D, Fire Safety Requirements*, for copies of the letters containing updated comments from these agencies.*

The requirements related to fuel breaks have been updated from the original comment letter. The original recommendation to clear all trees within 550 feet of the towers has been revised to require the following specific vegetation modifications.

Turbine Ridge Road:

- *Provide a 100-foot shaded fuel break on the western side of Turbine Ridge Road.*
- *From the centerline of Turbine Ridge Road going east, provide a 50-foot clear zone.*
- *From the easternmost edge of the clear zone, provide an additional 100-foot shaded fuel break.*

Turbines:

- *From the outer edge of each tower, going in all directions, provide a 30-foot clear zone.*
- *From the outer edge of the clear zone, going in all directions, provide an additional 70-foot shaded fuel break.*

Definitions and specifications for the clear zones and shaded fuel breaks are provided in Appendix D. Potential impacts of the proposed fuel breaks would not be significantly different from the impacts already disclosed in the Draft EIR.

Response to Comment PA2-3

Comment noted. The defensible space requirement will be included as a condition of approval of the proposed project. All flammable vegetation within 100 feet of buildings will be removed. Also see the response to Comment PA2-2 and Appendix D.

Response to Comment PA2-4

Comment noted. Required onsite and in-vehicle fire tools (per PRC 4427 and 4428) will be included as a condition of approval of the proposed project. Also see the response to Comment PA2-2 and Appendix D.

Response to Comment PA2-5

At this juncture, neither the applicant nor the landowner has indicated any plans to abandon existing roads.

Response to Comment PA2-6

All new roads installed for project construction and access will be permanently maintained.

Response to Comment PA2-7

Acreages of proposed disturbance are based on the applicant's preferred arrangement of 44 turbines.

Response to Comment PA2-8

All appropriate permits will be obtained before any treatment of biomass that results from clearing of the vegetation associated with project construction. All such activities will be conducted in compliance with Air Quality Management Regulations as well as state and local fire agency burning permit requirements.

Response to Comment PA2-9

Pursuant to state regulations, the applicant will coordinate and obtain all necessary permits and approvals from CAL FIRE prior to project installation. See Section 2.10 of the Draft EIR for a list of possible permits required.

Response to Comment PA2-10

It is acknowledged that, depending on the method of biomass removal, a Public Agency, Public and Private Utility Right-of-Way Exemption, and/or a Timberland Conversion Permit may be required. All necessary permits will be obtained and filed with CAL FIRE as appropriate. See pages 3.2-4 and 3.2-8 in Section 3.2, *Agricultural and Forest Resources*, of the Draft EIR for a disclosure of impacts related to timberland conversion and discussion of these permit requirements.

Response to Comment PA2-11

See the response to Comment PA2-10.

JAN-07-2008 MON 03:11 PM CALTRANS FAX NO. 530 225 3020 P. 01

Letter PA3

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
OFFICE OF COMMUNITY PLANNING
1657 RIVERSIDE DRIVE
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IGR/CEQA Review
Sha-299-68.1
Hatchet Ridge Wind
Use Permit 06-016
DEIR
SCH# ~~2007122037~~
2007042078

January 7, 2008

Bill Walker, Senior Planner
Shasta County
Department of Resource Management
Planning Division
1855 Placer Street
Redding, CA 96001

Dear Mr. Walker:

Thank you for the opportunity to review the Draft Environmental Impact Report (DEIR) prepared for the use permit submitted on behalf of Hatchet Ridge Wind LLC, for a 125 megawatt electrical generation facility, including 49 wind turbines. The project is located along Bunch Grass Lookout Road, north of Hatchet Mountain Summit in the Burney community area. **PA3-1**

Access to the project site would be from State Route 299 via Bunch Grass Mountain Lookout Road. Ten (10) full-time employees are proposed when the facilities are completed. Up to 200 construction workers are anticipated during peak construction months. The existing highway connection is adequate for the proposed construction and use. The Traffic section includes a mitigation measure that a traffic control plan be prepared. This measure adequately addresses concerns related to construction traffic which is anticipated to be when the greatest number of vehicles would use the transportation facilities. **PA3-2**

We have also reviewed the Cultural Resources section. Impact CUL-1 recognizes Hatchet Ridge-Bunchgrass Mountain as a historical resource. Mitigation Measure CUL-1 provides for coordination with the Pit River Tribe to perform a recordation of the historic property. The Tribe will have the right to determine the dissemination of the report. The information provided in Appendix D indicates the area immediately to the north of Hatchet Ridge and Bunchgrass Mountain as being the area of concern. Caltrans would like to work with the County and the Tribe in verifying that the recordation area does not include Highway 299. If the recordation includes Highway 299, the cultural impact concerns would need to be addressed for future highway projects. Therefore, it is of significant importance that Caltrans be aware of whether the State Highway is included in the recordation area. **PA3-3**

"Caltrans improves mobility across California"

JAN-07-2008 MON 03:11 PM CALTRANS FAX NO. 530 225 3020 P. 02

Sha-299-68.1
Hatchet Ridge Wind
Use Permit 06-016
DEIR
SCH# 2007122037
January 7, 2008
Page 2

As indicated in the draft initial study, the site is not located in an area currently eligible for scenic highway designation.

If you have any questions, please call me at (530) 225-3369. For consultation regarding the cultural concerns, please contact Ms. Sandra Rivera, Native American Liaison at (530) 229-0516 or Ms. Cassandra Hensher, Native American Coordinator/Associate Archaeologist at (530) 225-3332. PA3-4

Sincerely,

MARCELINO GONZALEZ
Local Development Review
District 2

"Caltrans improves mobility across California"

Letter PA3 California Department of Transportation, District 2

Response to Comment PA3-1

The comment correctly identifies the location and key aspects of the proposed project, as described in Chapter 2 of the Draft EIR.

Response to Comment PA3-2

State Route 299 is not included in the recordation area. Caltrans should note, however, that the recordation area does not dictate the geographic scope of potential impacts on historical resources such as Hatchet Ridge–Bunchgrass Mountain.

Response to Comment PA3-3

It is noted that Caltrans concurs with the findings of the traffic analysis and approves the traffic control plan in the Draft EIR.

Response to Comment PA3-4

Caltrans notes that the site is not located in an area currently eligible for scenic highway designation. Contact information for Caltrans is provided.

Letter PA4

SHASTA COUNTY FIRE DEPARTMENT

MEMORANDUM

DATE: January 21, 2008
BW

TO: Russ Mull, Director
Department of Resource Management

FROM: Mike Chuchel
Shasta County Fire Warden

SUBJECT: 14 FIRE PREVENTION
14.3 Fire Safety and Land Use Planning
Use Permit 06-16 / Hatchet Ridge Wind LLC

PROJECT LOCATION: Hatchet Mountain
PROJECT DESCRIPTION: Wind Energy Project

The above referenced project is located within the California Department of Forestry and Fire Protection / Shasta County Fire Department (CAL FIRE / SCFD) jurisdiction. CAL FIRE / SCFD has reviewed the proposal and submits the following requirements. (Note: The Resource Management Division of CAL FIRE will also be submitting comments.) **PA4-1**

CONDITIONS

----- Roadways and turnarounds shall be constructed in accordance with Section 6.12 of the Fire Safety Standards prior to the construction of any portion of the proposed facility.

----- The facility shall be identified with a street address marker located adjacent to facility access road and Highway 299. The address numbers shall be a minimum of four inches in height, reflectorized, and shall contrast in color with the background. The address shall be clearly visible at all times.

----- Roofing shall have a Class A rating as per the Shasta County Fire Safety Standards and the California Building Code. **PA4-2**

----- All buildings constructed on parcels one acre or larger in size shall be setback a minimum of 30 feet from all property lines and road easements in accordance with the Shasta County Fire Safety Standards, but a 100 foot setback is recommended in order to comply with the defensible space requirement.

7.9 Chimneys and flues shall be equipped with an approved spark arrestor as defined in Section 6.53 of the Fire Safety Standards.

1

----- Fire protection water shall be in compliance with Section 6.43 of the Fire Safety Standards.

----- The applicant shall dispose of any vegetation cleared for construction and/or land development purposes prior to the final inspection by the Shasta County Building Division and CAL FIRE / SCFD. Disposal shall be in accordance with Air Quality Management Regulations and State or local Fire Department Burning Permit Regulations.

7.16 Storage, use, and dispensing of flammable/combustible liquids shall be in accordance with the adopted edition of the California Fire Code. Plans shall be submitted to CAL FIRE / SCFD for review and approval prior to construction, storage, or use.

7.19 Portable fire extinguisher(s) shall be provided in accordance with the adopted edition of the California Fire Code.

----- All welding and storage of cylinders shall be in accordance with the adopted edition of the California Fire Code. In addition to welding, other high risk activities such as cutting and grinding shall require welding curtains, and shall be restricted based on fire weather indices as determined by the CAL FIRE / SCFD.

PA4-2 cont.

7.23 Accumulations of waste paper, weeds, combustible waste material, waste petroleum products, tires, or rubbish of any type shall be prohibited.

7.24 Rags, cloth, or paper towels saturated with oil, solvent, or petroleum products shall be kept in a metal can with a tight fitting cover.

7.25 In accordance with Public Resources Code 4291 (a) the applicant shall provide "Defensible Space", by removing all flammable vegetation from around all buildings for a minimum of 100 feet or to the property line, whichever is closer.

7.26 All mobile and stationary equipment with non-turbocharged internal combustion engines shall be equipped with a properly functioning, approved spark arrestor.

7.27 Each vehicle shall be equipped with a portable fire extinguisher.

7.28 The CAL FIRE / SCFD shall sign the improvement plans for this project prior to submitting the plans to the Department of Public Works. Improvement plans will be reviewed for compliance with the Fire Safety Standards and other project specific conditions.

7.29 Advisory note: The project is located in an area designated as a "VERY HIGH" Fire Hazard Severity Zone under Section 4203 of the Public Resources Code of the State of California.

2

----- If applicant installs an automatic fire extinguishing system in the facility, plans shall be submitted for CAL FIRE / SCFD review as part of the building permit.

----- All fires shall be reported even though they may have been extinguished.

----- Applicant shall clear all trees and brush within 550 feet of all towers. This shall be maintained for the life of the facility.

----- Applicant shall provide the necessary equipment and training to CAL FIRE / SCFD employees for extinguishment of facility specific fires, confined space rescue and high angle rescue.

----- All electrical systems shall be designed and maintained in accordance with the California Public Utilities General Order 95 and corresponding underground standards.

PA4-2 cont.

----- All electrical distribution and collection components shall be underground where possible. Where above ground installations are necessary, the latest standards for raptor and rodent protection should be incorporated.

----- All electrical distribution and collection components shall be "exempt" and designed for high wind conditions.

----- Applicant shall provide a "Risk Manager" to be available on site whenever construction activities are in progress. The Risk Manager shall have oversight authority and shall be the point of contact for the CAL FIRE / SCFD.

Further questions or comments may be directed to County Fire Marshal Jim Diehl at (530) 225-2423.

Sincerely,

Mike Chuchel
County Fire Warden

By

Jim Diehl
County Fire Marshal

cc: Hatchet Ridge Wind, LLC
RES American Developments, Piscitello

3

Letter PA4 Shasta County Fire Department

Response to Comment PA4-1

This comment indicates that CAL FIRE and Shasta County Fire Department have jurisdiction over the project area.

Response to Comment PA4-2

As a condition of project approval, the applicant will be required to comply with Shasta County Fire Department requirements, including specifications for roadways and turnarounds; address markers; defensible space and setbacks; spark arrestors or chimney flues; water supply for fire protection; disposal of cleared vegetation; storage, use, and dispensing of flammable/combustible liquids; availability of portable fire extinguishers; welding and other high-risk activities; disposal of waste, weeds, and combustible waste material; storage of oil, solvents, and rags; spark arrestors for equipment with internal combustion engines; review and approval of improvement plans and automatic fire extinguisher plans; reporting of fires; training; electrical systems; and designation of a "risk manager."

See also the response to Comment PA2-2 and Appendix D.

Utility Agency Comments

Letter UT1

STATE OF CALIFORNIA
Arnold Schwarzenegger, *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

January 28, 2008

Bill Walker, Senior Planner
Shasta County Department of Resource Mangement
1855 Placer Street, Suite 103
Redding, California 96001

Dear Mr. Walker:

The Energy Division of the California Public Utilities Commission (CPUC) appreciates the opportunity to review the "Draft Environmental Impact Report for the Proposed Hatchet Ridge Wind Project" (State Clearinghouse No. 2007042078). Hatchet Ridge Wind, LLC, proposes to build and operate a wind turbine energy project that would produce 100 MW and would require the construction of 42 to 68 wind turbines. Also included in the project is the construction of a series of transmission lines from the wind turbines; a new substation; and an interconnection switching station (to be owned by PG&E.) **UT1-1**

Under the California Environmental Quality Act (CEQA), any agency exercising discretionary authority over a portion of a project is regarded as a "responsible agency" for the purposes of the environmental review. Because the Hatchet Ridge project involves the construction of a switching station to be owned and operated by PG&E, the CPUC must make a discretionary decision to approve or deny a permit to construct a segment of this project. The CPUC, is therefore a responsible agency in this proceeding in accordance with CEQA. **UT1-2**

The CPUC Energy Division has prepared comments relating to the Hatchet Ridge Wind Project DEIR. The comments are attached hereto as Attachment A.

Once again, thank you for the opportunity to review and comment on the DEIR for the Hatchet Wind Energy Project. Please do not hesitate to contact me at (415) 703-5484 if you have any questions regarding this matter. **UT1-3**

Sincerely,

Jensen Uchida

Jensen Uchida
California Public Utilities Commission
Regulatory Analyst

Attachment A
Comments of the California Public Utilities Commission
Relating to the Hatchet Ridge Wind Energy Project

Executive Summary

Project Description, Overview. This section states that the project may include up to 68 small wind turbines or as few as 44 large wind turbines. The section further states that because the applicant chose this as the preferred option, the DEIR evaluates the 44 wind turbine configuration. The section then states that the EIR evaluates the impacts of three possible configurations (i.e., 42, 44, or 68 turbines). The section also notes that the "impacts are not generally anticipated to vary substantially" between the three configurations. **UT1-4**

Comment: The project description is extremely confusing. As a result, it is difficult to determine what project configuration was evaluated in the DEIR. The section states that the project may include the construction of 42, 44, or 68 turbines and that all three configurations were evaluated. However, the section then discloses that the 44 turbine configuration was preferred configuration evaluated in the DEIR. Indeed, the 44 turbine configuration appears to be the configuration depicted in visual simulations and proposed wind turbine layouts throughout the DEIR. However, because there are no equivalent analyses for the 42 and 68 turbine configurations, the assertion that the "impacts are not generally anticipated to vary substantially among the configurations" appears to be based on speculation, rather than data gathered during analysis. Without side-by-side comparisons of the three possible turbine configurations, it is impossible to determine the best/worst case scenario or the relative impacts of each option on the environment. **UT1-5**

- To ensure full disclosure of the possible impacts of each option, the DEIR should evaluate the 42, 44, and 68 wind turbine configurations individually. The DEIR should include a grid that enables the reader to view the relative impacts of all three options on a single page.

Chapter 2. Project Description

(1) Section 2.6.2 Electrical System. This section discloses that the project would include, but not be limited to: (1) An Electrical Collector System; (2) A Substation (3) A five mile long 3 phase 230 kV circuit; and (4) An interconnection switching station.

Comment: The DEIR does not include visual simulations of the aforementioned system components from a street-level perspective. Nor does the DEIR include overhead maps identifying the locations of these components in relation to the project corridor. Aside from the noting that the project will include a switching station, the DEIR does not appear to evaluate the impacts of this facility any further. **UT1-6**

- The DEIR should include visual simulations of these components from multiple viewpoints in the environment in which they will be situated. This recommendation applies to the substation; the switching station; the 230 kV circuit; the interconnection system; the operation and maintenance building; and any other aboveground facility;
- The DEIR should include a single overhead diagram of the project that illustrates the layout of all of the project components to be developed in connection with this project.
- The DEIR should include a full impact analysis of the switching facility.
- The DEIR should indicate the type of transmission towers the applicant intends to install to support the 230 kV circuit.

(2) Section 2.6.3 Communication. This section states that the project will include an underground fiber optic system to enable monitoring and control from "remote" locations.

Comment: The DEIR does not identify the location of this remote monitoring facility or whether the fiber optic intends to directly connect with this facility or interconnect into the Public Switched Telephone Network (PSTN).

- The DEIR should indicate whether the fiber optic system will be interconnected with the PSTN; and
- The DEIR should include a overhead map that indicates where trenching will take place and where conduit will be installed. The map should identify the facilities that will be directly connected to the fiber optic system.

UT1-7

(3) Section 2.6.6 Permanent Meteorological Towers. This section states that two permanent meteorological towers approximately 220 feet tall, would be constructed in the project area. In addition, up to five towers may be installed on a temporary basis.

Comment: Aside from noting the towers will be built, the DEIR does not appear to include the towers in any visual simulation, nor does it identify the locations of these towers on the project area maps.

- The DEIR should include the meteorological towers on all project simulations and maps.

UT1-8

Chapter 3. Environmental Analysis

(1) Section 3.3 Air Quality. This section states that greenhouse gases (GHG) are thought to be responsible for the greenhouse effect or global warming.

Comment: Aside from noting that GHGs are a problem, the DEIR does not appear to estimate of forecast the amount of carbon dioxide that may be generated as a result of the project.

- The DEIR should estimate to level of carbon dioxide, methane, and nitrous oxide that may be generated as a result of the project.

UT1-9

Letter UT1 California Public Utilities Commission

Response to Comment UT1-1

The California Public Utilities Commission provides a summary of the project description as presented in Chapter 2 of the Draft EIR.

Response to Comment UT1-2

The California Public Utilities Commission identifies its role as a responsible agency under CEQA due to its discretionary authority over PG&E activities including the proposed interconnection switching station.

Response to Comment UT1-3

These comments preface the formal comments contained in Attachment A of the letter.

Response to Comment UT1-4

As discussed in Chapter 2, *Project Description*, of the Draft EIR, a range of three turbine sizes and locations were considered to allow for fluctuating turbine market availability. However, because of the reasonable certainty of the project applicant that the configuration selected would comprise forty-four 2.3-MW turbines, and because the relative severity of impacts associated with each of the three options would be similar (i.e., none of the three options would entail a change in the significance finding for any resource area), the analysis focused on the 44-turbine configuration. The County maintains that the Draft EIR adequately analyzes the potential environmental impacts of the proposed project regardless of the turbine model ultimately selected. We concur that the language in the Executive Summary leaves room for misinterpretation; accordingly, that text has been revised for clarity the Final EIR (see Chapter 3).

Response to Comment UT1-5

In response to the CPUC's concern regarding visual simulations of the electrical collection system, it should be noted that during the initial study and scoping process for the project, it was determined that simulations of the transmission facilities were not needed because these facilities would likely not be visible from the town of Burney or SR 299. As discussed in Chapter 2, *Project Description*, the electrical collector system would be installed underground, resulting in no long-term visual/aesthetic impact. The substation would be located adjacent to the existing telecommunication facilities on Hatchet Ridge and would not result in a significant visual impact.

In general terms, the electrical collection and transmission system associated with the project would not result in any significant visual impairment on Hatchet Mountain because of the considerations listed below.

- Some of the facilities would be undergrounded.
- The baseline conditions (including the existing overhead transmission line and telecommunication towers) constitute a preexisting visual impact of considerably greater prominence than that presented by the electrical collection and transmission facilities of the proposed project.
- The wind turbines comprising the bulk of the proposed project (evaluated in Section 3.1, *Aesthetics and Visual Resources*, of the Draft EIR) constitute a significant and unavoidable

impact. Because the electrical collection and transmission facilities are of far lesser stature, and because they are not visually discernable from as great a distance, there would be no change to the finding of a significant and unavoidable impact set forth in the Draft EIR.

It is acknowledged that the figure does not reflect the locations of either the electrical connector system or the interconnection switching station. Because the electrical connector system would be installed underground in association with new and existing access roads, there would be little utility in modifying the layout graphic (Figure 2-1 in the Draft EIR) to show that component. However, the figure has been revised to show the location of the interconnection switching station. Because the proposed location is at the southern end of the project area at the junction of two existing PG&E transmission lines in an area already subject to vegetation management practices, there would be no impact on sensitive plant species. Subsequent to issuance of the Draft EIR, PG&E commented that the size of the switching station was not 2 acres as indicated in Chapter 2, *Project Description*, but 4.6 acres. The increased size of the switching station would result in the loss of an additional 2.6 acres of habitat that could support special-status wildlife species. This effect is addressed in Impact BIO-3. The addition of 2.6 acres to the 73 acres already identified would not increase the level of significance of this impact; however, the text in Section 3.4 has been revised to reflect inclusion of the switching station.

The matter of poles planned for the overhead transmission lines is addressed on page 2-7 of the Draft EIR, which states that "single steel poles or double wood poles would likely support the overhead transmission lines."

Response to Comment UT1-6

According to the applicant, *"the communication cable including fiber optic for turbine monitoring and control would be located in the underground collector system trench back to the project substation. The overhead ground wire on the 230kV line would contain the fiber optic between the project substation and the POI. No new facilities or trenches will be needed to contain the communication fiber optic system."*

The potential environmental impacts of the installation of the fiber optic system were reviewed in conjunction with the electrical collection system, and no significant environmental impacts were noted. The applicant has not provided information regarding the location of the remote monitoring facility, but it is assumed that it would be located offsite, likely at the applicant's headquarters in Texas, and therefore presents no potential for environmental impacts at the project site.

The applicant's response implies that the fiber network will be interconnected with the Public Switched Telephone Network (PTSN) at the point of interconnect (POI), which will be located at the switchyard location. Trenching for communication and electrical collector lines would be required in locations shown on Figure 2-1 of the Draft EIR.

Response to Comment UT1-7

Because the locations of the meteorological towers have not been finalized, it was not possible to depict those locations on the project configuration graphic (Figure 2-1 in the Draft EIR), nor to include them in the visual simulations prepared for the proposed project. However, because there would be only two permanent towers, because all the towers would be considerably smaller than the wind turbines (220 feet contrasted with more than 400 feet) and would have no moving parts, and because the visual impact has already been determined to be significant and unavoidable, revising the figures would add no meaningful substance to the analysis.

Response to Comment UT1-8

The Draft EIR addresses greenhouse gas emissions on page 3.3-3, and associated impacts are analyzed on page 3.3-14. The conclusion is that the project's construction-related emissions will have a less-than-significant impact on greenhouse gases. In addition, please see page 3 of the Applicant's Response letter, dated February 11, 2008. Although the Draft EIR did not include calculation of the greenhouse gas emissions associated with construction activities, due to the short-term nature of emissions from construction equipment, it was determined to be a less-than-significant impact.

Letter UT2

Pacific Gas and Electric Company

3600 Meadow View Drive
Redding, CA 96002

DEPARTMENT OF
RESOURCE MANAGEMENT
RECEIVED

JAN 23 2008

PLANNING/BUILDING
DIVISIONS

January 23, 2008

Shasta County
Department of Resource Management
Planning Division, Attn: Bill Walker
1855 Placer Street, Suite 103
Redding, California, 96001

RE: Draft EIR for Hatchet Ridge Wind Project

Dear Mr. Walker:

Thank you for the opportunity to review and comment on the Hatchet Ridge Wind Project Draft EIR. As you may know, PG&E will construct the interconnection between our existing tower lines and the proposed electric switching station and we will be the ultimate owner of the switching station. **UT2-1**

PG&E's electric transmission projects are regulated by the California Public Utilities Commission (CPUC) through its General Order 131-D. The CPUC should be listed as a Responsible Agency in this EIR. **UT2-2**

The Draft EIR incorrectly states that the size of the switching station will be about two acres. PG&E's need for the switching station area is roughly 450 feet by 450 feet or about 4.6 acres. I'm enclosing a drawing that shows our conceptual layout for the switching station and interconnecting 230kV loop transmission line. **UT2-3**

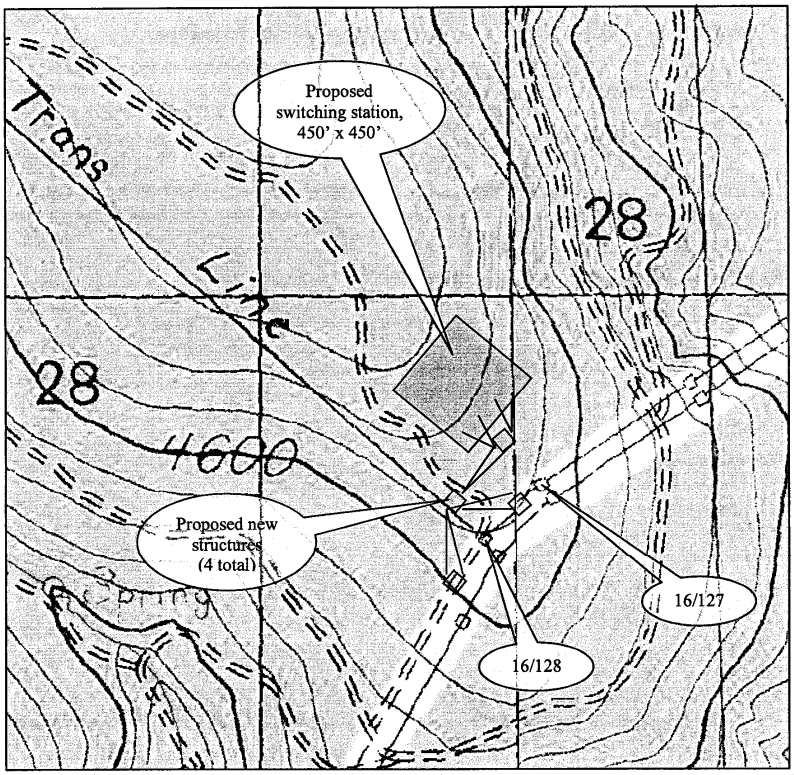
If you would like to discuss this further or need additional information, please call me at (530) 246-6419.

Sincerely,

Michael J. Momber
Land Planner

HATCHET RIDGE WIND FARM

PG&E's conceptual switching station siting



Letter UT2 Pacific Gas and Electric Company

Response to Comment UT2-1

PG&E acknowledges its role on the proposed project: to construct and own the interconnection switching station between the project and the existing transmission lines.

Response to Comment UT2-2

Table 2-2 on page 2-13 of the Draft EIR lists the California Public Commission as a state agency responsible for issuing a permit for the proposed project under General Order 131(d).

Response to Comment UT2-3

See the response to Comment UT1-2.

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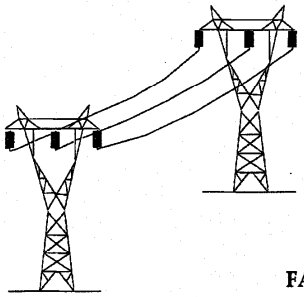
Letter UT3



TRANSMISSION AGENCY OF NORTHERN CALIFORNIA
P.O. Box 15129, Sacramento, CA 95851-0129 (916) 852-1673

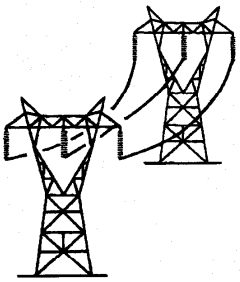
FAX TRANSMITTAL SHEET

Date: January 28, 2008	Time:	W.O. # 127217.4.1
To: Mr. Bill Walker		Fax #: 530/245-6468
Message		
From: James W. Beck		
Operator: Barbara Ford		
Number of pages (including cover sheet): 3		

Hard Copy WILL NOT follow via U.S. Mail.

If you have any problems or questions, please contact the operator noted above at (916) 852-1673. For transmittal of documents to TANC, please dial (916) 852-1073.

01/28/2008 MON 16:06 FAX 9168521073 002/003



TRANSMISSION AGENCY OF NORTHERN CALIFORNIA

P.O. Box 15129, Sacramento, CA 95851-0129 (916) 852-1673

January 28, 2008

Via Facsimile

Mr. Bill Walker
Shasta County Dept. of Resource Management
1855 Placer Street, Suite 103
Redding, CA 96001

Dear Mr. Walker:

We understand that Shasta County, as the Lead Agency under the California Environmental Quality Act (CEQA) will be evaluating and responding to comments, preparing and certifying the final EIR, making findings, and potentially approving the Hatchet Ridge Wind Project (Project). **UT3-1**

The Transmission Agency of Northern California (TANC) is the largest owner and project manager of the California-Oregon Transmission Project (COTP). The COTP is one of three major 500-kV transmission lines that comprise the California-Oregon Interties (COI). These facilities are interconnected with a number of 230-kV lines owned by Pacific Gas & Electric (PG&E) and located in the proximity of the proposed Project. **UT3-2**

Previous interconnection studies done by PG&E relative to projects located in the same area as the proposed Project and interconnected with PG&E 230-kV facilities in the area have indicated that the injection of power from these projects could have a detrimental impact on the amount of power that could be imported into California from the Pacific Northwest over the 500-kV grid. TANC has contacted the California Independent System Operator (CAISO) and requested a copy of the impact studies for the Project to determine if these studies for the Project had demonstrated any impacts on the 500-kV grid and, if so, how such were proposed to be mitigated. To date we have not received a response from the CAISO. **UT3-3**

In the absence of specific studies quantifying the impacts or associated mitigation costs of the Project, on the existing 500-kV grid, please be aware that this and similar projects will likely increase the costs of rebuilding or re-conductoring existing 230-kV lines to maintain appropriate import levels and related performance objectives for potentially affected public facilities. The allocation of these costs is governed by the Owners **UT3-4**

A Public Entity whose Members include:
Alameda, Biggs, Gridley, Healdsburg, Lodi, Lompoc, Modesto Irrigation District,
Palo Alto, Plumas-Sierra Rural Electric Cooperative, Redding, Roseville,
Sacramento Municipal Utility District, Santa Clara, Turlock Irrigation District, Ukiah

Coordinated Operating Agreement (OCOA) among TANC, PG&E, and the Western Area Power Administration. UT3-4 cont.

Please be advised that TANC has no desire to stifle the development of renewable resources within California. In fact, TANC is actively working with the TANC Members to identify additions to the transmission grid which would facilitate the delivery of such resources to our members. The transmission plans that we are developing have not demonstrated any negative impacts on the existing grid and we believe that minimizing such impacts should be the goal of all parties in California pursuing the development of resources; both renewable and thermal. UT3-5

Please contact Bryan Griess or Dave Larsen at (916) 852-1673 if you have any questions concerning the above.

Sincerely,

James W. Beck
General Manager

Letter UT3 Transmission Agency of Northern California

Response to Comment UT3-1

This comment correctly identifies Shasta County's role as the lead CEQA agency and its associated duties and responsibilities.

Response to Comment UT3-2

This comment provides information about the Transmission Agency of Northern California, its mission, and transmission lines in the project vicinity.

Response to Comment UT3-3

This comment refers to previous interconnection studies and communication with the California Independent System Operator regarding impacts of the proposed project on the existing transmission system .

Response to Comment UT3-4

Comment noted. Because PG&E is the owner and operator of the 230kV lines in the project vicinity, and will also be the owner of the proposed switch yard, any responsibility for reconductoring or upgrading transmission lines in the project area will be the sole responsibility of PG&E.

Response to Comment UT3-5

The Transmission Agency of Northern California's favorable position on renewable resources, along with its own transmission plans, is noted.

Other Groups Comments

Letter OG1

BURNEY
CHAMBER OF COMMERCE
37098 Main Street • P.O. Box 36 • Burney, CA 96013
(530) 335-2111

January 14, 2008

Shasta County Department of Resource Management
Planning Division
Attn: Mr. Bill Walker
1855 Placer Street, #103
Redding, CA 96001

Dear Mr. Walker:

At the general meeting of the Chamber of Commerce this date, the Officers, Board of Directors, and Chamber members present discussed the Hatchet Ridge Wind Project. After much discussion, the decision was made to support the Project. OG1-1

At a public meeting held last year, a second meeting was to be held in Burney scheduled by Shasta County officials to discuss the financial impact on the community. This is of great concern to many residents and we feel the meeting should be soon.

If you have any questions or concerns, please feel free to contact me at 335-3636. I will be out of the office until January 28, 2008. OG1-2

Kindest regards,

Pam Giacomini

Pam Giacomini
President

DEPARTMENT OF RESOURCE MANAGEMENT RECEIVED
JAN 18 2008
PLANNING/BUILDING DIVISIONS

Letter OG1 Burney Chamber of Commerce

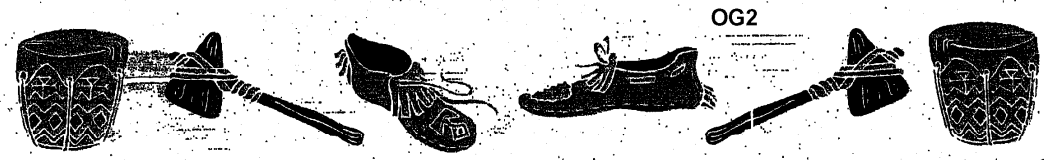
Response to Comment OG1-1

It is noted that the Burney Chamber of Commerce supports approval of the proposed project.

Response to Comment OG1-2

This comment supports additional public hearings on the project in the near future.

OG2



Pit River Tribe
37118 Main St
Burney Ca. 96013
Ph. # : 530-335-5421
Toll Free # : 1-877-279-9097
Fax # : 530-335-3140

Fax Transmittal Form

Number of Pages 4 (including Cover Page)

To: Bill Walker – Senior Planner

From: Natural Resources Dept. of Pit River Tribe

Date: 1-28-08

Fax #: 530-245-6468

Message: Please see attached comments from the Pit River Tribe regarding the Proposed Windmill Project.
Thank you.
Rae

Have A Good Day

JESSICA JIM
TRIBAL CHAIRMAN

IDA RIGGINS
VICE-CHAIR

SHONDA ANNIS
TRIBAL SECRETARY

PIT RIVER TRIBE

PIT RIVER TRIBE
37118 Main Street
Burney, CA 96013

Telephone
(530) 335 5421
(530) 335 3140 FAX

ELEVEN AUTONOMOUS BANDS

ATWAMSINI ASTARAWI ATSUGEWI APORIGE AJUMAWI

HEWISEDAWI ILLMAWI ITSATAWI KOSEALEKTE HAMMAWI

1/28/2008

Bill Walker, Senior Planner
Shasta County Department of Resource Management, Planning Division
Suite 103
1855 Placer Street
Redding CA 96001
530-225-5532

Re: Hatchet Ridge Windmill Project

Dear Mr. Walker,

The purpose of these comments to Shasta County and future licensee is to reveal the Pit River Indian Tribe concerns in the project area that is being prepared for development. The Tribe has some serious concerns regarding the project and its impacts on the natural and cultural resources at this site held sacred to the Itsatawi and Atsugewi Bands of the Pit River Nation. OG2-1

This document is not an opposition letter to alternative forms of energy to reduce cumulative effects of nonrenewable energy resources. The Tribe will however take the position that takes into account the Bald and Golden Eagle Act as well as the Migratory Bird Treaty Act. Based on the information provided within the report, it is the Tribe's opinion that the windmill project will result in a violation of both of these Acts. However, given the nature of these Acts and violations by other windmill projects (ie Altamont Pass), the Tribe still has some serious questions with EIR and what the cumulative impacts might be to the areas bird populations. OG2-2

BRIEF HISTORY OF THE PIT RIVER INDIAN and THE WIND MILL PROJECT AREA

Pit River Indians traditionally utilized this area for their subsistence and spirituality for thousands of years. Their existence was only one part of the watershed's ecosystem life cycle. Until disease, murder, and removal to reservations reduced the Pit River Indian population, a handful struggled to continue this cycle harmoniously with the earth. The project area is well-documented in ethnographic studies. Projects, such as these that propose to kill the eagles and other birds in the Pit River Indian's ecosystem is another direct threat to their religious freedom. OG2-3

MADESI

During the period of major hydropower development and rapid destruction of the fishery, many of the Pit Rivers greatest warriors were adopted by the United States government to fight battles in Europe, Japan, Vietnam, and Korea. Ironically, while their warriors were away fighting the United States battles, the remaining Pit Rivers, like many other California Indians, were still practicing the Native American's traditional way-of-life and fighting for land claims. Although they were seen as homeless, occupiers, and trespassers on their own traditional lands, they struggled to practice the cultural ways that allowed them to exist in the Pit River Watershed for over 8000 years. Between 1910 and 1940, the federal government finally deeded Rancherias and a large Reservation to the "homeless Pit River Indian." At the same time several thousands of acres were put into trust with the federal government. It is these lands that compose the sovereign nation of the Pit River Tribe. In 1967 the Tribe formed its constitution. In 1984 the Pit River Nation became federally recognized. Since 1995, the Tribe engaged in building program capacity to manage natural and cultural resources recognized in Docket 347 of the Department of Interior Land Claims Commission and their 1967 constitution. The programs are responsible for several thousands of acres within the Pit River and McCloud watersheds. Cultural and watershed restoration projects on these lands are often inter-agency efforts. This windmill project occurs within the lands recognized in Docket 347.

OG2-4

HABITAT IMPROVEMENT PROJECTS UNDONE?

Within the past 10 years, the Tribe has proposed and implemented many habitat improvement projects for the bald eagle, greater sandhill cranes, and other birds that will likely be killed by the windmill project. The Tribe has concerns that this windmill project will undo such habitat improvement work on Tribal Land. Additionally, due to the migratory nature of birds, other Tribal and sovereign nations may be impacted by the project. We believe that this concern can be alleviated if Shasta County and the future licensee receive meaningful input from the Tribe, state and federal agencies, conservation groups, raptor biologists, and leaders of other sovereign nations. We suggest to Shasta County and the future licensee to fund a stakeholders group. Once a stakeholder group is organized, we propose that Shasta County and the future windmill licensee fund extensive and long-term monitoring at the project site and within the Pit River Watershed to determine impact to bird populations on Tribal and public lands.

OG2-5

ECONOMIC IMPACTS

Since the federal and state governments have subsidized several conservation easements and habitat improvement projects, we would like the County to address the economic impacts to these conservation easements and other subsidy programs that promote special-status bird habitat protection. We would like some guarantee that habitat improvement projects will continue to be funded even if birds are continually killed. Perhaps the funded stakeholder group can act as a third party that guarantees that Shasta County and the licensee will be responsible to pay for habitat improvement projects to promote a "no-net loss-of-bird-life" policy. Of course, research and monitoring would have to be funded and conducted to determine what the baseline populations might be.

OG2-6

BALD AND GOLDEN EAGLE ACT and MIGRATORY BIRD TREATY ACT

The Tribe requests pre and post-construction quantitative and qualitative information to gauge cumulative impacts regarding impacts to bird populations listed in the Bald and Golden Eagle Act and Migratory Bird Treaty Act. In other words, does Shasta County or

OG2-7

MADESI

the future licensee see a future "take" from these populations? Will a decline be measurable or observable in the species in these Acts? Is Shasta County or the project licensee prepared to fund monitoring efforts for qualitative and quantitative monitoring efforts?

Because of the nature of migratory birds, several nest on Tribal jurisdictional lands in the Upper and Lower Pit River Watershed. Is Shasta County or the future licensee prepared to fund monitoring and mitigate bird population loss on Tribal Lands?

OG2-7 cont.

GOVERNMENT-TOGOVERNMENT CONSULTATION

In addition to these scientific questions, we have some concerns with Shasta County's diplomacy experience or knowledge of government-to-government consultations. Is Shasta County prepared to work with the Tribe and leaders of other sovereign nations? We believe that this project warrants a government-to-government consultation with the Pit River Tribal government and Shasta County Board of Supervisors.

OG2-8

CULTURAL RESOURCES

Cultural resources can be found within this unit. The cultural resources include, but are not limited to, sacred sites, traditional and medicinal plants, Native American artifacts, and human remains. The Tribe maintains that the artifacts and human remains are their responsibility. The Tribe will utilize all laws to protect these resources. The Tribe will want to work with Shasta County and develop to assure all artifacts are curated by the Pit River Tribe.

OG2-9

NOXIOUS WEEDS

The Tribe request's that best management practices outline practices that control the spread of noxious weeds within the project area.

OG2-10

Respectfully,

Natural Resources and Roads Program

MADESI

Letter OG2 Pit River Tribe

Response to Comment OG2-1

This comment expresses the Pit River Tribe's serious concerns about the project's impacts on natural and cultural resources.

Response to Comment OG2-2

The Tribe suggests its support of renewable resources, but it also has concerns related to the possible violation of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Response to Comment OG2-3

The Tribe notes its historic use of the project area and the project's potential to pose a "direct threat to their religious freedom."

Response to Comment OG2-4

This comment provides background information regarding the Pit River Tribe and its federal status under Docket 347 of the Department of Interior Land Claims Commission.

Response to Comment OG2-5

Neither the County nor consulting state agencies are aware of habitat restoration efforts by the Pit River Tribe conducted in the project area. As addressed in the responses to comments submitted by the California Department of Fish and Game and the Wintu Audubon Society, formation of a stakeholder group does not mitigate or lessen the significance of potential impacts, and is, therefore, not proposed as mitigation in the Draft EIR. However, as part of the proposed mitigation, a monitoring/adaptive management program and formation of a Technical Advisory Committee are included in revised Mitigation Measure BIO-6.

Response to Comment OG2-6

CEQA does not require an assessment of the economic impacts of a proposed project in an EIR. While the County could consider conservation easements and stakeholder groups as a condition of approval of the proposed project, as suggested by the Pit River Tribe in this comment, these activities have not been included in the Draft EIR because neither would substantially lessen any identified environmental impacts, such as avian mortality. Neither Shasta County nor the project applicant has announced any plans "to fund monitoring or mitigation for bird population loss on Tribal lands" as expressed in the comment. However, offsite mitigation for habitat has been added as part of revised Mitigation Measure BIO-6.

Response to Comment OG2-7

The EIR sets forth extensive monitoring requirements to determine if the impacts resulting from project operations are substantially different from those predicted in the Draft EIR, and has identified mitigation measures to minimize those impacts if they exceed predictions. See also the responses to Comment PA1-4 which summarizes the additional mitigation requirements determined in consultation with the California Department of Fish and Game. Please refer to revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG2-8

Relationships between the Tribe and the County are beyond the scope of environmental analysis as mandated by CEQA; accordingly, this issue is not addressed in the Draft EIR.

Response to Comment OG2-9

Comment noted. Impacts on cultural resources and coordination with the Pit River Tribe are disclosed in Section 3.5 of the Draft EIR.

Response to Comment OG2-10

Measures to control the spread of noxious weeds are provided in Mitigation Measure BIO-2 in the Draft EIR.

Letter OG3

REMY, THOMAS, MOOSE and MANLEY, LLP
ATTORNEYS AT LAW

MICHAEL H. REMY
1944 -- 2003

TINA A. THOMAS
OF COUNSEL

JAMES G. MOOSE
WHITMAN F. MANLEY
ANDREA K. LEISY
TIFFANY K. WRIGHT
SABRINA V. TELLER
ASHLE I. CROCKER

455 CAPITOL MALL, SUITE 210
SACRAMENTO, CALIFORNIA 95814

Telephone: (916) 443-2745
Facsimile: (916) 443-9017
E-mail: info@rtmmlaw.com
http://www.rtmmlaw.com

JENNIFER S. HOLMAN
MICHELE A. TONG
AMY R. HIGUERA
HOWARD F. WILKINS III
MEGAN M. QUINN
AMANDA R. BERLIN
JASON W. HOLDER
LAURA M. HARRIS
KATHRYN C. COTTER
COURTNEY K. FRIEH
CHRISTOPHER J. BUTCHER

BRIAN J. PLANT
OF COUNSEL

VIA FACSIMILE
Original to follow by Federal Express

January 28, 2008

Mr. Bill Walker
Senior Planner, Planning Division
Shasta County Dept. of Resource Management
1855 Placer Street, Suite 103
Redding, California 96001

Re: Comments on Draft EIR for the Hatchet Ridge Wind Project

Dear Mr. Walker:

On behalf of the applicant, Hatchet Ridge Wind LLC (HRW), I submit the following comments on the Draft EIR for the Hatchet Ridge Wind Project. HRW appreciates the hard work by you and your staff to prepare and produce the EIR for this important project for the County.

In general, HRW agrees with most of the County's analysis and conclusions regarding the potential impacts of the project. There are, however, several important clarifications HRW requests to make in the analysis and recommended mitigation measures that will be presented in the Final EIR.

OG3-1

Biological Resources

Under separate cover, HRW's biological consultant, Dave P. Young, of Western Ecosystems Technology, Inc. (WEST) is submitting his comments on the Draft EIR's biological resources analysis and recommended mitigation. As his comments explain, HRW believes that the Draft EIR overstates the magnitude of the potential impacts to the Butte County morning glory, and that the impacts are likely to be much less severe than

OG3-2

the Draft EIR's analysis suggests. Mr. Young's conclusions are not based on the wishful thinking of the applicant, but rather, the most recent and site-specific information available. Additionally, Mr. Young suggests several refinements to the thresholds of significance and resulting mitigation proposed for impacts to avian and bat species (Mitigation Measure BIO-6). HRW, through Mr. Young, has provided substantial evidence in support of the revised significance conclusions and mitigation measures proposed in his letter. HRW respectfully requests that the County and EIR consultant carefully consider the evidence and comments submitted so that the biological resource analysis and resulting recommendations for mitigation in the Final EIR are as accurate and fair as possible.

OG3-2 cont.

OG3-3

Cultural Resources

I am also enclosing the comments of Nicole Hughes, an experienced Registered Professional Archaeologist, for Renewable Energy Systems Americas Inc., HRW's affiliate company, regarding the Draft EIR's analysis and proposed mitigation for cultural resources. RES's most significant concern about the cultural resources analysis is the recommendation to record the project site as a "traditional cultural property." As Ms Hughes explains, this designation is a creature of federal law, not CEQA or any other state law. The recommendation to record the property with a federal designation is inappropriate and excessive because federal regulations pertaining to cultural resources are not applicable to this project due to the lack of jurisdiction of federal permitting agencies over the project. The analysis and proposed mitigation should be revised to properly investigate whether the property meets the criteria for eligibility to the *state* Register of Historical Resources, as explained by Ms. Hughes.

OG3-4

Ms. Hughes also describes RES's extensive previous and ongoing efforts to work with the Pit River Tribe to operate the wind power project with sensitivity to the Tribe's concerns. As a lessee and not the owner of the project property, however, RES cannot agree to implement mitigation that would allow access and property rights to third parties that the property owners will not grant.

OG3-5

Feasibility of Project Alternatives

Although the goal under CEQA is for a lead agency to analyze a wide range of potentially feasible alternatives to a project that would result in significant impacts, the site- and fact-specific circumstances of individual projects sometimes lead the agency to the unavoidable but proper conclusion that no other project alternative is feasible. This project is such an example, as the alternatives analysis of the Draft EIR explains. RES, through its earlier communications and the additional information presented in Ms. Hughes' second letter attached hereto, has provided substantial evidence to the County

OG3-6

explaining how the unique physical constraints of the project site and the economic considerations of wind power generation result in the proposed project being the only feasible design and configuration the applicant can build. As Ms. Hughes' letter explains, RES has investigated the suggestion of the Wintu Audubon Society in its January 22, 2008 comments to use vertical axis wind turbines (VAWT) at the project site, but found that VAWT technology is not without its own flaws and potentially significant effects at this site. For example, the footprint of such turbines is much larger than the turbines proposed to be used, thereby potentially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Furthermore, the height of VAWTs is only 29 meters, which would not work well in the timberland setting of the Hatchet Ridge project site, where trees will interfere with the wind at that lower height. Moreover, the company that manufactures the VAWT Audubon recommends currently does not have a turbine that even produces 1 MW; thus, HRW would need to install almost three times as many turbines as proposed for this project to produce 102 MW, the minimum capacity project size that is economically feasible for HRW to construct. The design of the VAWTs Audubon recommends also have a much bulkier silhouette than the traditional design HRW proposes, and could therefore result in significantly different and more adverse visual effects if VAWTs were installed on the project site.

OG3-6 cont.

OG3-7

RES has further investigated the specifications of the various models of turbines that would work for the site, and has settled on a 2.4 MW turbine because this model would allow the fewest number of turbines to be installed to achieve the minimum feasible 102 MW project capacity. Using the 2.4 MW turbines, HRW could install just 43 turbines, the lowest end in the range analyzed in the EIR, thereby keeping the project's visual impacts, as well as the footprint-related impacts on vegetation like the Butte County morning glory, to the minimum level possible. HRW would also have to remove fewer trees to install and maintain the turbines than it would if it selected lower-megawatt producing turbines. The most beneficial aspect of using these few turbines is that the potential for avian and bat strikes would be kept to the lowest possible level.

OG3-8

Greenhouse Gas Emission Comparisons

The Draft EIR notes that the project's cumulative contribution to air quality impacts is considered beneficial (DEIR, p. 4-4), but HRW believes that more details on this point are warranted in the Final EIR. The proposed project would help reduce the state's dependence on energy derived from fossil fuels, ultimately reducing cumulative greenhouse gas emissions. By generating energy from the proposed project in lieu of construction of a coal-, oil-, or natural-gas-burning facility to meet increased energy needs, the proposed project would help to reduce dependency on fossil fuels that have significantly greater operational emissions of CO_2, the leading greenhouse gas associated with global warming. For example, for every kilowatt-hour (kWh) generated, 2.13, 1.03,

OG3-9

and 1.56 pounds of CO_2 are produced from coal, natural gas, and oil burning, respectively. (Wind Energy Fact Sheet, by American Wind Energy Association, attached.) By comparison, wind power generates no CO_2. A single 750-kW wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of CO_2, 14, 172 pounds of SO_2, and 8,688 pounds of NOx, based on the U.S. average utility generation fuel mix. (*Ibid*.) The larger 2.4 mW turbines proposed to be used at the Hatchet Ridge project site could be expected to achieve even greater savings. **OG3-9 cont.**

According to the American Wind Energy Association, emissions from the manufacture and installation of wind turbines are negligible. The measure of how long a wind farm must operate to generate the amount of electricity required for its manufacture and construction is 3 to 8 months, depending on the wind speed at the site – one of the shortest of any energy technology.

As the attached materials from the U.S. Department of Energy and American Wind Energy Association explain, the air pollutant and greenhouse gas emissions savings of wind power are significant as compared to energy generated from fossil fuel combustion. Therefore, HRW believes that the operation of the Hatchet Ridge Wind Project will cumulatively benefit air quality in the Sacramento Valley Air Basin and that this beneficial impact should be further explained in the Final EIR. **OG3-10**

Other Considerations

At two other points in the EIR, HRW requests minor clarifications or revision to the proposed mitigation. First, for Mitigation Measure AES-1 (page 3.1-13), the Draft EIR proposes to require the applicant to use a "rapid-discharge flashing red light" on each of the end turbines along the ridgeline, rather than a single incandescent light. As the Draft EIR notes, the FAA dictates the type of safety lighting that must be installed to reduce hazards to aircraft and HRW must consult with FAA prior to project construction regarding the type of light FAA will require. HRW is not in a position to agree to a condition that may be contrary to what FAA will require; thus, HRW requests that the mitigation measure be revised to state that while a rapid-discharge flashing red light is preferred by the County and that preference will be communicated to FAA, HRW will be required to install whatever type of light is ultimately required by FAA. **OG3-11**

Second, in Mitigation Measure AIR-1 (page 3.3-11), one of the "Standard Mitigation Measures" listed for control of particulate matter is to suspend all land clearing, grading, earth moving, and excavation activities on the project when winds are expected to exceed 20 miles per hour. Given that a wind power project was proposed for this site precisely *because* the winds regularly exceed 20 miles per hour, this restriction could result in **OG3-12**

making it extremely difficult to complete construction of the project within the short summer construction season afforded by the local weather and site altitude. In order to ensure adequate PM_{10} control if this restriction were deleted, HRW proposes to increase the frequency of watering of the construction site and material stockpiles during windy conditions.

OG3-12 cont.

Conclusion

Again, HRW agrees with and supports most of the Draft EIR's analysis and proposed mitigation as adequate and consistent with CEQA's requirements. On these few but important points, however, HRW respectfully requests that the County consider the expert evidence submitted with these letters in preparing responses to comments and revising the analysis and mitigation presented in the Final EIR.

OG3-13

Please do not hesitate to contact me if you have any questions regarding these comments. Thank you for your consideration of these matters.

Sincerely,

Sabrina Teller

Sabrina V. Teller

Enclosures

WIND ENERGY FACT SHEET

American Wind Energy Association
[illegible] C Street, N.W.
Suite [illegible]
Washington, D.C.
[illegible]
[illegible]

Comparative Air Emissions Of Wind and Other Fuels

Wind energy's most important environmental benefit is its lack of emissions of both air pollutants and greenhouse gases when compared with alternative methods of generating electricity.

The American Wind Energy Association (AWEA) has developed a set of statistics to quantify the comparative emissions of wind and other fuels, based on data gathered by the U.S. Department of Energy's Energy Information Administration (EIA)[1], which collects information on the U.S. utility industry.

This, and similar fact sheets, can be found online at http://www.awea.org/pubs/factsheets.html.

For carbon dioxide (CO_2), the leading greenhouse gas associated with global warming, comparative emissions during electricity generation are as follows:

Fuel	CO_2 Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	CO_2 Emitted, Total Generation (billion pounds)
Coal	2.13	1,788	3,807
Natural Gas	1.03	283.6	291
Oil	1.56	77.8	122
U.S. Average Fuel Mix [2]	1.52	3,494	5,313
Wind	--0--	3.4	--0--

For sulfur dioxide (SO_2), the leading precursor of acid rain:

Fuel	SO_2 Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	SO_2 Emitted, Total Generation (million pounds)
Coal	0.0134	1,788	24,028
Natural Gas	0.000007	283.6	2
Oil	0.0112	77.8	870
U.S. Average Fuel Mix [2]	0.0080	3,494	27,914
Wind	--0--	3.4	--0--

For nitrogen oxides (NOx), another acid rain precursor and the leading component of smog:

Fuel	NOx Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	NOx Emitted, Total Generation (million pounds)
Coal	0.0076	1,788	13,668
Natural Gas	0.0018	283.6	504
Oil	0.0021	77.8	162
U.S. Average Fuel Mix [2]	0.0049	3,494	17,112
Wind	--0--	3.4	--0--

A single 750-kilowatt wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of carbon dioxide, 14,172 pounds of sulfur dioxide, and 8,688 pounds of nitrogen oxides, based on the U.S. average utility generation fuel mix.[3]

AWEA has prepared a spreadsheet which permits calculations based on these and other air emissions statistics and which can be e-mailed to researchers on request.

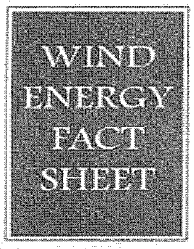
NOTE

1. Emissions data in this fact sheet are based on statistics provided in the EIA's *Annual Energy Review 1998*. (Washington, D.C.: Energy Information Administration, DOE/EIA-0384 ((98)), July 1998.) The Annual Energy Review can be accessed on the Web at <http://www.eia.doe.gov/aer>.

2. The numbers for kilowatt-hours generated and emissions for "Coal," "Natural Gas," and "Oil" are based on U.S. electric utility generation. The numbers for kilowatt-hours generated and emissions for "US Average Fuel Mix" and "Wind" are the totals for all U.S. generation, including nonutility plants."

3. Estimate derived by AWEA using data from *Renewable Energy Technology Characterizations*, published by the U.S. Department of Energy and the Electric Power Research Institute, December 1997.

American Wind Energy Association
122 C Street NW, Suite 380, Washington, DC 20001



American Wind
Energy Association
1 C Street, N.W.
Suite 380
Washington, D.C.
20001
(202) 383-2500

Save the Loon with Wind Energy:

Comparative Impacts of Wind and Other Energy Sources on Wildlife

One of wind energy's important environmental benefits is its minimal impact on wildlife and natural habitat.

While no electricity generation is entirely benign, the impacts of some energy sources dwarf others in terms of the harm they cause to wildlife. Electricity in the U.S. is mostly produced from coal and other fossil fuels (70%), nuclear energy (20%), and dams, sources which take a heavy toll or impose significant risks on wildlife.[i]

Example: The common loon and other aquatic wildlife are at risk from high concentrations of the toxic heavy metal mercury, emitted largely from coal power plants, according to the National Wildlife Federation. "Rain falling over cities in the Great Lakes region contains as much as 65 times the EPA's "safe level" of mercury, which holds extremely serious health implications for both humans and wildlife," according to the Federation.[ii] Coal power plants are the single largest source of mercury emissions in the U.S., and those emissions are not regulated.[iii] Half of that mercury is airborne, and travels anywhere from 30 to 600 miles downwind of a plant.

Other impacts of U.S. electricity generation on wildlife include:

--Harm from the sulfur dioxide (SO_2) and nitrogen oxide (NOx) released by coal and other fossil fuel power plants. These pollutants not only cause respiratory ailments in humans—and probably also in wildlife—but also acidify rain, snow, and fog. Because of acid rain, in the Northeast in particular, many lakes and streams once thriving with aquatic creatures are now almost void of life in spite of their pristine appearance. Acidity depletes calcium, so acid rain also results in weaker eggshells for birds. Power plants account for 70% of SO_2 and 33% of NOx emitted in the U.S. "Protected" areas such as state and national parks offer no protection to wildlife from this and other forms of airborne pollution.

--Loss of habitat from mining for coal, uranium, gas and petroleum used to generate electricity. Birds and other wildlife lose their habitat and can be killed as land is blown up (for mountaintop removal, a coal-mining technique) or strip-mined for coal. An estimated 130,000 acres are disturbed every year for coal used for electricity generation in the U.S. In addition to the land and waste that fills riverbeds, acid mine drainage can occur for years after mines are closed, harming river systems and endangering waterfowl. No total national tally is kept of the impact on wildlife of extraction of fuels for electricity generation in the U.S.

--Direct and indirect kills from hydroelectric and nuclear power plants. Dams have caused the extinction or dramatic decline of several species of ocean-going fish, including

wild salmon of the Pacific Northwest and shad of the Eastern Coast. Even if the fish get past the dams to spawn upstream thanks to fish ladders, many of the young perish in the retention ponds above the dam. Local river and coastal ecosystems are also altered by nuclear and other power plants using "once-through" river or coastal water to cool their reactors and equipment. Waters are warmed above their normal temperature, and fish and other aquatic creatures including seals can be killed in the cooling systems.[iv]

--Global warming. The earth's temperatures are growing warmer, with build-up of carbon dioxide (CO_2) and other greenhouse gases a key factor, according to the U.S. National Oceanic and Atmospheric Administration and other scientific organizations. Some species may thrive with the ecosystem changes brought about by global warming, but many others are likely to perish, as they are unable to adapt. A new report by the World Wide Fund for Nature (WWF) finds that the gradual warming of the Arctic is already endangering the lives of birds in the polar region. Fossil fuel power plants account for about 34% of CO_2 emitted by the United States, itself the largest emitter of CO_2 worldwide.

--**Risks from radioactivity and radioactive wastes.** The operation of nuclear power plants presents low-probability, but potentially catastrophic risks for wildlife as well for human beings. Transportation and storage of radioactive waste similarly pose risks to wildlife.

By contrast, the impacts of wind energy on wildlife are minimal, **even where wind energy is widely used**.

--Minimal harmful impacts on birds: In Denmark, the country with the most intensive use of wind energy, wind turbines generate 10% of electricity and are widespread, but have not been found to cause significant harm to wildlife including birds. Power lines pose a much greater threat to birds, according to Danish and U.S. studies. The National Audubon Society recently issued a statement in support of responsibly sited wind project development [v]

--**Positive impacts on wildlife**: In 1998-99, 925 megawatts (MW)—equivalent to about four medium-size coal or one nuclear power plant—of wind energy generating capacity were added in the U.S., mostly on Iowa and Minnesota farmland. Based on the average U.S. electricity mix, this new wind power is, every year, saving 170 acres of land from mining, and displacing 10,128 tons of SO_2, over 2 million tons of CO_2, 6,500 tons of NOx, and many other pollutants, thereby helping provide cleaner air and healthier habitat for wildlife.

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[i] *The Environmental Imperative for Renewable Energy An Update*, April 2000, Renewable Energy Policy Project
[ii] *Great Lakes Power Plants Top List of Mercury Polluters*, Nov. 17, 1999, National Wildlife Federation press release.
[iii] *Mercury Falling, An Analysis of Mercury Pollution from Coal-Burning Power Plants*, Nov. 1999, Environmental Working Group, Clean Air Network and Natural Resources Defense Council.
[iv] Over 40 million fish die per year in the intakes of 90 Great Lakes power plants using once-through systems, according to *Environmental Costs of Electricity*, 1991, Richard Ottinger et al., Pace University Center for Environmental Studies.
[v] *National Audubon Applauds Enron Wind Corp. Decision to Pursue Alternate Site for Wind Power Development*, Nov. 3, 1999, Audubon press release. In the U.S. the only site that has caused major bird kills is the Altamont Pass, developed in the 1980s in California. See *A Continued Examination of Avian Mortality in the Altamont Pass Wind Resource Area*. BioSystems, January 1996.

American Wind Energy Association™

Wind Energy and Wildlife: The Three C's

In terms of impacts on wildlife, wind energy has three primary benefits as an energy generation source: it is **clean**; it is **compatible** with animals and humans; and the industry is **committed** to ensuring minimal impacts on nature and the environment in wind energy development. This fact sheet provides information and statistics on each of these attributes.

- **CLEAN**: Wind energy is one of the cleanest, most environmentally friendly energy sources in the world. Wind energy development protects air quality, reduces the effects and rate of global warming, and displaces mining and drilling for natural gas, coal, and other fuels. While wind energy cannot supply all of the electricity we need, using more of it will reduce the overall environmental impact of our society's energy use.
- **COMPATIBLE**: Wind energy is also one of the healthiest energy options, and the most compatible with animals and humans. The modern wind turbine is far less harmful to birds and other wildlife than are radio towers, tall buildings, airplanes and vehicles and numerous other manmade objects. Bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly-accepted human activities.
- **COMMITTED**: The wind industry is committed to, and has demonstrated, continual innovations leading to greater protection of the environment and wildlife. By offsetting impacts from other energy sources, the use of wind energy improves environmental conditions for birds and other wildlife.

CLEAN

Wind energy is one of the cleanest, most environmentally friendly energy sources in the world.

- Wind energy produces no emissions.
- Wind energy requires no mining, drilling, or transportation of fuel, and no disposal of radioactive or other hazardous or polluting waste. It is a renewable energy resource found in abundant supply in many regions of the United States.

Environmental Impacts of Electricity Sources

	Wind	Nuclear	Coal	Natural Gas
Global Warming Pollution	None	None	Yes	Yes
Air Pollution	None	None	Yes	Limited
Mercury	None	None	Yes	None
Mining/Extraction	None	Yes	Yes	Yes
Waste	None	Yes	Yes	None
Habitat Impacts	Yes	Limited	Yes	Yes

Based on AWEA's estimates and data from a 2002 study by the Natural Resources Defense Council (NRDC):

- A single 1-MW turbine displaces nearly 1,800 tons of carbon dioxide each year (equivalent to planting nearly a square mile of forest), based on the current average U.S. utility fuel mix.
- To generate the same amount of electricity as a single 1-MW turbine using the average U.S. utility fuel mix results in the emissions of 9 tons of sulfur dioxide and 4 tons of nitrogen oxide each year.
- To generate the same amount of electricity as a single 1-MW wind turbine for 20 years would require burning 29,000 tons of coal (a line of 10-ton trucks 11 miles long) or 92,000 barrels of oil.
- To generate the same amount of electricity as today's U.S. wind turbine fleet (over 6,000 MW) would require burning more than 9 million tons of coal (a train of coal cars 750 miles long) or 28 million barrels of oil each year.
- 100,000 MW of wind energy will reduce CO2 production by nearly 180 million tons annually (assuming displacement of the fuels used today by U.S. utilities to generate electricity), or about 8% of today's utility carbon dioxide emissions. Carbon dioxide is the most important global warming pollutant.

CLEAN

Wind energy development protects air quality, reduces the effects of global warming, and displaces drilling and mining for natural gas, coal, and other fuels.

- Electricity generation is the largest industrial source of air pollution in the U.S. In 1999, power plants in the U.S. emitted 13.2 million tons of sulfur dioxide and 7.9 million tons of nitrogen oxide, pollutants which cause acid rain and/or smog, and lung and heart damage. Power plants are also the largest source of mercury pollution in the U.S., releasing an estimated 48 tons of the toxic heavy metal annually into the atmosphere. This toxic heavy metal makes its way into lakes and streams, accumulating in fish and wildlife and humans who consume them (see http://www.ewg.org/reports/mercuryfalling/MercuryFalling.pdf). Wind farms emit no pollution.
- Fossil fuel power plants account for about 34% of the carbon dioxide emitted by the United States, itself the largest emitter of CO2 worldwide; the Energy Information Administration reports that in 1999, U.S. power plants emitted 2.245 billion tons of CO2. Carbon dioxide is the leading global warming pollutant, threatening habitats for wildlife and air quality for humans worldwide. A scientific study published in *Nature* (January 2004) estimated that global warming may lead to the extinction of one million species by 2050 (BBC news report at http://news.bbc.co.uk/1/hi/sci/tech/3375447.stm). Wind farms emit no carbon dioxide.
- Emissions from the manufacture and installation of wind turbines are negligible. The "energy payback time" (a measure of how long a power plant must operate to generate the amount of electricity required for its manufacture and construction) of a wind farm is 3 to 8 months, depending on the wind speed at the site--one of the shortest of any energy technology.
- Wind farm development can support preservation of habitat from suburban sprawl and other development that often has devastating impacts on wildlife. And unlike other forms of development, the footprint of a wind project is generally small, meaning that many forms of wildlife can still use the area.
- The wind farms in place in the U.S. (over 6,700 MW at the end of 2004) save about 0.5 Bcf/day of natural gas annually. Rapid expansion of the nation's wind turbine fleet to 36,000 MW would increase its output to the equivalent of nearly 3 Bcf/day (about as much natural gas as the states of Colorado and Alaska produce today), substantially reducing the need to drill for more natural gas or import liquefied natural gas (LNG). See http://www.awea.org/news/news030618gas.html

2

COMPATIBLE

Wind is also one of the healthiest energy options, and the most compatible with animals and humans.

- Wind has minor wildlife impacts (breaking up uninterrupted forest or grassland habitat at some locations, avian and bat collisions, noise disturbance during construction), but they are small compared to other electric generation choices.
- The list of environmental and wildlife impacts of other energy sources is long and varied, including:
  - Habitat impacts from mining (coal, uranium), drilling (natural gas, oil), and compressing fuel (natural gas). Some of these effects are local, while others can extend over fairly broad areas.
  - Habitat impacts from air and water pollution (acid rain, smog, mercury, drilling wastewater disposal – fossil fuels)
  - Habitat impacts from global warming. Significant changes in some species' ranges are already occurring, particularly in northern latitudes.
  - Habitat impacts from thermal pollution of water (nuclear and fossil power plants).
  - Habitat impacts from flooding of land and streamflow changes (hydro).
  - Habitat impacts from waste disposal (coal).
  - Direct mortality from collisions with structures (power plant smokestacks, cooling towers) and from other sources (waste oil pits, oil tanker spills).

  While wind plants and their construction definitely have local impacts, the use of wind energy largely avoids more far-reaching effects of traditional energy generation.
- The picture with human health impacts is similar. Air pollution in particular has been linked to a number of human ailments, including heart and lung problems. Greater use of wind energy will reduce these concerns.
- Many extensive studies of bird collisions at wind farms have been carried out, a practice that contrasts greatly with the lack of a systematic effort to monitor direct impacts on avian species from mining and drilling, power plant emissions or pollution, or habitat loss brought on by these activities.
- Energy policy is all about choices. Less wind energy means more of something else—almost certainly something that is more damaging to the environment.

COMPATIBLE

The modern wind turbine is far less harmful to birds and other wildlife than radio towers, tall buildings, airplanes and vehicles, and numerous other manmade objects. Bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly accepted human activities.

- All avian studies at wind farm sites show that bird kills per turbine average two to five per year or less, with the exception of a single 3-turbine plant in Tennessee that has recorded eight per turbine per year. These include sites passed by millions of migrating birds each year. At some

3

sites, no kills have been found at all. Summaries of available wind studies can be found at www.currykerlinger.com and at www.nationalwind.org

- A reasonable, conservative estimate is that of every 10,000 human-related bird deaths in the U S. today, wind plants cause less than one.
- Even if wind were used to generate 100% of U S. electricity needs, at the current rate of bird kills, wind would account for only one of every 250 human-related bird deaths. See Erickson et al, "Avian Collisions With Wind Turbines," http://www.nationalwind.org/pubs/avian_collisions.pdf. This estimate, again, is a conservative one—the actual number could be one in 1,000 or higher.
- Leading human-related causes of bird kills, in the U S. alone, include:
  - cats (1 BILLION per year)
  - buildings (100 million to 1 BILLION per year)
  - hunters (100 million per year);
  - vehicles (60 million to 80 million per year)
  - communications towers (10 million to 40 million per year)
  - pesticides (67 million per year)
  - power lines (10,000 to 174 million per year)

Data on buildings, vehicles, communications towers, power lines contained in Erickson et al, "Avian Collisions With Wind Turbines," http://www.nationalwind.org/pubs/avian_collisions.pdf and elsewhere. Data on cats in Ohio State University Extension Fact Sheet, "Managing for Forest Songbirds," http://ohioline.osu.edu/w-fact/0006.html. Data on pesticides at http://www.currykerlinger.com/birds.htm

Wind energy simply does not constitute a significant threat to birds in general.

COMMITTED

The wind industry is committed to, and has demonstrated, continual innovations leading to greater protection of the environment and wildlife.

- In 1994, shortly after raptor deaths (of eagles, hawks, and owls) in California's Altamont Pass became a general concern, the wind energy industry joined with other stakeholders (government officials, environmental groups, utilities) to form the National Wind Coordinating Committee (NWCC), a multi-stakeholder collaborative aimed at addressing the wind/avian issue and other issues affecting the industry's future.
- At the same time, the industry began funding research on bird kills and adopting practices (equipment changes to reduce bird electrocutions, use of tubular towers to discourage perching, testing of anti-perching devices and other measures) aimed at minimizing the impact of Altamont and other wind projects on birds. (It should be noted that while raptor deaths in Altamont Pass, one of the first and oldest wind projects, are an issue, the overall number of bird kills there is very low—approximately one bird for every five turbines in the pass per year. The turbine owners recently agreed to making changes in the project's operations such as shutting down the most risky turbines, stopping operations seasonally, and other measures to reduce mortality by 35%.)
- The wind industry has supported the NWCC's development of a siting handbook and avian site evaluation guidelines used by wind developers to screen sites and provide research-based analysis that can avoid potential problems.
- The wind industry has also supported the NWCC's sponsoring of a series of national research summits examining wind energy's impacts on birds and bats. At these meetings, scientists

present the latest research findings and talk with other stakeholders about research gaps and future needs.

- Pre-construction wildlife surveys are common practice throughout the wind industry. Typically a wildlife consultant is retained, and efforts are made to contact state and federal fish and wildlife agencies and local wildlife groups (e.g., Audubon chapters, Izaak Walton League chapters) to identify any issues of possible concern. The consultant examines the proposed site and prepares a detailed report on impacts for review by the developer. These surveys reduce the threat to birds to minimal levels; as noted above, cats, hunters, glass windows, and communications towers are far more dangerous to birds.
- The industry has been conducting avian studies at wind sites across the country for more than twenty years. Over this period, post-construction monitoring of bird kills at several wind sites in a wide variety of geographic locations (Vansycle Ridge, Oregon; Ponnequin, Colorado; Foote Creek Rim, Wyoming; Buffalo Ridge, Minnesota; Searsburg, Vermont; Garrett, Pennsylvania) has validated the industry's ability to assess risk to birds and build safe projects. See http://www.west-inc.com/reports/avian_collisions.pdf.
- Even sites with high use by protected species need not necessarily be off limits to wind. At Foote Creek Rim in Wyoming, pre-construction surveys found that golden eagles frequently used the mesa's edge for hunting. The wind farm developer voluntarily redesigned the site to move the planned turbines 50 meters away from the rim, and the subsequent number of eagle deaths at the site has been so small that the technical advisory committee has been discontinued. See http://www.west-inc.com/reports/fcr_final_baseline.pdf.
- Prior to 2003, bat kills at wind farms studied were generally low. However, the frequency of bat deaths at a newly-constructed wind farm in West Virginia in 2003—far higher than those encountered elsewhere--has caused concern. In response, AWEA and several of its member companies have entered into a three-year cooperative effort with Bat Conservation International, the National Renewable Energy Laboratory, and the U.S. Fish and Wildlife Service to research wind/bat interaction and test ways to reduce bat mortality. See http://www.awea.org/news/news040303bat.html.
- The wind industry is currently engaged in discussions with the Federal Aviation Agency (FAA) aimed at reducing the aviation safety lighting required on wind projects. One goal of this effort is to ensure that turbine lights do not attract migrating birds on foggy nights—a phenomenon that is believed to have contributed to mass kills at some very tall communications towers and other structures in the past.

COMMITTED

By offsetting impacts from other energy sources, the use of wind energy improves environmental conditions for birds and other wildlife.

- Birds, bats, and other wildlife suffer habitat loss from mining and drilling for fossil fuels. An estimated 1 million acres are disturbed every year by mining related to electricity generation in the U.S. For example, the American Bird Conservancy has estimated that approximately one-third of the global population of cerulean warblers will be destroyed by loss of habitat due to mining in Appalachia (See "Determining Biological Significance," Winegrad, Gerald, http://www.nationalwind.org/events/wildlife/20031117/presentations/Winegrad.pdf).
- Power plants account for 70% of the sulfur dioxide (SO2) and 30% of the nitrogen oxide (NOx) emitted in the U.S. SO2 and NOx emissions acidify rain, snow and fog. Acidity depletes

calcium, resulting in weaker eggshells for birds—a problem believed to account for the widespread decline of the wood thrush in the northeastern U.S. Acidity also damages trees and deters the regeneration of forests. (See http://www.epa.gov/airmarkets/acidrain/effects/forests.html and http://www.cleanairtrust.org/acidrain.html).

- The earth's temperatures are growing warmer, with build-up of carbon dioxide (CO2) and other global warming pollutants a key factor. A report by the World Wide Fund for Nature determined that global warming in the Arctic is already endangering the lives of birds in the polar region. See "Arctic Warming Signals Dire Straits for Birds," Environmental News Network, http://www.enn.com/news/enn-stories/2000/04/04052000/arcticbird_11676.asp .
- A Defenders of Wildlife report states that "The costs of not adopting alternative energy strategies based on renewable energy sources such as wind are potentially enormous. Global warming is predicted to result in countless bird deaths through large-scale alteration of breeding habitats." See http://www.defenders.org/habitat/renew/wind.html.
- As of December 31, 2004, over 6,700 MW of wind power generating capacity—generating the same output as 6 medium-size coal or 3 large nuclear power plants – were online in the U.S. Producing the same amount of electricity with the average U S electricity mix results in the emission of 11 million tons of CO2, 55,000 tons of SO2, 26,000 tons of NOx, and many other pollutants each year. Wind energy development helps provide cleaner air and healthier habitat for wildlife.

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Carbon Dioxide Emissions from the Generation of Electric Power in the United States

July 2000

Department of Energy
Washington, DC 20585
Environmental Protection Agency
Washington DC 20460

Contacts

This report was prepared jointly by the staff of the U.S. Department of Energy and the U.S. Environmental Protection Agency. Questions about this publication, as well as other energy inquiries may be directed to the National Energy Information Center on (202) 586-8800.

Questions regarding specific information in the report may be directed as follows:

Electric Power Data and Carbon Dioxide Emission Estimates:

Wiley Barbour (202-260-6972)
e-mail: barbour.wiley@epamail.epa.gov

Channele Carner (202-426-1270)
e-mail: channele.carner@eia.doe.gov

Melvin Johnson (202-426-1172)
e-mail: melvin.johnson@eia.doe.gov

Rick Morgan (202-564-9143)
e-mail: morgan.rick@epamail.epa.gov

Roger Sacquety (202-426-1160)
e-mail: roger.sacquety@eia.doe.gov

Stephen Scott (202-426-1149)
e-mail: stephen.scott@eia.doe.gov

Betty Williams (202-426-1269)
e-mail: betty.williams@eia.doe.gov

Projected Electricity Generation and Carbon Dioxide Emissions:

Scott Sitzer (202-586-2308)
e-mail: scott.sitzer@eia.doe.gov

Voluntary Carbon-Reduction and Carbon-Sequestration Programs:

Paul McArdle (202-586-4445)
e-mail: paul.mcardle@eia.doe.gov

Stephen Calopedis (202-586-1156)
e-mail: stephen.calopedis@eia.doe.gov

Kate Narburgh (202-564-1846)
e-mail: narburgh.kate@epamail.epa.gov

Environmental Effects of Federal Restructuring Legislation:

Tracy Terry (202-586-3383)
e-mail: tracy.terry@hq.doe.gov

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Carbon Dioxide Emissions from the Generation of Electric Power in the United States

Introduction

The President issued a directive on April 15, 1999 requiring an annual report summarizing the carbon dioxide (CO_2) emissions produced by the generation of electricity by utilities and nonutilities in the United States. In response, the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) jointly submitted the first report on October 15, 1999. This is the second annual report[1] that estimates the CO_2 emissions attributable to the generation of electricity in the United States. The data on CO_2 emissions and the generation of electricity were collected and prepared by the Energy Information Administration (EIA), and the report was jointly written by DOE and EPA to address the five areas outlined in the Presidential Directive.

- The emissions of CO_2 are presented on the basis of total mass (tons) and output rate (pounds per kilowatthour). The information is stratified by the type of fuel used for electricity generation and presented for both regional and national levels. The percentage of electricity generation produced by each fuel type or energy resource is indicated.
- The 1999 data on CO_2 emissions and generation by fuel type are compared to the same data for the previous year, 1998. Factors contributing to regional and national level changes in the amount and average output rate of CO_2 are identified and discussed.
- The Energy Information Administration's most recent projections of CO_2 emissions and generation by fuel type for 1999 are compared to the actual data summarized in this report to identify deviations between projected and actual CO_2 emissions and electricity generation.
- Information for 1998 on voluntary carbon-reducing and carbon-sequestration projects reported by the electric power sector and the resulting amount of CO_2 reductions are presented. Included are programs undertaken by the utilities themselves as well as programs supported by the Federal government to support voluntary CO_2 reductions.
- Appropriate updates to the Department of Energy's estimated environmental effects of the Administration's proposed restructuring legislation are included.

Electric Power Industry CO_2 Emissions and Generation Share by Fuel Type

In 1999,[2] estimated emissions of CO_2 in the United States resulting from the generation of electric power were 2,245 million metric tons[3] an increase of 1.4 percent from the 2,215 million metric tons in 1998. The estimated generation of electricity from all sources increased by 2.0 percent, going from 3,617 billion kilowatthours to 3,691 billion kilowatthours. Electricity generation from coal-fired plants, the primary source of CO_2 emissions from electricity generation, was nearly the same in 1999 as in 1998. Much of the increase in electricity generation was produced by gas-fired plants and nuclear plants. The 1999 national average output rate,[4] 1,341 pounds of CO_2 per kilowatthour generated, also showed a slight change from 1,350 pounds CO_2 per kilowatthour in 1998 (Table 1). While the share of total generation provided by fossil

[1] The Presidential directive required the first report by October 15, 1999 and thereafter the report is required by June 30. See Appendix A for the full text of the directive.

[2] Data for 1999 are preliminary. Data for 1998 are final. Last year, 1998 data were preliminary and have been revised to final numbers.

[3] To convert metric tons to short tons, multiply by 1.1023. Carbon dioxide units at full molecular weight can be converted into carbon units by dividing by 44/12.

[4] The average output rate is the ratio of pounds of carbon dioxide emitted per kilowatthour of electricity produced from all energy sources, both fossil and nonfossil, for a region or the Nation.

fuels rose slightly a reduction in the emission rate for coal-fired generation combined with growth in the market share of gas-fired generation contributed to the modest improvement in the output rate.[5]

In the United States, about 40.5 percent[6] of anthropogenic CO_2 emissions was attributed to the combustion of fossil fuels for the generation of electricity in 1998 the latest year for which all data are available.[7] The available

Table 1. Summary of Carbon Dioxide Emissions and Net Generation in the United States, 1998 and 1999

	1998	1999 P	Change	Percent Change
Carbon Dioxide (thousand metric tons)[a]				
Coal	1,799,762	1,787,910	-11,852	-0.66
Petroleum	110,244	106,294	-3,950	-3.58
Gas	291,236	337,004	45,768	15.72
Other Fuels[b]	13,596	13,596	-	-
U.S. Total	**2,214,837**	**2,244,804**	**29,967**	**1.35**
Generation (million kWh)				
Coal	1,873,908	1,881,571	7,663	0.41
Petroleum	126,900	119,025	-7,875	-6.21
Gas	488,712	562,433	73,721	15.08
Other Fuels[b]	21,747	21,749	2	-
Total Fossil-fueled	**2,511,267**	**2,584,779**	**73,512**	**2.93**
Nonfossil-fueled[c]	**1,105,947**	**1,106,294**	**347**	**0.03**
U.S. Total	**3,617,214**	**3,691,073**	**73,509**	**2.04**
Output Rate[d] (pounds CO_2 per kWh)				
Coal	2.117	2.095	-0.022	-1.04
Petroleum	1.915	1.969	0.054	2.82
Gas	1.314	1.321	0.007	0.53
Other Fuels[b]	1.378	1.378	-	-
U.S. Average	**1.350**	**1.341**	**-0.009**	**-0.67**

[a] One metric ton equals one short ton divided by 1.1023. To convert carbon dioxide to carbon units, divide by 44/12.
[b] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity. Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.
[c] Nonfossil includes nuclear, hydroelectric, solar, wind, geothermal, biomass, and other fuels or energy sources with zero or net zero CO_2 emissions. Although geothermal contributes a small amount of CO_2 emissions, in this report it is included in nonfossil.
[d] U.S. average output rate is based on generation from all energy sources.
P = Preliminary data.
- = No change.
Note: Data for 1999 are preliminary. Data for 1998 are final.
Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; and Form 900, "Monthly Nonutility Power Report." •Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

[5] Caution should be taken when interpreting year-to-year changes in the estimated emissions and generation due to an undetermined degree of uncertainty in statistical data for the 1999 estimates. Also, differences in the 1998 and 1999 estimation methodologies have an undetermined effect on the change from 1998 to 1999 estimates. See Appendix B, "Data Sources and Methodology," for further information. For more information on uncertainty in estimating carbon dioxide emissions, see Appendix C, "Uncertainty in Emissions Estimates." *Emissions of Greenhouse Gases in the United States*. DOE/EIA-0573(98) (Washington, DC, October 1999). Also, because weather fluctuations and other transitory factors significantly influence short-run patterns of energy use in all activities, emissions growth rates calculated over a single year should not be used to make projections of future emissions growth.
[6] About 37 percent of CO_2 emissions are produced by electric utility generators, as reported in the greenhouse gas inventory for 1998. An additional 3.5 percent are attributable to nonutility power producers, which are included in the industrial sector in the GHG inventory.
[7] Energy Information Administration. *Emissions of Greenhouse Gases in the United States 1998*. Chapter 2, "Carbon Dioxide Emissions." DOE/EIA-0573(98) (Washington, DC, October 1999). Data for 1999 will be available in October 2000.

energy sources used for electricity generation result in varying output rates for CO_2 emissions from region to region across the United States. Although all regions use some fossil fuels for electricity generation, several States generate almost all electricity at nuclear or hydroelectric plants, resulting in correspondingly low output rates of CO_2 per kilowatthour. For example, Vermont produces mostly nuclear power, while Washington, Idaho, and Oregon generate almost all electricity at hydroelectric plants. At the other extreme, Colorado, Indiana, Iowa, Kentucky, New Mexico, North Dakota, Ohio, West Virginia, and Wyoming—a group that includes some of the Nation's largest coal-producing States—generate most of their electricity with coal. Regions where coal-fired generators dominate the industry show the highest rates of CO_2 emissions per kilowatthour.

Coal

Estimated emissions of CO_2 produced by coal-fired generation of electricity were 1,788 million metric tons in 1999 (Table 1), 0.7 percent less than in 1998, while electricity generation from coal was 0.4 percent more than the previous year. The divergent direction of generation and emissions changes may reflect a combination of thermal efficiency improvements, changes in average fuel characteristics, and variances associated with both sampling and nonsampling errors. CO_2 emissions from coal-fired electricity generation comprise nearly 80 percent of the total CO_2 emissions produced by the generation of electricity in the United States, while the share of electricity generation from coal was 51.0 percent in 1999 (Table 3). Coal has the highest carbon intensity among fossil fuels, resulting in coal-fired plants having the highest output rate of CO_2 per kilowatthour. The national average output rate for coal-fired electricity generation was 2,095 pounds CO_2 per kilowatthour in 1999 (Table 4).

Coal-fired generation contributes over 90 percent of CO_2 emissions in the East North Central, West North Central, East South Central, and Mountain Census Divisions and 84 percent in the South Atlantic Census Division (Table 2). Nearly two-thirds of the Nation's CO_2 emissions from electricity generation are accounted for by the combustion of coal for electricity generation in these five regions where most of the Nation's coal-producing States are located. Consequently, these regions have relatively high output rates of CO_2 per kilowatthour.

Table 2. Estimated Carbon Dioxide Emissions From Generating Units at U.S. Electric Plants by Census Division, 1998 and 1999
(Thousand Metric Tons)

Census Division	1998					1999				
	Total	Coal	Petroleum	Gas	Other[a]	Total	Coal	Petroleum	Gas	Other[a]
New England	50,450	16,470	23,068	7,966	2,945	52,822	14,637	24,224	11,015	2,945
Middle Atlantic	189,023	139,821	17,315	28,441	3,447	190,214	134,528	15,232	37,007	3,447
East North Central	427,580	410,141	4,351	12,039	1,049	423,063	397,266	5,415	19,333	1,049
West North Central	217,123	209,858	1,521	4,726	1,018	219,104	208,786	1,957	7,342	1,018
South Atlantic	445,435	373,780	43,777	24,515	3,363	452,180	378,018	41,356	29,442	3,363
East South Central	226,749	212,350	5,018	9,299	82	228,240	214,486	3,212	10,460	82
West South Central	364,056	214,544	5,461	143,945	106	380,792	221,309	5,744	153,634	106
Mountain	219,147	206,256	888	12,002	*	217,543	202,421	1,278	13,843	*
Pacific Contiguous	64,668	14,555	2,588	46,165	1,360	70,591	14,563	2,153	52,515	1,360
Pacific Noncontiguous	10,606	1,985	6,257	2,138	225	10,256	1,895	5,724	2,413	225
U.S. Total	**2,214,837**	**1,799,762**	**110,244**	**291,236**	**13,596**	**2,244,804**	**1,787,910**	**106,294**	**337,004**	**13,596**

[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity. Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.

* = the absolute value is less than 0.5.

Note: Data for 1999 are preliminary. Data for 1998 are final.

Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900, "Monthly Nonutility Power Report." •Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

Table 3. Percent of Electricity Generated at U.S. Electric Plants by Fuel Type and Census Division, 1998 and 1999
(Percent)

Census Division	1998					1999				
	Coal	Petroleum	Gas	Other[a]	Nonfossil	Coal	Petroleum	Gas	Other[a]	Nonfossil
New England	17 9	24 4	13 8	4 6	39.3	16 3	22.9	18 0	4 6	38 3
Middle Atlantic	38 4	5.2	13 6	1 3	41.5	35 8	4 5	17 5	1 3	40 9
East North Central	76 3	0.8	3 8	0 4	18 8	72 0	0 7	4 4	0 4	22 5
West North Central	75.5	0 7	2 3	0 3	21 1	73 9	0 7	3 0	0 3	22 0
South Atlantic	55 3	7 2	6 6	0 7	30 2	55 5	6 7	7 8	0 7	29 2
East South Central	66 2	2 1	3 2	*	28 4	68 0	1 4	3 9	*	26 7
West South Central	39 1	0 6	42 2	0 3	17 8	40 1	0 7	44 6	0 3	14 3
Mountain	67 9	0 2	6 8	0 1	25 0	67.5	0 3	8 1	0 1	24 1
Pacific Contiguous	4 3	0 7	23 1	0 4	71 4	4 2	0 5	26 2	0 4	68 7
Pacific Noncontiguous	12 2	52 3	21 3	1 9	12 4	11 7	52 2	24 8	1 9	9 4
U.S. Total	**51.8**	**3.5**	**13.5**	**0.6**	**30.6**	**51.0**	**3.2**	**15.2**	**0.6**	**30.0**

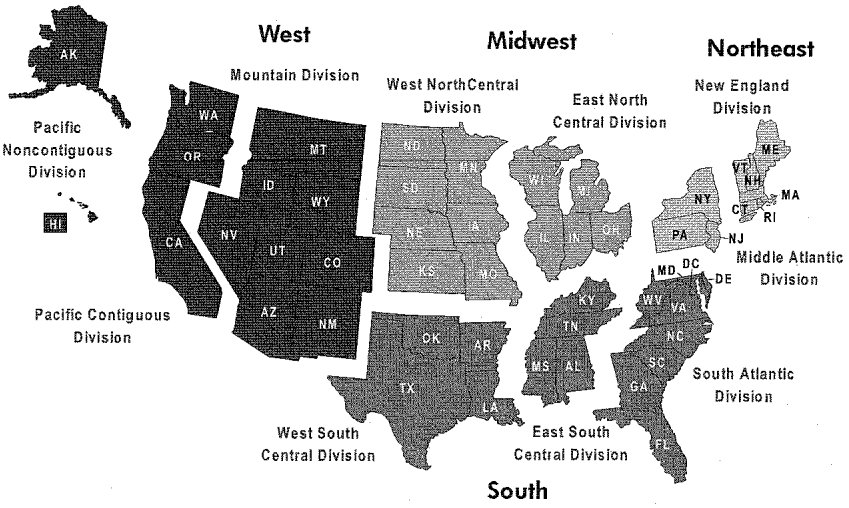
[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity Nonutility data for 1999 for these fuels are unavailable; 1998 data are used
* = the absolute value is less than 0.05.
Note: Data for 1999 are preliminary Data for 1998 are final.
Sources: •Energy Information Administration Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900 "Monthly Nonutility Power Report " •Federal Energy Regulatory Commission FERC Form 423 "Monthly Report of Cost and Quality of Fuels for Electric Plants "

Table 4. Estimated Carbon Dioxide Emissions Rate From Generating Units at U.S. Electric Plants by Census Division, 1998 and 1999
(Pounds per Kilowatthour)

Census Division	1998					1999				
	Total	Coal	Petroleum	Gas	Other[a]	Total	Coal	Petroleum	Gas	Other[a]
New England	1 059	1 934	1 984	1.213	1.339	1 077	1.827	2 156	1 250	1 328
Middle Atlantic	1 071	2.062	1 884	1 188	1 502	1 058	2.089	1.872	1 178	1 502
East North Central	1.680	2.113	2 244	1 239	1 124	1 579	2.061	2.759	1.630	1 131
West North Central	1.767	2.262	1 759	1.659	2.422	1 746	2 250	2 207	1 958	2.596
South Atlantic	1.334	2 026	1.821	1 113	1 377	1 342	2 019	1 822	1.115	1.372
East South Central	1 457	2 060	1 515	1 857	3 244	1 470	2 031	1 530	1 734	3 244
West South Central	1 469	2 214	3 955	1 376	0 151	1 529	2 215	3 170	1 382	0 151
Mountain	1 572	2 179	2 802	1 257	0 005	1 542	2 128	3 036	1 214	0 005
Pacific Contiguous	0 417	2 158	2 396	1 287	2 140	0 435	2 152	2 419	1 238	2 108
Pacific Noncontiguous	1 453	2 229	1 641	1 375	1 661	1 393	2 209	1 488	1 319	1 661
U.S. Average	**1.350**	**2.117**	**1.915**	**1.314**	**1.378**	**1.341**	**2.095**	**1.969**	**1.321**	**1.378**

[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.
Note: Data for 1999 are preliminary Data for 1998 are final.
Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767 "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900 "Monthly Nonutility Power Report " •Federal Energy Regulatory Commission FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants "

Figure 1. Census Regions and Divisions



Note: Map not to scale.
Source: Adapted from U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1998* (Washington, DC, October 1998), Figure 1.

Petroleum

CO_2 emissions from petroleum-fired electricity generation were 106 million metric tons in 1999. 3 6 percent less than in 1998. Generation of electricity from petroleum-fired plants decreased from 127 billion kilowatthours in 1998 to 119 billion kilowatthours in 1999. CO_2 emissions from petroleum-fired electricity generation accounted for 4 7 percent of the national total while generation from petroleum plants was 3.2 percent of the Nation's total electricity generation. The national average output rate for all petroleum-fired generation was 1.969 pounds CO_2 per kilowatthour in 1999.

The New England Census Division generates about one-fourth of its electricity at petroleum-fired plants which produce approximately 45 percent of that region's CO_2 emissions. The Pacific Noncontiguous Census Division generates about one-half of its electricity at petroleum-fired plants, producing about one-half of the region's CO_2 emissions. The South Atlantic and Middle Atlantic Census Divisions also use some petroleum for electricity generation, particularly in Florida. The South Atlantic Census Division contributes the largest share of CO_2 emissions from petroleum-fired plants. 1 8 percent of the Nation's total CO_2 emissions from all sources.

Natural Gas

Emissions of CO_2 from the generation of electricity at natural gas-fired plants were 337 million metric tons in 1999. Natural gas-fired plants were the only fossil-fueled plants to substantially increase generation from 1998 to 1999. Generation increased an estimated 15 0 percent, with CO_2 emissions increasing a corresponding 15 7 percent. Emissions of CO_2 from natural gas-fired plants represented 15 0 percent of total CO_2 emissions from electricity generation in 1999, while natural gas-fired electricity generation accounted for 15.2 percent of total generation. The output rate for CO_2 from natural gas-fired plants in 1999 was 1 321 pounds CO_2 per kilowatthour. Natural gas is the least carbon-intensive fossil fuel.

The West South Central Census Division, which includes Texas, Oklahoma, and Louisiana, is where much of the Nation's natural gas-fired capacity is located. The Northeast and Pacific Contiguous Census Divisions also use natural gas to generate a substantial portion of their electricity. About 40.4 percent of the West South Central Division's CO_2 emissions from the generation of electricity comes from gas-fired plants, representing approximately 45.6 percent of all CO_2 emissions from natural gas combustion for electricity generation in the Nation. About three-fourths of the Pacific Contiguous Census Division s CO_2 emissions are from natural gas-fired plants; however, most of that division's electricity generation is produced at nonfossil-fueled plants such as hydroelectric and nuclear plants.

Nonfossil Fuels

Nonfossil-fueled generation from nuclear, hydroelectric, and other renewable sources (wind, solar, biomass, and geothermal) represented about 30.0 percent of total electricity generation in 1999 and 30.6 percent in 1998. The use of nonfossil fuels and renewable energy sources to generate electricity avoids the emission of CO_2 that results from the combustion of fossil fuels. Due to lower marginal costs, nuclear and hydroelectric power generation typically displace fossil-fueled electricity generation.

Nuclear plants increased their output by 8.1 percent in 1999 as several plants in the East North Census Division returned to service, contributing to a record capacity factor of 86 percent for nuclear plants in 1999.[8] Nuclear energy provided 19.7 percent of the Nation's electricity in 1999.[9] Two-thirds of the Nation's nuclear power is generated in the New England, East North Central, South Atlantic, and Middle Atlantic Census Divisions, which generate 27.6 percent, 21.0 percent, 26.0 percent, and 35.6 percent, respectively, of their electricity with nuclear power.

More than one-half of the Nation s hydroelectric capacity is located in the Pacific Contiguous Census Division, which includes California, Oregon, and Washington. In the Mountain Census Division, Idaho generates virtually all of its electricity at hydroelectric plants. The availability of hydroelectric power is affected by both the amount and patterns of precipitation. High snowpack levels in the Northwest increased hydroelectric generation in Washington and Oregon during 1999, despite the fact that on an annual basis both States received less precipitation in 1999 than they did in 1998. However, the remainder of the Nation experienced dry conditions in 1999, decreasing the amount of hydroelectric power available to displace fossil-fueled generation.[10]

Factors Contributing to Changes In CO_2 Emissions and Generation

The primary factors that alter CO_2 emissions from electricity generation from year to year are the growth in demand for electricity, the type of fuels or energy sources used for generation, and the thermal efficiencies of the power plants. A number of contributing factors influencing the primary factors can also be identified: economic growth, the price of electricity, the amount of imported electricity, weather, fuel prices, and the amount of available generation from hydroelectric, renewable, and nuclear plants. Other contributing factors include demand-side management programs that encourage energy efficiency, strategies to control other air emissions to comply with the requirements for the Clean Air Act Amendments of 1990, and the installation of new capacity utilizing advanced technologies to increase plant efficiency, such as combined-cycle plants and combined heat and power projects. Annual changes in CO_2 emissions are a net result of these complex and variable factors.

As estimated in this report, the amount of anthropogenic CO_2 emissions attributable to the generation of electricity in the United States increased 1.4 percent since the previous year. In 1999, fossil-fueled generation increased by about 2.9 percent; however, almost all of the increase was associated with natural gas, the least carbon-intensive fossil fuel. The increase in CO_2 emissions from the combustion of natural gas for electricity generation

[8] Capacity factor is the ratio of the amount of electricity produced by a generating plant for a given period of time to the electricity that the plant could have produced at continuous full-power operation during the same period. Based on national level consumption and generation data presented in the *Electric Power Monthly*, and assuming a net summer nuclear capability of 99 000 MW, a 1-percent increase in the annual nuclear plant capacity factor (equivalent to 8 672 400 megawatthours of additional nuclear generation) translates into a reduction in annual consumption of either 4.4 million short tons of coal, 14 million barrels of petroleum, or 92 billion cubic feet of gas, or most likely a combination of each.

[9] Energy Information Administration, *Electric Power Annual 1999 Volume I*, DOE/EIA-0348(99)/1 (Washington, DC, forthcoming).

[10] Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants, 1999*, http://www.eia.doe.gov/cneaf/electricity/cq/cq_sum.html

amounted to 46 million metric tons, while the CO_2 emissions from the combustion of petroleum and coal decreased 16 million metric tons.

The national average output rate declined from 1 350 pounds of CO_2 per kilowatthour in 1998 to 1 341 pounds CO_2 per kilowatthour in 1999. The primary driver of this change was the decreased output rate for coal-fired electricity generation, which went from 2.117 pounds of CO_2 per kilowatthour to 2.095 pounds of CO_2 per kilowatthour. A change in the output rate for coal-fired electricity generation in the absence of significant change in non-emitting generation will have the greatest effect on the national average output rate of CO_2 per kilowatthour both because coal-fired generation dominates the industry and is the most carbon-intensive fuel.

Economic Growth

Economic factors influence the demand for electric power. In 1999, a strong economy was measured by the 4.2-percent increase in the Gross Domestic Product (GDP).[11] Electricity consumption grew by 1.7 percent,[12] while the average national price of electricity decreased 2.1 percent, from 6.74 cents in 1998 to 6.60 cents in 1999.[13] Although the growing demand for electricity is primarily met by a corresponding growth in generation, a small amount is met by imported power, primarily from Canada.

Weather

Weather is another factor affecting the year-to-year changes in the demand for electricity. Both 1999 and 1998 were record-breaking years in terms of warm weather in the United States. The availability of hydroelectric power to displace fossil-fueled power was limited by dry conditions in much of the Nation, with the exception of the Pacific Northwest States.

During the summer months, the demand for power for air conditioning is a major factor in setting record high peak demands for some utilities. In 1999, electricity generating plants consumed almost as much coal as the record amount consumed in 1998 and increased their natural gas consumption to meet the continuing high demand for electricity in the summer of 1999.

Demand-Side Management (DSM)

Energy efficiency programs and DSM activities such as improving insulation and replacing lighting and appliances with more energy efficient equipment, can reduce the demand for electricity. The reductions in demand achieved by DSM programs contribute to avoided CO_2 emissions. In 1998, 49.2 billion kilowatthours of energy savings were achieved by DSM activities at electric utilities, a decrease from 56.4 billion kilowatthours in 1997. Declining levels of energy savings reflect, in part, lower utility spending on DSM programs. In 1998, utilities' total expenditures on DSM were $1.4 billion, a decrease of 13.1 percent from the previous year, and nearly 50 percent below the 1994 spending level.[14] Data for 1999 are not yet available.

Fossil and Nonfossil Fuels for Electricity Generation

The fuel or energy source used to generate electricity is the most significant factor affecting the year-to-year changes in CO_2 emissions. Because hydroelectric and nuclear generation displace fossil-fueled generation when available, CO_2 emissions increase when hydroelectric or nuclear power is unavailable and fossil-fueled generation is used as a replacement. Conversely, CO_2 emissions can be reduced through a greater use of nuclear, hydroelectric, and renewable energy for electricity generation. Collectively, nonfossil-fueled electricity generation by nuclear, hydroelectric, and renewable energy sources that do not contribute to anthropogenic CO_2 emissions remained almost unchanged in 1999 as compared to 1998, with much of the increase in nuclear generation being offset by an absolute decrease in hydroelectric power generation and other generation from fuels such as municipal solid waste, tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity.

As stated previously, the amount of available hydroelectric power is affected by precipitation patterns. In 1999, hydroelectric power generation was lower in all regions except in the Northwestern States. Oregon, Idaho, and Washington typically generate more than 90 percent of their power at hydroelectric plants and export power to California. Hydroelectric power generation

[11] http://www.bea.doc.gov/bea/dn1.htm, Department of Commerce web site, accessed May 10, 2000.

[12] Retail sales by utilities grew 1.73 percent from 1998 to 1999. Retail sales by marketers in deregulated, competitive retail markets are not included. The addition of an estimated 48 billion kilowatthours in retail marketer sales would result in an increase in electricity consumption of 2.45 percent from 1998 to 1999.

[13] Energy Information Administration, *Electric Power Annual 1999 Volume I*, DOE/EIA-0348(99)/1 (Washington, DC, forthcoming).

[14] DSM data for 1999 will be available in the latter part of 2000.

increased in 1999 in these States, reducing the need for fossil-fueled generation and contributed to keeping CO_2 emissions low in the Pacific Contiguous Census Division. Nationally, hydroelectric power generation decreased by 3.6 percent in 1999.

Nuclear power generation increased by 8.1 percent to a record level in 1999, which contributed to keeping CO_2 emissions lower by displacing fossil-fueled generation, particularly in the East North Central Census Division. Several nuclear plants came back online in 1999, helping to increase the average nuclear capacity factor to 86 percent. An absolute increase in the amount of nuclear power more than offset the loss of some hydroelectric power in 1999.

Fuel Quality and Price

The amount of CO_2 emissions from the combustion of fossil fuels to generate electricity varies according to the quality of the fuels, defined by their carbon content and the associated heating value (Btu).[15] The Btu content of fuels is a determinant of the number of kilowatthours that can be produced[16] and carbon content is a determinant of the amount of CO_2 released when the fuel is burned. Fossil fuels are categorized as either coal, natural gas and other gaseous fuels, or petroleum and petroleum products. Coal-fired electricity generation has the highest output rate of CO_2 per kilowatthour produced, averaging 2.095 pounds per kilowatthour in 1999. Petroleum-fired electricity generation averaged 1.969 pounds per kilowatthour, and natural gas-fired electricity generation had the lowest rate of 1.321 pounds per kilowatthour. With coal-fired plants generating the majority of electricity in the Nation and having the highest output rate, they produced the greatest share of CO_2 emissions from electricity generation, approximately 80 percent of the total.

Some plants are capable of switching fuels to take advantage of the least expensive or the most available resources. In 1998, the price of crude oil reached its lowest level since 1976, causing the price of petroleum delivered to electric utilities to fall below that of natural gas for the first time since 1993. This factor is important when considering the capability of some electric plants to burn the least expensive of these two fuels. As a result of falling prices in 1998, petroleum-fired generation was higher in 1998 than in 1997. However during 1999, the price of petroleum began to increase, and generation from petroleum plants declined. Petroleum has a higher output rate of CO_2 than natural gas; therefore, switching from petroleum to natural gas can have a beneficial effect on both the overall amount and output rate of CO_2 emissions.

In 1999, virtually all of the increase in fossil-fueled generation was from natural gas-fired plants. Coal-fired electricity generation was close to unchanged, while petroleum-fired electricity generation fell. Most of the increase in CO_2 emissions from gas-fired plants was offset by the decline in CO_2 emissions from petroleum- and coal-fired plants.

Thermal Efficiencies of Power Plants

CO_2 emissions from electric power generation are influenced by the efficiency with which fossil fuels are converted into electricity. In a typical power plant, about one-third of the energy contained in the fuel is converted into electricity, while the remainder is emitted as waste heat. Substantial improvements in generation efficiency can be achieved in the future through the replacement of traditional power generators with more efficient technologies, such as combined-cycle generators and combined heat and power (CHP) systems. In these types of systems, waste heat is captured to produce additional kilowatthours of electricity or displace energy used for heating or cooling. Both strategies result in lower CO_2 emissions. The national average thermal efficiency of power generation from fossil fuels in 1999 was estimated to be 32.54 percent, slightly higher than the previous year's average of 32.42 percent.[17]

The average thermal efficiency of coal-fired plants went from 33.15 percent to 33.54 percent in 1999. The improvement in efficiency is also reflected in the national average output rate of pounds of CO_2 per kilowatthour. The output rate for coal-fired plants decreased from 2.117 pounds of CO_2 per kilowatthour in 1998 to

[15] Heating value is measured in British thermal units (Btu), a standard unit for measuring the quantity of heat energy equal to the quantity of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit.

[16] Boiler type and efficiency, capacity factor, and other factors also affect the number of kilowatthours that can be produced at a particular plant.

[17] The thermal efficiency is a ratio of kilowatthours of electricity produced multiplied by 3,412 Btu to the fuel consumed, measured in Btu. This ratio is dependent on the estimated generation and fuel consumption for 1999. Uncertainty and an undetermined degree of variation in both generation and fuel consumption data for the nonutility sector may contribute to an apparent change in the ratio, which should be regarded as a preliminary value at this time.

2 095 in 1999 Petroleum-fired plants and natural gas-fired plants showed slightly lower thermal efficiencies in 1999, with a corresponding change in the output rate. The rate for petroleum-fired plants increased from 1.915 to 1 969 pounds of CO_2 per kilowatthour, and natural gas-fired plants' output rate increased from 1.314 to 1.321 pounds of CO_2 per kilowatthour.

Conclusion

The emission of CO_2 by electric power plants is not controlled because no standards or required reductions currently exist. Some technology is available to limit CO_2 emissions, but it is extremely expensive. The options to limit the emission of CO_2 from electricity generation are to encourage reduction of the overall consumption of electricity through energy efficiency and conservation initiatives, to improve combustion efficiency at existing plants or install new units that employ more efficient technologies, such as combined-cycle units and combined heat and power (CHP) systems, and to replace fossil-fueled generation with nonfossil-fueled alternatives, such as nuclear, hydroelectric, and other renewable energy sources.

Comparison of Projected with Actual CO_2 Emissions and Generation by Fuel Type

Each year the Energy Information Administration prepares the *Annual Energy Outlook* (AEO), which contains projections of selected energy information. Projections for electricity supply and demand data, including CO_2 emissions and generation by fuel type, are made for the next 20 years. To evaluate the accuracy and usefulness of the forecast, a comparison was made between the latest forecast for 1999 (from the AEO2000) and the estimated actual data for 1999 (Table 5). The near-term projections in the AEO are based on a combination of the partial-year data available when the forecast was prepared, the latest short-term forecast appearing in the *Short-Term Energy Outlook*, and the regional detail contained in the National Energy Modeling System (NEMS). Consequently, comparisons with the actual data for 1999 are not a definitive indicator of the accuracy of the longer-term projections appearing in the AEO. Nevertheless, they do provide a useful preliminary gauge for tracking and measuring the projections against actual data over time.

Total electricity-related CO_2 emissions for fossil fuels in 1999 were 1.4 percent below the projected emissions level, while the actual total generation from fossil fuels was 0.9 percent above the projected generation level. The largest percentage difference between projected and actual generation by fuel (other than for "Other") was for natural gas-fired generation, which was 3.7 percent higher than projected, but with a corresponding difference in CO_2 emissions of 7.7 percent. However, the largest absolute difference between projected and actual CO_2 emissions by fuel was for coal-fired generation, whose emissions were 75 million metric tons, or 4.0 percent below the projected level, even while generation was 0.2 percent higher. Three primary factors contribute to the divergence in projected and actual CO_2 emissions:

- **Efficiency of generating units**. Average generating efficiencies for coal-fired capacity were higher in 1999 than those assumed by NEMS, on the order of about 4 percent. On the other hand, the efficiency of natural gas-fueled capacity was about 4 percent lower than the NEMS assumptions. Because coal-fired units produce more than three times the generation of natural gas-fired generators, the impact of the higher efficiencies of coal-burning capacity outweighs the lower actual efficiencies for natural gas capacity. Efficiencies for petroleum-based generation, a much smaller share of overall supply, were 5.6 percent lower than the NEMS assumptions.
- **Total generation requirements**. Overall electricity generation was 1.6 percent higher in 1999 than projected. This was due to the combined effects of higher sales, lower imports, and higher losses for electricity than expected. The incremental generation requirements were met in part by higher natural gas-fired generation, as well as greater reliance on nonfossil sources of electricity such as nuclear and renewables. To the extent that natural gas-fired generation was above the forecast, higher CO_2 emissions resulted.
- **Increased nuclear and hydroelectric generation**. Nuclear generation was 30 billion kilowatthours, or 5.7 percent, above the projected levels in 1999. The difference was due primarily to improving performance of nuclear generating units, beyond that assumed in the projections. Also, hydroelectric generation was 13 billion kilowatthours or 4.3 percent, above projections. Given the same overall level of generation, higher nuclear and hydroelectric projections would have resulted in less projected

Table 5. U.S. Electric Power Industry Projected and Actual Carbon Dioxide Emissions and Generation, 1999

	Projected	Actual	Percentage Difference
CO_2 Emissions (million metric tons)			
Coal	1,863	1,788	-4.0
Petroleum	100	106	6.0
Natural Gas, Refinery and Still Gas	313	337	7.7
Other[a]	--	14	N/A
Total CO_2 Emissions	**2,277**	**2,245**	**-1.4**
Generation (billion kWh)			
Coal	1,878	1,882	0.2
Petroleum	121	119	-1.7
Natural Gas, Refinery and Still Gas	542	562	3.7
Other[a]	20	22	10.0
Non-Fossil Fuels [b]	1,072	1,106	3.2
Total Generation	**3,632**	**3,691**	**1.6**
Net Imports	47	29	-38.0
Total Electricity Supply	**3,679**	**3,720**	**1.1**
Retail Electricity Sales by Utilities (billion kWh)	3,288	3,296	0.2
Nonutility Generation for Own Use/Sales (billion kWh)[c]	173	165	-4.6
Losses and Unaccounted For (billion kWh)	218	259	18.8

[a]Other fuels include municipal solid waste (MSW), tires, and other fuels that emit anthropogenic CO_2 when burned to generate electricity. MSW generation represents the largest share of this category. MSW projections in the *Annual Energy Outlook 2000* are assumed to have zero net CO_2 emissions. Due to a change in the accounting for MSW by the Environmental Protection Agency, future AEOs will estimate the CO_2 emissions attributed to the non-biomass portion of this fuel. If this had been done for the AEO2000, CO_2 emissions for MSW would have been 14 million metric tons for 1999.

[b]Includes nuclear and most renewables, which either do not emit CO_2 or whose net CO_2 emissions are assumed to be zero.

[c]Data for 1999 are estimated.

Note: Actual data for CO_2 emissions and electricity generation for 1999 are preliminary. Components may not add to total due to independent rounding.

Sources: **Projections**: Energy Information Administration, *Annual Energy Outlook 2000*, DOE/EIA-0383 (2000) (Washington, DC, December 1999) and supporting runs of the National Energy Modeling System. **Actual**: Carbon dioxide emissions and generation: Table 1; other data: Energy Information Administration, *Monthly Energy Review, April 2000*, DOE/EIA-0035(2000/04) (Washington, DC, April 2000); Energy Information Administration, *Short-Term Energy Outlook*, May 2000 (EIA Web site, www.eia.doe.gov/emeu/steo/pub/contents.html).

generation from fossil fuels, thus bringing electricity-related CO_2 emissions more in line with actual data.

Voluntary Carbon-Reduction and Carbon-Sequestration Programs

Both the DOE and the EPA operate voluntary programs for reducing greenhouse gas emissions and reporting such emission reductions. Voluntary programs that contribute to emission reductions in the electricity sector include DOE/EIA's Voluntary Reporting of Greenhouse Gases Program and EPA's ENERGY STAR program.

EIA's Voluntary Reporting of Greenhouse Gases Program collects information from organizations that have undertaken carbon-reducing or carbon-sequestration projects. Most of the electric utilities that report to the Voluntary Reporting Program also participate in voluntary emission reduction activities through DOE's Climate Challenge Program. In 1998, as part of the Voluntary Reporting Program, 120 organizations in the electric power sector reported on 1,166 projects

undertaken in 1998.[18] By undertaking these projects participants indicated that they reduced CO_2 emissions by 165.8 million metric tons[19] (Table 6). The organizations almost universally measured their project-level reductions by comparing emissions with what they would have been in the absence of the project. Reported CO_2 reductions from these projects accounted for 7.5 percent of 1998 CO_2 emissions attributed to the generation of electric power in the United States. Foreign reductions, largely from carbon-sequestration projects, account for 6.0 percent of total electric utility sector reductions reported for 1998.

DOE's Climate Challenge Program, a voluntary initiative with the electric utility sector established under the President's 1993 Climate Change Action Plan, has become the principal mechanism by which electric utilities participate in voluntary emission reduction activities. Participants that reported the CO_2 emission reductions summarized in this report include electric utilities and holding companies, independent power producers, and landfill methane operators. Climate Challenge participants negotiate voluntary commitments with the DOE to achieve a certain level of emission reductions and/or to participate in specific projects. Companies making Climate Challenge commitments as of 1998 accounted for about 71 percent of 1990 U.S. electric utility generation.[20] Climate Challenge participants are required to report their achieved emissions reductions to the Voluntary Reporting of Greenhouse Gases Program.

Results from the Climate Challenge program cannot be compared directly to other figures in this report because

Table 6. Electric Power Sector Carbon Dioxide Emission Reductions, 1997 and 1998
(Million Metric Tons Carbon Dioxide)

Type of Reduction	Carbon Dioxide[a]	
	1997	1998
Domestic Reductions		
Emission Reductions Projects	135.9	155.3
Sequestration Projects	0.3	0.5
Total Domestic Reductions	**136.2**	**155.8**
Foreign Reductions		
Emission Reductions Projects	0.1	0.1
Sequestration Projects	9.4	9.9
Total Foreign Reductions	**9.5**	**10.0**
Total CO_2 Reductions Reported	**145.8**	**165.8**

[a]The Voluntary Reporting of Greenhouse Gases Program is currently in the 1999 data reporting cycle; the most recent year for which complete data are available is 1998. The 1997 and 1998 data in last year's report were preliminary and have been revised in this report due to subsequent completion of internal EIA review of those data. Emission reductions also include those reported by landfill methane operators. The use of landfill methane to generate electricity displaces fossil fuel power generation and produces a reduction in CO_2 emissions equivalent to the amount of CO_2 that would have resulted from fossil fuel power generation. In calculating CO_2 reductions, it is assumed that landfill carbon is biogenic and, thus, the CO_2 emissions from landfill gas combustion are zero.

Note: Totals may not equal the sums of the parts due to independent rounding. This data cannot be compared directly to other figures in this report because reporters to EIA's Voluntary Reporting of Greenhouse Gases Program may report emission reductions using baselines and valuation methods different from those applied elsewhere.

Source: Energy Information Administration, Form EIA-1605, "Voluntary Reporting of Greenhouse Gases," (long form) and EIA-1605EZ, "Voluntary Reporting of Greenhouse Gases," (short form), 1997 and 1998 data.

[18] The Voluntary Reporting of Greenhouse Gases Program is currently in the 1999 data reporting cycle; the most recent year for which complete data are available is 1998. The 1997 and 1998 data in last year's report were preliminary and have been revised in this report due to subsequent completion of internal EIA review of those data. Emission reductions also include those reported by landfill methane operators.

[19] The EIA also receives numerous reports on projects and emissions reductions from reporters outside the electric power sector. In addition, many reports submitted to the Voluntary Reporting Program (including electric power sector reports) include reductions of greenhouse gases other than carbon dioxide, such as methane and nitrous oxide and the high Global Warming Potential gases such as HFCs, PFCs and sulfur hexafluoride.

[20] U.S. Department of Energy, Climate Challenge Fact Sheet (1998), and conversation with Larry Mansueti, August 10, 1999. See also http://www.eren.doe.gov/climatechallenge/execsumm/execsumm.htm.

the Climate Challenge program allows participants to report emissions reductions using baselines and calculation methods different from those applied elsewhere. For this reason, EIA keeps an accounting of reports submitted by Climate Challenge participants, but the United States counts only a fraction of these reported reductions in comprehensive assessments of overall reductions in greenhouse gases.[21]

The largest reductions claimed for 1998 are from these major U.S. electric utilities: the Tennessee Valley Authority (26.0 million metric tons of CO_2), TXU (19.9 million metric tons of CO_2), Duke Energy (12.1 million metric tons of CO_2), and FirstEnergy (10.6 million metric tons of CO_2).[22] These four companies accounted for about 41.4 percent of the CO_2 emissions reductions reported in 1998 by the electric power sector. Each of these companies owns one or more nuclear power plants and the bulk of their reported reductions is calculated by comparing either actual or additional nuclear output from their plants with the emissions that would have occurred if the same quantity of electricity had been generated using fossil fuels.

Electric power industry companies also reported on projects reducing other greenhouse gases.[23] Combining all projects and all greenhouse gases, the electric power sector reporters claimed 176.9 million metric tons of carbon dioxide equivalent reductions in 1998.

Utilities also undertook a number of carbon-sequestration projects. Although these projects do not directly affect CO_2 emissions, they do offset utility CO_2 emissions. Foreign carbon-sequestration projects from the electric sector were reported to be 9.9 million metric tons of CO_2 in 1998, while domestic projects were reported to be 0.5 million metric tons. These activities were dominated by three independent power producer subsidiaries of the AES Corporation which reported 7.6 million metric tons of CO_2 sequestration annually from three projects with activities in Belize, Bolivia, Ecuador, Peru, and Guatemala. These projects undertake tropical rain forest management, preservation, or reforestation.

In addition, more than 30 companies reported on their pro-rated share of participation in the Edison Electric Institute's UtiliTree program.[24] The UtiliTree program is a carbon-sequestration mutual fund in which electric utilities purchase shares. UtiliTree uses the funds to participate in forest management and reforestation projects in the United States and abroad.

The United States' voluntary programs are reducing domestic emissions of greenhouse gases in a number of sectors across the economy through a range of partnerships and outreach efforts. For example the ENERGY STAR Program, run by the EPA in partnership with DOE, reduces energy consumption in homes and office buildings across the Nation. EPA and DOE set energy-efficiency specifications for a range of products including office equipment, heating and cooling equipment, residential appliances, televisions and VCRs, and new homes. The ENERGY STAR label for buildings is based on a performance rating system that allows building owners to evaluate the efficiency of their buildings relative to others. On average buildings across the country can improve efficiency by 30 percent through a variety of improvements. Manufacturer and retailer partners in the program may place the nationally recognized ENERGY STAR label on qualifying products.

In the past several years the ENERGY STAR label has expanded to include more than 30 products and nearly 7,000 product models. In 1999, energy consumption was reduced by approximately 28 billion kilowatthours as a result of the program, reducing greenhouse gas emissions by nearly 21 million metric tons CO_2 (Table 7). Through EPA's ENERGY STAR Buildings and Green Lights Partnership, more than 15 percent of the square footage in U.S. buildings has undergone efficiency upgrades resulting in electricity savings in excess of 21 billion kilowatthours and emissions reductions of more than 16 million metric tons CO_2.

Environmental Effects of Federal Restructuring Legislation

In April 1999, the Administration submitted to Congress the Comprehensive Electricity Competition Act (CECA), a bill to restructure the U.S. electricity industry and foster retail competition. CECA was designed to ensure

[21] See the *1997 Climate Change Action Report* (the Submission of the United States of America under the United Nations Framework Convention on Climate Change) p. 100 for one such assessment.

[22] TXU was formerly known as Texas Utilities, while FirstEnergy is the result of a merger between Ohio Edison and Centerior Energy (Cleveland Electric).

[23] Other greenhouse gases include methane reductions from landfills and oil and natural gas systems and sulfur hexafluoride (SF_6) which has 23,900 times the global warming impact of carbon dioxide when released into the atmosphere.

[24] The more than 40 companies referenced in last year's report are participants in EEI's UtiliTree program. Of these companies, 31 reported their share of participation to the Voluntary Reporting of Greenhouse Gases Program for 1998.

Table 7. CO_2 Emission Reductions and Energy Savings from EPA's Voluntary Programs, 1998 and 1999

	1998		1999	
	Million Metric Tons of CO_2 Reduced	Billion kWh Saved	Million Metric Tons of CO_2 Reduced	Billion kWh Saved
ENERGY STAR Labeled Products	14.7	20	20.9	28
ENERGY STAR Buildings and Green Lights	8.8	13	16.5	21
Climate Wise	9.9	3	13.9	5

Source: U.S. Environmental Protection Agency, Climate Protection Division, *1998 Annual Report: Driving Investment in Energy Efficiency, ENERGY STAR and Other Voluntary Programs* (EPA 430-R-99-005), forthcoming.

that the full economic and environmental benefits of electricity restructuring are realized. The expected environmental benefits are the result of both the effects of competition and specific provisions included in the Administration s proposal such as a renewables portfolio standard, a public benefits fund, and tax incentives for investment in combined heat and power facilities Competition itself will also provide incentives to generators to improve their own efficiencies, and create new markets for green power and end-use efficiency services all of which reduce greenhouse gas emissions.

Following an exhaustive interagency review, the DOE issued a *Supporting Analysis*[25] that quantified both the economic and environmental benefits of the Administration's plan in May 1999. The analysis focused on the impacts of full national retail competition relative to continued cost-of-service regulation. The results showed that the Administration's proposal will reduce CO_2 emissions by 216 million metric tons in 2010. An EIA study[26] using the same assumptions from the supporting analysis produced similar results Carbon dioxide emissions in the EIA report were estimated to be 194 million metric tons lower in the competitive case than in the cost-of-service reference case in 2010. A number of key uncertainties, however, can affect these projections and some of the reductions could be realized due to actions already taken by individual States. Recognizing uncertainties and the need to avoid double-counting the Administration projected that its proposal would reduce CO_2 emissions from energy use by 147 to 220 million metric tons annually by 2010

The DOE and EPA see no recent developments that would change our projection of the expected impact of the Administration proposal. However, we note that restructuring bills that have recently moved forward in the Congress differ significantly from the Administration's comprehensive proposal These bills do not include key provisions that support the effective functioning of competitive electricity markets and energy diversity while at the same time providing reductions in CO_2 emissions. In addition to maintaining our capability to reassess the impacts of our own proposal. we are also prepared to provide quantitative analyses of alternative restructuring bills. Additional measures could offer potential for cost-effective emissions reductions in the electric power sector, although they are no substitute for comprehensive restructuring legislation that promotes competitive markets and consumer benefits while providing important reductions in CO_2 emissions from electric power generation.

[25] U.S. Department of Energy *Supporting Analysis for the Comprehensive Electricity Act* May 1999.

[26] Energy Information Administration *The Comprehensive Electricity Competition Act: A Comparison of Model Results* Internet site at http://www eia.doe gov/oiaf/servicerpt/ceca html

Appendix A

Presidential Directive

April 15, 1999
MEMORANDUM FOR THE
SECRETARY OF ENERGY
ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Report on Carbon Dioxide (CO_2) Emissions

My Administration's proposal to promote retail competition in the electric power industry, if enacted, will help to deliver economic savings, cleaner air, and a significant down payment on greenhouse gas emissions reductions. The proposal exemplifies my Administration's commitment to pursue both economic growth and environmental progress simultaneously.

As action to advance retail competition proceeds at both the State and Federal levels, the Administration and the Congress share an interest in tracking environmental indicators in this vital sector We must have accurate and frequently updated data

Under current law, electric power generators report various types of data relating to generation and air emissions to the Department of Energy (DOE) and the Environmental Protection Agency (EPA). To ensure that this data collection is coordinated and provides for timely consideration by both the Administration and the Congress, you are directed to take the following actions:

- On an annual basis, you shall provide me with a report summarizing CO_2 emissions data collected during the previous year from all utility and nonutility electricity generators providing power to the grid, beginning with 1998 data. This information shall be provided to me no more than 6 months after the end of the previous year, and for 1998, within 6 months of the date of this directive

- The report which may be submitted jointly, shall present CO_2 emissions information on both a national and regional basis stratified by the type of fuel used for electricity generation, and shall indicate the percentage of electricity generated by each type of fuel or energy resource The CO_2 emissions shall be reported both on the basis of total mass (tons) and output rate (e g , pounds per megawatt-hour)

- The report shall present the amount of CO_2 reduction and other available information from voluntary carbon-reducing and carbon-sequestration projects undertaken both domestically and internationally, by the electric utility sector

- The report shall identify the main factors contributing to any change in CO_2 emissions or CO_2 emission rates relative to the previous year on a national, and if relevant, regional basis In addition, the report shall identify deviations from the actual CO_2 emissions, generation, and fuel mix of their most recent projections developed by the Department of Energy and the Energy Information Administration, pursuant to their existing authorities and missions

- In the event that Federal restructuring legislation has not been enacted prior to your submission of the report, the report shall also include any necessary updates to estimates of the environmental effects of my Administration's restructuring legislation.

- Neither the DOE nor the EPA may collect new information from electricity generators or other parties in order to prepare the report.

WILLIAM J. CLINTON

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Appendix B

Data Sources and Methodology

This section describes the data sources and methodology employed to calculate estimates of carbon dioxide (CO_2) emissions from utility and nonutility electric generating plants. Due to the report being submitted in June of 2000, the annual census data on which 1998 emission estimates are based, are not yet available from the Form EIA-860B and Form EIA-767. The methodology employed for estimating 1999 CO_2 emissions in this report are based on two monthly data collections, Form EIA-759 and Form EIA-900. The Form EIA-759 collects monthly generation and fuel consumption from all utility-owned generating plants, and the Form EIA-900 collects generation and fuel consumption from nonutility plants with a nameplate capacity of 50 megawatts (MW) or more. The 1999 estimates of CO_2 emissions and net generation are preliminary estimates; final emissions estimates based on annual census data will be published in the *Electric Power Annual Volume II 1999* later this year.

Electric Utility Data Sources

The electric utility data are derived from several forms. The Form EIA-767, "Steam-Electric Plant Operation and Design Report" collects information annually for all U.S. power plants with a total existing or planned organic- or nuclear-fueled steam-electric generator nameplate rating of 10 MW or larger. Power plants with a total generator nameplate rating of 100 MW or more must complete the entire form, providing among other data, information about fuel consumption and quality. Power plants with a total generator nameplate rating from 10 MW to less than 100 MW complete only part of the form, including information on fuel consumption.

Form EIA-759, "Monthly Power Plant Report," is a cutoff model sample of approximately 360 electric utilities drawn from the frame of all operators of electric utility plants (approximately 700 electric utilities) that generate electric power for public use. The monthly data collection is from all utilities with at least one plant with a nameplate capacity of 50 MW or more. For all utility plants not included in the monthly sample, those with nameplate capacities less than 50 MW, monthly data are collected annually. Form EIA-759 is used to collect data on net generation; consumption of coal, petroleum, and natural gas; and end-of-the-month stocks of coal and petroleum for each plant by fuel-type combination.

The Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," is a monthly record of delivered-fuel purchases, submitted by approximately 230 electric utilities for each electric generating plant with a total steam-electric and combined-cycle nameplate capacity of 50 MW or more. FERC Form 423 collects data on fuel contracts, fuel type, coal origin, fuel quality and delivered cost of fuel.

Nonutility Data Sources

Form EIA-860B, "Annual Electric Generator Report – Nonutility" (prior Form EIA-867, "Annual Nonutility Power Producer Report") collects information annually from all nonutility power producers with a total generator nameplate rating of 1 MW or more including cogenerators, small power producers, and other nonutility electricity generators. All facilities must complete the entire form, providing, among other data, information about fuel consumption and quality; however facilities with a combined nameplate capacity of less than 25 MW are not required to complete Schedule V "Facility Environmental Information" of the Form EIA-860B.

Form EIA-900 "Monthly Nonutility Power Plant Report," is a cutoff model sample of approximately 500 nonutilities drawn from the frame of all nonutility facilities (approximately 2000 nonutilities) that have existing or planned nameplate capacity of 1 MW or more. The monthly data collection comes from all nonutilities with a nameplate rating of 50 MW or more. A cutoff model sampling and estimation are employed using the annual Form EIA-860B.

CO_2 Coefficients

The coefficients for determining carbon released from the combustion of fossil fuels were developed by the

Energy Information Administration. A detailed discussion of the development and sources used is contained in the publication, *Emissions of Greenhouse Gases in the United States* (DOE/EIA-0573), Appendix B. The nonutility coefficients were developed to be consistent with the utility coefficients.

Methodology for 1998

The methodology for developing the CO_2 emission estimates for steam utility plants and nonsteam utility plants (calculations performed on a plant basis by fuel), as well as for nonutility plants (calculations performed on a facility basis by fuel) is as follows:

Steam Utility Plants

Form EIA-767, "Steam-Electric Plant Operation and Design Report"
Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1. Sum of Monthly Consumption (EIA-767) times Monthly Average Btu Content (EIA-767) divided by Total Annual Consumption (EIA-767) = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-767) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times CO_2 factors = Annual CO_2 Emissions.

Step 4. Reduce Annual CO_2 Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

Nonsteam Utility Plants

Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a). If monthly EIA-759 and monthly FERC Form 423 are available: Sum of Monthly Consumption (EIA-759) times Monthly Average Btu Content (FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 1(b). If monthly EIA-759 is available but not monthly FERC Form 423: Sum of Monthly Consumption (EIA-759) times Average Monthly Btu Content (calculated from FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 1(c) If only annual EIA-759 is available: Annual Consumption (EIA-759) times Average Annual Btu Content (calculated from FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-759) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times CO_2 Factors = Annual CO_2 Emissions.

Step 4. Reduce Annual CO_2 Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

Nonutility Plants

Form EIA-860B, "Annual Electric Generator Report – Nonutility"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1 Annual Consumption (EIA-860B) times Average Annual Btu Content (EIA-860B) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-860B) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) x CO_2 Factors = Annual CO_2 Emissions.

Step 4. Reduce Annual CO_2 Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

Methodology for 1999

Utility Plants

Form EIA-767, "Steam-Electric Plant Operation and Design Report"
Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a) If monthly EIA-759 and prior year annual EIA-767 are available: Sum of Monthly Consumption (EIA-759) times Monthly Average Btu Content (EIA-767) divided by Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(b) If prior year annual EIA-767 is not available, but monthly EIA-759 and monthly FERC Form 423 are available: Sum the Monthly Consumption (EIA-759) times the Monthly Average Btu Content (FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(c) If prior year annual EIA-767 and monthly FERC Form 423 are not available, but monthly EIA-759 is available: Sum the Monthly Consumption (EIA-759) times the Average Monthly Btu Content (calculated at State level from FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(d) If prior year annual EIA-767, monthly EIA-759 and monthly FERC Form 423 are not available, but only annual EIA-759 is available: Annual Consumption (EIA-759) times the Average Annual Btu Content (calculated at State level from FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 2 Annual Consumption (EIA-759) times the Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times CO_2 Coefficients (*Emissions of Greenhouse Gases in the United States*) = Annual Gross CO_2 Emissions

Step 4. Reduce Annual Gross CO_2 Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

Nonutility Plants

Form EIA-900, "Monthly Nonutility Power Report"
Form EIA-860B, "Annual Electric Generator Report - Nonutility"
FERC Form 423 "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a) If monthly EIA-900 and prior year annual EIA-860B are available: Sum the Monthly Generation by Census Division and Fuel Type (EIA-900), and apply annual growth factor model to estimate 1999 Annual Generation. Divide 1999 Annual Generation by 1998 Annual Generation (EIA-860B) subtract 1, and multiply by 1998 Total Annual Consumption[27] (EIA-860B) = 1999 Total Annual Consumption 1999 Total Annual Consumption times Average Btu Content (EIA-860B for prior year) = 1999 Annual Btu Consumption

Step 1(b) If monthly EIA-900 and FERC Form 423 for 1998 are available: (sold utility plant to nonutility in 1999): Annual Consumption (EIA-900) times the Average Btu Content (FERC Form 423) = 1999 Annual Btu Consumption.

Step 1(c). If only monthly EIA-900 is available (new nonutility plants): Annual Consumption (EIA-900) times the Average Btu Content (calculated at State level from FERC Form 423) = 1999 Annual Btu Consumption

Step 2. 1999 Annual Btu Consumption (Step 1) times CO_2 Coefficients (*Emissions of Greenhouse Gases in the United States*) = Annual Gross CO_2 Emissions

Step 3 Reduce Annual Gross CO_2 Emissions (Step 2) by 1 percent to assume 99 percent burn factor

[27] 1998 Annual Consumption for cogenerators is adjusted to exclude fuel not used for generation of electricity

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on the alternatives analysis in the Hatchet Ridge Draft EIR

Dear Mr. Walker,

RES would like to provide comments on the alternatives analysis provided in the Draft EIR. The Hatchet Ridge Project has unique geographic features which impose siting constraints on turbines and associated facilities. Additionally, constraints on the minimum size of commercial wind energy projects to ensure an economically viable project play an important role in how a project is developed and financed. As the Draft EIR explained, some of these constraints were taken into consideration when determining the range of potentially feasible alternatives for the project. Below I have provided additional evidence supporting the Draft EIR's conclusions regarding the infeasibility of three of the initially considered alternatives that were rejected for further analysis: the Smaller Capacity Project Alternative, the Butte County morning glory Avoidance Alternative, and the Alternative Technology Alternative.

Smaller Capacity Project Alternative

RES would like to provide further explanation as to why we do not consider the Smaller Capacity Project Alternative feasible; the primary reason relates to economies of scale. The costs of development and construction of certain facilities associated with a wind project (i.e., transmission, substations, transformers, roads, etc.) needs to be spread out over an optimum MW output. As an example, regardless of the number of turbines installed a transformer will be needed. MW output associated with five turbines will not support a multi-million dollar transformer. When the energy output is minimized by reducing the total number of turbines, and the cost of the remaining facilities required to support the turbines exceeds the output, the project becomes infeasible. Very few commercial scale, stand-alone (not considering a second phase of an existing project) wind energy projects in the west are developed below 102 MW due to economies of scale relating to associated facilities. It is for this reason that RES chose the development of a minimum 102 MW-sized project as one of its key project objectives. (DEIR, p. 2-4.)

Additionally, the smaller capacity project would not reduce the environmental impacts identified in the EIR to a less than significant level. As mentioned in the previous paragraph, the same associated facilities would be needed for a wind power project, whether it has 50 turbines or 100 turbines. To obtain optimal energy output for a reduced capacity project, turbines would still have to be sited along the ridge,

which would require construction of roads, a substation, an operations and maintenance buildings, etc. Therefore, any reduction of environmental impacts is likely to be minimal with a reduced capacity project because the related facilities, which contribute to the project's significant impacts identified in the Draft EIR, would still be required to be built.

For these reasons, RES considers the Smaller Capacity Project Alternative both infeasible and unlikely to substantially reduce or avoid significant environmental impacts and therefore unworthy of further consideration or substantive analysis in an EIR.

Butte County Morning Glory Avoidance Alternative

In this alternative the Draft EIR suggested eliminating or relocating six of the turbines identified in an area where the Butte County morning glory was found. As described above, a reduction in the number of turbines proposed by RES would render the project infeasible due to the financial constraints of wind energy plant development and construction.

It is also infeasible to relocate the six turbines given the current topography of the proposed project area. The ridge upon which the project is proposed is at its widest 450 meters. There is no room along the existing ridge to relocate the turbines and it is not possible to place turbines upwind of one another along the ridge. Turbines that are placed too close together run the risk of causing a wake effect, which in turn affects the performance of the turbine and could have some safety implications as well. A trade-off exists between optimizing the turbine location for energy production and maintaining reasonable turbine interconnection costs, which increase with wider spacing. Experience, mathematical analysis, and cost considerations are employed to determine the optimum configuration given all of the existing site conditions. The layout currently proposed for Hatchet Ridge in the Draft EIR takes all these factors into consideration and has been optimized to produce the greatest amount of energy using the minimum number of turbines and appropriate spacing. Also, there is not another ridge or geographic feature adjacent to Hatchet Ridge upon which the six relocated turbines could be placed without requiring a significant amount of additional transmission or underground cabling, which would result in additional environmental impacts not addressed in this EIR.

Finally, as pointed out in comments provided by WEST (RES' environmental consultant) the project is unlikely to have a negative impact on the local Butte County morning glory population, and may, in fact, result in an increased population over time, due to the species' affinity for disturbed environments. WEST also notes that the Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, and the number of occurrences and number of individuals exceeds the state criteria for listing. Therefore, a project alternative that considers changes to the layout to accommodate the Butte County morning glory is not warranted under CEQA and is unlikely to protect or benefit the species of concern.

Alternative Technologies Alternative

The Draft EIR states "The use of vertical axis wind turbine (VAWT) could theoretically minimize the visual impact because of the reduced height; however, the availability – and hence the feasibility – of these devices is unknown." (DEIR, p. 4-13.) Additionally, Wintu Audubon Society in its comments provided to the County on January 22, 2008, suggests using VAWT turbines would reduce environmental impacts. RES has researched VAWT technology and has found that not only is it infeasible to use this

technology at the Hatchet Ridge project, but it is unlikely to reduce environmental impacts. In fact, it could substantially increase the footprint-related impacts associated with turbine installation. (See footnote 1 below.) Moreover, Terra Moya Aqua, the company recommended by Wintu Audubon Society, currently has VAWT turbines in the range of only 1kw to 750 kw. The following excerpt is taken directly from the Terra Moya Aqua Web Site (www.tmawind.com):

> Our expected catalogue of turbines is as follows:
>
> A 1-5 kw units, approximately 8' tall with a footprint equal to a 8'x8'x8' equilateral triangle
> B 25-100 kw units, approximately 34' tall with a footprint equal to a 34'x34'x34' equilateral triangle
> C 100-350 kw units, approximately 116' tall with a footprint equal to 96'x96'x96' equilateral triangle.
> D 350-500/750 kw units approximately 150' tall with a footprint equal to 150'x150'150' equilateral triangle.
> E Larger models will be considered if new generator technologies prove out

It is not possible in today's energy market to develop a commercial scale energy project that is economically viable with the turbines currently available at Terra Moya Aqua. RES does not know of any other VAWT manufacturer supplying VAWT turbines viable for use on a commercial wind energy project. In fact, out of over 16,800 MW of currently operating commercial wind projects in the United States, zero MWs are produced from VAWT. The Wyoming facility that Wintu referenced in their comments is a test facility, not a commercial wind project, and we were not able from the information provided by Terra Moya Aqua to determine the size of the project.

Since VAWT turbines are currently manufactured with a top capacity of only 750 kw, almost three times the number of VAWT turbines would be needed at Hatchet Ridge to produce 102 MW, the minimum capacity that is financially feasible to construct and operate. Increasing the number of turbines on the project site would undoubtedly result in a greater impact on the environment than the currently proposed project.

The Wintu Audubon Society also commented on its concern for the Butte County morning glory in recommending the use of VAWT turbines; however, RES believes that VAWT turbines would have a far greater impact on this species than would a standard rotating blade turbine. The footprint of VAWT turbines is significantly larger than the turbines RES proposes to use[1], thereby substantially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Additionally, the claim that this turbine technology will not cause any wildlife fatalities is not backed by any peer reviewed literature. Since there are no VAWT turbines in use at commercial scale wind energy projects, we were not able to find any avian impact or mortality studies for which to compare potential impacts at the Hatchet Ridge Project.

---

[1] / A typical foundation for the standard rotating blade turbine RES proposes to use ranges from 420-1600 square feet in size, depending on the type of foundation the ground conditions would require (16-foot diameter pier-type or 40-foot by 40-foot spread-footing type). (See DEIR, p. 2-10.) The footprint of just one foundation for the largest VAWT turbines manufactured by Terra Moya Aqua (750 kw) is 9,743 square feet (the area of one 150-foot equilateral triangle). As noted above, RES would have to install three times as many (approx. 138) of the largest VAWT turbines as standard rotating blade 2.4 MW turbines (43) in order to achieve the minimum financially feasible 102 MW output. Doing so would result in a total VAWT turbine foundation footprint on Hatchet Ridge of approximately 1,344,534 square feet (or 30.8 acres) (138 VAWT turbines x 9,743 sq.ft.). Compare this hypothetical VAWT footprint to the total maximum of just 68,800 square feet (1.58 acres) (43 turbines x 1600 sq.ft.) if the largest possible foundations were used for all of the standard rotating blade 2.4 MW turbines RES proposes to use.

Furthermore, the height of VAWTs is only 29 meters, which may function well in the treeless plains of Wyoming, but which will not function in the timberland setting of the Hatchet Ridge project site, where trees would significantly interfere with the wind at that lower height. Overall, RES finds this technology is incomparable to the technology required to build a viable commercial scale wind energy project, and therefore, the County was correct in considering it an infeasible alternative for the Hatchet Ridge Project.

Even if the VAWT turbine as referenced in the Wintu Audubon Society's comment letter was technically feasible (which it is not as indicated herein), there are no VAWT turbines manufactured anywhere in the world today that are financeable by any institutional investors or lenders active in the wind or power industry. The fact is, the proposed Hatchet Ridge Project is a $200 million project and suggesting that a commercially unproven and largely unknown manufacturer of turbines could be a financially viable alternative is a baseless assertion.

RES appreciates your consideration of this information regarding the feasibility of the project alternatives discussed in the Draft EIR. If the County needs further information about economic or construction constraints associated with the proposed project, please feel free to contact me.

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

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Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on cultural resources section of EIR

Dear Mr. Walker,

RES has reviewed the Draft EIR for the Hatchet Ridge Wind Project and has some comments on the impact analysis and recommended mitigation measures listed in section 3.5, Cultural Resources. As a Registered Professional Archaeologist with several years of experience conducting cultural resources investigations and evaluating traditional cultural properties throughout the Northwest, I am very familiar with the complexities of evaluating cultural resources under state and federal environmental regulations. While I believe the Hatchet Ridge Draft EIR is thorough in its evaluation of the potential impacts regarding cultural resources, I have some concerns regarding the recommended mitigation measures and feel that some are outside the purview of CEQA. I urge you to consider my comments not only as the project applicant, but also as a professional archaeologist with unique experience in cultural resources investigations for large energy development and construction projects.

In addition to providing you with comments specific to the Draft EIR, I would like to share with you evidence of our commitment to put forth a good faith effort at consultation with the Pit River Tribe. Our goal from the beginning of this project has been to work cooperatively with the tribe to attempt to minimize and mitigate impacts to culturally sensitive areas and resources. Working towards this goal, we have attempted several communications with the tribe over the last 7 months. Our communications to the Pit River Tribe include letters, e-mail messages and phone messages requesting a meeting with the tribe to discuss their concerns (copies of these communications are included). Unfortunately, with the exception of one short phone conference between myself and tribal members in September 2007, we have not been very successful at engaging the tribe in meaningful discussions regarding potential impacts to cultural resources and tribal values.

RES will continue to attempt communications with the Pit River Tribe and understands from the findings of the EIR that coordination with the tribe will be an essential item for moving forward with project approval. We continue to be interested in initiating substantive discussions with the tribe and in preparing an agreement outlining an understanding of the tribe's future involvement in the project in a timely manner. We are concerned, however, that based on the lack of responses we have received to date from the tribe, further communications attempts may not be successful. We would appreciate the County's

assistance in facilitating further coordination with the tribe, especially now that such coordination is proposed as part of the mitigation approach in the Draft EIR.

Comments specific to the Draft EIR:

Pg 3.5-2:

The Draft EIR suggests that Bunchgrass Mountain is a well known locality used by Achumawi spiritual practitioners for vision quests and as a power place and may be affected by the proposed project. According to our records, Bunchgrass Mountain is approximately 1 mile outside the proposed project area. RES would like the Final EIR to explain further how Bunchgrass Mountain will be directly affected by the proposed project.

Under the section entitled *Identified Cultural Resources* the Draft EIR names "Hatchet Ridge-Bunchgrass Mountain" as an identified cultural resource. The EIR consultant provides descriptions of Hatchet Ridge and Bunchgrass Mountain and how these localities are significant to the Pit River Tribe and a statement that Hatchet Ridge is used as a route to access Bunchgrass Mountain. However, by the mere fact that one locality is used as a travel route to get to the other does not seem to justify the two localities being considered as one in the impact analysis. RES believes that an independent analysis of the two localities is a more appropriate way to analyze project impacts.

Pg. 3.5-8:

The Draft EIR lists the criteria for eligibility for listing in the California Register of Historical Resources, however, it fails to explain how under California law the integrity of a property is also taken into consideration. The following is a statement from the California Historic Resources Information System publication entitled *California Register Eligibility*:

> Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Historical resources that have been rehabilitated or restored may be evaluated for listing.
>
> Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a resource is proposed for eligibility. Alterations over time to a resource or historic changes in its use may themselves have historical, cultural, or architectural significance.
>
> It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register if it

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maintains the potential to yield significant scientific or historical information or specific data.

Pg. 3 5-11; Mitigation Measure CUL-1:

RES does not agree that Mitigation Measure CUL-1 is an appropriate measure for mitigation of visual and auditory disruption of Pit River Tribe religious practices. The mitigation measure suggests the project area be recorded as a Traditional Cultural Property. "Traditional Cultural Property" is a term used in federal historic preservation law to define a property that is eligible for inclusion in the National Register on the basis of its importance to a living community for maintaining cultural identity. If the consultant suggests that the site is a significant Archaeological or Historic Resource as defined in California Code of Regulations, Title 14, Chapter 3 15064.5, any further recordation of the site should be in support of a determination of eligibility to the California Register of Historical Resources, not as a Traditional Cultural Property under the federal regulatory scheme.

Furthermore, there currently is no legal precedent set for use of the proposed project area as a Traditional Cultural Property. The property is owned by Sierra Pacific Industries and Fruit Growers Association and is managed primarily as timberland. The timberland within the proposed project area has been managed for timber production and harvested for over 100 years. During that time there have been multiple entries and active uses, including logging, road construction and maintenance, forest management, and tree planting, as well as the construction of several telecommunication sites.

Sierra Pacific has been the owner of lands within the proposed project area since 1978. During the last 20 of these 40 years, they have prepared 4 different Timber Harvest Plans (THP) within or adjacent to the project area, in which the Pit River Tribe has been given the opportunity to comment on each THP. In addition, the entire area was completely harvested and mechanically site-prepped following the Fountain Fire in 1992. During this time, the tribe never provided input and never suggested that the property should be considered a Traditional Cultural Property. Furthermore, in the course of owning and conducting activities on this property, the landowner has had no knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites. The lack of comment from the tribe regarding the significance of the site over the last 20 years of timber management indicates that the area has only recently been determined a potential Traditional Cultural Property.

Right to pass on this property is by permission and subject to control of the owner as per Section 1008 of the California Civil Code and is posted accordingly. Access to properties subject to this provision is sometimes available, but the landowners reserve the right to control such access. Some activities would require a permit that would include insurance coverage and liability releases. Examples would include group use, woodcutting, Christmas trees, mushroom picking, and bough or greenery collection. The Pit River Tribe does not have a permit for resources extraction or any other use on the property.

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Since granting approval of the project would result in no changes to land ownership or existing access rights, and because RES does not have the right to change the designation of the property through its leases with Sierra Pacific Industries and Fruit Growers Association, RES does not intend to facilitate the recording of the property as a Traditional Cultural Property.

While RES feels it is important to protect significant cultural properties and wishes to implement a monitoring program which will include tribal input and involvement, we do not feel that it is necessary nor warranted to officially designate the property as a Traditional Cultural Property.

Impact CUL-3:

The Draft EIR suggests that access restrictions adversely affect the use of a historical resource, and even though the proposed project would not change the access rights of the Pit River tribe, it is still considered in the CEQA analysis as an impact. The Pit River Tribe does not have a permit with the landowner for resource extraction; therefore, any collection of basketry material conducted in the area is considered an illegal activity. RES does not consider access restrictions an impact which should be evaluated in the EIR because it is an existing condition of the property which will be unchanged by the proposed project.

Thank you for taking the time to consider my comments on the Draft EIR and suggestions for revisions of the proposed mitigation measures and impact analyses.

Sincerely,

Nicole S. Hughes, M A , RPA
RES America Developments, Inc.

Enclosures
Pit River Communications

4

Call Log Hatchet Mt.

Contact	Date	Subject	Left Message
Sharon Elmore	6/19/07		phone
Sharon Elmore	7/10/07		phone
Sharon Elmore	9/14/07		phone
Sharon Elmore w/ several Tribal members	9/[illegible]/07	Discussed Tribe's concerns about Project + requested meeting w/ Tribe the week of the Sept. 24	
Sharon Elmore	9/21/07	message re setting up mtg on 27th	phone

RES
RES America Developments, Inc.

1 SW Columbia
Suite 460
Portland, OR 97258

Tel: (503) 219 9000
Fax: (503) 219 9009

May 30, 2007

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O. Drawer 1570
Burney, CA 96013

Dear Ms. Jim,

Renewable Energy Systems (RES) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As you know Shasta County is preparing a SEQA document outlining environmental concerns for the project. We understand from public scoping comments obtained during the SEQA process that there are concerns about how the proposed project will impact cultural sites and natural resources. RES would like the opportunity to answer questions and identify concerns so that appropriate measures can be taken to avoid unnecessary adverse impacts. If you would like, RES can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you considering our request, we look forward to meeting with you.

Feel free to call me directly at 503-789-5741

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
Renewable Energy Systems

Hatchet Ridge Wind, LLC
an affiliate of
RES
RES America Developments, Inc.

1 SW Columbia St
Suite 460
Portland, OR
97258 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

July 5, 2007

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O. Drawer 1570
Burney, CA 96013

Dear Ms. Jim,

Hatchet Ridge Wind, LLC (an affiliate of Renewable Energy Systems (RES)) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As you know Shasta County is preparing a SEQA document outlining environmental concerns for the project. We understand from public scoping comments obtained during the SEQA process that there are concerns about how the proposed project will impact cultural sites and natural resources. RES would like the opportunity to answer questions and identify concerns so that appropriate measures can be taken to avoid unnecessary adverse impacts. If you would like, we can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you for considering our request; we look forward to meeting with you.

Feel free to call me directly at 503-341-0185.

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
RES America Developments

Cc:
Sharon Elmore, Culture Information Officer
Bill Walker, Shasta County Dept. of Resource Management (electronic copy)

Nicole Hughes

From: Nicole Hughes
Sent: Monday, September 10, 2007 11:00 AM
To: 'ajumawi@frontiernet net'
Subject: Hatchet Ridge Wind contacts

Sharon, here is the contact information I have for the county and Jones and Stokes

Shasta County
Bill Walker
Shasta County Dept of Resource Mgmt
bwalker@co.shasta.ca.us
1855 Placer Street, Suite 103
Redding, CA 96001-1759
(530) 225-5532

Jones and Stokes
John Forsythe
Senior Project Manager
jforsythe@jsanet com
2600 V Street
Sacramento, CA 95818
(916) 737-3000

Nicole S Hughes
Renewable Energy Systems
One SW Columbia
Portland, OR 97258

(503) 219-9000 (direct dial)
(503) 341-0185(cell) ***NEW CELL NUMBER***
(503) 219-9009 (fax)
nicole hughes@res-americas com (email)

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11/13/2007

Nicole Hughes

From: Nicole Hughes
Sent: Monday, September 17, 2007 4:11 PM
To: 'ajumawi@frontiernet.net'
Subject: Visit next week

Sharon, I am planning a visit to Burney next week and would like to come speak with tribal members as we discussed I can also arrange for a site visit if you are interested. I will be in Burney on Thursday the 27th

Nicole S. Hughes
Renewable Energy Systems
One SW Columbia
Portland, OR 97258

(503) 219-9000 ext. 4 (direct dial)
(503) 341-0185 (cell)
(503) 219-9009 (fax)
nicole.hughes@res-americas.com (email)

11/13/2007

Nicole Hughes

From: Nicole Hughes
Sent: Tuesday, November 13, 2007 1:14 PM
To: ajumawi@frontiernet.net
Subject: Hatchet Ridge Project

Sharon, we have heard from Shasta County recently, they are expecting a draft of the Environmental Impact Report soon. I plan on making several copies of the report available at the Burney Chamber of Commerce. I will let you know when they are available. RES would still like to schedule a meeting with the tribe to discuss the concerns that were shared during the conference call in September. Please let me know the availability of the tribe and I can either set up a meeting place or come to your offices.

Please note new address

Nicole S. Hughes
Renewable Energy Systems
700 SW Taylor St. Suite 210
Portland, OR 97205

(503) 219-9000 ext. 2106 (direct)
(503) 341-0185 (cell)
(503) 219-9009 (fax)
nicole.hughes@res-americas.com (email)

11/13/2007

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor St
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 8, 2008

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O Drawer 1570
Burney, CA 96013

Dear Ms Jim,

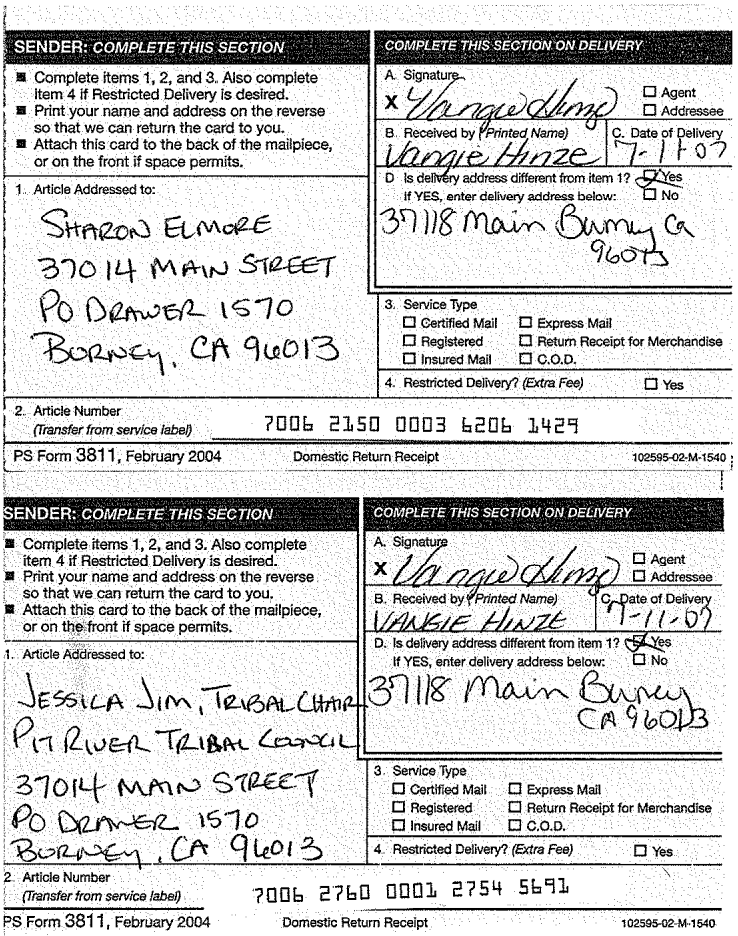
Hatchet Ridge Wind, LLC (an affiliate of RES America Developments, Inc. (RES)) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As I am sure you are aware Shasta County has released a draft CEQA document which identifies a potential significant and unavoidable impact related to tribal resources. We would like to work with the Pit River Tribe to minimize impacts and are interested in entering into an agreement with the tribe which outlines future tribal involvement. If you would like, we can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you for considering our request; we look forward to working with you.

Feel free to call me directly at 503-341-0185

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
RES America Developments, Inc.

Cc:
Sharon Elmore, Culture Information Officer
Bill Walker, Shasta County Dept of Resource Mgmt, 1855 Placer Street, Suite 103
Redding, CA 96001-1759



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1. Article Addressed to:

SHARON ELMORE
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Vangie Hinze ☐ Agent ☐ Addressee

B. Received by (Printed Name) VANGIE HINZE C. Date of Delivery 7-11-07

D. Is delivery address different from item 1? ☒ Yes
If YES, enter delivery address below: ☐ No
37118 Main Burney CA 96013

3. Service Type
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☐ Registered ☐ Return Receipt for Merchandise
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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

JESSICA JIM, TRIBAL CHAIR
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Vangie Hinze ☐ Agent ☐ Addressee

B. Received by (Printed Name) VANGIE HINZE C. Date of Delivery 7-11-07

D. Is delivery address different from item 1? ☒ Yes
If YES, enter delivery address below: ☐ No
37118 Main Burney CA 96013

3. Service Type
☐ Certified Mail ☐ Express Mail
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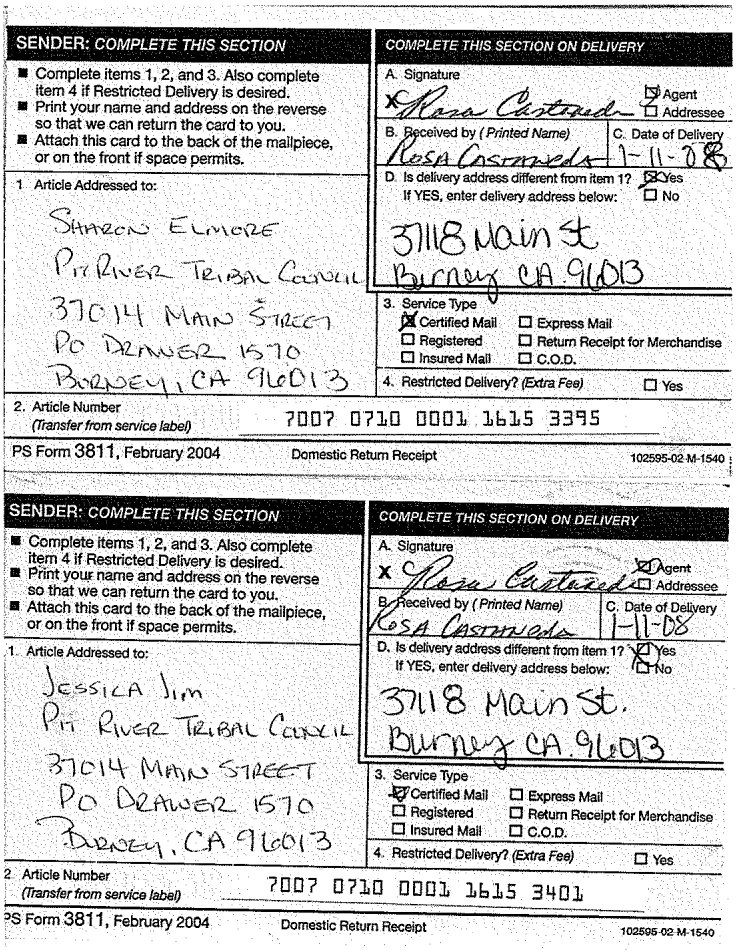

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SHARON ELMORE
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

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X Rosa Castaneda ☒ Agent ☐ Addressee

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1. Article Addressed to:

JESSICA JIM
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

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X Rosa Castaneda ☒ Agent ☐ Addressee

B. Received by (Printed Name) ROSA CASTANEDA C. Date of Delivery 1-11-08

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Letter OG3 Remy, Thomas, Moose and Manley, LLP

Response to Comment OG3-1

This comment introduces the applicant's attorney's comments on the Draft EIR. The comment states that the applicant is in agreement with most of the conclusions of the Draft EIR, with a few exceptions as noted in subsequent comments.

Response to Comment OG3-2

Based on currently available information on the number of known Butte County morning-glory occurrences and the element occurrence rank of each occurrence as provided in the California Natural Diversity Database (2008), the Draft EIR does not overstate the significance of impacts on Butte County morning-glory. Please see the response to Comment OG6-7, OG6-8, and OG6-9 for further explanation.

Response to Comment OG3-3

The evidence and comments submitted by Dave P. Young of WEST have been carefully reviewed and considered, and proposed changes to Section 3.4 of the Draft EIR have been made where appropriate. Please refer to the responses to Letter OG6 below.

Response to Comment OG3-4

The term *traditional cultural property* has been removed from Mitigation Measure CUL-1 to eliminate any implication that the project is required to comply with federal cultural resource regulations.

Response to Comment OG3-5

It is acknowledged that any private property access must be granted by the property owner.

Response to Comment OG3-6

Comment noted. The Draft EIR screened a reasonable range of project alternatives that could reduce or eliminate one or more of the significant environmental impacts associated with the project. Section 4.5, *Alternatives Analysis*, beginning on page 4-11 of the Draft EIR, discusses this process in detail.

Response to Comment OG3-7

Comment noted. The commenter offers additional information on the constraints associated with the use of vertical axis wind turbines for the proposed project. The Draft EIR addresses this technology in Section 4.5.1, *Alternatives Considered but Rejected.* The information provided supports and does not change the conclusions in that section of the Draft EIR.

Response to Comment OG3-8

In this comment, the applicant's CEQA counsel describes the research and justification for RES's selection of a particular turbine for the proposed project. This information is presented in Appendix A of Final EIR as information supporting the project description, presented in Chapter 2 of the Draft EIR.

Response to Comment OG3-9

The commenter provides supporting information quantifying the reductions in greenhouse gas emissions generated by wind turbines in contrast to those generated by fossil fuels.

Response to Comment OG3-10

The AWEA citation is noted and included in the administrative record. Additional information is provided by the applicant's CEQA counsel. The information is noted and will be included in the administrative record for the project.

Response to Comment OG3-11

Comment noted. The relevant FAA requirements, as set forth in the technical note *Development of Obstruction Lighting Standards for Wind Turbine Farms*, are excerpted below.

> Nighttime wind turbine obstruction lighting should consist of the preferred Federal Aviation Administration (FAA) L-864 aviation red-colored flashing lights. Minimum intensities of 2000 candelas for nighttime red flashing or strobe lights are required. The standard FAA L-810 steady-burning obstruction light, with an intensity of approximately 32 candelas, is of very little use. (Patterson 2005.)

The wording of Mitigation Measure AES-1 has been revised to clarify compliance with FAA regulations.

Response to Comment OG3-12

Comment noted. The wording of Mitigation Measure AIR-1 has been revised to remove the requirement that operations be discontinued when wind speeds exceed 20 mph and that other minimization measures be implemented instead.

Response to Comment OG3-13

This comment expresses the applicant's interest in reconsideration of certain issues in the Draft EIR, as identified above.

Letter OG4

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on the alternatives analysis in the Hatchet Ridge Draft EIR

Dear Mr. Walker,

RES would like to provide comments on the alternatives analysis provided in the Draft EIR. The Hatchet Ridge Project has unique geographic features which impose siting constraints on turbines and associated facilities. Additionally, constraints on the minimum size of commercial wind energy projects to ensure an economically viable project play an important role in how a project is developed and financed. As the Draft EIR explained, some of these constraints were taken into consideration when determining the range of potentially feasible alternatives for the project. Below I have provided additional evidence supporting the Draft EIR's conclusions regarding the infeasibility of three of the initially considered alternatives that were rejected for further analysis: the Smaller Capacity Project Alternative, the Butte County morning glory Avoidance Alternative, and the Alternative Technology Alternative.

OG4-1

Smaller Capacity Project Alternative

RES would like to provide further explanation as to why we do not consider the Smaller Capacity Project Alternative feasible; the primary reason relates to economies of scale. The costs of development and construction of certain facilities associated with a wind project (i.e., transmission, substations, transformers, roads, etc.) needs to be spread out over an optimum MW output. As an example, regardless of the number of turbines installed a transformer will be needed. MW output associated with five turbines will not support a multi-million dollar transformer. When the energy output is minimized by reducing the total number of turbines, and the cost of the remaining facilities required to support the turbines exceeds the output, the project becomes infeasible. Very few commercial scale, stand-alone (not considering a second phase of an existing project) wind energy projects in the west are developed below 102 MW due to economies of scale relating to associated facilities. It is for this reason that RES chose the development of a minimum 102 MW-sized project as one of its key project objectives. (DEIR, p. 2-4.)

OG4-2

Additionally, the smaller capacity project would not reduce the environmental impacts identified in the EIR to a less than significant level. As mentioned in the previous paragraph, the same associated facilities would be needed for a wind power project, whether it has 50 turbines or 100 turbines. To obtain optimal energy output for a reduced capacity project, turbines would still have to be sited along the ridge,

which would require construction of roads, a substation, an operations and maintenance buildings, etc. Therefore, any reduction of environmental impacts is likely to be minimal with a reduced capacity project because the related facilities, which contribute to the project's significant impacts identified in the Draft EIR, would still be required to be built.

OG4-2 cont.

For these reasons, RES considers the Smaller Capacity Project Alternative both infeasible and unlikely to substantially reduce or avoid significant environmental impacts and therefore unworthy of further consideration or substantive analysis in an EIR.

Butte County Morning Glory Avoidance Alternative

In this alternative the Draft EIR suggested eliminating or relocating six of the turbines identified in an area where the Butte County morning glory was found. As described above, a reduction in the number of turbines proposed by RES would render the project infeasible due to the financial constraints of wind energy plant development and construction.

It is also infeasible to relocate the six turbines given the current topography of the proposed project area. The ridge upon which the project is proposed is at its widest 450 meters. There is no room along the existing ridge to relocate the turbines and it is not possible to place turbines upwind of one another along the ridge. Turbines that are placed too close together run the risk of causing a wake effect, which in turn affects the performance of the turbine and could have some safety implications as well. A trade-off exists between optimizing the turbine location for energy production and maintaining reasonable turbine interconnection costs, which increase with wider spacing. Experience, mathematical analysis, and cost considerations are employed to determine the optimum configuration given all of the existing site conditions. The layout currently proposed for Hatchet Ridge in the Draft EIR takes all these factors into consideration and has been optimized to produce the greatest amount of energy using the minimum number of turbines and appropriate spacing. Also, there is not another ridge or geographic feature adjacent to Hatchet Ridge upon which the six relocated turbines could be placed without requiring a significant amount of additional transmission or underground cabling, which would result in additional environmental impacts not addressed in this EIR.

OG4-3

Finally, as pointed out in comments provided by WEST (RES' environmental consultant) the project is unlikely to have a negative impact on the local Butte County morning glory population, and may, in fact, result in an increased population over time, due to the species' affinity for disturbed environments. WEST also notes that the Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, and the number of occurrences and number of individuals exceeds the state criteria for listing. Therefore, a project alternative that considers changes to the layout to accommodate the Butte County morning glory is not warranted under CEQA and is unlikely to protect or benefit the species of concern.

OG4-4

Alternative Technologies Alternative

The Draft EIR states "The use of vertical axis wind turbine (VAWT) could theoretically minimize the visual impact because of the reduced height; however, the availability – and hence the feasibility – of these devices is unknown." (DEIR, p. 4-13.) Additionally, Wintu Audubon Society in its comments provided to the County on January 22, 2008, suggests using VAWT turbines would reduce environmental impacts. RES has researched VAWT technology and has found that not only is it infeasible to use this

OG4-5

technology at the Hatchet Ridge project, but it is unlikely to reduce environmental impacts. In fact, it could substantially increase the footprint-related impacts associated with turbine installation. (See footnote 1 below.) Moreover, Terra Moya Aqua, the company recommended by Wintu Audubon Society, currently has VAWT turbines in the range of only 1kw to 750 kw. The following excerpt is taken directly from the Terra Moya Aqua Web Site (www.tmawind.com):

> Our expected catalogue of turbines is as follows:
>
> A 1-5 kw units, approximately 8' tall with a footprint equal to a 8'x8'x8' equilateral triangle
> B 25-100 kw units, approximately 34' tall with a footprint equal to a 34'x34'x34' equilateral triangle
> C 100-350 kw units, approximately 116' tall with a footprint equal to 96'x96'x96' equilateral triangle.
> D 350-500/750 kw units approximately 150' tall with a footprint equal to 150'x150'150' equilateral triangle.
> E Larger models will be considered if new generator technologies prove out

OG4-5 cont.

It is not possible in today's energy market to develop a commercial scale energy project that is economically viable with the turbines currently available at Terra Moya Aqua. RES does not know of any other VAWT manufacturer supplying VAWT turbines viable for use on a commercial wind energy project. In fact, out of over 16,800 MW of currently operating commercial wind projects in the United States, zero MWs are produced from VAWT. The Wyoming facility that Wintu referenced in their comments is a test facility, not a commercial wind project, and we were not able from the information provided by Terra Moya Aqua to determine the size of the project.

Since VAWT turbines are currently manufactured with a top capacity of only 750 kw, almost three times the number of VAWT turbines would be needed at Hatchet Ridge to produce 102 MW, the minimum capacity that is financially feasible to construct and operate. Increasing the number of turbines on the project site would undoubtedly result in a greater impact on the environment than the currently proposed project.

OG4-6

The Wintu Audubon Society also commented on its concern for the Butte County morning glory in recommending the use of VAWT turbines; however, RES believes that VAWT turbines would have a far greater impact on this species than would a standard rotating blade turbine. The footprint of VAWT turbines is significantly larger than the turbines RES proposes to use[1], thereby substantially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Additionally, the claim that this turbine technology will not cause any wildlife fatalities is not backed by any peer reviewed literature. Since there are no VAWT turbines in use at commercial scale wind energy projects, we were not able to find any avian impact or mortality studies for which to compare potential impacts at the Hatchet Ridge Project.

OG4-7

[1] / A typical foundation for the standard rotating blade turbine RES proposes to use ranges from 420-1600 square feet in size, depending on the type of foundation the ground conditions would require (16-foot diameter pier-type or 40-foot by 40-foot spread-footing type). (See DEIR, p. 2-10.) The footprint of just one foundation for the largest VAWT turbines manufactured by Terra Moya Aqua (750 kw) is 9,743 square feet (the area of one 150-foot equilateral triangle). As noted above, RES would have to install three times as many (approx. 138) of the largest VAWT turbines as standard rotating blade 2.4 MW turbines (43) in order to achieve the minimum financially feasible 102 MW output. Doing so would result in a total VAWT turbine foundation footprint on Hatchet Ridge of approximately 1,344,534 square feet (or 30.8 acres) (138 VAWT turbines x 9,743 sq.ft.). Compare this hypothetical VAWT footprint to the total maximum of just 68,800 square feet (1.58 acres) (43 turbines x 1600 sq.ft.) if the largest possible foundations were used for all of the standard rotating blade 2.4 MW turbines RES proposes to use.

3

Furthermore, the height of VAWTs is only 29 meters, which may function well in the treeless plains of Wyoming, but which will not function in the timberland setting of the Hatchet Ridge project site, where trees would significantly interfere with the wind at that lower height. Overall, RES finds this technology is incomparable to the technology required to build a viable commercial scale wind energy project, and therefore, the County was correct in considering it an infeasible alternative for the Hatchet Ridge Project. OG4-8

Even if the VAWT turbine as referenced in the Wintu Audubon Society's comment letter was technically feasible (which it is not as indicated herein), there are no VAWT turbines manufactured anywhere in the world today that are financeable by any institutional investors or lenders active in the wind or power industry. The fact is, the proposed Hatchet Ridge Project is a $200 million project and suggesting that a commercially unproven and largely unknown manufacturer of turbines could be a financially viable alternative is a baseless assertion. OG4-9

RES appreciates your consideration of this information regarding the feasibility of the project alternatives discussed in the Draft EIR. If the County needs further information about economic or construction constraints associated with the proposed project, please feel free to contact me. OG4-10

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

4

Letter OG4 RES America Developments, Inc.

Response to Comment OG4-1

The project applicant notes the particular considerations that factor into an alternatives analysis under CEQA, particularly at this site. The applicant notes that additional information about the alternatives is provided in this comment letter.

Response to Comment OG4-2

This comment states that the smaller project alternative is not economically feasible at this site, and provides a rationale for this assertion.

Response to Comment OG4-3

The comment provides additional explanation and justification for the elimination of the Smaller Capacity Project Alternative in the Draft EIR. The Draft EIR's discussion of the Smaller Capacity Project Alternative begins on page 4-15. This discussion states that the alternative "may" be feasible but that it would not reduce the significance of identified impacts to a less-than-significant level. The applicant states that a smaller capacity alternative (less than 100 MW) is not economically feasible and does not meet the project objective (Draft EIR Page 2-4) due to the cost of supporting infrastructure (a constant) regardless of the number of turbines installed. Therefore, based on the analysis presented in the Draft EIR and the supporting information provided by the applicant in this comment, this alternative was considered infeasible and was not considered further in the Draft EIR.

Response to Comment OG4-4

The commenter provides additional information concerning the Butte County Morning Glory Avoidance Alternative and its infeasibility. As discussed in Section 4.5.1 of the Draft EIR, this alternative was considered but rejected from further analysis. The information does not change the Draft EIR conclusions regarding this alternative.

Response to Comment OG4-5

Comment noted. This comment provides additional information regarding the feasibility of the vertical axis wind turbine (VAWT) technology at this project site.

Response to Comment OG4-6

The project applicant addresses the availability and commercial viability of vertical axis wind turbines, also previously addressed in both the Draft EIR and Wintu Audubon comment letter (and response thereto). The applicant makes clear its view that VAWTs are not feasible for the proposed project. See also the response to Comment OG3-6.

Response to Comment OG4-7

Comment noted. The applicant provides information indicating that the areal extent of habitat loss associated with the installation of vertical axis wind turbines would far exceed the habitat loss associated with the wind turbines planned for the proposed project.

Response to Comment OG4-8

The comment supports the elimination of VAWTs as an alternative technology as discussed on page 4-13 of the Draft EIR. The applicant supports the finding that this alternative technology is infeasible for the proposed project and does not meet the project objectives. The information does not change the conclusion regarding this alternative presented in Chapter 4 of the Draft EIR.

Response to Comment OG4-9

In addition to the applicant's contention that the application of VAWT technology is not feasible for the proposed project (see the response to Comment OG4-7), this comment provides additional information indicating that such equipment "cannot be financed by institutional investors or lenders in the wind or power industry." The commenter suggests that because the project would cost approximately $200 million, the claim that an "unproven" technology from a largely "unknown" manufacturer of turbines could be financially viable is a "baseless" assertion. As stated in the Draft EIR, based on these factors, the use of VAWTs is not feasible, does not meet the project objectives, and was eliminated from consideration in the Draft EIR. The information does not change the conclusion regarding this alternative presented in Chapter 4 of the Draft EIR.

Response to Comment OG4-10

Comment noted. No further information on the economic or construction constraints is needed at this time.

Letter OG5

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on cultural resources section of EIR

Dear Mr. Walker,

RES has reviewed the Draft EIR for the Hatchet Ridge Wind Project and has some comments on the impact analysis and recommended mitigation measures listed in section 3.5, Cultural Resources. As a Registered Professional Archaeologist with several years of experience conducting cultural resources investigations and evaluating traditional cultural properties throughout the Northwest, I am very familiar with the complexities of evaluating cultural resources under state and federal environmental regulations. While I believe the Hatchet Ridge Draft EIR is thorough in its evaluation of the potential impacts regarding cultural resources, I have some concerns regarding the recommended mitigation measures and feel that some are outside the purview of CEQA. I urge you to consider my comments not only as the project applicant, but also as a professional archaeologist with unique experience in cultural resources investigations for large energy development and construction projects. **OG5-1**

In addition to providing you with comments specific to the Draft EIR, I would like to share with you evidence of our commitment to put forth a good faith effort at consultation with the Pit River Tribe. Our goal from the beginning of this project has been to work cooperatively with the tribe to attempt to minimize and mitigate impacts to culturally sensitive areas and resources. Working towards this goal, we have attempted several communications with the tribe over the last 7 months. Our communications to the Pit River Tribe include letters, e-mail messages and phone messages requesting a meeting with the tribe to discuss their concerns (copies of these communications are included). Unfortunately, with the exception of one short phone conference between myself and tribal members in September 2007, we have not been very successful at engaging the tribe in meaningful discussions regarding potential impacts to cultural resources and tribal values. **OG5-2**

RES will continue to attempt communications with the Pit River Tribe and understands from the findings of the EIR that coordination with the tribe will be an essential item for moving forward with project approval. We continue to be interested in initiating substantive discussions with the tribe and in preparing an agreement outlining an understanding of the tribe's future involvement in the project in a timely manner. We are concerned, however, that based on the lack of responses we have received to date from the tribe, further communications attempts may not be successful. We would appreciate the County's

assistance in facilitating further coordination with the tribe, especially now that such coordination is proposed as part of the mitigation approach in the Draft EIR. **OG5-2 cont.**

Comments specific to the Draft EIR:

Pg 3.5-2:

The Draft EIR suggests that Bunchgrass Mountain is a well known locality used by Achumawi spiritual practitioners for vision quests and as a power place and may be affected by the proposed project. According to our records, Bunchgrass Mountain is approximately 1 mile outside the proposed project area. RES would like the Final EIR to explain further how Bunchgrass Mountain will be directly affected by the proposed project. **OG5-3**

Under the section entitled *Identified Cultural Resources* the Draft EIR names "Hatchet Ridge-Bunchgrass Mountain" as an identified cultural resource. The EIR consultant provides descriptions of Hatchet Ridge and Bunchgrass Mountain and how these localities are significant to the Pit River Tribe and a statement that Hatchet Ridge is used as a route to access Bunchgrass Mountain. However, by the mere fact that one locality is used as a travel route to get to the other does not seem to justify the two localities being considered as one in the impact analysis. RES believes that an independent analysis of the two localities is a more appropriate way to analyze project impacts. **OG5-4**

Pg. 3.5-8:

The Draft EIR lists the criteria for eligibility for listing in the California Register of Historical Resources, however, it fails to explain how under California law the integrity of a property is also taken into consideration. The following is a statement from the California Historic Resources Information System publication entitled *California Register Eligibility*: **OG5-5**

> Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Historical resources that have been rehabilitated or restored may be evaluated for listing.
>
> Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a resource is proposed for eligibility. Alterations over time to a resource or historic changes in its use may themselves have historical, cultural, or architectural significance.
>
> It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register if it

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maintains the potential to yield significant scientific or historical information or specific data.

OG5-5 cont.

Pg. 3 5-11; Mitigation Measure CUL-1:

RES does not agree that Mitigation Measure CUL-1 is an appropriate measure for mitigation of visual and auditory disruption of Pit River Tribe religious practices. The mitigation measure suggests the project area be recorded as a Traditional Cultural Property. "Traditional Cultural Property" is a term used in federal historic preservation law to define a property that is eligible for inclusion in the National Register on the basis of its importance to a living community for maintaining cultural identity. If the consultant suggests that the site is a significant Archaeological or Historic Resource as defined in California Code of Regulations, Title 14, Chapter 3 15064.5, any further recordation of the site should be in support of a determination of eligibility to the California Register of Historical Resources, not as a Traditional Cultural Property under the federal regulatory scheme.

OG5-6

Furthermore, there currently is no legal precedent set for use of the proposed project area as a Traditional Cultural Property. The property is owned by Sierra Pacific Industries and Fruit Growers Association and is managed primarily as timberland. The timberland within the proposed project area has been managed for timber production and harvested for over 100 years. During that time there have been multiple entries and active uses, including logging, road construction and maintenance, forest management, and tree planting, as well as the construction of several telecommunication sites.

Sierra Pacific has been the owner of lands within the proposed project area since 1978. During the last 20 of these 40 years, they have prepared 4 different Timber Harvest Plans (THP) within or adjacent to the project area, in which the Pit River Tribe has been given the opportunity to comment on each THP. In addition, the entire area was completely harvested and mechanically site-prepped following the Fountain Fire in 1992. During this time, the tribe never provided input and never suggested that the property should be considered a Traditional Cultural Property. Furthermore, in the course of owning and conducting activities on this property, the landowner has had no knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites. The lack of comment from the tribe regarding the significance of the site over the last 20 years of timber management indicates that the area has only recently been determined a potential Traditional Cultural Property.

OG5-7

Right to pass on this property is by permission and subject to control of the owner as per Section 1008 of the California Civil Code and is posted accordingly. Access to properties subject to this provision is sometimes available, but the landowners reserve the right to control such access. Some activities would require a permit that would include insurance coverage and liability releases. Examples would include group use, woodcutting, Christmas trees, mushroom picking, and bough or greenery collection. The Pit River Tribe does not have a permit for resources extraction or any other use on the property.

OG5-8

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Since granting approval of the project would result in no changes to land ownership or existing access rights, and because RES does not have the right to change the designation of the property through its leases with Sierra Pacific Industries and Fruit Growers Association, RES does not intend to facilitate the recording of the property as a Traditional Cultural Property.

OG5-8 cont.

While RES feels it is important to protect significant cultural properties and wishes to implement a monitoring program which will include tribal input and involvement, we do not feel that it is necessary nor warranted to officially designate the property as a Traditional Cultural Property.

OG5-9

Impact CUL-3:

The Draft EIR suggests that access restrictions adversely affect the use of a historical resource, and even though the proposed project would not change the access rights of the Pit River tribe, it is still considered in the CEQA analysis as an impact. The Pit River Tribe does not have a permit with the landowner for resource extraction; therefore, any collection of basketry material conducted in the area is considered an illegal activity. RES does not consider access restrictions an impact which should be evaluated in the EIR because it is an existing condition of the property which will be unchanged by the proposed project.

OG5-10

Thank you for taking the time to consider my comments on the Draft EIR and suggestions for revisions of the proposed mitigation measures and impact analyses.

Sincerely,

Nicole S. Hughes, M A , RPA
RES America Developments, Inc.

Enclosures
Pit River Communications

4

Letter OG5 RES America Developments, Inc.

Response to Comment OG5-1

These comments provide information from the applicant regarding cultural resources at the site.

Response to Comment OG5-2

The project applicant expresses a willingness to coordinate with the Pit River Tribe regarding the Tribe's concerns about Hatchet Ridge, while acknowledging the difficulty of arranging meaningful discussions with the Tribe. The applicant is requesting that the County assist in facilitating such consultation, especially since consultation is one component of Mitigation Measure CUL-1 as set forth in the EIR. The County is committed to assisting the applicant in arranging the coordination activities specified in Mitigation Measure CUL-1 to ensure that the interests of both the applicant and the Pit River Tribe are addressed.

Response to Comment OG5-3

The EIR does not treat Bunchgrass Mountain as an entity separate from Hatchet Ridge (see response to Comment OG5-4 below). Accordingly, this comment is not relevant to the impact analysis presented in the cultural resources section of the Draft EIR.

Response to Comment OG5-4

As indicated on page 3.5-6 of the Draft EIR, the Pit River Tribe identified Hatchet Ridge–Bunchgrass Mountain as a single cultural resource. Page 3.5-6 also discloses that power places are distributed along the ridge on Hatchet Ridge and Bunchgrass Mountain. Because the cultural resource was identified by the Pit River Tribe (who treats the two localities as one) on the basis of their historic and recent use of Hatchet Ridge–Bunchgrass Mountain, and because power places are distributed within both localities, treatment of Hatchet Ridge–Bunchgrass Mountain as a single entity is consistent with the information on record. The fact that persons outside the Pit River Tribe prefer to regard Hatchet Ridge and Bunchgrass Mountain as separate geographic features does not reflect the Pit River Tribe's conception of the area as a cultural resource, but instead reflects modern geographic conventions made independently of cultural resource concerns.

Response to Comment OG5-5

Comment noted. Although the Draft EIR does not cite the integrity discussion contained in the California Historical Resources Information System publication *California Register Eligibility*, such a discussion of integrity is presented on page 3.5-7 of the Draft EIR. Specifically,

> A number of recent disturbances are evident on Hatchet Ridge–Bunchgrass Mountain: radio and microwave towers on Hatchet Ridge and Bunchgrass Mountain, a system of dirt roads, Sierra Pacific Industries timber operations, and the partial vegetative denuding of the area caused by the Fountain Fire. *Despite these recent disturbances, for the purposes of traditional cultural practices, the Pit River Tribe considers Hatchet Ridge–Bunchgrass Mountain "visually pristine"* (Tiley 2007:Appendix C). Although Bunchgrass Lookout Road and other elements of the road system are doubtless larger travel corridors than historic-era Achumawi foot trails, *the presence of unpaved roads along the ridge is not inconsistent with traditional use of the ridge as a travel corridor. The damage inflicted on the ridge's vegetative communities, while severe, is at worst a temporary impact on the character-defining features of Hatchet Ridge–Bunchgrass Mountain.* Forest fires are not exclusively modern phenomena; they doubtless occurred on the ridge in former times.

> Additionally, though not documented specifically in the project area, the deliberate burning of vegetation was a common California Indian forest management practice (Woods and Raven 1985:6–7). *Finally, the radio and microwave towers, while clearly visible on most of the ridge, do not impede views from the ridge of important natural features such as Mt. Lassen and Mt. Shasta. The towers are sufficiently dispersed relative to the length of the ridge that they do not dominate the viewshed on or fully compromise the character-defining features of Hatchet Ridge–Bunchgrass Mountain for traditional cultural practices*. [Emphasis added.]

Whereas the specific term *integrity* is not used in the previous paragraph, a clear case is made that Hatchet Ridge–Bunchgrass Mountain, in the words of *California Register Eligibility*, retains "enough…historic character or appearance to be recognized as [a historical resource] and to convey the reasons for [its] significance."

Response to Comment OG5-6

The first sentence under Impact CUL-1 identifies Hatchet Ridge–Bunchgrass Mountain as a historical resource for the purposes of CEQA (page 3.5-10 of the Draft EIR): "Hatchet Ridge–Bunchgrass Mountain appears to be a historical resource for the purposes of CEQA."

As Ms. Hughes points out in her letter, further evaluative and subsequent mitigation efforts will be made within the framework of the California Register of Historical Resources' significance criteria. For a more in-depth discussion of the identification of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property, refer to the responses to Comments OG3-4 and OG5-7.

Response to Comment OG5-7

Although Ms. Hughes' statement that the Pit River Tribe has provided no input concerning the status of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property *may* be valid[1], a careful reading of page 3.5-6 of the Draft EIR reveals that the status of Hatchet Ridge–Bunchgrass Mountain as a sacred or religious site has long been a matter of record. As recently as 2003, Registered Professional Forester M. E. Wyhlidko (2003:1) documented that Hatchet Ridge–Bunchgrass Mountain is a sacred site. Bureau of Land Management archaeologist Eric Ritter (1986:1) documented that the Pit River Tribe used Hatchet Ridge–Bunchgrass Mountain for seeking visions, consistent with Olmsted and Stewart's (1978:Figure 1) designation of Hatchet Ridge–Bunchgrass Mountain as a power place. Furthermore, professional cultural anthropologist Shelley (Raven) Tiley—who prepared the consultation report (Tiley 2007) on which the Draft EIR's analysis of Hatchet Ridge–Bunchgrass Mountain is based—documents the Pit River Tribe's use of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property from the historic period through 1985 (Woods and Raven 1985:40) to the present day (Tiley 2007: 8–9). Whatever the history of consultation between the present landowner and the Pit River Tribe, the sources cited in this paragraph reveal that the Pit River Tribe's use of Hatchet Ridge–Bunchgrass Mountain as a sacred site and traditional cultural property has been a matter of record among anthropologists and cultural resource managers for a minimum of 30 years (dating from Olmsted and Stewart 1978). Depending on what point in time previous timber harvest plans were conducted on Hatchet Ridge–Bunchgrass Mountain, some or all of this literature was accessible to archaeologists, cultural resource managers, and registered professional foresters qualified to review confidential cultural resource documents. These sources of information should have been reviewed during the timber harvest plan impact

[1] The information in Ms. Hughes' comment letter is not sufficient to substantiate the claim, because she does not cite actual timber harvest plans or supporting documents.

analyses referred to by Ms. Hughes. Whether these sources refer to Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property, sacred site, or religious site, all such designations conform to state and federal definitions of a cultural resource "site" (not archaeological site), and the responsibility to consider impacts on this resource under past, present, and future environmental reviews is not obviated by the degree of input by the Pit River Tribe or the categorization of the resource. Its status as a cultural resource is a matter of record.

The fact that the landowner has no specific "knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites" has little bearing on whether Hatchet Ridge–Bunchgrass Mountain constitutes a traditional cultural property that qualifies as a historical resource for the purposes of CEQA. Furthermore, the Draft EIR (page 3.5-7) documents two projectile points (HR-ISO-1 and HR-ISO-3) and a historic can (HR-ISO-2) in the project area. These three isolated finds do not constitute historic or prehistoric archaeological sites, but do indicate that, in the absence of a pedestrian survey by a qualified archaeologist, statements as to the absence of such sites are anecdotal and not indicative of the absence of any type of cultural resource.

Response to Comment OG5-8

It is noted that private property access requires permission by the landowner.

Response to Comment OG5-9

It is noted that the applicant does not recognize the cultural resources as a traditional cultural property.

Response to Comment OG5-10

Impact CUL-3 was identified on the assumption that construction-related activities would present an impediment to continued traditional cultural use of Hatchet Ridge–Bunchgrass Mountain. Ms. Hughes makes a fair argument that a lack of net change in accessibility to the property constitutes no effective change in baseline access conditions. This point is consistent with the information disclosed in Impact CUL-3 of the Draft EIR.

Letter OG6

WEST, Inc.
Western EcoSystems Technology, Inc. 2003 Central Ave., Cheyenne, WY 82001
Phone: 307.634.1756 Fax: 307.637.6981 Web site: www.west-inc.com

January 28, 2008

Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

Re. Comments on the Draft Environmental Impact Report for the Hatchet Ridge Wind Project

Attn: Mr. Bill Walker

Western EcoSystems Technology, Inc. (WEST) was retained by Renewable Energy Systems North America (RES) to develop and implement pre-project studies of avian and bat resources in the proposed Hatchet Ridge Wind Project area. The overall objectives of the studies were to provide information that would be useful in developing an impact assessment for the project and information that may be useful in siting project facilities to minimize potential impacts to avian and bat resources. **OG6-1**

WEST has been a leader in the U.S. in the study of wind projects and wildlife interactions and impacts. WEST is active in both the American Wind Energy Association and the National Wind Coordination Committee wildlife initiatives. WEST has worked and conducted studies in nearly all states in the U.S. where active wind development is taking place. Many of the protocols that are in place for studying wind power projects were developed by WEST biologists and statisticians and WEST has participated in wind power study guidelines at the state and national level. WEST is considered an expert in the field of wind power and wildlife impacts assessment and documentation. Additional WEST credentials and experience can be found on the corporation web page (www.west-inc.com) as well as curriculum vitas for WEST principals. These further document the experience and expertise of the company and personnel in the study of wind power projects and impacts on natural resources. **OG6-2**

I have reviewed the EIR for the proposed Hatchet Ridge Wind Power project to provide comments for the County to consider in it's preparation of the Final EIR. The following review is provided on the behalf of RES to clarify certain discussions and proposed mitigation in the Draft EIR based on the results of the site specific studies as well as general knowledge of the field of study of wildlife and wind turbine interaction. **OG6-3**

In addition, I have summarized below the preliminary results of the nocturnal radar studies conducted by ABR, Inc., a subcontractor to WEST, Inc. I expect the study report will be available very soon, and we will provide it to the County to include in the Final EIR as soon as possible. **OG6-4**

Thank you for your consideration of this additional information regarding the Hatchet Ridge Draft Environmental Impact Report. If there are any questions regarding the information I can be contacted at the address or phone number in the letterhead. **OG6-5**

Sincerely,

David P. Young, Jr.
Senior Manager/Senior Biologist
Western EcoSystems Technology, Inc.

dy/

Enclosure

Shasta County
Comments on Draft EIR for the Hatchet Ridge Wind Project
Page 1

Draft EIR Comments

Table 3.4-3 Special-Status Wildlife Potentially Occurring in the Hatchet Ridge Project Area.

Page 8 of 8 of this table presents definitions for the Potential Occurrence in the Study Area column of the table. These definitions are somewhat misleading because they do not accurately reflect the relative abundance of species listed in the table in the project area and they are not used consistently in the table with the definition provided. This tends to generate confusion and ambiguity in the subsequent impact assessment. Indicating that a species has high potential to occur in the project area implies high risk, when in reality most of the species in this table have low risk of being impacted by the project. For example, the table defines "high" potential as "known occurrences of the species within the study area or … records of the species within a 10-mile radius of the study area". The table then lists cascade frog, peregrine falcon, and spotted owl as moderate or low but also indicates that there are known records for these species within 10 miles. While even the moderate potential ranking for spotted owls to occur in the project area is probably too high, and they should be listed as low potential, by the definition used in the table they should be listed as high. This conclusion would be erroneous given the results of surveys conducted by the landowner and the habitat and management of the site, which is unsuitable for spotted owl occurrence (see WEST, Inc. 2007b). Based on the results of the surveys and the characteristics of the project area habitat, spotted owls are not expected to occur and should therefore be described as having low potential for occurrence in the project area.

The table also lists ferruginous hawk as having high potential occurrence in the project area based on a *single* record of the species seen during migration during the baseline studies (WEST, Inc. 2007a). The table then goes on to say that there is no suitable habitat and the species does not nest in the project area. This tends to contradict the high potential occurrence ranking, leading to confusing conclusion about the level of risk to the species. The site studies recorded only one individual ferruginous hawk in the study area during the spring migration season. While this indicates that, yes, ferruginous hawks may occasionally migrate over the project area, it does not correlate to a high probability of occurrence in the project. Moreover, the lack of suitable habitat in the project area would indicate that there is little to attract them to the site, a further indication that a low ranking is more appropriate.

OG6-6

I suggest that this table be revised to indicate (1) whether a species has been documented in the study area and, (2) an estimate of the potential for the project to impact a species based on a more comprehensive assessment of the occurrence data, habitat, and other information. This will improve the ability of the reader to infer a reasoned judgment about whether the project may impact any particular species and put the occurrence data in the proper context. For example, while spotted owl has been documented within 10 miles of the study area, it has not been documented in the project area and its occurrence in the project area is unlikely due to lack of suitable habitat. Also, for ferruginous hawk, the occurrence information should explain that the species has been documented at least once but the estimate of potential impact is low because the information regarding the single record indicates that the frequency of occurrence and relative abundance are very low (see WEST, Inc. 2007a). Improving the table to include better

information supporting an estimate of risk would also change the ranking of several other species, including peregrine falcon, horned lark, golden eagle, sandhill crane, northern goshawk, osprey, prairie falcon, Vaux's swift, willow flycatcher, California wolverine, spotted bat, western mastiff bat, and cascades frog, all of which in reality, likely have low potential to be affected by the project.

OG6-6 cont.

Page 2.4-15, Impact BIO-1

This section refers to the presence of special-status plants in the project area, and in particular, Butte County morning glory in areas where it will be disturbed by construction. The analysis does not take into account information related to the abundance, distribution, and status of the species, and so presents conclusions and mitigation that are not warranted for protection of the species. I have the following suggestions to correct the impact assessment and to provide the appropriate level of mitigation for this species.

The text erroneously equates the loss of 11 acres of habitat to 8% of the population of Butte County morning glory (fifth sentence, third paragraph, p. 3.4-15). This statement should be clarified to state that this loss equates to 8% *of the habitat.* The percentage of the population in the 11 acres that will be impacted is unknown. While the site surveys documented the species over an approximately 144-acre area, the relative percentage of the population within any subset of this area is unknown. The EIR also states (first sentence, last paragraph p. 3.4-15) that the "morning glory appears to have a patchy distribution within the population in the project area". It appears that the author's intent with this statement is to say that the plants are located in patches within the area where it is found (144 acres). Under this scenario (patchy distribution), the 11 acres could have greater than or less than 8% of the local population. Thus, it is more accurate to clarify that the 11 acres correlates to habitat, not population.

OG6-7

According to available information regarding the ecology of Butte County morning glory, it is an early-successional perennial herb that responds favorably to stand regeneration events (e.g., fire, logging) within mixed conifer forests (State of California, Department of Forestry and Fire Protection 2007). It grows in general forest soils on timber sites from approximately 1975 to 4000 feet in elevation. It appears to do best in more open, disturbed areas rather than under the canopy of mixed-conifer forests (State of California, Department of Forestry and Fire Protection 2007). In general, the species is invasive and occupies disturbed areas and areas with low canopy cover. While the Draft EIR discusses loss of habitat generally, it does not consider the fact that because of the plant's ecology, new habitat will be made available for the species as a result of the ground disturbance that will occur for construction of the project. The new project roads and areas cleared for turbines will create areas where the species will likely colonize, given the existing nearby population. It is likely that Butte County morning glory will occupy a much larger area than it currently does following completion of the project.

OG6-8

An analysis of the records for Butte County morning glory in the Natural Diversity Database (NDDB) provides additional information about the abundance of the species, location occurrences, and its response to disturbance. The Sierra Pacific Industries, Bovine Timber

OG6-9

Harvest Plan (2007) provides an annotated summary of NDDB records. In general, the species responds quite readily to disturbance, including bulldozing, timber harvest, fire, and herbicide applications; it is often located along roadsides, transmission lines, and canals where vegetation cover is actively managed for open, no-canopy vegetation communities. At least one record in the NDDB lists millions of the plant in harvested national forest lands. Collectively, the observations in the NDDB suggest that Butte County morning glory is not vulnerable to, and in fact, responds positively to, the types and intensities of disturbances associated directly with activities such as timber harvest, transmission lines, and road corridors – all components of the proposed Hatchet Ridge project.

In a letter from Botanist Dr. Dean Wm. Taylor dated August 2001 to Sierra Pacific Industries in support of preparation of the Bunchgrass Canyon Timber Harvest Plan (State of California, Department of Forestry and Fire Protection 2001), a description of the Butte County morning glory is provided. Dr. Taylor states "*Calystegia artiplicifolia* ssp. *buttensis* was until recently unknown from timberlands in Shasta County. I first located regional populations of this taxon in 1996. This perennial, summer flowering herb is found in mid elevation Cascade Range forested habitats southward to Butte County. In my surveys throughout the range of this plant, it consistently is most abundant in recently logged sites or on roadbanks. In Tehama County, near Cohasset, it occurs in abundance in young pine plantations that are under treatment with herbicides for brush control. In 1987-1988, this plant was absent from mixed conifer forests in nearby Flat Woods on the Pit River Canyon rim. When these areas were cleared of forest for a major electrical-transmission line, it became abundant and often the dominant herb under the powerline where regular vegetation management (including herbicide use) is now practiced."

OG6-9 cont.

Another important point to note is that Butte County morning glory no longer meets the definition of "rare or endangered" under CEQA Guidelines section 15380, subdivision (d). The California NDDB has not yet processed all submitted records for the species, including the population found in the project area, as well as populations found through timber harvest plan evaluations. Presently, NDDB lists 69 occurrences. Sierra Pacific Industries, the largest landowner in the project area, is aware of an additional 38 occurrences, for a total of at least 107. The California Department of Fish and Game's "Special Plants List" (DFG 2006) provides the criteria for State Ranking. Butte County morning glory exceeds the state ranking limits for S3 rank: number of occurrences exceeding 21-80, and number of individuals, 3,000-10,000 for S3 rank. During the California Native Plant Society Inventory revision, one CNPS biologist suggests that a S4 ranking is warranted (State of California, Department of Forestry and Fire Protection 2007), noting that the species is common in clear cuts, apparently benefiting from timber harvest.

The mitigation measures identified for impacts to the species in the 11 acres that will be disturbed do not appear warranted based on the ecology of the species and the expected expansion of the species population and distribution due to the project. As explained above, due to the species' positive response to ground disturbance, the project will result in a net increase in habitat for the species. The primary focus of mitigation for the species should be to insure continued compliance with the existing land management measures and mitigation requirements

and to prevent encroachment by non-native invasive species. No plant protection measures for the species are needed when the normal construction activities for the wind project will create habitat for the species and are likely to result in the expansion of the species distribution along the whole Hatchet Mountain ridgeline. Since it already occurs in the area, it will likely invade new areas suitable for its occurrence following construction. Dense or otherwise shaded conifer forest stands will be removed, creating bare mineral soil sites and conditions where full sun is present. Site preparation and maintenance treatments may also include ripping or discing, piling and burning, or noxious weed control, which would further create areas of suitable habitat for the species establishment. Butte County morning glory is known to be tolerant of typical vegetation control methods (State of California, Department of Forestry and Fire Protection 2007). The proposed Hatchet Ridge wind project will not result in a substantial reduction of suitable habitat for Butte County morning glory; to the contrary, it will increase the amount of suitable habitat. The effect of the proposed project on this species is beneficial and therefore not a significant adverse impact requiring mitigation.

OG6-9 cont.

Since Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, the number of occurrences and number of individuals exceeds the state criteria for listing, and construction and operation of the Hatchet Ridge wind project will benefit the species, no additional protections need to be afforded this species. If, however, the County disagrees with this assessment, then effective mitigation would include minimizing areas of construction related impacts where the plant occurs, minimizing peripheral construction impacts through Best Management Practices (BMPs) on site (e.g., silt fences for erosion control), noxious weed control to prevent encroachment by other invasive competitors, and maintaining the existing land management measures which are apparently conducive to the plant's existence on site.

Page 3.4-20, Mitigation Measure BIO-6

This mitigation measure is proposed in reference to a post-construction monitoring study of the wind project and adaptive management strategies for mitigating impacts. The Draft EIR recommends that the monitoring study of the wind project be conducted in accordance with the CEC guidelines; however, the mitigation measures and monitoring recommendations do not actually appear to be consistent with the CEC Guidelines. According to the CEC Guidelines, the project is likely to be a "Category 2 - Project Sites with Little Existing Information and No Indicators of High Wildlife Impacts" or a "Category 3 - Project Sites with High or Uncertain Potential for Wildlife Impacts" project. The following is a description of the inconsistencies between mitigation measures currently recommended in the Draft EIR and the guidance available in the CEC Guidelines:

OG6-10

- Under the heading *Duration of Operations Monitoring,* the CEC Guidelines set recommended durations for monitoring that include the following: "Category 2 and 3 projects will need two years of carcass count data to assess whether pre-permitting impact estimates were accurate, evaluate the effectiveness of mitigation measures, and capture variability between years. Category 2 projects may be able to reduce the level of

study effort for year two if the results of year one monitoring indicate fatality rates equal to or lower than those estimated during pre-permitting studies and if CDFG, USFWS, and experts agree such a reduction is warranted. Category 3 projects may need additional study effort in year two and possibly beyond if the first year of data shows fatalities higher than expected and/or to different species than anticipated. For both Category 2 and 3 projects, the results of the first year of data should be critically assessed to determine which modifications, if any, are needed for the second year of study."

The Draft EIR does not follow the CEC's recommended duration of monitoring, instead suggesting that five years of monitoring are needed, but does not give any justification for why any more than two years is necessary. Additionally, the EIR does not suggest a review of the data after one year to determine if modifications or additional years of monitoring are necessary (consistent with the CEC Guidelines). The CEC Guidelines suggest using the monitoring data to determine if long term monitoring beyond the recommended schedule is necessary. The Draft EIR's approach of a blanket requirement for five years of monitoring is not justified by the impact analysis for the project nor is it consistent with the CEC Guidelines for this type of project. As an alternative, I recommend following the CEC Guidelines and requiring that two years of monitoring be conducted and a determination of modifications and timing for the second year be made based on the results of the first year of monitoring. In addition, it could be added that the need for monitoring beyond two years will be determined following the second year of monitoring, and continued project monitoring will be evaluated on an annual basis.

OG6-10 cont.

- The CEC Guidelines also recommend against using open-ended mitigation. They state explicitly: "To avoid open ended conditions that are difficult for developers to include when planning for project costs and timing, establish minimization measures and compensatory mitigation that could be needed for unexpected impacts as well as the thresholds that will trigger these actions." The statement on page 3.4-20 of the Draft EIR – "If mortality rates exceed levels at which population-level effects could occur, one or more of the following adaptive management measures will be implemented at the discretion of the USFWS and the CDFG…" – is an open-ended mitigation measure that results in extreme difficulty in planning for project costs and specific mitigation measures. The adaptive management suggested by the Draft EIR includes measures related to operating the wind project which would further complicate project planning efforts.

OG6-11

- The CEC Guidelines further state, "Mitigation measures should establish clear, objective, and verifiable biological goals, a requirement to adjust management and/or mitigation measures if those goals are not met, and a timeline for periodic reviews and adjustments." It is my recommendation that any mitigation measures that require adjustment to the wind project management be clearly stated with defensible thresholds and objectives for when and what is expected that the project management adjustments would achieve.

OG6-12

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The following are recommended changes to the mitigation measure to make them consistent with the CEC Guidelines (as the Draft EIR states they will be) as well as the intent of Shasta County in minimizing and mitigating potential impacts.

- The applicant shall be responsible for the formation of a Technical Advisory Committee (TAC). Invitations for participation will be sent to representatives from the California Department of Fish and Game, the U.S. Fish and Wildlife Service, Shasta County Resources Management Division, the landowners, the applicant's project operations and construction managers, conservation organizations, and a representative of the local community. The applicant will make reasonable efforts to insure participation by the above parties, but notwithstanding a failure of any of these representatives to respond to the applicant's invitations or to agree to participate, the TAC would be formed within six months of the initiation of project operations. The TAC will review results from fatality monitoring to determine if fatality thresholds have been exceeded and make recommendations on what appropriate additional mitigation measures should be applied (see Recommended Mitigation Measures table below).

- Hatchet Ridge Wind shall implement a two-year monitoring study consistent with the CEC Guidelines. Consultation with agencies shall occur on an annual basis during the monitoring studies to determine the need for continued monitoring or additional studies specific to refining mitigation measures as appropriate. One objective of the monitoring study would be to determine if specific mitigation for impacts is warranted and what the mitigation would entail. Mitigation may be appropriate if fatality rates exceed a threshold of concern for particular species or groups of species (see Fatality Thresholds table below). To determine if a threshold has been exceeded, the average annual fatality rate for species and species groups will be determined after two years of monitoring. Fatality Thresholds listed in the table below were determined based on the pre-project surveys, current knowledge of species that are likely to use the habitat in the project area, and the Draft EIR impact analysis

  If data shows that a threshold of concern has been exceeded, the project owner shall implement additional mitigation measures if the TAC determines the mitigation is appropriate based on the analysis of the data and best available information for the species impacted. The project TAC could propose mitigation measures designed to benefit the affected species or species group (e.g., raptors). Example of appropriate mitigation include, but are not limited to, protection of nesting habitat for the affected species through purchase or conservation easement, enhancement of habitat or protected areas, creating artificial nesting habitat (e.g., nest structures), improving wildfire response and prevention, changes in land management (e.g., logging, grazing, weed control), wetland enhancement or creation, species related research to improve our knowledge of a species and conservation needs (e.g., bat population research), contributing to established conservation programs for specific species or issues (e.g., Bat Wind Energy Cooperative), and establishing a compensatory mitigation fund for species-specific conservation programs. Focusing mitigation on species and resources impacted is

OG6-12 cont.

consistent with national policies for environmental protection such as the National Environmental Protection Act, Endangered Species Act, and Clean Water Act.

Mitigation that includes operations strategies for the wind project would be considered only if the additional mitigation measures recommended by the TAC fail to address the fatality threshold exceedance. Also the operations strategy must benefit the appropriate species or species group (e.g., raptors) where a threshold for significant impacts has been exceeded and there are no other appropriate mitigation measures to offset the impact. Any operations management strategies would be determined through the TAC and approved by the applicant's operations management team and Shasta County's Resources Management Division so that expertise and feasibility related to turbine management is considered in the process.

Fatality Thresholds

OG6-12 cont.

Species	Fatality Threshold Per Year of Operations
Bald Eagle	0.07 fatalities per turbine; 0.03 fatalities per MW
Sandhill Crane	0.11 fatalities per turbine; 0.05 fatalities per MW
Other Raptor Species	0.35 fatalities per turbine; 0.15 fatalities per MW
Yellow Warbler	0.07 fatalities per turbine; 0.03 fatalities per MW
Owls	0.11 fatalities per turbine; 0.05 fatalities per MW

The operational monitoring study would be designed to determine the level of mortality from the project and take into account biases such as the searcher efficiency, carcass removal, and effective search area to estimate total mortality from the project. The exceedence of fatality thresholds would be based on the results of the monitoring so are therefore expressed as a rate per turbine or per MW. This method effectively utilizes the adjusted or calculated fatalities impacts as opposed to the observed impacts. For example, the number of fatalities for any given species that are found may not be the total number of that species actually impacted because of the biases associated with searcher efficiency (carcasses that are not found) or carcass removal (carcasses scavenged before they could be found).

Recommended Mitigation Measures

The following measures are a suggested starting point for further discussion of refining the Draft EIR's mitigation measures to address potential impacts to birds and bats. Further revisions may be necessary to ensure that the final proposed mitigation measures fully comply with the requirements of CEQA, California State Law, and Shasta County Law.

OG6-13

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Mitigation Measure	Description	Duration	Threshold for Additional Mitigation
Fatality Monitoring	Fatality monitoring will be conducted by a qualified biologist and will be used to compare pre-operations predictions of fatality with actual fatalities associated with project operations and determine if impacts threshold have been exceeded.	2 years, beginning within 1 year of first day of operations. After first year of monitoring the TAC will meet to assess the methods and determine if changes to methods are necessary	Referral to the TAC for potential changes to monitoring methods and additional monitoring or research will occur if the above fatality thresholds are exceeded.
Technical Advisory Committee	Formation of a Technical Advisory Committee (invited parties should include representatives from the CDFG, USFWS, conservation organization, biologists conducting monitoring studies, project operations and construction managers, landowners, representative of the community at large, and the permitting agency representative)	Meets bi-annually to review the results of avian fatality monitoring for two years, beginning 6 months after first year of monitoring has begun.	If fatality thresholds are exceeded, the TAC will confer to determine recommendations for additional mitigation as necessary
Compensatory Mitigation Fund	The applicant will set aside a mitigation fund to be used for Habitat Protection and Enhancement, Additional Research, and/or additional monitoring beyond the recommended 2 years. The TAC will decide on the best uses of the compensatory mitigation fund	Mitigation fund will be set up as a one time payment for individual mitigation activities.	The Compensatory Mitigation Fund will be used when fatality thresholds are exceeded
Habitat Protection and Enhancement	Habitat protection and enhancement measures will be implemented if thresholds for additional mitigation are reached. Examples of possible mitigation measures include, protection of nesting habitat, off-site habitat enhancement, alterations to habitat within study area to inhibit or enhance certain species success. The TAC will determine the appropriate habitat protection measures for the particular species in question.	Habitat Protection and Enhancement measures will be implemented according to recommendations of the TAC.	If fatality thresholds are exceeded, habitat protection and enhancement measures may be needed.

OG6-13 cont.

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Additional Research	Additional Research may be needed if unexpected fatalities occur as a result of operations. Unexpected fatalities include exceedance of fatality thresholds or fatalities of special status species not expected in pre-operations studies. Studies will be limited to addressing specific unexpected fatalities and the results will be used to determine appropriate mitigation measures.	Additional research to address unexpected fatalities may be needed after the first year of fatality monitoring.	If fatality thresholds are exceeded, additional research may be necessary.
Operations Measures	Changes to operations will be considered if all other mitigation measures are not effective in addressing the impact. Changes to operations will need to be approved by the operations management team and the permitting agency representative. Operations changes that may be implemented include shutdown of individual turbines during times of sensitivity of species of concern. Operations shutdowns will be limited to individual turbines where fatality thresholds are consistently exceeded and will be limited to the month where the highest number of threshold exceedances occur.	Limited to month within which the highest number of fatality exceedances occur.	Only implemented if fatality threshold exceedance cannot be mitigated by Habitat Protection and Enhancement, Compensatory Mitigation, and Additional Research. Must be approved by permitting agency representative and operations management team.

OG6-13 cont.

Page 3.4-24, Impact BIO-13

Additional supporting information has been collected through a nocturnal migration study in the project area with the use of marine radar that confirms the less-than-significant impact assessment presented. Final results of the study are not yet available and will be provided upon completion of the study report. However, preliminary information from the study supports the conclusion in the Draft EIR that potential avian and bat migration corridor impacts are less than significant. Preliminary results from the nocturnal study, which ran for 39 nights from 7 September to 15 October 2007, were consistent with other nocturnal migration studies showing temporal variation in passage rates of targets both within a single night and across several nights. The mean nightly passage rate, which is typically expressed as the number of targets that pass overhead within one kilometer of migratory front per hour period, ranged from approximately 50 to 1200 targets with an average across the whole study period of approximately 300 targets. The mean nightly flight altitude of targets ranged from approximately 275 to 700 meters above

OG6-14

ground level with an average across all nights studied of approximately 450 meters above ground level, well above the typical height of turbines (128 meters). These results are typical of nocturnal migration studies using marine radar, which generally show that while some nocturnal migrants will pass over the site in the zone of risk posed by turbine rotors, the vast majority of nocturnal migrants passing over the site will not be at risk of turbine collisions. The final report for the migration study is expected to be completed very soon, at which time it will be submitted to the County for consideration in the Final EIR.

OG6-14 cont.

References:

State of California, Department of Forestry and Fire Protection. 2001. Bungrass Canyon Timber Harvesting Plan. Sierra Pacific Industries. Date Filed August 27, 2001.

State of California, Department of Forestry and Fire Protection. 2007. Bovine Timber Harvesting Plan. Sierra Pacific Industries. Date Filed September, 2007

WEST 2007a Ecological Baseline Studies for the Hatchet Ridge Wind Energy Project, Shata County California

WEST 2007b Biological Assessment of Endangered, Threatened, Proposed and Candidate Species for the Hatchet Ridge Wind Project.

DAVID P. YOUNG, JR., Senior Biologist/Senior Manager
Western **E**co**S**ystems **T**echnology, Inc. 2003 Central Ave., Cheyenne, Wyoming 82001; dyoung@west-inc.com

EDUCATION
M.S. University of Georgia, Athens, Georgia 1988 *Zoology*
B.A. Earlham College, Richmond, Indiana 1986 *Biology*

PREVIOUS POSITIONS
1991-1992 *Field Supervisor*, Wildlife International Ltd., Easton, Maryland
1990-1991 *Environmental Health Specialist*, Liberty County, Georgia
1989-1990 *Research Technician II*, Savannah River Ecology Laboratory, Aiken, South Carolina
1983-1986 *Assistant Curator*, Joseph Moore Museum of Natural History, Earlham College, Richmond, Indiana

ADDITIONAL TRAINING & EDUCATION
Supervisory Development Workshop, Wildlife International, Ltd., Easton, Maryland
Studies for Resource Selection, Western EcoSystems Technology, Inc., Lakewood, Colorado
Basic Wetland Delineation, Wetland Training Institute, Inc., San Diego, California
Practical Project Development and Documentation, NEPA/Section 4(f) Applied to Transportation Projects, Robert Jacobsen Environmental Planning, Lakewood, Colorado
Interagency Consultation for Endangered Species, U.S. Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, West Virginia
Habitat Conservation Planning, U.S. Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, West Virginia
Wind-Wildlife Interaction Seminar, Northern Arizona University - presenter

SPECIALTY AREAS
Wind Power Studies: Twelve years experience conducting avian and bat research in wind resource areas and wind projects throughout the U.S. and Canada. Extensive experience supervising wildlife and natural resource studies through all phases of wind project development from early site assessment studies to post-construction monitoring and mitigation. Studies include Site Characterization Studies, Environmental Issues Analyses Site screening and ranking, Phase 1 Fatal Flaw analyses, Environmental Impact Assessments, Threatened and Endangered Species Biological Assessments and Habitat Conservation Plans, literature reviews, pre-construction baselines avian and bat studies, post-construction impact monitoring, mitigation planning, cumulative impact analyses, and Technical Advisory Committees. Clients include AES Alternative Energy, PacifiCorp, enXco, Horizon Wind Energy, Renewable Energy Systems, Bonneville Power Administration, BP Alternative Energy, Eurus Energy America Corp, NedPower, Acciona. Presentations and invited speaker at annual meetings of the National Wind Coordination Collaborative, American Wind Energy Association, Wildlife Society, American Ornithologist Union,.

Threatened and Endangered Species: Experience includes: formal training in Endangered Species Act, Section 7 consultation and Habitat Conservation Plans; T&E species surveys, clearances, and monitoring; Biological Assessments for highway construction projects, water development projects, and wind power proejcts; paid and volunteer field technician studying threatened and endangered species.

Species include: *Indiana bat*, Indiana, New York; *grey bat*, Indiana; *green sea turtles*, Florida; *wood stork*, Georgia; *black-footed ferrets*, *Wyoming toads*, *Preble's meadow jumping mouse, mountain plover*, *Ute ladies' tresses orchid*, and *Colorado butterfly plant,* Wyoming; *Mexican spotted owl*, Arizona; *copperbelly water snake* and *Kirtland's snake*, Indiana; *bull trout* and *westslope cutthroat trout*, Montana; *Allen's Cay Rock Iguana* and *Riley's Rock Iguana,* Bahamas.

Environmental Impact Assessment: Experience in environmental regulation compliance including work under the *National Environmental Policy Act, Endangered Species Act, Clean water Act,* and *Federal Insecticide, Fungicide, and Rodenticide Act*; biological assessments for impacts to threatened and endangered species; Environmental Impact Statements for water development, highway construction, and wind power projects; Categorical Exclusions, and Environmental Assessments for highway projects; Environmental Assessments for Indian reservation casinos; Environmental Impact Assessments and reports under California, Oregon, Washington, and New York State Environmental Quality Acts.

SCIENTIFIC ORGANIZATION MEMBERSHIPS
American Ornithologists Union *Society for the Study of Amphibians & Reptiles* *Raptor Research Foundation*

Letter OG6 WEST, Inc.

Response to Comment OG6-1

The author identifies WEST's role on the project and the studies it conducted.

Response to Comment OG6-2

This comment references WEST's credentials in the field.

Response to Comment OG6-3

This comment presents the purpose of this letter: to clarify issues identified in the Draft EIR.

Response to Comment OG6-4

This comment references the nocturnal migration radar study recently conducted for the project.

Response to Comment OG6-5

The author provides contact information.

Response to Comment OG6-6

Table 3.4-3 contained several errors and has been revised to correct those errors. This comment addresses specific issues associated with the special-status species table referenced above; no substantive CEQA issues are raised.

Response to Comment OG6-7

The commenter correctly notes that the percentage of the area occupied by Butte County morning-glory within the 11 acres that will be affected is unknown. Because the amount of this impact is unknown, it must be assumed that all 11 acres could be occupied by Butte County morning-glory. Accordingly, the impact estimate of approximately 8% as provided in the Draft EIR is correct.

Response to Comment OG6-8

The commenter is correct in stating that Butte County morning-glory has been observed to respond to certain types of ground disturbance. The disturbance created by the project may result in temporarily higher densities (numbers of individuals) within that habitat on the project site that is not converted to roads or turbine foundations. However, the commenter erroneously equates the proliferation of more individuals with an increase in habitat. The Draft EIR correctly states that there will be a net loss of habitat as a result of the proposed project.

Response to Comment OG6-9

The commenter notes that Butte County morning-glory is known to respond to disturbance such as bulldozing, timber harvest, and fire. Please see the response to Comment OG6-8 above, which acknowledges that Butte County morning-glory is known to respond to disturbance.

The commenter also notes that the project will cause types of disturbance that will increase habitat for the species. Please see the response to Comment OG6-3 regarding this issue. The commenter erroneously equates the proliferation of more individuals with an increase in habitat. The project will convert lands currently occupied by Butte County morning-glory to other uses

such as turbine foundations and access roads, resulting in a net decrease in habitat. The Draft EIR correctly states that there will be a net loss of habitat as a result of the proposed project.

The commenter also notes that Butte County morning-glory should no longer meet the definition of "rare or endangered" under CEQA because approximately 38 additional occurrences have not been recorded in the California Natural Diversity Database (CNDDB) and the species no longer meets the definition of "rare or endangered" under CEQA. Based on a review of the most current version of the CNDDB (February 2008), there are now 101 known extant occurrences of Butte County morning-glory. The commenter is correct in noting that the California Department of Fish and Game's *Special Plants List* (California Department of Fish and Game 2008) provides the criteria for state ranking and that 21–80 occurrences or 3,000–10,000 individuals or 10,000–50,000 acres defines the S3 rank. There is good evidence from recent timber harvest plans prepared for harvests in the region that there may be additional occurrences not yet recorded in the CNDDB. Regardless of the 101 occurrences currently known in the CNDDB, apparent additional occurrences, and the apparent affinity for disturbance displayed by the species, the california Department of Fish and Game published its most recent update of the *Special Plants List* in January 2008 in which they retained the S3 rank for Butte County morning-glory. The California Department of Fish and Game states in the *Special Plants List* that there "is more to ranking than just counting EO's and individuals". The *Special Plants List* also indicates that there are other factors that contribute to the ultimate ranking of a particular species, such as aspects of ecology and biology, known trends, and types of threats. The species must be considered "rare or endangered" for the purposes of CEQA based on the recent status listing.

The proposed project would result in a net loss of habitat for Butte County morning-glory. Although construction of the project would result in a net loss of habitat for the species, the Draft EIR acknowledges that the amount of direct loss does not appear to be substantial. However, potential indirect impacts as described in the Draft EIR, such as competition with nonnative species, could result in a substantial reduction of the population over time; accordingly, the measures described in the Draft EIR—avoidance and/or control of invasive species—are warranted and appropriate to mitigate this impact. The commenter notes that if impacts on Butte County morning-glory are found to be potentially significant, effective mitigation would include minimizing areas of construction-related impacts where the plant occurs and noxious weed control to prevent encroachment by invasive competitors. The County concurs with the commenter's recommendations. The mitigation proposed in the Draft EIR is consistent with those recommendations.

Response to Comment OG6-10

Comment noted. Mitigation Measure BIO-6 has been extensively revised, and the duration of monitoring has been set at 3 years, unless mortality thresholds are exceeded. However, the mitigation measure was not and is not inconsistent with CEC guidelines as the commenter suggests. A longer period of monitoring than the standard 2-year recommendation is warranted by the fact that two of the species most likely to be affected are state- and federally listed species that are relatively large and long-lived, and thus more likely to exhibit greater temporal variation in their behavior patterns than other species might be.

Response to Comment OG6-11

Thresholds that would trigger actions to minimize avian mortality have been further refined in the final version of Mitigation Measure BIO-6.

Measures "related to operating the wind farm" are the only measures that are available to minimize impacts. See response to comment PA1-8 for a discussion of the appropriateness of compensatory mitigation and why such mitigation is inconsistent with CEQA in this case.

Response to Comment OG6-12

Mitigation Measure BIO-6 has been revised to include thresholds of mortality below which no further mitigation is required. It has also been revised to include development and implementation of a monitoring and adaptive management program, which includes formation of a Technical Advisory Committee and a 2-year monitoring study. Clear timelines are established for when mortality monitoring will no longer be required. The goal of the adaptive management program is clearly stated to be the reduction and maintenance of avian mortality rates that are below the established thresholds. Please see the complete revised text of Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG6-13

Many of the recommendations presented in the comment have been incorporated into revised Mitigation Measure BIO-6.

Response to Comment OG6-14

The final results of the nocturnal migration study using marine radar are included as Appendix B of the Final EIR. However, the data and results of the study provide no new information that would alter any of the conclusions in the Draft EIR.

Letter OG7

January 22, 2008

Bill Walker, Senior Planner
Shasta County Department of Resources Management
1855 Placer Street, Suite 103
Redding. California 96001-1759

Dear Mr. Walker,

The Wintu Audubon Society of Redding review comments for the Hatchet Ridge Wind Project Draft EIR are attached as enclosure (1.).

A committee of our directors reviewed the DEIR with the intent to ensure compliance with CEQA regulations and that every consideration has been given to the protection and preservation of avian species. Unfortunately, we find that is not the case and strongly recommend some portions of the DEIR be revisited and investigated at greater length. Specifically, we are concerned about compliance with the law as regards threatened and endangered species, limited studies done on migrating avian species, especially nocturnal, studies on alternate wind generation technologies, lack of a positive mitigation plan, and cumulative impacts of this and other proposed wind farm projects on avian species and bats. **OG7-1**

We feel the project should not go forward as written and feel the time spent in investigative studies now can and should provide the basis for compliance with the laws, and provide appropriate safeguards, from the beginning, for avian species and bats. An added benefit would be the avoidance of lengthy and expensive hearings and revisions later. We also feel that the best science currently available is represented by the California Energy Commission's recent report, *Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* These guidelines should be consulted when assessing appropriate methods/protocols and proposed mitigations. **OG7-2**

We hope we have provided some assistance by our review as well as a critical analysis. We strongly endorse wind energy development as a green source of available and relatively inexpensive energy, but feel proper siting, appropriate safeguards, and realistic mitigation are imperative.

OG7-2 cont.

Sincerely,

/s/ William W. Oliver

William W. Oliver, President

Enclosure: (1.) Response to the Proposed Hatchet Ridge Windmill Project Draft Environmental Impact Report (DEIR) (26 pages)

Copy to: Glenn Olson, Executive Director
Audubon California

Mike Daulton, Director of Conservation Policy
National Audubon Society

RESPONSE TO THE PROPOSED HATCHET RIDGE WINDMILL PROJECT DRAFT ENVIRONMENTAL IMPACT REPORT

The Wintu Audubon Society of Redding, California is submitting this response to the Draft Environmental Impact Report (DEIR) for the Hatchet Ridge Windmill Project, Shasta County, California.

Executive Summary:

We support the responsible implementation of 'clean' sources of alternative energy, including wind power. However, we cannot support this project as proposed because of the unacceptably high level of avian and bat mortality it predicts, with no proposed mitigations in place that would substantially reduce this 'significant' impact to avian and bat species. Contradictions in the Baseline Biological study and subsequent analyses are present in the DEIR. The Alternatives required by CEQA were not explored and were dismissed without reasoned cause. Cumulative impacts were not adequately assessed and no mitigations were proposed. The CEQA guidelines are not being followed in many instances and this is unacceptable. However, since we believe in the responsible implementation of alternative energy sources, we have devoted considerable time and resources to develop recommendations with regard to this project which will serve to aid Shasta County and the applicant in reducing the unacceptable levels of bird and bat mortality projected for this project. Thus, we are optimistic that a wind farm can be a responsible form of alternative energy. If wind development is to be undertaken responsibly, it must be planned with real measures in place to minimize impacts to avian and bat populations, both resident and migratory. We hope to be able to work with the county and responsible agencies to aid in the successful implementation of responsible alternative energy sources in our area.

OG7-3

CEQA requires that the DEIR be governed in large part by the following:
CEQA Guidelines, Section 15003.Policies, state that:

- *The EIR serves not only to protect the environment but also to demonstrate to the public that it is being protected.(County of Inyo v. Yorty, 32 Cal. App. 3d 795)*
- *CEQA was intended to be interpreted in such manner as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language. (Friends of Mammoth v. Board of Supervisors, 8 Cal. 3d 247"*
- *The lead agency must consider the whole of an action, not simply its constituent parts, when determining whether it will have a significant environmental effect. (Citizens Assoc. For Sensible Development of Bishop Area v. County of Inyo (1985) 172 Cal.App.3d 151)*

CEQA Guidelines, Section 15002.General Concepts p2-3, state that:

> *(h) Methods for Protecting the Environment. CEQA requires more than merely preparing environmental documents. The EIR by itself does not control the way in which a project can be built or carried out. Rather, when an EIR shows that a project would cause substantial adverse changes in the environment, the governmental agency must respond to the information by one or more of the following methods:"*

These methods include the ones quoted below, which we feel are the most appropriate options for this project, among the methods listed in the Guidelines: **OG7-3 cont.**

> *(1) Changing a proposed project*
> *(2) Imposing conditions on the approval of the project*
> *(4) Choosing an alternative way of meeting the same need*
> *(5) Disapproving the project*

The DEIR is not in keeping with CEQA Guidelines and we support this contention by the presentation of points, and an analysis of the DEIR that follow in the body of this comment letter. We will also offer Recommendations for the EIR and the project based on our analysis of the EIR and the effects of the project on the natural environment.

POINTS:

1-A. THE PROJECT IS IN CLEAR VIOLATION OF STATE AND FEDERAL LAW **OG7-4**

1-B. THE DEIR CONTAINS NO DISCUSSION OF THE LAW AS IT SPECIFICALLY PERTAINS TO THE AFFECTED AVIAN SPECIES. **OG7-5**

1-C. AN INCIDENTAL TAKE PERMIT IS REQUIRED FOR THE NORTHERN SPOTTED OWL. **OG7-6**

2. THE BIOLOGICAL RESOURCES SECTION OF THE DEIR IS INADEQUATE, including the lack of a nocturnal study of avian migrants. **OG7-7**

3. THE PROJECT'S OWN STATED GOALS WITH REGARD TO THE IMPACT ON THE ENVIRONMENT ARE NOT BEING MET. **OG7-8**

4. ALTERNATIVES WERE NOT ADEQUATELY CONSIDERED; this includes inadequate consideration of an alternative vertical axis wind turbine (VAWT) design. **OG7-9**

5. NO FUNCTIONAL MITIGATIONS ARE BEING REQUIRED.

6. NO CONTINGENCY MITIGATION PLAN IS INCLUDED. **OG7-10**

7. THE EIR IS LACKING ANY FORM OF COMPENSATORY MITIGATION. **OG7-11**

8. SIGNIFICANT CUMULATIVE IMPACTS WILL OCCUR BUT ARE NOT EVALUATED. **OG7-12**

RECOMMENDATIONS:

It is our position that PRIOR to the final EIR being issued that:

1. A study for monitoring nocturnal avian migrants must be implemented and completed as recommended in the *California Energy Commission's 'Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development'. The analysis provided in the current DEIR lacks any data on nocturnal migrants and as such is meaningless and cannot provide an adequate foundation for any credible scientific conclusions or mitigation planning. **OG7-13**

2. Classification of the impact of Butte County morning glory as: 'Significant and Unavoidable' that cannot be mitigated to a less-than-significant level. Based on the classification of this species by the California Native Plant Society as 'Rare and Endangered', any permanent loss of population is significant, and this project will result in habitat loss. Mitigation BIO measures 1 and 2 will not reduce this impact to a less-than-significant level. Measures discussed under the Butte County Morning Glory Avoidance Alternative require a use permit, and should not be classified as a separate alternative. Location of turbines must be coordinated with both Shasta County and CDFG prior to issuance of a use permit to minimize, to the extent possible, disturbance and habitat loss of the Butte County morning glory. **OG7-14**

3. Alternatives need to be adequately analyzed and considered , including:

- **Alternative Technologies** such as solar power need to be adequately explored, and if windpower is still the preferred type of power recommended for this project, then use of the VAWT design, patented and manufactured by Terra Moya Aqua, Inc. should be considered. Use of this design would largely eliminate the bird and bat kills of this project.

  If the use of this type of windmill design is not possible due to the current project construction timeline, the project should be delayed to accommodate installation of this type of windmill, and if this is not possible, the project should be implemented in phases that allow for the inclusion of this design of windmill in the later phases. The project has a projected lifetime of 20 years, which means 20 years worth of avian and bat mortality. A potential delay of a few months to a year when viewed in this larger context is insignificant, and worth the tradeoff. **OG7-15**

- **Alternative Sites**
- **Alternative Siting**
- **Smaller Project**
- **Phased Project**

OG7-15 cont.

4. Establish a concrete and meaningful MITIGATION PLAN in accordance with CEC Guidelines that includes:

- Appropriate compensatory mitigation
- Detailed monitoring methodologies and requirements
- Detailed adaptive operations and mitigation mechanisms

OG7-16

5. Adopt additional requirements that would lessen the impact to birds and bats:

- Paint turbine blades in Hodos Scheme
- Locate any man-made rock piles away from turbine area
- Use non-guyed meteorological towers; if this is not possible, use bird deterrents on guy cables.

OG7-17

- **Safety Lighting:**
  - Turbine towers: If allowed by FAA regulations, white strobe lighting should be considered as recent studies indicate that birds are less attracted to white strobe lights under poor visibility conditions than they are to conventional red flashing lights.
  - General facilities lighting: Keep lighting at both operation and maintenance facilities and substations to the minimum required to meet safety and security needs. Use white lights with sensors and switches that keep the lights off when they are not required. These lights should be hooded and directed to minimize backscatter, reflection, skyward illumination, and illumination of areas outside of the facility or substation.

OG7-18

6. Establish a contingency mitigation plan that includes detailed adaptive operations and mitigation mechanisms per California Energy Commission (CEC) Guidelines to mitigate high levels of unanticipated fatalities, which *.becomes even more important when choices for operational impact avoidance or minimization are so limited." (CEC Guidelines p. 69),* as is the case for this project as currently proposed.

OG7-19

7. We urge the lead agency, Shasta County to contract the California Energy Commission to manage the mitigation measures, as they have extensive expertise and experience in this area, and are an independent third party.

OG7-20

8. Provide discussion and analysis of the biological impacts of the project pertaining to species that are protected by law. This includes California 'fully protected status' species, as well as, species protected under various other state and federal laws. The DEIR mentions the state and federal laws that govern the protection of these species. However, it does not analyze and discuss the possible biological impacts of this project on these species.

OG7-21

9. The natural life histories of species impacted must be analyzed and considered in assessing the magnitude of the specific and overall impact(s) of the project. OG7-22

10. Other Species Protected by Law

Golden Eagle, Red-tailed Hawk, Turkey Vulture, Osprey, American Robin and Common Raven are afforded considerable protection under law, and as such, the impacts on them by the project MUST be analyzed and discussed in the DEIR. These impacts must be considered and added to the weight of impacts already discussed in the DEIR when estimating the magnitude of the impact of this project. OG7-23

11. Incidental Take Permit and Habitat Conservation Plan

It is required by federal law and otherwise appropriate for consultation with the US Fish and Wildlife Service (USFWS) to determine if a take permit and subsequent development and submission of a habitat conservation plan is necessary for the Northern Spotted Owl, a federal 'protected status' species. If required, these permits and a clear plan are necessary for the conditional use permit for this project. OG7-24

12. Cumulative Impacts

The wind farm projects planned in the immediate vicinity need to be analyzed and considered more thoroughly because of their significant cumulative impact. The migratory nature of avian species populations needs to be considered in determining the geographical area to be considered in assessing the cumulative impacts of this project. OG7-25

All significant cumulative impacts need to be fully mitigated to the extent possible, using means such as off-site compensatory mitigation, or other functional mitigations.

Signed,
/s/ William W. Oliver
/s/Claudia Lyons Yerion
/s/Victor Modeen
/s/Rob santy
/s/W. R. Yutzy

Board of Directors
The Wintu Audubon Society
Shasta County, California

DISCUSSION OF POINTS:

1. THE LAW

Several of the species that would be severely impacted, including Bald Eagle, Golden Eagle and Greater Sandhill Crane, are protected by state and federal law and have **'**Fully Protected Species' status under California law. This means that California Department of Fish and Game cannot issue a 'take permit' for these species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. Thus, this project as proposed would result in the violation of State and Federal law. Consequently, Shasta County, as the lead agency should fully consider the ramifications of this before deciding to issue a use permit for this project as currently proposed. **OG7-26**

Because of this violation of the law and the DEIR's own assessment of the impacts to these species as 'significant and unavoidable there exists no reasonable foundation to support a decision by the County to issue a 'statement of overriding consideration' to justify granting of a use permit for this project, unless the recommendations outlined subsequently in this letter are implemented to reduce and fully mitigate the impacts.

1-A. There are a number of state and federal laws that govern protection of various species of birds, bats and animals that must be considered by the lead agency when determining whether to grant a conditional use permit and what conditions to impose as conditions of that permit, including any appropriate mitigation. This project as currently proposed will result in violation of most of the laws listed below. Also, Shasta County, California Department of Fish and Game, and the U.S. Fish and Wildlife Service share liability as Lead and permitting agencies, respectively.
These laws are:

CALIFORNIA STATE LAW

California Endangered Species Act (CESA)

CA Fish and Game Code: **OG7-27**
Fully Protected Species, Fish and Game Code section 3511, 4700, 5050, and 5515
Migratory Birds, CA Fish and Game Code section 3513
Birds of Prey and Their Eggs, CA Fish and Game Code section 3503.5
Nongame Birds, CA Fish and Game Code section 3800

FEDERAL LAW

Federal Endangered Species Act (FESA)
Migratory Bird Treaty Act (MBTA)
Bald and Golden Eagle Protection Act

1-B. The DEIR does not provide discussion and analysis of the biological impacts of the project to species protected by law. This includes California 'fully protected status' species as well as species protected under various other state and federal laws. The DEIR mentions the state and federal laws that govern the protection of these species. However, it does not analyze and discuss the biological impacts of this project. OG7-28

The California Energy Commission's 'Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC Guidelines) This document is a valuable tool for local lead agencies, government agencies such as CDFG and USFWS, as well as developers for use during the project planning, CEQA and permitting process. It provides guidance in assessing a project's impacts to birds and bats, understanding the law, and aids in the creation of effective mitigation plans. The County has selectively utilized these guidelines in some aspects of the EIR, and we encourage an even more extensive adherence to them in the final EIR. The Guidelines state that:

Other state and federal protective wildlife laws, some of which mandate avoidance of 'take' without options for permitting, can also influence project siting and operations. Project developers, permit decision makers, and the resource agencies involved should consider these strict liability laws during the permitting process to ensure that impacts to bird and bat species are minimized and mitigated to offset impacts. Implementing the methods recommended in the Guidelines during the permitting process will demonstrate a good faith effort to develop and operate projects in a fashion that is consistent with the intent of these state and federal wildlife protection laws. Such good faith efforts will be considered by CDFG before taking enforcement actions for violation of a California wildlife protection law. OG7-29

1-C. Incidental Take Permit and Habitat Conservation Plan. A permit is required for incidental take of species protected under the Federal Endangered Species Act. The Northern Spotted Owl is a federal threatened status species. In its brief description of the FESA under "Endangered Species Act Authorization Process"p.3.4-10-11 the DEIR states that:

To receive an ITP, the nonfederal entity is required to prepare a Habitat Conservation Plan (HCP). The HCP must include conservation measures that avoid, minimize, and mitigate the project's impact on listed species and their habitat. OG7-30

The Northern Spotted Owl, a federal 'threatened status species, has designated 'Critical Habitat' adjacent to the project site. As such, we do not agree with the DEIR's assessment that exposure of this species to lethal contact with the turbines will be minimal. We think it is required by federal law and otherwise appropriate for consultation with US Fish and Wildlife Service to determine if a take permit and subsequent development and submission of a habitat conservation plan will be necessary.

2. BIOLOGICAL RESOURCES

The Biological Resources Section of the DEIR is incomplete**,** and as such any resulting conclusions presented are not credible. It does not examine the impacts to several key OG7-31

avian species mentioned in its own baseline study that are protected by law. In addition, nocturnal monitoring, essential for the acquisition of data on night migrants, was not undertaken at all. (see CEC Guidelines*)

OG7-31 cont.

2-A. No Nocturnal Monitoring study was performed. The analysis provided in the current DEIR lacks any data on nocturnal migrants and as such is meaningless and cannot provide an adequate foundation for any credible scientific conclusions or mitigation planning.

California is part of the Pacific Flyway, a major migration corridor between the waterfowl nesting grounds of Alaska and Canada and the wintering grounds of California. Every fall and spring, millions of ducks and geese fly through our Northern California region. Even during migration season, however, the volume of migration varies by orders of magnitude from day to day. This variation is to a large extent a function of weather. Much of this migration occurs at night and, especially in autumn, Large migrations are often associated with the passage of cold fronts. This is well documented in the California Guidelines for Reducing Impacts to Birds and Bats From Wind Energy Development, October 2007, document number CEC-700-2007-008-CMF (p. 51):

OG7-32

Most songbirds, waterfowl, shorebirds, herons, and egrets migrate at night (Kerlinger and Moore, 1989), and radar studies yield some insight into general patterns of night flying behavior. Nocturnal migrants generally take off after sunset, ascend to their cruising altitude between 300 and 2,000 feet (90 to 610 meters), and return to land before sunrise (Kerlinger, 1995). For most of their flight, songbirds and other nocturnal migrants are above the reach of wind turbines, but they pass through the altitudinal range of wind turbines during ascents and descents and may also fly closer to the ground during inclement weather or when negotiating mountain passes (Able, 1970; Richardson, 2000).

This agrees with the personal experiences of many members of the Wintu Audubon Society. Most of us hear geese and swans migrating at night, especially in the fall. Casual field observers have seen many thousands of Greater White-fronted Geese and Snow Geese flying at just above treetop height over Hatchet Ridge right before an early fall snowstorm. Even these anecdotal observations show that at least occasionally large numbers of actively migrating birds pass over Hatchet Ridge at low altitudes during unfavorable weather conditions. So, we know the ridge is used as a migration corridor during bad weather. But, there is not a lot of information about bird migration in the Hatchet Ridge area.

OG7-33

This deficiency is also supported by the 'analysis' presented in the Ecological Baseline Study (EBS) p.10:

Even though waterfowl were the second most abundant group on terms of numbers of individuals observed (Table1), they were observed only during 4.4% of the surveys.

This is due in part because they *migrate at night.* The EBS even states that:

This analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior or abundance of nocturnal migrants (EBS p.17).

They directly contradict this statement in the EBS, saying:

The data collected during this study suggest that the Hatchet Ridge project is not within a major migratory pathway, either for diurnal or nocturnal migrants.

How can data collected during the day point to ANY conclusion about night migrants?

They continue on to state that:

…based on all survey data, song bird mortality at Hatchet Ridge would likely be lower than the national average of 2.3birds/turbine/year or 3.1/MW/year.

That's an unfounded conclusion. Presenting baseless conclusion(s) is a clear is a violation of CEQA.

OG7-33 cont.

In our estimation, it is collisions with turbines by actively migrating birds, particularly species that migrate in large flocks,that provide the greatest potential for large bird kills at this site. The most likely conditions for high mortality will be during periods of low cloud, fog or other reduced visibility conditions coincident with large migratory movements, a condition most likely to occur in the fall. Such conditions will likely be infrequent and migration itself is pulsatile and highly weather-dependent. Problems could occur either during the day or at night. The DEIR expresses concern about Greater Sandhill Cranes, which are largely diurnal migrants, but geese, swans and other waterfowl migrate both day and night. The co-occurrence of "kill conditions" and a large migration might only happen once or twice per season, if that, but when it does, very large numbers of birds could be killed.

OG7-34

Because of the energetic advantages, birds tend to initiate migration on days or nights with a tail wind. Because the blades of these wind turbines will rotate automatically such that they are always oriented into the prevailing wind, migrating birds will generally be flying in directions perpendicular to the rotational axis of the blades. Thus whether birds are moving parallel to the ridge or crossing it will make little difference with respect to their vulnerability to collision with the rotors.

Little or nothing is apparently known about active migration by passerine nocturnal migrants over these mountains. Neither the magnitude, direction nor altitude of such movements has been studied, so it is impossible to predict the impact of the wind farm, if any, on these birds. It is worth noting, however, that there are ridge-top sites in both North America and Europe where songbirds migrating at night pass over ridges at altitudes at which they can be captured in standard mist nets set up along the top of the ridge.

McCrary et al. (1983) noted that wind turbines on ridges might present a risk of collision because the altitude of birds in relation to ground level decreases when the birds fly over ridges. Williams et al. (2001) conducted studies in the northern Appalachian Mountains and noted that avian migrants react to local terrain, resulting in concentrations of migrants over ridge summits or other topographic features. Richardson (2000) also noted that migration altitudes can be lower than cruising altitude when birds cross a ridge or pass.(CEC Guidelines, Chapter 4, p. 64-65)

OG7-34 cont.

Williams et al. (2001) conducted studies in the northern Appalachian Mountains and noted that avian migrants react to local terrain, resulting in concentrations of migrants over ridge summits or other topographic features.

Richardson (2000) also noted that migration altitudes can be lower than cruising altitude when birds cross a ridge or pass."(CEC Guidelines, Chapter 4, p. 64-65)

The DEIR also admits that:

This analysis …does not take into consideration flight behavior..."(EBS p.17)

The EBS cites several wind farms that do not have geographical characteristics present at Hatchet Ridge as part of their basis for the conclusion that:

OG7-35

In any event, waterfowl mortality at the Hatchet Ridge is expected to be minor.

This conclusion is unfounded. The Baseline Study arrives at this conclusion based on :

- incomplete data that does not include a nocturnal monitoring study
- the comparison of data from wind farms that do not share the same topography characteristics
- not taking into account low cloud ceiling conditions that regularly occur at the site or at sites with similar topographical features.

No specific migration component to the bird census was done by WEST. They state that they found no evidence of migration during the year they did their bird counts. This is to be expected because 30-minute, fixed-point counts performed once a week on days not selected on the basis of the likelihood of occurrence of a large migration are very poorly suited to sample active migration. All of the surveys were performed during daylight hours and it is likely that there was a distinct bias toward calm days with good visibility. Ground-based censuses could well indicate no migration when large numbers could be passing over unnoticed. Most bird migration occurs at night and the conditions most likely to lead to mortality among actively migrating birds, day or night, are those involving low cloud cover, fog or other reduced visibility conditions.

OG7-36

There is ample evidence from the observations of amateur birders that at some times and under some conditions, large migrations of Greater Sandhill Cranes, several species of geese and Tundra Swans pass at low altitudes over the Hatchet Mountain

ridge where the wind turbines are proposed to be sited. Because the potential for significant avian mortality exists, even by the estimate presented in the DEIS, there is a need for additional study at the site specifically designed to address the timing, spatial pattern, altitude and magnitude of bird migration in the vicinity of the ridge. We propose that such studies be required before approval of this project is considered.

OG7-36 cont.

An appropriate study of migration in this situation should encompass both spring and fall migration seasons (note that in this region, southward migration of waterfowl often extends into December and beyond, with late-season movements stimulated by weather changes and freeze-up of open water farther north). Monitoring should take place both day and night and must be able to detect movements during periods of inclement weather when the ridge top may be enshrouded in clouds. Marine radar coupled with night vision technology should be employed and these techniques should be accompanied with direct visual and acoustic observations by competent ornithologists to provide data on the identity of the bird targets observed (see e.g., Harmata, et al., 1999, Nohara, et al., 2005, Gauthreaux and Livingston, 2006). Because migration is highly pulsatile and strongly influenced by local weather, observations should be made every day. It might require observations over several seasons to develop an accurate picture of the risk to migrating birds because the local conditions under which large kills of birds are likely to occur are relatively infrequent. It is important to emphasize again that when these conditions coincide with a large migratory passage of flocked birds, there is the potential for very significant mortality. On most days and nights, under favorable weather conditions, migrants passing near or over the ridge would probably be above, or even well above, the airspace swept by the rotors.

OG7-37

2-B. Other Species Protected by Law: Golden Eagle, Red-tailed Hawk, Turkey Vulture, Osprey. American Robin and Common Raven are afforded considerable protections under law, and as such the impacts on them by the project MUST be analyzed and discussed in the DEIR. These impacts also must be considered and added to the weight of impacts already discussed in the DEIR when estimating the magnitude of the impact of this project in general terms as well. These species were described in the Baseline Study as diurnal species most likely to have the highest rates of direct mortality for windmill collision. Yet, no mention was made of this in the main DEIR, and subsequently nor was this impact considered as a component of the overall impact of the project

OG7-38

The DEIR, by not considering these species in discussion and analysis in the main body of the report, is misleading and incomplete. It presents analysis and conclusions that, as severe as they may seem, give a grossly underestimated picture of the project's impact to birds.

2-C. Natural History of Raptors as it relates to the impacts of numbers killed: While a discussion of the natural history of (only) Bald Eagle and Northern Spotted Owl is included in Appendix C of the DEIR in the Hatchet Ridge Wind Project Biological Assessment, Sec. 3.0, no real correlation or discussion is made in the DEIR of how

OG7-39

these life histories relate to a loss in population. Providing applied analysis of the Baseline data in the main body of the DEIR is essential to an understanding of the real impacts of this project. For raptors and owls, the impact would be greater than the numbers reflect because of the: (In the case of the Bald Eagle, for instance)

- Because only an average of 2 young are produced each year, and because both may not survive to sexual maturity, the number of birds produced each year is quite low, especially when you take into consideration the low number of breeding pairs distributed over any given geographic area as compared to other more prolific orders of birds, such as Passerines. Also, if the mother is killed before the young have fledged, all young in the nest die. Thus the death of one eagle could result in the death of up to 4 birds.

- This species takes 4-5 yrs to reach sexual maturity. This fact, coupled with the low number of young produced per year means that a bird lost is not quickly replaced in the population (as is more likely the case of bird species that quickly reach maturity in a year or so)

- The lifespan can be 20 to 30 years. Obviously the ability of a species with such a long expected life span to recover quickly from numerous deaths is not favorable. The population simply can't support numerous unnatural losses.

- The number of individuals of the species for a given home range is small when compared to other bird orders that have higher relative numbers. Since there are fewer individuals of eagle than more numerous species of birds, a given number of bird deaths for this species will have much greater impact than the same number of deaths of a species of bird that has a greater density of individuals for any given geographic area.

Given all of the above, a loss of one bird is significant, and the impact of deaths on the populations would be greater than the numbers reflect. This discussion needs to be part of the DEIR as part of the assessment for the severity of the impacts on these species populations.

OG7-39 cont.

2-D. Golden Eagle: The Golden Eagle should have been discussed in the BIO section of the DEIR. It is listed as a 'fully protected' status species in California. This means the California Department of Fish and Game cannot issue a 'take permit' fully protected species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. The DEIR states that the potential for Golden Eagles to occur in the project area is high. Audubon Christmas Bird counts and observations by local bird watchers and scientists that live in the area reflect that a year-round resident population exists in the area, as well as a wintering population. . This all needs to be stated in the DEIR. Incidental take is not allowed for migratory birds of this species under the FESA and MBTA.

OG7-40

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2-E. Other Species Protected by Law: Under 'Birds of Prey and Their Eggs, the California Fish and Game Code Section 3503.5', It is unlawful to take, possess, or destroy any birds in the orders *Falconiformes* or *Strigiformes*. The order Falconiformes includes Red-tailed Hawk, Turkey Vulture, and Osprey. The DEIR does not discuss these species specifically, as it did the Bald Eagle and the Greater Sandhill Crane. It should have, because they are protected under State law as described above. In fact, the Red-tailed Hawk and Turkey Vulture are species that were singled out in the Baseline Biological Study as the top two species most often observed at rotor-swept heights. OG7-41

The DEIR, by not considering these species in discussion and analysis in the main body of the report, when this information was in their own baseline study, is misleading and incomplete. It presents analysis and conclusions that, as severe as they may seem, give a grossly underestimated picture of the project's impact to birds.

2-F. 'Mitigation Measure BIO-6': The DEIR states that:

If mortality rates of special-status species are determined to be below the level at which populations may be negatively affected (as defined above), no further mitigation will be required.

However, the California Fish and Game Code Sec. 3505.5 states:

It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey)... OG7-42

And the Migratory Birds, Fish and Game Code Sec. 3513 and Federal Migratory Bird Treaty Act state that:

It is unlawful to take, possess, or destroy migratory non-game bird as designated by the federal Migratory Bird Treaty Act,..

The impacts to birds and proposed mitigations discussed under the Operational Impacts portion of the Biological Resources section of the DEIR only include special status species, and specific discussions of impacts to three: Bald Eagle, Spotted Owl and Greater Sandhill Crane. This is unacceptable, as the law is very clear that non-listed species are protected.

- CEQA requirements pertain to all aspects of the natural environment, not just to special status species. Therefore, impacts, especially the resulting mortality of all avian species and bats must be considered, both in data collection, analysis and mitigation in the DEIR. OG7-43
- Also the law says nothing about population levels in regard to the fully protected status species likely to be killed. Any instance of 'take' is illegal, and thus any death should be considered significant, both as it pertains to the environment and the law. So the mitigations trigger referenced in Mitigation Measure Bio 6 should

not be based on mortality rates that negatively affect the population, but any significant avian mortality, to any bird species. OG7-43 cont.

2-G. Mitigation Measure BIO-8: Potential direct mortality of greater sandhill cranes: The DEIR states that:

Implementation of Mitigation Measure BIO-6 would reduce this impact to the maximum extent practicable. OG7-44

The impact to the Sandhill Crane and other avian species can be much more effectively reduced through other means, such as installation of a VAWT (Vertical Axis Wind Turbine) windmill design that does not result in large numbers of birds and bats killed. (This is discussed in greater detail later)

2-H. Impact BIO-9: Potential direct mortality of bald eagles: The DEIR does not mention in this section that this species is a State 'fully protected' status species in California. This means that California Department of Fish and Game cannot issue a 'take permit' for these species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. They also do not mention that this bird is protected under the Bald and Golden Eagle Protection Act**.** As such,

This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The law does not allow for any project-related take, including that associated with wind energy development projects. The 1972 amendments increased penalties for violating provisions of the act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the act. CEC Guidelines, p. 35 OG7-45

This act does allow permits for take under certain circumstances, as does the MBTA,

…but incidental take of migratory birds is not allowed. Under all three statutes" (including FESA),*"unauthorized take may be penalized, even if the offender had no intent to harm a protected species. Direct consultation with the USFWS should occur early at appropriate points in the project development process to ensure that projects will be as consistent as possible with these federal laws. (CEC Guidelines p. 35)*

2-I. IMPACT BIO-1: Removal and disturbance of special-status plants (less than significant with mitigation) : As stated in the DEIR:

The Butte County morning glory is classified as 'rare and endangered' by the California Native Plant Society. Consequently, an evaluation of impacts on the species is mandatory under CEQA. OG7-46

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The DEIR contends that mitigation measures BIO-1 and BIO-2 would reduce the impact to the plant to a less-than-significant level. This impact would be due to the loss of 11 out of 144 acres of population. The DEIR states that:

…this permanent removal of 11 acres..does not appear to result in a substantial adverse effect on the population.

We contend that the destruction of 11 acres of population IS a significant impact because of the rare and endangered status of this species. Therefore, we also contend that this impact will not be minimized to a less-than-significant level by the Mitigation Measures in BIO-1 and BIO-2 as is claimed in the DEIR, because there will still have been a loss of 11 acres of population. The DEIR also states that the disturbance during construction could result in the **OG7-46 cont.**

…subsequent introduction of non-native species. Changes to the habitat over time may ultimately make the area unsuitable for the species and eliminate it from the area.

The impact

…must be assumed to be potentially significant at this time.

2J. Mitigation Measure BIO-1: Avoid Butte County morning glory: The DEIR states:

Wherever possible, redesign the location of the facilities to avoid habitat for Butte County morning glory. The applicant will, to the extent possible, adjust the location of six turbines and associated access roads currently planned for constriction in Butte County morning glory habitat.

This contradicts the statement made in Project Description 2.3: Background and Project Overview p.2-2:

HRW has requested flexibility in the precise spacing and number of turbines in the turbine corridor, as well as in the location of the corridor within the leased area. **OG7-47**

Obviously, both of these conditions cannot occur. If the lead agency grants this flexibility, Mitigation Measures BIO-1 AND BIO-2 are impossible to implement.

…all final project location information would be provided to the …County…and other resource agencies prior to the initiation of project construction.

The lead agency cannot allow the applicant to dictate the placement of the turbines. This is in direct conflict with the provisions of BIO-1 and BIO-2**.** The placement of the turbines must be coordinated with the County and CDFG prior to the granting of the use permit. Mitigation Measure BIO-2 requires that

…final facility siting must be submitted to the California Department of Fish and Game (DFG) and the Shasta County Department of Resource Management and approved by both agencies prior to construction.

Again, this needs to be approved by both agencies prior to the granting of the use permit. (as recommended in the CEC Guidelines)

OG7-47 cont.

3. GOALS

Stated Goals for the impact on the environment are not met by the Project: The project as proposed does not meet these its own objectives in protecting the environment. In the DEIR, Alternatives Screening Section, under Proposed Project: Project Goal and Objectives, the second objective is:

Develop a wind power project in a location that will have minimal impacts on birds, bats, vegetation, and other environmental resources.

The project as proposed does not meet this objective. The DEIR itself contradicts this goal by stating the severity of the impacts to birds and bats as *Significant and Unavoidable.* The fourth goal listed is:

OG7-48

Meet regional energy needs in an efficient and environmentally sound manner.

This goal is also contradicted in the EIR itself by the severity of the impact on birds, bats, and stating that the effects to these animals would be *Significant and Unavoidable.* The project is not even meeting its own stated goals with regard to protecting the environment. If the second and 4th objectives on the Project Goal and Objectives list are not being met, and are as important to the environment as these two are, perhaps it would be better not to build this particular wind farm project, unless changes are adopted such as those we are recommending that would help achieve these goals.

4. ALTERNATIVES

When analyzing the Alternatives Screening Report in Appendix F and 'Other Considerations', Section 4.5 of the DEIR and the resulting Range of Alternatives, we were impressed by the obvious lack of any real consideration and research into these alternatives and their feasibility, and the unsubstantiated and weak rationale given for the dismissal of several viable alternatives. This cursory treatment is NOT in keeping with the intent of the CEQA guidelines. In its analysis the DEIR comes to the completely illogical and unfounded conclusion that:

OG7-49

…the proposed project is considered to be the environmentally superior action alternative." (DEIR Chapter 4.5.3 Environmentally Superior Alternative)

The DEIR states that:

The alternative technology, alternative site, phased project, smaller capacity and Butte County morning glory avoidance alternatives do not have the potential to reduce significant impacts to a less-than-significant level;…

OG7-49 cont.

4-A. Alternative Technologies: Alternative technologies for the project were not adequately considered as required by CEQA**,** including available alternative Vertical Axis Wind Turbine technology, (VAWT)**.** This option, however, does meet the criteria for alternatives as set forth in CEQA and quoted in the EIR Alternatives Screening Intro., p. 1. Thus, it should have been considered by the DEIR as a viable Alternative. Use of this design would reduce the bird and bat kills of this project to almost nothing.

OG7-50

DEIR Section4.5.1 Alternatives Considered but Rejected (p.4-12 to p.4-13): The Screening process dismissed the VAWT technology as being unavailable and unknown**:**

The use of a vertical axis wind turbine alternative could theoretically minimize the visual impact because of reduced height; however, the availability—and hence the feasibility—of these devices is unknown. Consequently, inclusions of a vertical axis wind turbine alternative would be deemed speculative, and not appropriate as a viable alternative to the project as currently defined.

They do not mention that this type of design could remove the extreme impact of this project on avian species and bats!

Furthermore, the DEIR states that these alternatives:

- *are remote and speculative in terms of implementation…* The VAWT is not speculative; The Terra Moya Aqua, Inc. (TMA) design of the VAWT has been in operation at their fully licensed wind farm in Wyoming for over 11 years and they are currently developing another 11,000 acre site in Wyoming. They now have a 500 Kw commercial capacity turbine ready for production that is designed for use in large-scale commercial wind farm applications. The information on this technology *is* available and should be included in the DEIR as one of the alternatives.
- *with effects that cannot be reasonably ascertained…*Its hard to determine the effects of a technology that you don't investigate.
- *would not meet one or more of the project objectives…* We suggest that the VAWT could meet most of the project objectives.
- *the alternative could attain most (but not necessarily all) of the basic project objectives.* It does not have to meet all of the project objectives, so this argument is invalid. As we discussed earlier, the project as proposed does not meet two of its own stated objectives.
- *or would reduce the scale and power production capacity so as to render the project economically infeasible.* First of all, how can the DEIR draw this conclusion without any information? This technology option is dismissed as 'unavailable and unknown'. The VAWT technology may be just as efficient as the most efficient conventional HAWT designs, and we believe this option should be considered. The VAWT is not less efficient than conventional turbines**:**

OG7-51

The energy cost generation for the TMA Company's turbine design is about 2.5 to 3.5 cents per kilowatt hour, depending on the regimen, comparable to the most efficient propeller designs available (PureEnergy Systems.com News, 11-7-05)

- *the availability …of these devices is unknown.* Apparently, no effort was made to determine the availability of these turbines. This is an instance of CEQA non-compliance. We were able to learn of this non-lethal design using just a 5-minute internet search, and the availability of this 'unknown' technology in just one phone call to the President of TMA, Duane Rasmussen. He stated that the Company could have 500 Kw turbines for this project ready as early as 2009. (This timeline is pretty close to the goal of production starting in 2008, as since it is already 2008, and we are still in the DEIR process. Mr. Rasmussen also stated that his Company could build the VAWTs locally in northern California, thus reducing costs associated with production and contributing to the local economy. This company is located in the United States and is American-owned. We realize that the lead agency might not normally mandate the use of the product of one particular company, but in this case they are the only company who own the patents for this non-lethal design of turbine.

In addition, the units are only 150' tall, compared with the over 400' tall conventional horizontal axis wind turbines proposed. This lower height will greatly reduce potential collisions by birds and bats who may be flying low enough to collide with them at night or in poor visibility daytime conditions. The lower height also will reduce the visual impact on the natural environment. The design also offers the advantage of being able to operate at much colder temperatures. The proposed conventional HAWT's proposed do not operated well in freezing temperatures. This certainly would be an advantage to the VAWT given the climate characteristics of the site.

OG7-51 cont.

The DEIR Alternatives Screening Introduction, p.1 (per CEQA Guidelines) state:

The criteria for alternatives that must be considered are listed below:

- *The alternative could attain most (but not necessarily all) of the basic project objectives.*
- *The alternative is feasible.*
- *The alternative would avoid or substantially reduce one or more significant impacts of the proposed project.*

This alternative satisfies these criteria.

If the use of this type of windmill design is not possible due to the current project construction timeline, the project should be delayed to accommodate installation of this type of windmill. But if the County decides this is not possible, the project should be implemented in phases that allow for the inclusion of the VAWT in the later phases. (As also discussed in the 'Phased project' option of alternatives.) After all, the project has a projected lifetime of 20 years, which means 20 years worth of avian and bat deaths, so a

potential delay (if any) of 6 months to a year when viewed in this larger context is insignificant, and well worth the tradeoff.

OG7-51 cont.

4-B. Alternative Sites for the project were not considered adequately and should not have been dismissed. The DEIR states that an alternate site could reduce a number of impacts associated with the current chosen site, including those to birds:

…it is possible that avian impacts at another location could be less than those associated with the proposed project…

OG7-52

They go on to state that more monitoring data would be required, but we feel that given the severity of the impacts to birds and bats at the proposed site, the time and effort required to find and analyze another suitable site would be justified.

4-C. Alternative Siting would reduce the impacts to the birds and possibly bats. It is possible to site the wind turbines down-slope somewhat from the ridge. Although this would possibly result in less windpower generation, it would certainly reduce significantly the impacts to the birds and bats by removing the turbines from the top of the ridge.

Strickland et al. (2001) concluded that wind turbines located away from the edge of the ridge at Foote Creek Rim, Wyoming, would result in lower raptor fatality rates than turbines located immediately adjacent to the edge. Smallwood and Neher (2004) had similar findings… (CEC Guidelines Chapter 4 p.64)

In light of this significant reduction in avian mortality, this alternative should be considered and not be dismissed. The DEIR states that a different site plan could be implemented:

The arrangement of the turbines and other facilities could be reconfigured within the boundaries of the area that has been leased to accommodate the proposed project. (Other CEQA Considerations, Alternative Site Plan, p. 4-15)

OG7-53

Also:

…the development of an alternative site plan does not have the potential to avoid or reduce significant impacts…

As we have stated, it does, because placing the windmills below the ridge will obviously significantly reduce avian mortality. There may be other options that would reduce the impacts to avian species as well. These need to be investigated

…wind turbine siting contributes substantially to bird fatalities and that careful siting of new wind turbines could substantially reduce fatalities… (Smallwood and Neher 2004) (CEC Guidelines, p.64)

The DEIR states that:

The majority of large birds flew perpendicular to and across the prominent ridgeline..(Ecological Baseline Study p. ii)

This means that most large birds will be confronted by a 6 mile long 'curtain of death'. The current proposed general siting configuration of arranging the turbines along the ridge really gives birds passing though a minimal chance for avoidance, given the large horizontal and vertical area covered by the blades per windmill and the 6 mile length of the line of turbines.

OG7-53 cont.

4-D. Smaller Project: Under Preliminary Range of Alternatives, p. 6,

The alternatives listed below meet most or all of the project objectives, are considered feasible, and would avoid or substantially reduce one or more potentially significant impacts of the proposed project.

These include the 'Smaller Project' alternative.

A smaller project could permanently reduce the magnitude or extent of some impacts. A reduced project with a smaller capacity (e.g., 30 MW) would be possible and may be feasible. A smaller project would theoretically reduce the magnitude of biological impacts associated with the proposed projects, including a proportional reduction in avian and bat mortality. (Other CEQA Considerations, p. 4-15)

Given the above analysis, and the potential reduction in significant mortality, this alternative should not have been dismissed.

OG7-54

4-E. Phased Project:

The project could be developed in phases. This alternative would meet most of the project objectives. (Preliminary Alternatives Screen, Alternatives Screening, p.4)

This one had no justification for being rejected as an Alternative, especially since it could be coupled with the VAWT option. A phased project would allow more feasible implementation of this technology, if necessary. This option met the screening criteria, and would significantly reduce one or more of the significant impacts if coupled with the installation of VAWT turbines for the later phases.

OG7-55

4-F. Butte County Morning Glory Avoidance Alternative: This alternative was dismissed because it did not reduce the other significant impacts of the project. Obviously, this alternative needs to be incorporated into the mitigation measures or one of the other Alternatives, such as the Alternative VAWT option. Also the claim that Mitigation Measures BIO-1 and BIO-2 would reduce the significant impact to a less-than-significant level is unfounded, as we have already discussed.

OG7-56

4-G. No Project: A no-project alternative is required by CEQA, and for a good reason. Sometimes, the negative impacts of a project are so damaging, and so outweigh the advantages, that a no-project alternative is the only responsible option available. Unless the County and the applicant are willing to act responsibly to adopt real measures to avoid the huge number of avian and bat deaths that will occur with this project, the only reasonable and prudent option IS the no-project alternative. Under CEC Guidelines, this project would be classified as CATEGORY 4: PROJECT SITES INAPPROPRIATE FOR WIND DEVELOPMENT; **OG7-57**

Sites for which existing data indicate unacceptable risk of bird or bat fatalities might also be appropriately classified as Category 4, particularly if no feasible avoidance or mitigation measures are available to reduce impacts. (CEC Guidelines, p.9)

5. FUNCTIONAL MITIGATIONS

No functional mitigations are being required. This is because no mitigations exist that would minimize to an acceptable degree the on-site impact for this project as proposed. As stated in the DEIR,

Impacts of the Proposed Projects, Biological Resources (significant and unavoidable) – The project is expected to result in significant and unavoidable mortality to avian and bat species. No mitigation is available to reduce this impact to a less-than-significant level;… **OG7-58**

As we discuss under the 'No-Permit Option' earlier in this document, this project can be classified as 'Category 4: Project Sites Inappropriate for Development', because

…no feasible avoidance or mitigation measures are available to reduce impacts. (CEC Guidelines, p.9)

In addition, as stated in the DEIR: Mitigation Measure BIO-6:

Monitor avian mortality rates and implement adaptive management measures, if necessary.

This is only a carcass count, with no mandatory mitigation requirements or plan being triggered by the count findings. The implementation of **OG7-59**

…adaptive management measures…implemented at the discretion of USFWS or DFG…(DEIR p. 3.4-20)

is unacceptably vague and does not constitute an actual mitigation monitoring and operations impact mitigation plan. The CEC Guidelines are very clear that concrete detailed mitigation plan requirements as a prerequisite for the use permit are essential, as is a firm commitment by project owners to accountability and remedial action in response to avian and bat mortality levels, and that

This commitment must be included in permit conditions during the permitting process so that a mechanism is available to implement mitigation recommendations after the project is permitted. (CEC Guidelines p. 69)

OG7-59 cont.

The Carcass count included in the CEC Guidelines is most effective as a tool to assess the impacts to birds and bats at EXISTING wind farms, where real and more effective mitigation options are much more limited than with a new project. A new project has many more available options: proper site selection, siting of windmills, appropriate wildlife-friendly windmill design is selected, etc. If done properly, mitigation is minimal or not required. This project hasn't considered these options carefully enough, given the extreme magnitude of number of deaths to birds and bats that will occur. So they can only count dead bodies. This is not mitigation! The birds, bats and the public need to be assured that a mitigation plan is in place BEFORE the use permit is issued and is triggered by data collected, not at the discretion of an agency after the fact. The issue of liability is a very real one for everyone involved. The CEC Guidelines state that:

Other state and federal protective wildlife laws, some of which mandate avoidance of 'take' without options for permitting, can also influence project siting and operations. Project developers, permit decision makers, and the resource agencies involved should consider these strict liability laws during the permitting process to ensure that impacts to bird and bat species are minimized and mitigated to offset impacts. Implementing the methods recommended in the Guidelines during the permitting process will demonstrate a good faith effort to develop and operate projects in a fashion that is consistent with the intent of these state and federal wildlife protection laws. Such good faith efforts will be considered by CDFG before taking enforcement actions for violation of a California wildlife protection law.

OG7-60

If this project is permitted as proposed, which we feel is unacceptable and ill-advised, then the 'mitigation measures' should be in the form of a mandatory detailed mitigation plan, the elements of which are to be triggered by a pre-determined number of bird and/or bat fatalities and/or other impacts, such as nest disturbance, etc. These mitigation measures need to be monitored by an independent third party to ensure their execution. The plan should include the elements already stated in the DEIR under Mitigation Measure BIO-6:

- *Timing restrictions on the operation of one or more turbines (time of day or seasonal shutdown)*
- *Permanent shutdown of one or more turbines*
- *Relocation of one or more turbines*

6. ADDITIONAL RECOMMENDATIONS

Color Schemes: We recommend that the turbine blades be painted according to the Hodos scheme. This paint scheme is thought to increase visibility to diurnal raptors, and is required as a condition for the 2005 use permit renewals at Altamont Wind Farm in Alameda County, CA.(Use permit for Altamont Wind Farm, Attachment G, Avian Wildlife

OG7-61

Protection Schedule, p.2) This would not preclude the painting of the support towers themselves in the required color(s) as mandated by FAA regulations. **OG7-61 cont.**

Rock Piles: We recommend the location of any man-made rock piles well away from the turbines, as these attract raptor prey species of rodents and reptiles. This condition is also required as a condition for the 2005 use permit renewals at Altamont Wind Farm in Alameda County, CA. This is also in keeping with the CEC Guidelines, "Reduce Habitat for Prey Near Turbines", (Chapter 4, p.65). **OG7-62**

Lighting: It has been shown that lighting on and around turbine towers can attract avian and bat species. The CEC Guidelines discuss this and recommend

Avoid Lighting that Attracts Birds and Bats (CEC Guidelines, Chapter 4, p.65).

Different light colors attract different species under different conditions (such as fog and low cloud cover), so ANY lighting will attract birds and bats. The FAA requires safety lighting on towers over 200 feet tall, so use of the TMA VAWT turbines, which are only 150 feet tall, would not require any safety lighting. This is our preference. **OG7-63**

Plans for lighting should balance FAA requirements with protection of birds and bats (CEC Guidelines, Chapter 4, p.65)

For general lighting of facilities and buildings,

Keep lighting at both operation and maintenance facilities and substations to the minimum required to meet safety and security needs. Use white lights with sensors and switches that keep the lights off when they are not required. These lights should be hooded and directed to minimize backscatter, reflection, skyward illumination, and illumination of areas outside of the facility or substation. CEC Guidelines, Chapter 4, p.65)

We recommend the use of Meteorological towers that do not require the use of guy cables. Guy wires present a collision hazard to birds. If the installation of meteorological towers that require guy cables is permitted by the County, then those should be equipped with flight diverters to lessen avian collisions. **OG7-64**

Communications towers should not be guyed at turbine sites. If guy wires are necessary, then use bird deterrents. (CEC Guidelines, Chapter 4, p.66)

The management of mitigation measures is the responsibility of the lead agency, Shasta County. We would like to see them contract the California Energy Commission to manage the mitigation measures, as they have extensive expertise and experience in this area, and are an independent party. **OG7-65**

7. CONTINGENCY MITIGATION PLAN

There is no requirement to establish a detailed contingency mitigation plan to mitigate higher than anticipated levels of fatalities. The CEC Guidelines emphasize the importance of establishing such a plan before a use permit is issued. This contingency mitigation plan should include detailed adaptive operations and mitigation mechanisms per CEC Guidelines to mitigate high levels of unanticipated fatalities, which

...becomes even more important when choices for operational impact avoidance or minimization are so limited. (CEC Guidelines p. 69)

as is the case for this project as currently proposed. These mitigation measures need to be monitored by an independent third party to ensure their execution. This Contingency Mitigation Plan needs to be in place before the use permit is issued.

OG7-66

8. COMPENSATORY MITIGATION PLAN

The DEIR is conspicuously lacking any form of compensatory mitigation which is recommended in the CEC Guidelines for projects with effects on avian and bat mortality that cannot be avoided or minimized such as the Hatchet Ridge project. This type of mitigation is designed to offset the impacts to the avian and bat population (both specific and cumulative) by providing

- *Offsite conservation and protection of essential habitat,*
- *Offsite conservation and habitat restoration"*, and/or
- *Offsite habitat enhancement*

as potential compensation options for affected species. (CEC Guidelines, p. 67) Given the heavy bird and bat mortality the project would cause, and the ineffectiveness of on-site mitigations, compensatory mitigation is the only real alternative. Therefore, it should be mandated and executed in accordance with CEC Guidelines as a requirement for the project use permit.

OG7-67

9. CUMULATIVE IMPACTS:

The DEIR states that no significant cumulative impacts would occur with respect to the avian and bat species adversely affected by this project. This conclusion is based on insufficient data and illogical, contradictory analysis and conclusions. As such, it is contrary to the intent and requirements under CEQA. Because the extent the effects of this project have not been adequately determined, its effects cannot be analyzed in the context of cumulative impacts. CEQA requires that

An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in section 15065(a)(3), which states that: "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

OG7-68

The DEIR mentions several potential wind projects within relatively close regional proximity to the project site: Pondosa in Siskiyou County, three prospective wind project sites in the Plumas National Forest, and one in Lassen National Forest. For the Pondosa site, the DEIR states:

…it may be assumed that the Pondosa site is being investigated by a prospective wind energy developer…

They dismiss this potential project from consideration as a future project;

Due to the lack of formal documentation regarding any proposed wind energy development in the Pondosa area, it will not be included as part of this cumulative analysis."(DEIR p.4-2)

Just because the

…Siskiyou County Planning Department staff has not received a formal application from a project applicant to date…

does not necessarily mean that this project should not be considered as a 'probable future project'. We believe it should be considered. The DEIR analysis of the potential project sites in the Plumas and Lassen National Forests explains that meteorological towers have been erected to gather data and monitor wind speeds and concludes that:

…one or more of these sites may theoretically be suitable for wind power development.

However, they don't state that they are not likely to result in probable wind project(s), nor do they give any justification not defining them as probable wind project(s). Given the level of resources being devoted to the acquisition of data and the obvious level of interest by wind developers to determine a suitable site in the region, the likelihood of at least one of these sites resulting in a wind energy project is high. And, given the likelihood of significant avian mortality issues occurring in any wind development in the area, we believe that a significant cumulative impact will occur. In addition, the migratory nature of avian species populations needs to be considered when determining the geographical area contributing to cumulative impacts of this project.

Bird and bat species are highly mobile and migratory in their habits; their populations are not static nor are they confined to a particular region. Therefore, a wind farm in California can have a significant cumulative impact on a bird population that nests in the arctic, migrates through northern California, and winters in South America. By this reasoning, a bird species population that passes through the wind farm at Altamont, in Alameda County during migration, and proceeds via the Pacific Flyway to then pass over Hatchet Ridge, is likely to experience an incremental significant cumulative impact as the result with its contact with these two project sites. Therefore the incremental significant cumulative impacts of the many existing windfarm projects that exist along the Pacific

OG7-68 cont.

OG7-69

● Page 26 February 7, 2008

Flyway Migration Corridor must be factored into the total cumulative impact of which the Hatchet Ridge Project is a significant component. **OG7-69 cont.**

In addition, mitigation measures must be required that offset an appropriate portion of this significant cumulative impact. Compensatory mitigation is a reasonable mechanism to achieve this, as it works especially well given the mobile nature of birds within a population. An off-site mitigation measure can truly benefit the same population that is negatively impacted by the project. **OG7-70**

Letter OG7 Wintu Audubon Society

Response to Comment OG7-1

This comment discusses the intention of the group's review and a summary of its conclusions presented in the letter.

Response to Comment OG7-2

This comment notes the group's position on the project and its support of the California Energy Commission guidelines.

Response to Comment OG7-3

The analysis of cumulative impacts and alternatives is presented in Chapter 4 of the Draft EIR.

Response to Comment OG7-4

Comment noted. A discussion of the pertinent state and federal laws is presented in the regulatory setting section of each resource analysis section in Chapter 3 of the Draft EIR.

Response to Comment OG7-5

Comment noted. The regulatory setting pertaining to avian and other biological resources is discussed in detail on pages 3.4-10–3.4-13 of the Draft EIR.

Response to Comment OG7-6

An incidental take permit would be required for adverse impacts on northern spotted owl. However, no adverse impacts on northern spotted owls are expected to occur due to the fact that there is no habitat capable of supporting them in the project area and that spotted owls are not known to fly above the canopy where they would be at risk from turbine collision.

Response to Comment OG7-7

A study of nocturnal migration using marine radar has been conducted. The report, *A Radar Study of Nocturnal Bird and Bat Migration at the Proposed Hatchet Ridge Wind Project, California, Fall 2007*, detailing the results of that study is included as Appendix B of the Final EIR. It should be noted that the results of this study did not alter any of the conclusions regarding potential impacts on avian species.

Response to Comment OG7-8

The exact intention of this comment is somewhat unclear. One of the project objectives is to "Develop a wind power project in a location that will have minimal impacts on birds, bats, vegetation, and other environmental resources" (Draft EIR, page 2-3). Although this objective is subject to interpretation, it is the conclusion of the Draft EIR that this objective can be met by the proposed project.

Response to Comment OG7-9

Please refer to the responses to Comments OG3-6 and OG3-7.

Response to Comment OG7-10

The commenter's intended definition of "functional" mitigation is unclear. All feasible mitigation measures currently available have been required for the project. Contingency mitigation, in the form of an adaptive management program, has been added to Mitigation Measure BIO-6 in Chapter 3 of the Final EIR. Please refer to the response to Comment PA1-8.

Response to Comment OG7-11

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG7-12

The commenter references cumulative impacts but does not provide specific comments on the Cumulative Impacts analysis in Section 4.1 of the Draft EIR, where anticipated cumulative effects are disclosed.

Response to Comment OG7-13

See the response to Comment OG7-5.

Response to Comment OG7-14

The commenter notes that mitigation measures BIO-1 and BIO-2 will not reduce impacts on Butte County morning-glory to a less-than-significant level and that the impact should be considered significant and unavoidable. Because the commenter does not provide any rationale for this assertion, further responses to this comment are not possible.

Response to Comment OG7-15

Please refer to the responses to Comments OG3-6 and OG3-7.

Response to Comment OG7-16

See the response to Comment PA1-6 for a discussion of the appropriateness of compensatory mitigation and why such mitigation is inconsistent with CEQA in this case. Monitoring methods and requirements were provided in the Draft EIR and have been modified and expanded in the Final EIR. Adaptive mitigation methods presented in the Draft EIR have been expanded in the revised version of Mitigation Measure BIO-6, presented in Chapter 3 of the Final EIR.

Response to Comment OG7-17

See the response to Comment PA1-8. Most studies to date have shown no relationship between painting schemes and bird and bat mortalities; accordingly, the suggested minimization measure is unlikely to have any effect. The description of the meteorological towers on page 2-8 of the Draft EIR specifies that the towers would be freestanding structures without guy wires to minimize impacts on avian species. Finally, it is not anticipated that the proposed project would result in creation of any artificial rock piles because standard grading practices would be employed. Moreover, as described in Section 2.7 of the Draft EIR, areas of temporary disturbance would be graded and replanted to their original condition on completion of construction activities.

Response to Comment OG7-18

See the response to Comment PA1-8.

Response to Comment OG7-19

Comment noted. Mitigation Measure BIO-6 has been revised and expanded to include an adaptive management approach that requires increasing operational constraints until mortality levels remain below the thresholds established in the Final EIR.

Response to Comment OG7-20

Comment noted. The recommendation for coordination between Shasta County and the CEC is incorporated into the administrative record. The willingness of the CEC to "manage" the mitigation measures, even under contract, is unknown at this time.

Response to Comment OG7-21

Comment noted. Section 3.4 of the Draft EIR does in fact discuss the potential biological impacts of the proposed project on all special-status species, including all fully protected species, that could potentially be affected by the project.

Response to Comment OG7-22

Comment noted. These issues were considered in the analysis conducted for biological resources in Section 3.4 of the Draft EIR.

Response to Comment OG7-23

Impacts on other avian species are addressed in Impact BIO-11 on pages 3.4-22–3.4-23 of the Draft EIR.

Response to Comment OG7-24

See the response to Comment OG7-4.

Response to Comment OG7-25

Cumulative impacts are addressed in Chapter 4 of the Draft EIR. There are no other wind farms planned in the immediate vicinity.

Response to Comment OG7-26

Comment noted. Illegal take is still illegal take, even if it is "compensated for." The commenter implies that implementation of all the recommendations in the letter will make take of a fully protected species legal, even though the comment admits that take cannot be "avoided," but only "reduced."

Response to Comment OG7-27

Comment noted.

Response to Comment OG7-28

See the response to Comment OG7-21.

Response to Comment OG7-29

The CEC guidelines were reviewed in preparation of the Draft EIR and are referenced in that document and in this Final EIR where appropriate.

Response to Comment OG7-30

See the response to Comment OG7-6.

Response to Comment OG7-31

See the response to Comment OG7-7.

Response to Comment OG7-32

See the response to Comment OG7-7.

Response to Comment OG7-33

Avian use studies conducted at operating wind farms have been correlated with avian mortality studies at those same wind farms; this correlation forms the best currently available basis for predicting what the potential magnitude of avian mortalities will be. This is the basis for drawing conclusions about nocturnally migrating birds from observations of birds during the day. The information and conclusions drawn in the nocturnal migration study using radar provided no additional information that would contradict the conclusions drawn from the baseline ecological study. In addition, inclement weather such as low fog is typically associated with an atmospheric inversion layer, during which there is little to no wind. Therefore, the turbine blades are much less likely to be rotating during these periods, reducing the risks to birds moving through the area. See the response to Comment OG7-35.

Response to Comment OG7-34

Inclement weather conditions at Hatchet Ridge that could impede visibility for migrating birds (e.g., low clouds and fog) generally result from an inversion layer, a condition that is generally not accompanied by wind; under such conditions, turbine blades would not be rotating and the risk of avian mortality is low.

Response to Comment OG7-35

The conclusion that waterfowl mortality is expected to be low at Hatchet Mountain is based on (1) the estimate of exposure risk derived from the avian use studies conducted using standardized techniques developed specifically for this purpose, and (2) information on mortality rates of waterfowl at all wind farms in the U.S. with comparable data.

Response to Comment OG7-36

The WEST report (Appendix C-1 of the Draft EIR) included all observations of birds, and observers noted the altitude and direction of movement of all birds. This is certainly a "component" of migration. Subsequent to issuance of the Draft EIR, a study of nocturnal migration using marine radar was conducted.

Response to Comment OG7-37

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG7-38

The Draft EIR considered potential impacts on all species with a potential to occur within the study area, with emphasis placed on those species considered to be special-status species.

Potential impacts on common species were also addressed in Impact BIO-11 in Section 3.4 of the Draft EIR.

Response to Comment OG7-39

Comment noted. The estimated number of bald eagle deaths from turbine collision based on the avian use studies was approximately one per year. Even for a long-lived, k-selected species with a low reproductive rate, the mortality of one individual per year is unlikely to result in permanent population declines, unless the population is very small, and adversely affected by other factors. The WEST report concluded that any potential mortality of bald eagles would be most likely to occur during winter; the wintering population of bald eagles in the area likely comprises individuals originating from several different breeding populations, and not necessarily only from the local breeding population. Nevertheless, because of the *potential* for a higher than expected numbers of mortalities, this impact is considered significant.

Response to Comment OG7-40

See the response to Comment PA1-12.

Response to Comment OG7-41

Comment noted. Mitigation Measure BIO-6 has been revised to include mortality thresholds for diurnal raptors as a group, and thus would include red-tailed hawk and other diurnal raptors. Mitigation measures are included to reduce mortality of red-tailed hawk and other diurnal raptors if the thresholds are exceeded.

Response to Comment OG7-42

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG7-43

See the response to Comment OG7-38. The WEST report collected data on all avian species and all bat species detected in the project area. The Draft EIR addresses potentially significant impacts on biological resources. These include impacts on deer, other avian species, and bats as well as on special-status birds. Finally, the legality of an action is not necessarily correlated with its biological impact.

Response to Comment OG7-44

Comment noted. Please see the response to Comment OG3-7.

Response to Comment OG7-45

Comment noted.

Response to Comment OG7-46

CEQA requires that impacts on a rare, threatened, or endangered species be "substantial" in order to be considered significant. The status of a species alone cannot be used to indicate whether or not the impact is substantial. Factors such as distribution and number of occurrences, size of the population, biology and ecology of the species, and known threats to the species must be considered in order to make a determination regarding the severity of the impact. The Draft EIR finds that the loss of approximately 8% of one occurrence of Butte

County morning-glory does not rise to a "substantial" level under CEQA. Because additional indirect effects on the population may occur as described in the Draft EIR, effects of the project may result in a substantial impact over time. The County maintains that the mitigation measures addressing this impact would reduce the impact to a less-than-significant level.

Response to Comment OG7-47

The flexibility to site turbines as described in the project description is not inconsistent with mitigation measure BIO-1. This siting flexibility will enable the applicant to revise project design in response to identification of sensitive resources such as Butte County morning-glory. The commenter also notes that final facility siting must be submitted to the California Department of Fish and Game and Shasta County Department of Resource Management and approved by both agencies prior to granting of the use permit. As stated in Mitigation Measure BIO-2 in the Draft EIR, the applicant must conduct detailed surveys for Butte County morning-glory at the time of year it is identifiable. Delaying issuance of the use permit until final design documents have been completed will not change the outcome of the mitigation measure, but it will create an unnecessary delay for the project proponent. Moreover, final design should consider the results of the surveys.

Response to Comment OG7-48

Please refer to the response to Comment OG7-8. According to CEQA, for a project to be viable, it must meet *most* of the stated project objectives, not *all* stated objectives. As indicated throughout the entire Draft EIR document, most of the project objectives have, in fact, been met by the project as outlined.

Response to Comment OG7-49

In evaluating project alternatives, CEQA requires only that a proposed alternative meet most of the stated objectives (CEQA Guidelines 15126.6 (a)).

The County has prepared what it considers to be a thorough and complete investigation of all feasible alternatives to the proposed project, in full compliance with the spirit and intent of CEQA. An appropriate level of rationale and analysis was provided in both the supplemental alternative screening analysis and the Draft EIR.

Response to Comment OG7-50

Please refer to the responses to Comments OG3-6 and OG3-7.

Response to Comment OG7-51

The commenter provides additional information from a single manufacturer of VAWTs. Please refer to the responses to Comments OG3-5 and OG3-6.

Response to Comment OG7-52

CEQA requires that alternative sites be evaluated based on the following criteria: environmental impacts; suite suitability; economic viability, social and political acceptability; technological capacity; availability of infrastructure; General Plan consistency; regulatory limitation; jurisdictional boundaries; and whether the proponent could reasonably acquire control, or otherwise have access to an alternative site. (State CEQA Guidelines Section 15126.6(f)(1).

Because the proposed project would result in significant and unavoidable impacts that cannot be fully mitigated, the County chose to evaluate alternative sites. A reasonable attempt to locate a suitable site for the proposed project was conducted and the results of this assessment are provided in the Draft EIR. Lacking confidential information from wind energy companies seeking sites, finding a site comparable to Hatchet Ridge was difficult, but several possibilities were identified. Ultimately, an *alternative site* alternative was rejected due to the high number of variables that exist in the selection of a site (beyond the purview of the Draft EIR) and because there was no clear evidence that the significant and unavoidable impacts on avian and visual resources would be mitigated by selecting another site.

Response to Comment OG7-53

The commenter suggests that by placing the turbines "down-slope" from the ridge, avian mortalities would be reduced. However, the reference to "down-slope" is spatially unclear. Because Hatchet Mountain is a ridge, "down-slope" could be construed to refer to either side of the ridge. In support of the recommendation to move the turbines "downslope", the commenter cites studies from two operating wind farms as well as the CEC guidelines. These studies do not suggest that moving turbines "down-slope" would reduce avian impacts, but rather that placing turbines "away from the edge" reduces avian impacts. This is because winds coming in contact with the mountainside result in updrafts that raptors and other birds use to soar. The proposed project design places the turbine string as far from the southwestern edge of the ridge as possible in conformance with the CEC guidelines and the studies cited by the commenter. Avoidance of this edge is most beneficial because the prevailing wind is from southwest to northeast. Moving the turbines "down-slope" to the southwest would put them nearer the area where raptors are likely to be soaring on updrafts. Moving the turbines to the northeast is not feasible due to the steep dropoff on that side of the ridge.

Response to Comment OG7-54

Please refer to the applicant's supplemental information provided in this Final EIR (Hatchet Ridge Wind, LLC Jan. 28, 2008). On record, the applicant deemed a smaller project alternative infeasible.

Response to Comment OG7-55

Please refer to the applicant's supplemental information provided in this Final EIR(Hatchet Ridge Wind, LLC Jan. 28, 2008). Neither a phased project alternative or a VAWT design alternative was deemed feasible by the applicant on record.

Response to Comment OG7-56

Please refer to the response to Comment OG6-9.

Response to Comment OG7-57

This comment will be included in the administrative record for the project, available for review by the Shasta County Board of Supervisors. The impact analyses do not indicate that this project is a Category 4 project according to the CEC guidelines. In addition, Mitigation Measure BIO-6 requires the project proponent to continue adjusting operations until mortality rates remain below threshold levels for 2 consecutive years.

Response to Comment OG7-58

The Draft EIR indicates that no feasible mitigation to reduce avian mortality *to a less-than-significant level* exists. However, mitigation does exist, and is required in the revised Mitigation Measure BIO-6 (see Chapter 3 of the Final EIR), that would result in the reduction of avian mortality to below threshold levels at which population-level effects might occur. As stated in the response to Comment OG7-10, the commenter's definition of "functional" mitigation is unclear. The opinions of the Wintu Audubon Society become part of the administrative record for this project.

Response to Comment OG7-59

Mitigation Measure BIO-6 has been revised to include measures that would have to be implemented to reduce mortality rates, as did the original version in the Draft EIR.

Response to Comment OG7-60

Comment noted. As noted above and in the revised Mitigation Measure BIO-6, the mortality monitoring study is designed to determine if mortality thresholds at which population-level effects could occur are being met or exceeded. If the mortality thresholds are met or exceeded, then measures are required that would reduce the level of mortality. Additional measures must be implemented incrementally until avian mortality levels remain below threshold levels for 2 consecutive years.

Response to Comment OG7-61

Comment noted. There is no information to suggest that the suggested mitigation reduces avian mortality. Most studies conducted to date indicate that this measure would have no effect.

Response to Comment OG7-62

See the response to Comment OG7-17.

Response to Comment OG7-63

See the response to Comments OG3-6, OG3-7, and OG7-17. Impacts on aesthetics and visual resources (including the effects of lighting) are disclosed in Section 3.1.2 of the Draft EIR. Moreover, Section 2.6.4 of the Draft EIR specifies that site lighting would be designed to minimize light scatter beyond the necessary footprint for function and security purposes.

Response to Comment OG7-64

See the response to Comment OG7-15.

Response to Comment OG7-65

Please refer to the response to Comment OG7-20.

Response to Comment OG7-66

Please refer to the revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG7-67

See the response to Comment PA1-8 and revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

Response to Comment OG7-68

There is minimal information on any nearby potential wind energy sites. There are no other known proposals in close regional proximity that are reasonably foreseeable.

Response to Comment OG7-69

Comment noted.

Response to Comment OG7-70

Comment noted.

References Cited

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Chapter 3

Revisions to the EIR

Revisions to the text of the draft EIR are presented in this chapter. Changes are referenced by chapter and page number as the original text appeared in the draft EIR. One figure (Figure 2-1) has also been revised, and is included here. Table 3.4-3 has been revised; it is included in its entirety. The figure and the table appear at the end of this chapter. Revisions are shown in strikeout/underline format. These changes, in concert with the unrevised text of the draft EIR, constitute the final EIR.

Executive Summary

Page i

Hatchet Ridge Wind LLC (HRW) is proposing to build the Hatchet Ridge Wind project. The proposed project would generate up to 102 megawatts (MW) of electricity. The project may comprise up to sixty-eight 1.5-MW wind turbines (i.e., a 102-MW facility utilizing relatively small turbines) or as few as forty-two 2.4-MW wind turbines (i.e., a 100.8-MW facility utilizing relatively large turbines). Because the applicant has selected it as the preferred option, this analysis considers an array of forty-four 2.3-MW wind turbines, constituting a project with a generating capacity of 101.2 MW. Impacts are not generally anticipated to vary substantially with the size/number of turbines~~; however, where differences exist, they are identified in the analysis. This EIR provides an evaluation of potential environmental impacts associated with any of the three configurations (i.e., 42, 44, or 68 turbines)~~. The proposed project would be constructed in one or more phases and would include construction of an interconnection with an existing Pacific Gas and Electric Company (PG&E) transmission line that crosses the leased property; the interconnection switching station would be owned by PG&E.

Chapter 2, Project Description

Page 2-1

HRW proposes to construct up to 68 three-bladed wind turbines along a 6.5-mile turbine string corridor on Hatchet Ridge. Each wind turbine would be installed on a tubular steel tower up to 262 feet (80 meters) tall. Each turbine/tower combination would have a maximum height of approximately 420 feet (128 meters), measured from the ground to the turbine blade tip at its highest point. The exact height and placement of the turbines and associated facilities within the development corridor would be determined by such factors as equipment manufacturer and environmental constraints. HRW has requested to make these final turbine and equipment siting determinations prior to construction but subsequent to this environmental analysis. However, the overall footprint of the turbines and associated facilities would not exceed the turbine

development corridor boundaries as shown in Figure 2-1; the final permanent project footprint of the Hatchet Ridge Wind Energy project would be approximately ~~73~~ 75.6 acres.

Page 2-7

- An interconnection switching station (to be owned by PG&E) would be constructed adjacent to the existing 230 kV PG&E transmission line. The switching station is planned to be located adjacent to the associated existing PG&E transmission line, most likely in Section 28 of Township 35N, Range 2E Mt. Diablo Baseline & Meridian. The switching station would occupy approximately ~~2~~ 4.6 acres. It would be a graveled, fenced area with switching equipment and an area to park utility vehicles.

Section 3.1, Aesthetics and Visual Resources

Page 3.1-11

Impact AES-2: Adverse effects on a scenic vista by degrading the visual character of the project area and its surroundings (significant and unavoidable)

As described in Chapter 2, *Project Description*, the proposed project involves installing wind turbines along the ridgeline of Hatchet Mountain. It would introduce large, vertical, artificial structures with revolving turbine blades into the viewshed and would change the ridgeline from one that is predominantly natural to one with distinct artificial features that would be highly visible to Burney residents and businesses, roadway travelers, and recreationists in or on the outskirts of Burney. Between 42 and 68 turbines, with hub height of either 65 or 80 meters would be installed along a 6.5-mile alignment along the ridgeline. Relative to baseline conditions, these turbines would substantially alter the existing visual character and quality of views toward the ridge regardless of the number or height of the turbines. As shown in the simulation for Viewpoint 1 (Figure 3.1-11), at such distances the turbines would not be very noticeable and would not affect the existing visual character. Moreover, movement of the turbines from this vantage would not be very noticeable due to distance. However, as shown in simulations for Viewpoints 2 and 3 (Figures 3.1-12 and 3.1-13, respectively), from closer vantage points (e.g., Burney) the turbines become prominent visual features on the ridgeline and alter the visual character and quality for all viewer groups. In addition to the size, movement of the turbines would likely draw more focused viewer attention toward the structures than would stationary structures of equal size and visual mass. Furthermore, the visibility and stature of the turbines would be more pronounced in the morning hours after sunrise when the turbines are illuminated by the lower angle of the sun, and during sunset when they are silhouetted against the evening sky.

Page 3.3-13

Mitigation Measure AES-1: Use rapid-discharge flashing red safety lighting

As discussed in Chapter 2, *Project Description*, studies have suggested that use of a flashing red light reduces the visual impacts on neighboring communities. To comply with FAA regulations, ~~Accordingly,~~ a rapid-discharge flashing red light will be used rather than a single incandescent light ~~to comply with FAA regulations~~.

Section 3.3, Air Quality

Page 3.3-11 (Mitigation Measure AIR-1)

- ~~All land clearing, grading, earth moving, and excavation activities on a project will be suspended when winds are expected to exceed 20 miles per hour.~~ If ground-disturbing activities are conducted under windy conditions (in excess of 20 miles per hour), the applicant will ensure that best available dust prevention techniques are used during such activities and will increase the frequency of watering to protect air quality as needed.

Section 3.4, Biological Resources

Following Page 3.4-8

Table 3.4-3 has been revised. Errors in the *Potential Occurrence in Project Area* column of the table have been corrected for several species. The revised table is reproduced in its entirety at the end of this chapter.

Page 3.4-17 (Mitigation Measure BIO-3)

- Construct project components using the setback recommendations established in USACE and California Department of Fish and Game guidance: a 100-foot setback from wetlands and streams and a 250-foot setback from wetlands, streams, and ephemeral pools that provide habitat for special-status ~~amphibians~~species.

Page 3.4-20

Mitigation Measure BIO-6: Monitor avian and bat mortality rates and implement adaptive management measures, if necessary

Mitigation Measure BIO-6 involves preparing and implementing a multifaceted program of avian and bat mortality monitoring and implementing adaptive management measures, as needed. It comprises the components listed below.

- Forming a technical advisory committee (TAC).
- Preparation and implementation of an avian and bat mortality monitoring study plan, and submittal of annual monitoring reports.
- Evaluating results of the monitoring study relative to specified fatality thresholds.
- Providing funding for and implementation of offsite mitigation for potential take of fully protected species and/or impacts on other avian or bat species.
- Providing a secondary compensatory mitigation fund for implementation of offsite habitat enhancement or protection/conservation measures.
- Preparing and implementing an onsite habitat protection and enhancement plan.

- Implementation of adaptive operational management measures, based on monitoring results, if necessary.

A summary table presenting the Mitigation Measures Decision Framework is presented at the end of the description of this BIO-6 mitigation measure.

Technical Advisory Committee. Shasta County Department of Resource Management shall be responsible for the formation of a Technical Advisory Committee (TAC). Invitations for participation shall be sent to representatives from the California Department of Fish and Game, the U.S. Fish and Wildlife Service, Shasta County Department of Resource Management, the applicant's project operations and construction managers (also referred to herein as "project owner" or "owner"), and a not-for-profit organization dedicated to avian conservation. The County shall make reasonable efforts to ensure participation by the above parties, but notwithstanding failure of any of these representatives to respond or agree to participate, the TAC shall be formed prior to the initiation of project operations. As its first order of business the TAC shall approve its Charter which shall specify all organizational matters including but not limited to notice, frequency and conduct of meetings, and specification of those decisions which may be determined solely by the TAC without subsequent directive from the Planning Director. Attendance at TAC meetings shall be by invitation of its members only.

The TAC shall review and approve monitoring protocols prior to project operations and prior to implementation of any new or revised protocols. The TAC will review results from fatality monitoring to determine if fatality thresholds have been exceeded or if fatality of fully protected species has occurred. If such thresholds have been exceeded, the TAC shall make recommendations to the County Planning Director to require implementation of mitigation measures pursuant to the Mitigation Measures Decision Framework table below. To the extent practicable, decisions of the TAC shall be made using best available science as determined by the TAC. In the event that decisions cannot be made by consensus, decisions of the TAC shall be made by simple majority vote. The Planning Director shall have final authority to direct their implementation. Prior to making any decision based on a TAC recommendation, the Planning Director shall review the recommendations of the TAC and may consider additional recommendations of, or any other information provided by, any of its voting members.

Monitoring Study. The project owner shall implement and fully fund a 3-year operational avian and bat fatality monitoring study by a qualified professional recommended by the TAC and approved by the County Planning Director, which will begin when the first turbine begins operation, pursuant to the monitoring protocols developed by the TAC and approved by the Planning Director. The owner shall submit the monitoring results in an annual monitoring report, submitted to the TAC.

After the first full 2 years of monitoring after the entire project is in operation, a third year will be scheduled as determined by the TAC. Additional years of monitoring at the owner's expense may be required should population-level impacts on any species become apparent. Consultation among the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and Shasta County Department of Resource Management shall occur on a semiannual basis through the TAC process during the monitoring study to determine the need for continued monitoring or additional studies specific to refining mitigation measures. One objective of the monitoring study will be to determine if specific additional mitigation for impacts is warranted and what the mitigation should entail. Additional mitigation will be required if fatality rates exceed a threshold of concern for a particular species or groups of

species. See the fatality thresholds table below; note that due to state fully protected status for bald eagle and sandhill crane, more than one fatality of either shall constitute a requirement for additional mitigation as described below. To determine if a threshold has been exceeded, the average annual fatality rate for species and species groups will be determined after each year of monitoring. Fatality thresholds listed in the table below were determined based on the pre-project surveys, current knowledge of species that are likely to use the habitat in the project area, the EIR impact analysis, and the regulatory status of the potentially impacted species. The owner shall arrange for a permit to enter for research/monitoring purposes for qualified scientists (when funded by others) subject to approval of the TAC.

The operational monitoring study shall be designed to determine the level of each avian or bat species' mortality from the project and must take into account biases such as the searcher efficiency, carcass removal, and effective search area to estimate total mortality from the project, using methods such as those described in the California Energy Commission's *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* The determination of exceedance of fatality thresholds shall be based on the results of the monitoring, so will therefore be expressed as an annual rate per turbine or per MW. This method effectively utilizes the adjusted or calculated fatalities impacts, as opposed to just the observed impacts. For example, the number of fatalities for any given species that are found may not be the total number of that species actually impacted because of the biases associated with searcher efficiency (carcasses that are not found) or carcass removal (carcasses scavenged before they could be found).

Fatality Thresholds. Due to the project's potential for causing fatalities to bald eagle and sandhill crane, which are state fully protected species, compensatory mitigation is mandatory prior to construction (described further below). Under California law, any take of a fully protected species is illegal. Per the EIR, the project owner will assume impacts are possible and will mitigate up front for these potential impacts. Additionally, if impacts exceed the fatality thresholds identified in the tables below, additional mitigation will be required as described in the mitigation framework outlined below. Exceedance of the following fatality thresholds would trigger the TAC to evaluate additional mitigation and to use the funds set aside in a secondary compensatory mitigation fund as prescribed in the following below.

Fully Protected Species

Species	Fatality Thresholds
Bald eagle	1 fatality per year
Sandhill crane	1 fatality per year

Special-Status Species

Species	Fatality Threshold Per Year of Operations
Other raptor species	0.35 fatalities per turbine; 0.15 fatalities per MW
Yellow warbler	0.07 fatalities per turbine; 0.03 fatalities per MW
Owls	0.11 fatalities per turbine; 0.05 fatalities per MW

Funding for Offsite Mitigation for State Fully Protected Species Prior to Project Construction and Operation. In recognition of the project's potential to take state fully protected species (bald eagle and sandhill crane), which, were a take permit possible per the

State Fish and Game Code, would require the owner to minimize and fully mitigate for all take, the owner shall provide for compensatory mitigation prior to construction. Mitigation will involve acquisition of offsite habitat appropriate for sandhill crane and bald eagle. For impacts on sandhill crane, the project owner will work with an appropriate wildlife refuge with nesting and breeding habitat located such that sandhill crane populations potentially impacted have a reasonable nexus to populations that breed on the lands to be acquired. The acreage and quality of acquired breeding land shall be chosen to optimize opportunity for breeding enhancement of sandhill cranes at a ratio of 2:1 (i.e., two birds produced annually from enhanced or preserved breeding habitat for each bird potentially killed; best available estimate is 1 fatality per year). Title to acquired parcel(s) will be transferred to the wildlife refuge for preservation, enhancement, and management of sandhill crane breeding habitat prior to construction. The project owner shall also donate $100,000 to a reputable land trust or conservation program approved by the California Department of Fish and Game and U.S. Fish and Wildlife Service for the purpose of preservation and enhancement of bald eagle breeding habitat. The program may involve acquisition of lands, purchase of a conservation easement, land stewardship or conservation, or research projects.

Secondary Compensatory Mitigation Fund for Implementation of Offsite Species or Habitat Enhancement or Protection/Conservation Measures. If data show that a fatality threshold of concern has been exceeded, the project owner shall implement additional mitigation measures that the County Planning Director determines are appropriate, based on the TAC's recommendations and analysis of the data and best available information for the species impacted. Such mitigation shall be designed to benefit the affected species or species group (e.g., raptors). Examples of appropriate additional mitigations include, but are not limited to, protection of nesting habitat for the affected species through purchase or conservation easement, enhancement of habitat or protected areas, creating artificial nesting habitat (e.g., nest structures), improving wildfire response and prevention, modifications of onsite conditions (e.g., grazing, weed control), wetland enhancement or creation, species-related research to improve knowledge of a species and conservation needs (e.g., bat population research), contributing to established conservation programs for specific species or issues (e.g., Bat Wind Energy Cooperative), and establishing a compensatory mitigation fund for species-specific conservation programs. Focusing mitigation on specific impacted species and resources is consistent with state and national policies for environmental protection such as the California Environmental Quality Act, National Environmental Policy Act, Endangered Species Act, and Clean Water Act.

Onsite Habitat Protection and Enhancement Plan. Onsite habitat modification/ protection or enhancement measures shall also be implemented if thresholds for additional mitigation are reached or unexpected fatalities occur. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not anticipated in pre-operations studies. Examples of possible mitigation measures include, but are not limited to, protection of nests identified within the project boundary, alterations to habitat within the study area to inhibit or enhance certain species' success, and modification of lighting schemes to address fatalities related to lighting at the project site. The TAC shall review and consider the relevant data and recommend the appropriate habitat protection measures to be implemented for the particular species in question.

Adaptive Operational Management Measures. Further mitigation that includes operations strategies for the wind project would be considered only if the above-described additional species- or resources-specific mitigation measures imposed by the Planning Director fail to mitigate the fatality threshold exceedance after 1 year of implementation, as

determined by the recommendation of the TAC based on its review and analysis of the monitoring data following implementation of the above-described measures. Also, the operations strategies must be designed to benefit the appropriate species or species group (e.g., raptors) where a threshold for significant impacts has been exceeded and there are no other appropriate mitigation measures to offset the impact. Any operations management strategies would be developed by the TAC with input from the project owner's operations management team and Shasta County's Department of Resource Management, so that project owner expertise and understanding of feasibility related to turbine management is considered in the process.

Additional Research. Additional research may be needed if unexpected fatalities occur as a result of operations. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not expected in pre-operations studies. The scope of any additional studies shall be limited to addressing specific unexpected fatalities, and the results shall be used to determine appropriate additional mitigation measures; the owner shall provide updates to State BIOS and CNDDB records within 6 months of any new information on species occurrences, diversity, or migration.

Mitigation Measures Decision Framework. The following table provides a listing and summary of each component of the mitigation measures BIO-6 program, as well as the timing and responsibility for implementation and triggers for additional mitigation.

Mitigation Measures Decision Framework for BIO-6

Mitigation Measure Component	Summary Description	Timing/Duration/Formulae	Trigger/Threshold for Additional Mitigation
Technical Advisory Committee	Formation of a Technical Advisory Committee (invited parties shall include one representative each from the CDFG, USFWS, one conservation organization, project operations and construction manager (the owner), and Shasta County Department of Resource Management). The TAC shall be limited to one voting member from each party, with advisors for each party allowed to attend and participate in meetings and lend expertise to the members. See *Technical Advisory Committee* above for further details on the operation of the TAC.	The TAC shall be formed during construction and shall hold its first meeting prior to the commencement of commercial project operations in order to review and make initial recommendations for the monitoring study protocols. Thereafter, the TAC shall meet at least semiannually to review the results of avian fatality monitoring.	If the monitoring studies show that any fatality thresholds have been exceeded, the TAC shall confer to make recommendations to the Planning Director for additional mitigation as outlined below.

Mitigation Measure Component	Summary Description	Timing/Duration/Formulae	Trigger/Threshold for Additional Mitigation
Fatality monitoring and thresholds	Fatality monitoring will be conducted by a qualified biologist approved by the TAC and will be used to compare pre-operations predictions of fatality with actual fatalities associated with project operations to determine if impact thresholds have been exceeded. Carcass scavenge calibration shall commence on the first appropriate day for the applicable species after day 1 of operations. In addition the owner shall arrange for a permit to enter for research/monitoring purposes for qualified scientists (when funded by others) subject to approval of the TAC. Additionally, project operations staff will be trained in handling and reporting avian fatalities encountered in the course of turbine maintenance and other regular activities on site. A protocol for project staff will be developed through coordination with the California Department of Fish and Game and the County for appropriate handling and reporting of fatalities. The project owner acknowledges that project staff training is intended to supplement, not substitute, for the formal monitoring study requirements outlined above.	Three years, beginning as close as possible to the first day of commercial project operations. Additional periods of monitoring shall be required should results of monitoring studies suggest that additional monitoring is warranted. See *Monitoring Study* and *Fatality Thresholds* above for further details.	Referral to the TAC for potential changes to monitoring methods and additional monitoring or research shall occur if the monitoring studies show that the fatality thresholds are exceeded. The TAC shall review the first year of monitoring data to determine whether to recommend to the Planning Director any changes or refinements to the monitoring protocols. Reasons for extending monitoring beyond the 3 years include: fatality of species not expected during pre-project surveys, fatality of special-status or fully protected species exceeding thresholds, and inadequacy of monitoring data. Additional monitoring or changes to the monitoring protocols will be subject to the approval of the Planning Director based upon the recommendations of the TAC.
Up-front compensatory mitigation for potential bald eagle and sandhill crane impacts	The owner shall provide for compensatory mitigation prior to construction for potential impacts on bald eagle and sandhill crane.	For sandhill crane and bald eagle, mitigation will involve acquisition, enhancement, or preservation of sufficient offsite breeding habitat at a 2:1 ratio of potential mortality. The project owner will work with the appropriate wildlife refuge to identify appropriate sandhill crane breeding habitat for acquisition. Lands will be transferred to the wildlife refuge for preservation and enhancement. For bald eagle, mitigation will be contribution of $100,000 to a reputable land trust or conservation program approved by DFG and USFWS for the purpose of	Due to the project's potential for causing fatalities of bald eagle and sandhill crane, which are state fully protected species, compensatory mitigation is mandatory prior to construction.

Mitigation Measure Component	Summary Description	Timing/Duration/Formulae	Trigger/Threshold for Additional Mitigation
		offsite preservation and enhancement of bald eagle habitat. Proof of initiation of compliance with the up-front compensatory mitigation requirements shall be provided by the project owner to the Planning Director prior to the issuance of any construction permits.	
Secondary compensatory mitigation fund	The applicant shall set aside a mitigation fund to be used should threshold exceedances occur. The mitigation fund shall be used for habitat protection and enhancement, additional research, and/or additional mitigation determined to be appropriate by the TAC to address threshold exceedances. The TAC will recommend to the Planning Director the best uses of the compensatory mitigation fund.	A mitigation fund shall be set up by the project owner as a one-time endowment or other type of protected principal for individual mitigation activities approved by the Planning Director, based on the recommendations of the TAC. The mitigation fund shall be calculated at a rate of $1,000 per MW based on the full capacity of the project. Proof of funding and the details of the fund's principal value, custodial financial institution, and accessibility shall be provided by the project owner to the Planning Director prior to the commencement of commercial project operations.	Subject to the Planning Director's review and approval of the recommendations of the TAC, and in addition to all other mitigation herein described, the Secondary Compensatory Mitigation Fund shall be used when the fatality thresholds described above are exceeded in any year of operations
Onsite habitat protection and enhancement plan	Onsite habitat modification/protection or enhancement measures shall be implemented if thresholds for additional mitigation are reached or unexpected fatalities occur. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not anticipated in pre-operations studies. Examples of possible mitigation measures include, but are not limited to, protection of nests identified within the project boundary, alterations to habitat within the study area to inhibit or enhance certain species' success, and modification of lighting schemes to address fatalities related to lighting at the project site. The TAC shall review and consider the relevant data and recommend the appropriate habitat protection measures to be implemented for the particular species in question.	The TAC shall make a recommendation to the Planning Director for additional measures to be included in a Habitat Protection and Enhancement Plan. Such measures shall be implemented as specified by the Planning Director, but in all cases shall be fully implemented within 1 year following the final decision of the Planning Director to impose specific additional measures.	If fatality thresholds are exceeded, habitat protection and enhancement measures may be needed, subject to the recommendation of the TAC and approval of the Planning Director.

Mitigation Measure Component	Summary Description	Timing/Duration/Formulae	Trigger/Threshold for Additional Mitigation
Operations measures	Changes to operations shall be considered only if all other mitigation approaches outlined above are not effective in fully mitigating the impact to a less-than-significant level. Any proposed changes to operations shall be subject to the approval of the Planning Director and must be determined to be reasonable, feasible, and linked to reducing specific impacts identified through the monitoring studies conducted at the project. For example, operations changes that may be implemented include shutdown of individual turbines during times of sensitivity of species known to be impacted, if the TAC can determine that a particular turbine location and the spinning of its blades is a cause of the fatalities. Operations shutdowns will be limited to individual turbines where fatality thresholds are consistently exceeded and to the time periods in which the fatality threshold exceedances occur. Shutdowns shall only be approved on a month-to-month basis.	Approved on a month-to-month basis and limited to the time periods in which the fatality threshold exceedances occur.	Operational changes shall only be implemented if the fatality threshold exceedance persists and cannot be mitigated to a less-than-significant level by the Habitat Protection and Enhancement Plan, compensatory mitigation, and additional research mitigation approaches described above. The Planning Director has the ultimate approval authority over any changes to project operations.
Additional research	Additional research may be needed if unexpected fatalities occur as a result of operations. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not expected in pre-operations studies. The scope of any additional studies shall be limited to addressing specific unexpected fatalities and the results shall be used to determine appropriate additional mitigation measures; the owner shall provide updates to State BIOS and CNDDB records within 6 months of any new information on species occurrences, diversity, or migration.	Additional research to address unexpected fatalities may be needed after the first year of fatality monitoring. The TAC may make recommendations to the Planning Director regarding the protocols of any such additional research.	If fatality thresholds are exceeded, additional research may be necessary, subject to the discretion and recommendations of the TAC. The Planning Director shall have final approval authority over the protocol, timing, and methodology of any such additional research.

~~Mitigation Measure BIO-6: Monitor avian mortality rates and implement adaptive management measures, if necessary~~

~~Following initiation of project operations, a monitoring study will be conducted to determine avian mortality rates resulting from operation of the project. The monitoring study will use standardized area searches of all turbines at the project site in accordance with published guidelines (see California Energy Commission [CEC] *Guidelines* [California Energy Commission and California Department of Fish and Game 2006]). The information will be compiled, analyzed, and documented in annual reports for a period of 5 years, and will be made available to the public for use in evaluation of future wind farm projects. If mortality rates of special-status species are determined to be below the level at which populations may be negatively affected (as defined above), no further mitigation will be required. As lead agency under CEQA, the County will coordinate closely with USFWS and the California Department of Fish and Game (DFG) to set up an adaptive monitoring program for implementation by the applicant.~~

~~If mortality rates exceed levels at which population-level effects could occur, one or more of the following adaptive management measures will be implemented at the discretion of USFWS or DFG to reduce the level of mortality to the maximum extent practicable.~~

- ~~Timing restrictions on the operation of one or more turbines (time of day or seasonal shutdown). Turbines are shut down when the turbine blades are "feathered" horizontally in the wind, and the turbines stop rotating.~~
- ~~Permanent shutdown of one or more turbines.~~
- ~~Relocation of one or more turbines.~~

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(Impact BIO-11)

However, the accuracy of these estimates are confounded by several factors. The proposed project will use 2.3–2.4 MW turbines, whereas the data from other wind farms used in the analyses are from wind farms using 1.8 MW turbines. Larger turbines such as those proposed for use at Hatchet Mountain are characterized by larger and higher rotor-swept areas but lower rotation speeds (in revolutions per minute). Whether these turbine characteristics would result in lower, higher, or comparable mortality rates than traditional turbines is unknown.

In addition to the avian use studies, a radar study of nocturnal bird and bat migration using marine radar was conducted in fall 2007 (included as Appendix B of the final EIR). The results of this study provide no additional information that would alter the conclusions drawn from the diurnal avian use studies.

Due to the uncertainty associated with these estimates and the potential for unexpectedly high mortality rates, this impact is considered significant and unavoidable. Implementation of Mitigation Measure BIO-6 would reduce this impact to the maximum extent practicable.

Impact BIO-12: Potential direct mortality of special-status and common bat species (less than significant)

High levels of bat mortality resulting from collision with wind turbines have been documented at some wind farms, particularly in the eastern United States (Erickson et al. 2002). Ten species of bats occur or could potentially occur in the project area (Appendix C-1), four of which ~~is~~ are ~~considered a~~ special-status species (~~pallid bat is a California species of special concern~~Table 3.4-3). Operation of the proposed project could result in the direct mortality of special-status and common bat species through collision with rotating turbine blades. To assess the magnitude of this potential impact, bat use of the project area was sampled at a single location for 78 nights between May and October 2006 using Anabat detectors (Appendix C-1).

The mean number of bat passes per detector per night was compared to existing data at five wind farms where both bat activity and mortality levels have been measured. The level of bat activity documented at the Hatchet Mountain site is much lower than at three eastern and midwestern wind farm sites, all of which had relatively high levels of bat mortality; but it is higher than at two western wind farm sites, both of which had relatively low levels of bat mortality. Because the project area is intensively managed conifer forest on a ridgetop, there is no habitat capable of supporting large concentrations of bats (i.e., communal roosting or nursery sites). The data collected on site do not indicate that substantial numbers of bats migrate

through the project area, although some bat mortality is likely to occur. Therefore, this impact is considered less than significant. No mitigation is required.

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Impact BIO-13: Potential interference with avian and bat migration corridors (less than significant)

Significant levels of avian and bat mortality are not likely to occur unless the project area comprises a substantial portion of an established migration corridor. Avian use of Hatchet Mountain was relatively uniform, and no obvious flyways or concentration areas were observed. The majority of large birds flew perpendicular to and across the prominent ridgeline, rather than parallel with the ridge, suggesting that the ridge is not an important migratory route for diurnal migrants[1]. The majority of nocturnally migrating birds and bats observed during the study of nocturnal bird and bat migration were also observed moving perpendicular to the ridgeline. The data collected during the 1-year avian use study suggest that the project area is not within a major migratory pathway for diurnal migrants. The information available indicates that interference with migration corridors is unlikely; this impact is considered less than significant. No mitigation is required.

Section 3.5, Cultural Resources

Page 3.5-11

Impacts and Mitigation Measures

Mitigation Measure CUL-1: Coordinate with the Pit River Tribe during project development, and prepare a detailed recordation of Hatchet Ridge–Bunchgrass Mountain

The County and the project owner will facilitate a preconstruction meeting and field visit with the Pit River Tribe through the Tribe's chairperson and the Pit River Environmental Office to discuss locations or issues of cultural sensitivity in the proposed project area. The project owner will coordinate with the Tribe to consider ways to minimize impacts on culturally sensitive locations during construction. Additionally, the County and the applicant will coordinate with the Pit River Tribe through the Tribe's chairperson and the Pit River Environmental Office to retain a professional ethnographic consultant to undertake a detailed recordation of Hatchet Ridge–Bunchgrass Mountain ~~as a traditional cultural property~~. The recordation will commence prior to construction and will include photographic documentation of pre- and postconstruction conditions on Hatchet Ridge–Bunchgrass Mountain. Additional research, particularly into ethnographer Omer C. Stewart's notes filed at the University of California, Berkeley, and interviews with Itsatawi and Madesi individuals, will ~~also~~ be ~~required to complete the recordation~~referenced in the document. The information gathered as a result of field, interview, and research tasks will be compiled into a report, which ~~the ethnographer~~ will be transmitted to the Pit River Tribe. The Tribe will have the right to determine ~~the dissemination o~~if the report is submitted to the California Historical Resources Information System. Detailed recordation of Hatchet Ridge–Bunchgrass Mountain in this manner will create a photographic and documentary record of the ~~traditional~~ cultural ~~property~~ resource prior to construction of the proposed

project, resulting in partial compensation for the loss of the property's character-defining features of isolation, harshness, and serenity.

Mitigation Measure CUL-2: Implement a cultural resources monitoring program with the Pit River Tribe during construction

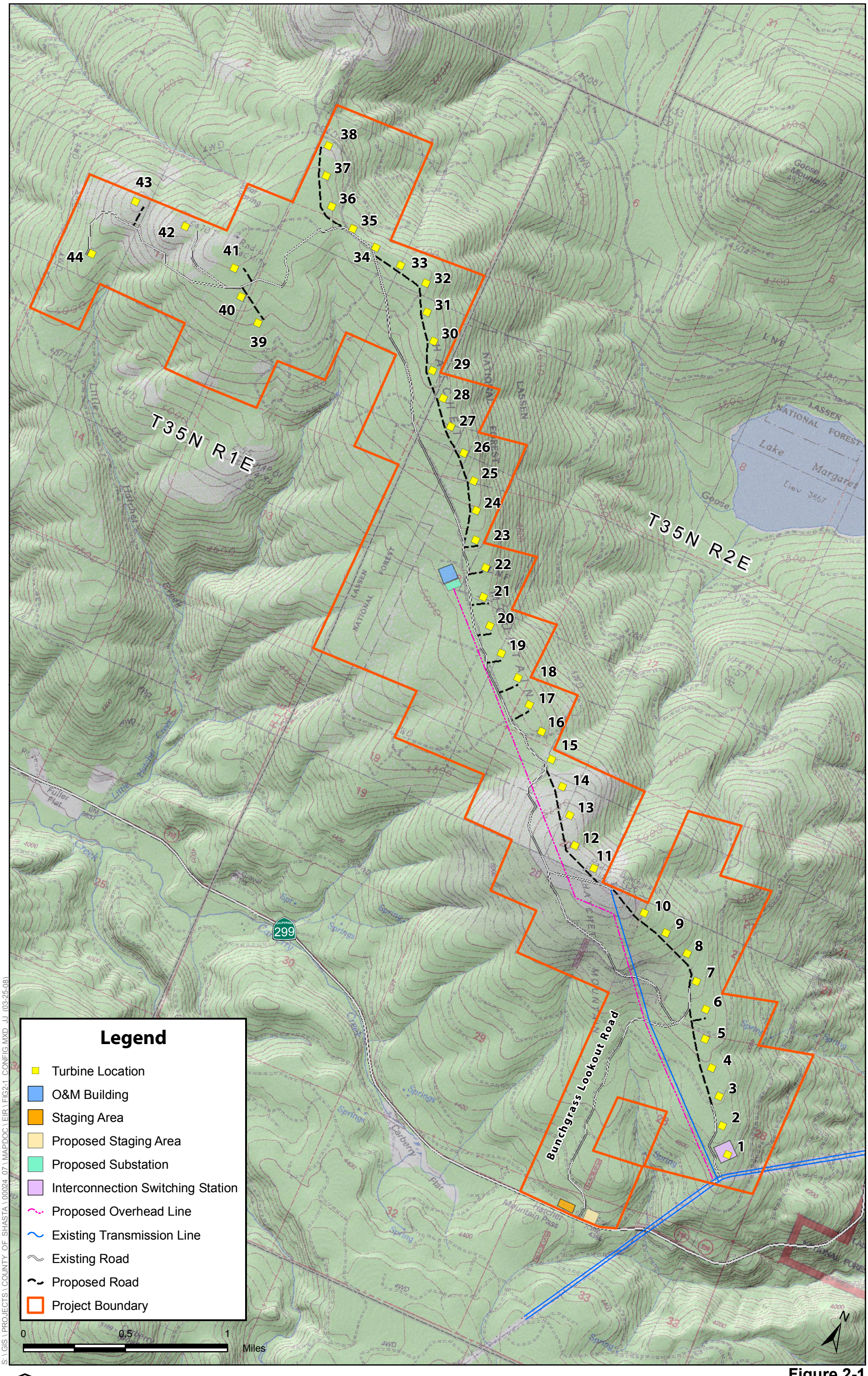
Cultural resource monitors from the Pit River Tribe will be invited by the project owner to monitor initial ground-disturbing construction activities associated with the proposed project in areas identified by the Tribe as culturally sensitive to ensure that more discrete sacred localities in the project area are avoided or that impacts on such localities are mitigated to the extent feasible, including, but not limited to, avoidance or data recovery. The Pit River Environmental Office should coordinate with the appropriate Achumawi bands (Itsatawi and Madesi) to assign monitors.~~Cultural resource monitors from the Pit River Tribe will monitor ground-disturbing construction activities associated with the proposed project to ensure that more discrete sacred localities in the project area are avoided or that impacts on such localities are mitigated to the extent feasible. The Pit River Environmental Office will coordinate with the appropriate Achumawi bands (Itsatawi and Madesi) to assign monitors.~~

Section 3-12, Transportation/Traffic

Page 3-12.10

Although no comment was received to this effect, it was noted during review that one mitigation measure was misnumbered. That error is corrected here.

Mitigation Measure TRA-~~6~~2: Consult with FAA to meet the FAA requirements



Jones & Stokes

Figure 2-1
Representative Configuration of the Proposed Hatchet Ridge Wind Project

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Invertebrates				
Valley elderberry longhorn beetle	T/–	Streamside habitats below 3,000 feet throughout the Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberry is the host plant	None; the project is outside the geographic (elevational) range of the species~~no suitable habitat (i.e. elderberry shrubs) in project area~~
Amphibians				
California red-legged frog *Rana aurora draytonii*	–/T	Along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama to Fresno Counties	Permanent and semipermanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation; may aestivate in rodent burrows or cracks during dry periods	None; no known occurrences within 10-mile radius of project area; no suitable habitat in project area
Cascades frog *Rana cascadae*	–/SSC	Shasta-Trinity region east to the Modoc Plateau and south to the Lassen area and the upper Feather River system	Ephemeral and permanent ponds and streams; oviposition habitat is open, shallow water in unshaded areas; overwinters underwater or in saturated ground	Moderate; known occurrences within 10-mile radius of project area; limited suitable habitat present in project area
Foothill yellow-legged frog *Rana boylii*	–/SSC	Klamath, Cascade, North Coast, South Coast, Transverse, and Sierra Nevada Ranges up to approximately 6,000 feet	Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along the edge; usually found near riffles with rocks and sunny banks nearby	None; no known occurrences within 10-mile radius of project area; no suitable habitat in project area
Shasta salamander *Hydromantes shastae*	–/T	Restricted to several tributaries of the McCloud River, Pit River, and Squaw Creek in Shasta County	Limestone caves at elevations from 1,000 to 3,000 feet, volcanic and other rock outcroppings; in rainy periods found under woody debris in mixed pine-hardwood stands	None; recorded occurrences within 12-mile radius of project area but project area is above species' known elevational range
Tailed frog *Ascaphus truei*	–/SSC	Northwestern California from Del Norte to central Sonoma Counties and east as far as southwest Shasta County	Cool, perennial, swiftly flowing streams in conifer dominated habitat including redwood, Douglas-fir, Klamath mixed conifer, and ponderosa pine habitats; also in montane hardwood conifer habitats	None; known occurrences within 12-mile radius of project area but no suitable habitat in project area

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Reptiles				
Northwestern pond turtle *Clemmys marmorata marmorata*	–/SSC	Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	None; known occurrences within 10-mile radius of project area but no suitable habitat in project area
Birds				
American peregrine falcon *Falco peregrinus anatum*	–/E, FP	Permanent resident along North and South Coast Ranges; may summer in Cascade and Klamath Ranges and through the Sierra Nevada to Madera County; winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large prey populations	Low; two nesting records within 10-mile radius of project area; no suitable nesting or foraging habitat in project area; not observed during WEST surveys; ~~may fly through project area during migration or movement between foraging areas~~
Bald eagle *Haliaeetus leucocephalus*	–/E, FP	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, and east of the Sierra Nevada south of Mono County	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, reservoir, stream, or the ocean	High; known occurrences within 10-mile radius of project area, including Lake Margaret; no suitable nesting or foraging habitat in project area; several sightings during WEST surveys
California horned lark *Eremophila alpestris actia*	–/SSC	Throughout much of the state; less common in mountainous areas of the north coast and in coniferous or chaparral habitats	Common to abundant resident in a variety of open habitats, usually where large trees and shrubs are absent; grasslands and deserts to dwarf shrub habitats above tree line	Low; no known ~~records~~ occurrences within 10-mile radius of project area; limited suitable habitat in project area; not observed during WEST surveys~~; suitable habitat in project area~~

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Northern spotted owl *Strix occidentalis caurina*	T/SSC	A permanent resident throughout its range; found in the north Coast, Klamath, and western Cascade Ranges from Del Norte to Marin Counties	Dense old-growth or mature forests dominated by conifers with topped trees or oaks available for nesting crevices	~~Moderate~~Low; known occurrences within 10-mile radius of project area; no suitable nesting and limited suitable foraging habitat in project ~~vicinity~~area; not observed during WEST surveys ~~but may fly through project area during dispersal~~
Cooper's hawk *Accipiter cooperii*	–/SSC	Throughout California except high altitudes in the Sierra Nevada; winters in the Central Valley, southeastern desert regions, and plains east of the Cascade Range	Nests in a wide variety of habitat types, from riparian woodlands and grey pine–oak woodlands through mixed conifer forests	~~High~~Moderate; known occurrences within 10-mile radius of project area; suitable foraging habitat in project area; observed during WEST surveys.
Ferruginous hawk *Buteo regalis*	–/SSC	Does not nest in California; winter visitor along the coast from Sonoma to San Diego Counties, east to the Sierra Nevada foothills and southeastern deserts, the Inyo-White Mountains, the plains east of the Cascade Range, and Siskiyou County	Open terrain in plains and foothills where ground squirrels and other prey are available	~~High~~Low; project is outside geographic range of the species; no known occurrences within 10-mile radius of project area; ~~no suitable habitat in project area; does not nest in project area; sighted~~ observed once during WEST surveys~~; known to pass through project area during migration~~
Golden eagle *Aquila chrysaetos*	–/SSC, FP	Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands such as the Central Valley	Nest on cliffs and escarpments or in tall trees overlooking open country; forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals	~~High~~Low; no known occurrences within a 10-mile radius; no suitable habitat in project area; ~~does not nest in project area;~~ observed once ~~sighted~~ during WEST surveys~~; known to pass through project area during migration~~

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Greater sandhill crane *Grus canadensis tabida*	–/T, FP	Breeds in Siskiyou, Modoc, Lassen, Plumas, and Sierra Counties; winters in the Central Valley, southern Imperial County, Lake Havasu National Wildlife Refuge, and the Colorado River Indian Reserve	Summers in open terrain near shallow lakes or freshwater marshes; winters in plains and valleys near bodies of fresh water	High; one known occurrence within 10-mile radius of project area; no suitable habitat in project area; ~~does not nest in project area;~~observed migrating over project area ~~sighted~~ during WEST surveys ~~known to pass through project area during migration~~
Long-eared owl *Asio otus*	–/SSC	Permanent resident east of the Cascade Range from Placer County to the Oregon border, east of the Sierra Nevada from Alpine County to Inyo County; scattered breeding populations along the coast and in southeastern California; winters throughout the Central Valley and southeastern California	Nests in abandoned crow, hawk, or magpie nests, usually in dense riparian stands of willows, cottonwoods, live oaks, or conifers	Low; no known occurrences within 10-mile radius of project area; limited ~~no~~ suitable habitat in~~on~~ project area; not observed during WEST surveys~~; limited suitable habitat in project area~~
Merlin *Falco columbarius*	–/SSC	Does not nest in California; rare but widespread winter visitor to Central Valley and coastal areas	Forages along coastline in open grasslands, savannas, and woodlands; often forages near lakes and other wetlands	Low; no known occurrences in project area; no suitable habitat in project area; not observed during WEST surveys~~may fly through project area during migration~~
Northern goshawk *Accipiter gentilis*	–/SSC	Permanent resident in Klamath and Cascade Ranges, North Coast Ranges from Del Norte to Mendocino Counties, and Sierra Nevada south to Kern County; winters in Modoc, Lassen, Mono, and northern Inyo Counties	Nests and roosts in older stands of red fir, Jeffrey pine, ponderosa pine, lodgepole pine, Douglas-fir, and mixed conifer forests	~~High~~Moderate; known occurrences within 10-mile radius of project area; no nesting but suitable foraging habitat in project area; not observed during WEST surveys ~~may fly through project area during migration or between foraging areas~~

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Osprey *Pandion haliaetus*	–/SSC	Nests along the north coast from Marin to Del Norte Counties, east through the Klamath and Cascade Ranges, and in the upper Sacramento Valley; important inland breeding populations at Shasta Lake, Eagle Lake, and Lake Almanor and small numbers elsewhere south through the Sierra Nevada; winters along the coast from San Mateo to San Diego Counties	Nests in snags, trees, or utility poles near the ocean, large lakes, or rivers with abundant fish populations	High; known occurrences within 10-mile radius of project area; no suitable foraging or nesting habitat in project area; two observations during WEST surveys ~~may fly through project area during migration or between foraging areas~~
Prairie falcon *Falco mexicanus*	–/SSC	Permanent resident in the South Coast, Transverse, Peninsular, and northern Cascade Ranges, the southeastern deserts, Inyo-White Mountains, foothills surrounding the Central Valley, and Sierra Nevada in Modoc, Lassen, and Plumas Counties; winters in Central Valley, along the coast from Santa Barbara to San Diego Counties, and in Marin, Sonoma, Humboldt, Del Norte, and Inyo Counties	Nests on cliffs or escarpments, usually overlooking dry, open terrain or uplands	Low; no known occurrences within 10-mile radius of project area; no suitable habitat in project area; not observed during WEST surveys~~; no suitable habitat in project area; may fly through project area during migration or between foraging areas~~
Purple martin *Progne subis*	–/SSC	Coastal mountains south to San Luis Obispo County, west slope of the Sierra Nevada, and northern Sierra and Cascade ranges; absent from Central Valley except in Sacramento; isolated, local populations in southern California	Nests in abandoned woodpecker holes in oaks, cottonwoods, and other deciduous trees in a variety of wooded and riparian habitats; also nests in vertical drainage holes under elevated freeways and highway bridges	Low; no known occurrences within 10-mile radius of ~~in~~ project area; no suitable nesting habitat in project area; not observed during WEST surveys ~~no suitable nesting habitat in project area~~
Sharp-shinned hawk *Accipiter striatus*	–/SSC	Permanent resident in the Sierra Nevada, Cascade, Klamath, and North Coast Ranges at mid-elevations and along the coast in Marin, San Francisco, San Mateo, Santa Cruz, and Monterey Counties; winters over the rest of the state except at very high elevations	Dense canopy ponderosa pine or mixed-conifer forest and riparian habitats	High; no known occurrences within 10-mile radius of project area; suitable habitat in project area; observed during WEST surveys ~~no suitable habitat in project area; may fly through project area during migration or between foraging areas~~

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Vaux's swift *Chaetura vauxi*	–/SSC	Coastal belt from Del Norte to Santa Cruz Counties and in mid-elevation forests of Sierra Nevada and Cascade Range	Nests in hollow, burned-out tree trunks in large conifers	Low; no known occurrences within 10-mile radius of project area; no suitable habitat in project area; not observed during WEST surveys~~; no suitable habitat in project area; may fly through project area during migration or movement between foraging areas~~
Willow flycatcher *Empidonax traillii*	–/E	Summers along western Sierra Nevada from El Dorado to Madera Counties; in Cascades and northern Sierra Nevada in Trinity, Shasta, Tahama, Butte, and Plumas Counties; and along eastern Sierra Nevada from Lassen to Inyo Counties	Riparian areas and large wet meadows with abundant willows. Usually found in riparian habitats during migration	Low; known occurrences within 10-mile radius of the project area; no suitable habitat in project area; not observed during WEST surveys ~~no suitable habitat in project area; may fly through project area during migration~~
Yellow warbler *Dendroica petechia brewsteri* (nesting)	–/SSC	Nests throughout California except Central Valley, Mojave Desert region, and high altitudes and eastern side of Sierra Nevada; winters along Colorado River and in parts of Imperial and Riverside Counties; two small permanent populations in San Diego and Santa Barbara Counties	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders or in mature chaparral; may also use oaks, conifers, and urban areas near stream courses	~~High~~Moderate; no known occurrences within 10-mile radius of project area; limited suitable habitat in project area; observed during WEST surveys ~~limited suitable nesting habitat in project vicinity~~
Yellow-breasted chat *Icteria virens*	–/SSC	Nests locally in coastal mountains and Sierra Nevada foothills, east of the Cascades in northern California, along the Colorado River, and very locally inland in southern California	Nests in dense riparian habitats dominated by willows, alders, Oregon ash, tall weeds, blackberry vines, and grapevines	~~None~~Low; no known occurrences within 10-mile radius of project area; no suitable nesting habitat in project area; not observed during WEST surveys~~; no suitable nesting habitat in project area~~
Mammals				
Sierra Nevada snowshoe hare *Lepus americanus tahoensis*	–/SSC	Cascade Range in Siskiyou and Del Norte Counties and Sierra Nevada from Mt. Lassen to Mono and Tulare Counties, generally between 4,800 and 8,000 feet	Dense thickets of conifers, riparian vegetation, or chaparral in boreal life zones	High; observed in project area during J&S reconnaissance survey

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
American badger *Taxidea taxus*	–/SSC	Uncommon, permanent resident throughout the state except for north coast	Most abundant in drier, open stages of most shrub, forest, and herbaceous habitats with friable soils	Low; one record within 10-mile radius of project area; suitable habitat in project area
California wolverine *Gulo gulo luteus*	–/T, FP	Klamath and Cascade Ranges south through Sierra Nevada to Tulare County	Sighted in a variety of habitats from 1,600 to 14,200 feet; most common in open terrain above timberline and subalpine forests	Low; known occurrences within 10-mile radius of project area; last occurrence record in 1983; suitable habitat in project area
Pacific fisher *Martes pennanti pacifica*	C/SSC	Coastal mountains from Del Norte to Sonoma Counties, east through Cascades to Lassen County, and south in Sierra Nevada to Kern County	Late successional coniferous forests and montane riparian habitats	Low; known occurrences within 10-mile radius of project area; limited poor quality habitat in project area
Pacific Townsend's (=western) big-eared bat *Corynorhinus townsendii townsendii*	–/SSC	Coastal regions from Del Norte to Santa Barbara Counties	Roosts in caves, tunnels, mines, and dark attics of abandoned buildings; very sensitive to disturbances and may abandon a roost after one onsite visit	Low; no known occurrences within 10-mile radius of project area; not detected during WEST surveys; no roosting habitat and marginal foraging habitat in project area
Pallid bat *Antrozous pallidus*	–/SSC	Throughout California except high Sierra from Shasta to Kern Counties and the northwest coast, primarily at lower and mid-elevations	Occurs in a variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California; relies heavily on trees for roosts	Moderate; no known occurrences within 10-mile radius of project area; suitable habitat in project area; possible detection during WEST surveys~~; suitable habitat in project area~~
Spotted bat *Euderma maculatum*	–/SSC	Throughout eastern and southern California, central Sierra Nevada, and Sierra Nevada foothills bordering the San Joaquin Valley; one recent record from northern California in the Trinity Alps; probably occurs in other portions of the state where habitat is suitable	Wide variety of habitats from low desert to high-elevation coniferous forest, primarily in areas associated with cliff and canyon habitat; females may favor ponderosa pine forests during reproduction	Moderate; one known occurrence in project area; no roosting habitat and suitable foraging habitat in project area

Common Name *Scientific Name*	Status Fed/State	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Western mastiff bat *Eumops perotis californicus*	–/SSC	Along western Sierra Nevada primarily at low to mid-elevations and widely distributed throughout Southern Coast Ranges; north to the Oregon border	Wide variety of habitats from desert scrub to montane conifer; roosts and breeds in deep, narrow rock crevices, but may also use crevices in trees, buildings, and tunnels	Moderate; no known occurrences within 10-mile radius of project area; suitable foraging habitat in project area; not observed during WEST surveys ~~suitable foraging habitat in project area~~

Status explanations:

Federal

T = listed as threatened under the federal Endangered Species Act.

C = species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

T = listed as threatened under the California Endangered Species Act.

FP = fully protected under the California Fish and Game Code.

SSC = species of special concern in California.

– = no listing.

~~Potential Occurrence in the Study Area~~

~~High: Known occurrences of the species within the study area, or CNDDB or other source records occurrence of the species within a 10-mile radius of the study area. Suitable habitat is present within the study area.~~

~~Moderate: CNDDB or other source records occurrence of the species within a 10-mile radius of the study area. Poor quality suitable habitat is present within the study area.~~

~~Low: CNDDB or other source does not record occurrence of the species within a 10-mile radius of the study area. Suitable habitat is present within the study area.~~

Chapter 4

Mitigation Monitoring and Reporting Program

4.1 Introduction

An environmental impact report (EIR) was prepared to comply with the California Environmental Quality Act (CEQA) for the Hatchet Ridge Wind Project (proposed project). The EIR identified potentially significant environmental impacts as well as mitigation measures to reduce the significance of those impacts, where feasible. Potentially significant and unavoidable impacts were identified for the resource areas listed below.

- Aesthetics and visual resources.
- Biological resources.
- Cultural resources.

4.2 Regulatory Background

CEQA provides that when an agency approves a project for which mitigation is required, that agency must adopt a mitigation monitoring and reporting program (MMRP) that ensures the mitigation measures will be implemented (Public Resources Code [PRC] Section 21081.6[a]). The MMRP addresses those mitigation measures identified in the EIR that are the responsibility of the agency to implement. CEQA's mandate is rather brief and gives agencies leeway in designing their MMRPs: some agencies focus on monitoring, some focus on reporting, and some focus on both.

This MMRP has been prepared to comply with Section 21081.6(a)(1) of the PRC, which requires that:

> The public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation.

This MMRP is intended to ensure the effective implementation of mitigation measures that are within the authority of the Shasta County Department of Resource Management (County) to implement (including monitoring where identified) throughout all phases of construction of the proposed project.

4.3 Implementation of Mitigation and Monitoring

The County, as lead agency under CEQA, has developed this MMRP for the proposed project. This MMRP is designed to ensure that the mitigation measures adopted by the County for this project are implemented.

This MMRP lists all mitigation measures identified in the EIR for the proposed project. In general, monitoring becomes effective at the time the action is taken on the project. The timing of monitoring is organized as follows.

- Prior to construction: The monitoring activity consists of ensuring that a particular mitigation action has taken place prior to the beginning of any construction or grading activities, i.e., before the County issues grading or building permits.
- During construction: The monitoring activity consists of active monitoring while grading or construction is occurring on the project site.
- After construction/ongoing: The monitoring activity consists of monitoring after the grading and construction phase of the project has been completed and is related to ongoing operation and maintenance.

The implementation timing of certain mitigation measures is also noted when different from the above-listed categories.

The MMRP is presented in Table 4-1. For each adopted mitigation measure, the table identifies the characteristics listed below.

- The timing of implementation.
- The mitigation measure.
- The implementing party.
- The monitoring party.

Each mitigation measure is copied from the certified final EIR. The table will be used as a reference by the County to identify the applicable measures and to ensure that they have been implemented in a timely manner.

The County will bear the primary responsibility for ensuring that the mitigation measures are implemented. When project work is undertaken by the County's or developer's contractors, the pertinent mitigation measures will be included in the terms and conditions of the contracts. The County's construction inspectors will undertake regular inspections of the job site to ensure that contractors are implementing the mitigation measures and complying with their contract. The County's project manager will be responsible for ensuring that mitigation measures that are the responsibility of the County are carried out.

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Aesthetics and Visual Resources				
Mitigation Measure AES-1 Use rapid discharge flashing red safety lighting	As discussed in Chapter 2, Project Description, studies have suggested that use of a flashing red light reduces the visual impacts on neighboring communities. To comply with FAA regulations, a rapid-discharge flashing red light will be used rather than a single incandescent light.	Installation prior to project operation	Shasta County Department of Resource Management—Planning/ FAA	
Air Quality				
Mitigation Measure AIR-1 Implement SCAQMD required standard mitigation measures	The project applicant will require the construction contractor to implement all feasible Standard Mitigation Measures. Such measures include but are not limited to those listed below. ■ PM10 Controls. ❑ Alternatives to open burning of vegetative material on the project site will be used by the project applicant unless otherwise deemed infeasible by the AQMD. Examples of suitable alternatives are chipping, mulching, and conversion to biomass fuel. ❑ The applicant will be responsible for ensuring that all adequate dust control measures are implemented in a timely and effective manner during all phases of project development and construction. ❑ All material excavated, stockpiled, or graded should be sufficiently watered to prevent fugitive dust from leaving property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering should occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day. ❑ All areas (including unpaved roads) with vehicle traffic should be watered periodically or have dust palliatives applied for stabilization of dust emissions. ❑ All onsite vehicles should be limited to a speed of 15 miles per hour on unpaved roads. ❑ If ground-disturbing activities are conducted under windy conditions (in excess of 20 miles per hour), the applicant will ensure that best available dust prevention techniques are used during such activities and will increase the frequency of watering to protect air quality as needed. ❑ All inactive portions of the development site should be seeded and watered until suitable grass cover is established. ❑ The applicant will be responsible for applying (according to manufacturer's specifications) nontoxic soil stabilizers to all inactive construction areas (previously graded areas that remain inactive for 96 hours) in accordance with the Shasta County Grading Ordinance. ❑ All trucks hauling dirt, sand, soil, or other loose material should be covered or should maintain at least 2 feet of freeboard (i.e., minimum vertical distance between top of the load and top of the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision will be enforced by local law enforcement agencies. ❑ All material transported off site will be either sufficiently watered or securely covered to prevent a public nuisance. ❑ During initial grading, earth moving, or site preparation, the project will be required to	Implementation during construction	Shasta County AQMD and Department of Resource Management — Planning	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	construct a paved (or dust palliative–treated) apron, at least 100 feet in length, onto the project site from the adjacent paved road(s). ❑ Paved streets adjacent to the development site should be swept or washed at the end of each day to remove excessive accumulations of silt and/or mud that may have accumulated as a result of activities on the development site. ❑ Adjacent paved streets will be swept (recommend water sweeper with reclaimed water) at the end of each day if substantial volumes of soil materials have been carried onto adjacent public paved roads from the project site. ❑ Wheel washers will be installed where project vehicles and/or equipment enter and/or exit onto paved streets from unpaved roads. Vehicles and/or equipment will be washed prior to each trip. ❑ Prior to final occupancy, the applicant will reestablish ground cover on the construction site through seeding and watering in accordance with the Shasta County Grading Ordinance. ■ Streets. ❑ The project will provide for temporary traffic control as appropriate during all phases of construction to improve traffic flow as deemed appropriate by the Department of Public Works and/or Caltrans. Construction activities will be scheduled to direct traffic flow to off-peak hours as much as practicable.			
Mitigation Measure AIR-2 Implement additional measures to reduce construction emissions	The project applicant will require construction contractors to implement measures to reduce construction-related emissions. All feasible measures should be implemented including but are not limited to those listed below. ■ Limit the area subject to excavation, grading, and other construction activity at any given time. ■ Limit the hours of operation of heavy-duty equipment and/or the amount of equipment in use. ■ Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run by a portable generator set). ■ Require that all diesel engines be shut off when not in use to reduce emissions from idling. ■ During the smog season (May through October), lengthen the construction period to minimize the number of vehicles and equipment operating at the same time. ■ Off-road trucks should be equipped with on-road engines when possible. ■ Minimize obstruction of traffic on adjacent roadways. ■ Power construction equipment with diesel engines fueled by alternative diesel fuel blends or ultra low sulfur diesel (ULSD). Only fuels that have been certified by ARB should be used. ARB has verified specific alternative diesel fuel blends for NOX and PM emission reduction. The applicant should also use ARB-certified alternative fueled (compressed natural gas [CNG], liquid propane gas [LPG], electric motors, or other ARB certified off-road technologies] engines in construction equipment where practicable. ■ Use construction equipment that meets the current off-road engine emission standard (as certified by ARB) or that is re-powered with an engine that meets this standard. Tier I, Tier II, and Tier III	Implemented during construction	Shasta County AQMD and Department of Resource Management — Planning	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	engines produce significantly less NOX and PM emissions than uncontrolled engines.			
Biological Resources				
Mitigation Measure BIO-1 Avoid Butte County morning-glory	Wherever possible, redesign the location of the facilities to avoid habitat for Butte County morning-glory. The applicant will, to the extent possible, adjust the location of six turbines and associated access roads currently planned for construction in Butte County morning-glory habitat. If this avoidance measure is not possible, the applicant will implement Mitigation Measure BIO-2.	Prior to initiating construction and ongoing throughout construction	Shasta County Department of Resource Management—Planning	
Mitigation Measure BIO-2 Minimize impacts on Butte County morning-glory	Butte County morning-glory appears to have a patchy distribution within the population in the project area. The applicant will minimize impacts on Butte County morning-glory by locating facilities in unoccupied patches of the population, or in areas that support the lowest densities of plants. To accomplish this measure, a qualified botanist (a *qualified botanist* is defined as a person with at least an undergraduate degree in botany or biology and specific experience conducting botanical surveys in the region surrounding the project area for at least 3 years/seasons) will conduct a detailed survey of the area prior to construction to describe and map the exact boundaries of the population in the project area and the density of plants within the population. The survey must be conducted during the appropriate time of year, and the results of the survey as well as final facility siting must be submitted to the California Department of Fish and Game (DFG) and the Shasta County Department of Resource Management and approved by both agencies prior to construction. For Butte County morning-glory habitat temporarily disturbed during construction (approximately 15 acres), the applicant will confine the work area to the minimum amount necessary to complete the work. Where temporary disturbance is necessary, the applicant will conduct project activities and necessary ground disturbance in a manner that is consistent with the successful reestablishment of the species. A list of specific actions necessary to ensure successful reestablishment of the species following temporary disturbance, and the locations where these actions will be implemented, will be prepared by a qualified botanist, submitted to DFG and the Shasta County Department of Resource Management, and approved by both agencies prior to construction. Finally, to minimize impacts on Butte County morning-glory resulting from the potential introduction of invasive species, the applicant will implement invasive species control measures during construction and implement monitoring for a period of 3 years following construction. Prior to construction, the applicant must conduct a survey to map invasive species within the project area. During construction, the applicant will implement measures to prevent the spread of existing invasive species as determined necessary by a qualified botanist. Following construction, the applicant will monitor the project area every year for a period of 3 years during the appropriate period(s) of the year to ensure that invasive species have not been spread into new areas or that no new invasive species have been introduced. Through coordination with the Shasta County Department of Resource Management, and under the judgment of a qualified botanist, the applicant will implement measures to control invasive species if deemed necessary. An invasive species control plan must be submitted to the Shasta County Department of Resource Management and DFG prior to construction. Additionally, invasive species monitoring and treatment reports must be submitted to the Shasta County Department of Resource	Prior to initiating construction and ongoing throughout construction	Shasta County Department of Resource Management—Planning /DFG	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	Management and DFG annually following the completion of construction activities.			
Mitigation Measure BIO-3 Avoid and minimize disturbance of waters of the United States, including wetlands	■ Redesign or modify the project to avoid direct and indirect impacts on wetlands and streams, if feasible. ■ Avoid all wetlands and other waters of the United States by installing orange construction barrier fencing (and sedimentation fencing in some cases) between the construction site and the wetland/other waters areas. ■ Avoid construction activities in saturated or ponded wetlands and streams during the wet season to the maximum extent possible. Where such activities are unavoidable, protective practices, such as use of padding or vehicles with balloon tires, will be employed. ■ If deemed necessary by USACE during the Section 404 permit process, use geotexile cushions and other materials (e.g., timber pads, prefabricated equipment pads, geotextile fabric) in saturated conditions to minimize damage to the substrate and vegetation. ■ Stabilize exposed slopes and stream banks immediately upon completion of construction activities. Other waters of the United States will be restored in a manner that encourages vegetation to reestablish to preproject conditions and contours to reduce the effects of erosion on the drainage system. ■ Restrict any instream construction within the ordinary high water mark to the low-flow period of May through October. ■ Complete all activities promptly to minimize their duration and resulting impacts. ■ Prohibit equipment access or staging in or within 250 feet of wetlands and other waters of the United States along existing access roads. Confine access to existing roads. ■ Keep all protective measures in place until all construction activities have been completed near the resource; remove such measures immediately following construction activities. ■ Locate all turbines and project infrastructure (roads, substations, and other facilities) away from wetlands and drainages. Establish a setback as described below. ■ Construct project components using the setback recommendations established in USACE and California Department of Fish and Game guidance: a 100-foot setback from wetlands and streams and a 250-foot setback from wetlands, streams, and ephemeral pools that provide habitat for special-status species. ■ Retain a qualified wetland biologist to identify and flag the boundaries of wetlands prior to construction as "exclusion areas"; construction crews will follow the recommended setbacks. ■ Appurtenant project facilities (e.g., underground cables) will be sited at least 250 feet from identified wetland resources. ■ Ground disturbance during construction will be sited at least 100 feet from the boundaries of delineated wetlands to the extent feasible to minimize secondary effects on the resources. ■ All fueling and storage areas will be located at least 250 feet from intermittent streams and wetlands to prevent spills of fuel or other hazardous materials from entering receiving waters. ■ Develop a Spill Prevention and Containment Plan and maintain appropriate equipment on site to	Prior to initiating construction and ongoing throughout construction	USACE	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	prevent adverse impacts on wetlands that could result from an inadvertent spill.			
Mitigation Measure BIO-4 Conduct vegetation removal activities during the non-breeding season	To avoid potential impacts on nesting yellow warblers, raptors, and other migratory birds, all initial ground disturbance and vegetation removal activities will occur during the non-breeding season (i.e., August 15–March 1). If vegetation removal activities during the breeding season cannot be avoided, implement Mitigation Measure BIO-6.	During construction activities (April–August 15)	DFG	
Mitigation Measure BIO-5 Conduct preconstruction surveys for nesting birds and avoid active nest sites	To avoid potential impacts on nesting yellow warblers, raptors, and other migratory birds, a preconstruction survey will be conducted to locate all active nests of special-status birds and birds protected under the Migratory Bird Treaty Act. Nest sites of special-status raptors will be avoided and no vegetation removal activities will occur within a 0.25-mile radius of the nest until the young have fledged or the nest has failed, as determined by a qualified biologist. No vegetation removal activities will be conducted within 100 feet of the nests of nesting songbirds until the young have fledged or the nest has failed, as determined by a qualified biologist.	Preconstruction surveys to be conducted prior to initiating construction; activities ongoing throughout construction	DFG	
Mitigation Measure BIO-6 Monitor avian and bat mortality rates and implement adaptive management measures, if necessary	Mitigation Measure BIO-6 involves preparing and implementing a multifaceted program of avian and bat mortality monitoring and implementing adaptive management measures, as needed. It comprises the components listed below. ■ Forming a technical advisory committee (TAC). ■ Preparation and implementation of an avian and bat mortality monitoring study plan. ■ Preparation and submittal of annual monitoring reports. ■ Review of results and implementation of adaptive management measures, if necessary. ■ Conducting an avian use study. ■ Offsite mitigation funding. **Technical Advisory Committee.** At the direction of the County, the project proponent will be responsible for the formation of a Technical Advisory Committee (TAC). Participation on the technical advisory committee will include, at a minimum, a representative of the project proponent, the California Department of Fish and Game, the U.S. Fish and Wildlife Service, conservation organization(s) (e.g., Wintu Audubon Society), the landowners, and at least two experts with experience in avian mortality associated with windfarms and/or other electrical infrastructure. One of these two experts will have significant expertise in statistical analysis of avian mortality data. Final participation on the TAC will be at the discretion of the County. The TAC will be formed prior to the initiation of project operations. The purpose of the TAC is to advise the County on technical matters related to avian and bat mortality issues, including the following: review of proposed research and/or monitoring plans; review of the results of avian and bat mortality monitoring to determine if fatality thresholds (see below) have been exceeded, and to make recommendations to the County Planning Director on which of the actions listed below will be implemented to reduce those fatalities if the thresholds are exceeded. The County Planning Director or his/her designated representative will have sole authority to make decisions concerning	TAC to be formed prior to initiating construction;recommendations implemented throughout construction	Shasta County Deparment of Resource Management—Planning /TAC	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)

monitoring results and adaptive measures.

The TAC will use the best available evidence to make recommendations to the County annually on which of the adaptive management measures listed below should be implemented, and in what specific fashion, to reduce the level of mortality until mortality rates remain below the thresholds defined above. The County will make the final determination of which measures recommended by the TAC will be implemented each year. An adaptive management approach will be used to determine the method resulting in the least restrictions on wind farm operations that the data suggest may have a beneficial effect on reducing mortality rates. Additional measures will be implemented each year there are data to suggest that the restrictions will reduce mortality rates until mortality rates remain below the thresholds defined above.

Monitoring Study. Prior to initiation of project operations (here defined as the beginning of electrical generation), the project applicant will submit an avian and bat mortality monitoring study plan for approval by the County. The purpose of the study will be to determine avian and bat mortality rates resulting from project operations. Following initiation of project operations, the project proponent will fund and implement, at the direction of the County, the avian mortality monitoring study plan. The monitoring study will require, at a minimum, searches of 30% of the turbines twice weekly using plot sizes and search protocols recommended in the California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development, published by the California Energy Commission (California Energy Commission and California Department of Fish and Game 2006). The study will be designed to estimate the mortality rate for each species and species group listed below. Mortality rates must be adjusted to take into account potential biases resulting from variation in searcher efficiency, carcass removal by predators and scavengers, and other known sources of bias.

Annual Monitoring Reports and Thresholds. The information will be compiled, analyzed, and documented in annual reports for a period of 2 years after all turbines have been placed in operation. The data will be made available to the public for use in the evaluation of avian mortality associated with wind farm projects. If mortality rates of bald eagle or sandhill crane do not meet or exceed the level at which populations may be adversely affected (listed below; see also the discussion in Operational Impacts above [page 3.4-19 of the Draft EIR]), and mortality of owls, diurnal raptors, or yellow warbler do not exceed the levels defined below, no further mortality monitoring will be required.

Bald eagle	3 fatalities per year
Greater sandhill crane	5 fatalities per year
Yellow warbler	0.07 fatalities per turbine per year
Owls	0.11 fatalities per turbine per year
Diurnal raptors	0.35 fatalities per turbine per year

If mortality rates meet or exceed the levels defined above, the avian mortality monitoring will be continued until mortality rates remain below all the thresholds defined above for a period of 2 consecutive years.

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	Adaptive Management Measures. The TAC will make a recommendation to the County, if thresholds defined above are met or exceeded, on which of the measures listed below should be implemented. ■ Alterations to habitats within the project area that reduce the level of attractants to the project area by species whose mortality thresholds have been exceeded. Examples include control of raptor prey species (e.g., ground squirrels, chipmunks, woodrats, pocket gophers) or the habitat elements (e.g., rock piles, particular shrub species) on which they depend. ■ Timing restrictions on the operation of one or more turbines (time of day or seasonal shutdown). Turbines are shut down when the turbine blades are "feathered" horizontally in the wind, and the turbines stop rotating. ■ Permanent shutdown of one or more turbines. ■ Relocation of one or more turbines. Although current information suggests that use of lighting and other means for discouraging use of the project area by avian species are not effective, new research or technologies may become available in the future that are effective. The TAC may recommend, and the County may require, additional monitoring and the implementation of additional mitigation measures, such as use of lighting, sounds, or other means of discouraging use of the project area by species or species groups experiencing high mortality rates, if new information suggests that use of these technologies is likely to have an appreciable beneficial effect. **Avian Use Study.** To provide a context for interpretation of avian fatality data and insight into turbine-specific fatality data, 1 year of avian use studies will be conducted as specified in the CEC Guidelines. The avian use study will be conducted concurrently with the avian and bat mortality monitoring study. **Offsite Mitigation Funding.** In addition to the foregoing mitigation measures, the project proponent has agreed to make funds available to be used for offsite mitigation, which may include any of the measures listed below. ■ Acquisition, development, and/or management of breeding and feeding areas for avian species potentially affected by the project. ■ Creation of artificial nesting habitat (e.g., nest structures). ■ Contributions to established conservation programs for specific species. ■ Establishment of a compensatory mitigation fund for species-specific conservation programs.			

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)

Mitigation Measures Decision Framework for BIO-6

Mitigation Measure Component	Summary Description	Timing/Duration/Formulae	Trigger/Threshold for Additional Mitigation
Technical Advisory Committee	Formation of a Technical Advisory Committee (invited parties shall include one representative each from the CDFG, USFWS, one conservation organization, project operations and construction manager (the owner), and Shasta County Department of Resource Management). The TAC shall be limited to one voting member from each party, with advisors for each party allowed to attend and participate in meetings and lend expertise to the members. See *Technical Advisory Committee* above for further details on the operation of the TAC.	The TAC shall be formed during construction and shall hold its first meeting prior to the commencement of commercial project operations in order to review and make initial recommendations for the monitoring study protocols. Thereafter, the TAC shall meet at least semiannually to review the results of avian fatality monitoring.	If the monitoring studies show that any fatality thresholds have been exceeded, the TAC shall confer to make recommendations to the Planning Director for additional mitigation as outlined below.
Fatality monitoring and thresholds	Fatality monitoring will be conducted by a qualified biologist approved by the TAC and will be used to compare pre-operations predictions of fatality with actual fatalities associated with project operations to determine if impact thresholds have been exceeded. Carcass scavenge calibration shall commence on the first appropriate day for the applicable species after day 1 of operations. In addition the owner shall arrange for a permit to enter for research/monitoring purposes for qualified scientists (when funded by others) subject to approval of the TAC. Additionally, project operations staff will be trained in handling and reporting avian fatalities encountered in the course of turbine maintenance and other regular activities on site. A protocol for project staff will be developed through coordination with the California Department of Fish and Game and the County for appropriate handling and reporting of fatalities. The project owner acknowledges that project staff training is intended to supplement, not substitute, for the formal monitoring study requirements	Three years, beginning as close as possible to the first day of commercial project operations. Additional periods of monitoring shall be required should results of monitoring studies suggest that additional monitoring is warranted. See *Monitoring Study* and *Fatality Thresholds* above for further details.	Referral to the TAC for potential changes to monitoring methods and additional monitoring or research shall occur if the monitoring studies show that the fatality thresholds are exceeded. The TAC shall review the first year of monitoring data to determine whether to recommend to the Planning Director any changes or refinements to the monitoring protocols. Reasons for extending monitoring beyond the 3 years include: fatality of species not expected during pre-project surveys, fatality of special-status or fully protected species exceeding thresholds, and inadequacy of

Mitigation Measure	Description			Timing	Monitoring Responsibility	Verification (date & initial)
		outlined above.	monitoring data. Additional monitoring or changes to the monitoring protocols will be subject to the approval of the Planning Director based upon the recommendations of the TAC.			
	Up-front compensatory mitigation for potential bald eagle and sandhill crane impacts	The owner shall provide for compensatory mitigation prior to construction for potential impacts on bald eagle and sandhill crane.	For sandhill crane and bald eagle, mitigation will involve acquisition, enhancement, or preservation of sufficient offsite breeding habitat at a 2:1 ratio of potential mortality. The project owner will work with the appropriate wildlife refuge to identify appropriate sandhill crane breeding habitat for acquisition. Lands will be transferred to the wildlife refuge for preservation and enhancement. For bald eagle, mitigation will be contribution of $100,000 to a reputable land trust or conservation program approved by DFG and USFWS for the purpose of offsite preservation and enhancement of bald eagle habitat. Proof of initiation of compliance with the up-front compensatory mitigation requirements shall be provided by the project owner to the Planning Director prior to the issuance of any construction permits.	Due to the project's potential for causing fatalities of bald eagle and sandhill crane, which are state fully protected species, compensatory mitigation is mandatory prior to construction.			
	Secondary compensatory mitigation fund	The applicant shall set aside a mitigation fund to be used should threshold exceedances occur. The mitigation fund shall be used for habitat protection and enhancement, additional research, and/or additional mitigation determined to be appropriate by the TAC to address	A mitigation fund shall be set up by the project owner as a one-time endowment or other type of protected principal for individual mitigation activities approved by the Planning Director, based on the	Subject to the Planning Director's review and approval of the recommendations of the TAC, and in addition to all other mitigation herein		

Mitigation Measure	Description				Timing	Monitoring Responsibility	Verification (date & initial)
		threshold exceedances. The TAC will recommend to the Planning Director the best uses of the compensatory mitigation fund.	recommendations of the TAC. The mitigation fund shall be calculated at a rate of $1,000 per MW based on the full capacity of the project. Proof of funding and the details of the fund's principal value, custodial financial institution, and accessibility shall be provided by the project owner to the Planning Director prior to the commencement of commercial project operations.	described, the Secondary Compensatory Mitigation Fund shall be used when the fatality thresholds described above are exceeded in any year of operations			
	Onsite habitat protection and enhancement plan	Onsite habitat modification/protection or enhancement measures shall be implemented if thresholds for additional mitigation are reached or unexpected fatalities occur. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not anticipated in pre-operations studies. Examples of possible mitigation measures include, but are not limited to, protection of nests identified within the project boundary, alterations to habitat within the study area to inhibit or enhance certain species' success, and modification of lighting schemes to address fatalities related to lighting at the project site. The TAC shall review and consider the relevant data and recommend the appropriate habitat protection measures to be implemented for the particular species in question.	The TAC shall make a recommendation to the Planning Director for additional measures to be included in a Habitat Protection and Enhancement Plan. Such measures shall be implemented as specified by the Planning Director, but in all cases shall be fully implemented within 1 year following the final decision of the Planning Director to impose specific additional measures.	If fatality thresholds are exceeded, habitat protection and enhancement measures may be needed, subject to the recommendation of the TAC and approval of the Planning Director.			
	Operations measures	Changes to operations shall be considered only if all other mitigation approaches outlined above are not effective in fully mitigating the impact to a less-than-significant level. Any proposed changes to operations shall be subject to the approval of the Planning Director and must be determined to be reasonable, feasible, and linked to reducing specific impacts identified through the monitoring studies conducted at the project. For example, operations changes that may be implemented include shutdown of individual turbines during times of	Approved on a month-to-month basis and limited to the time periods in which the fatality threshold exceedances occur.	Operational changes shall only be implemented if the fatality threshold exceedance persists and cannot be mitigated to a less-than-significant level by the Habitat Protection and Enhancement Plan, compensatory mitigation, and additional research mitigation approaches			

Mitigation Measure	Description				Timing	Monitoring Responsibility	Verification (date & initial)
		sensitivity of species known to be impacted, if the TAC can determine that a particular turbine location and the spinning of its blades is a cause of the fatalities. Operations shutdowns will be limited to individual turbines where fatality thresholds are consistently exceeded and to the time periods in which the fatality threshold exceedances occur. Shutdowns shall only be approved on a month-to-month basis.		described above. The Planning Director has the ultimate approval authority over any changes to project operations.			
	Additional research	Additional research may be needed if unexpected fatalities occur as a result of operations. Unexpected fatalities include exceedance of the above-established fatality thresholds or fatalities of special-status species not expected in pre-operations studies. The scope of any additional studies shall be limited to addressing specific unexpected fatalities and the results shall be used to determine appropriate additional mitigation measures; the owner shall provide updates to State BIOS and CNDDB records within 6 months of any new information on species occurrences, diversity, or migration.	Additional research to address unexpected fatalities may be needed after the first year of fatality monitoring. The TAC may make recommendations to the Planning Director regarding the protocols of any such additional research.	If fatality thresholds are exceeded, additional research may be necessary, subject to the discretion and recommendations of the TAC. The Planning Director shall have final approval authority over the protocol, timing, and methodology of any such additional research.			

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Cultural Resources				
Mitigation Measure CUL-1 Coordinate with the Pit River Tribe during project development, and prepare a detailed recordation of Hatchet Ridge–Bunchgrass Mountain	The County and the project owner will facilitate a preconstruction meeting and field visit with the Pit River Tribe through the Tribe's chairperson and the Pit River Environmental Office to discuss locations or issues of cultural sensitivity in the proposed project area. The project owner will coordinate with the Tribe to consider ways to minimize impacts on culturally sensitive locations during construction. Additionally, the County and the applicant will coordinate with the Pit River Tribe through the Tribe's chairperson and the Pit River Environmental Office to retain a professional ethnographic consultant to undertake a detailed recordation of Hatchet Ridge–Bunchgrass Mountain. The recordation will commence prior to construction and will include photographic documentation of pre- and postconstruction conditions on Hatchet Ridge–Bunchgrass Mountain. Additional research, particularly into ethnographer Omer C. Stewart's notes filed at the University of California, Berkeley, and interviews with Itsatawi and Madesi individuals, will be referenced in the document. The information gathered as a result of field, interview, and research tasks will be compiled into a report, which will be transmitted to the Pit River Tribe. The Tribe will have the right to determine if the report is submitted to the California Historical Resources Information System. Detailed recordation of Hatchet Ridge–Bunchgrass Mountain in this manner will create a photographic and documentary record of the cultural resource prior to construction of the proposed project, resulting in partial compensation for the loss of the property's character-defining features of isolation, harshness, and serenity.	Survey conducted with Pit River Tribe prior to initiation of construction	Shasta County Department of Resource Management—Planning /Pit River Tribe	
Mitigation Measure CUL-2 Implement a cultural resources monitoring program with the Pit River Tribe during construction	Cultural resource monitors from the Pit River Tribe will be invited by the project owner to monitor initial ground-disturbing construction activities associated with the proposed project in areas identified by the Tribe as culturally sensitive to ensure that more discrete sacred localities in the project area are avoided or that impacts on such localities are mitigated to the extent feasible, including, but not limited to, avoidance or data recovery. The Pit River Environmental Office should coordinate with the appropriate Achumawi bands (Itsatawi and Madesi) to assign monitors.	As a condition of approval, monitoring plan to be developed prior to construction	Shasta County Department of Resource Management—Planning /Pit River Tribe	
Mitigation Measure CUL-3a Stop work if archaeological materials are discovered during construction	If archaeological materials (such as chipped or ground stone, historic debris, building foundations, or non-human bone) are inadvertently discovered during ground-disturbing activities, the construction contractor will stop work in that area and within 100 feet of the find until a qualified archaeologist can assess the significance of the find and develop appropriate treatment measures. Treatment measures will be made in coordination with the Tribe and other parties as appropriate. Treatment measures typically include development of avoidance strategies or mitigation of impacts through data recovery programs such as excavation or detailed documentation. If cultural resources are discovered during construction activities, the construction contractor and lead contractor compliance inspector will verify that work is halted until appropriate treatment measures are implemented. Implementation of this mitigation measure may be sufficient to reduce impacts on archaeological sites to a less-than-significant level.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Planning /Pit River Tribe	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Mitigation Measure CUL-3b Stop work if human remains are discovered during construction	If human remains of Native American origin are discovered during ground-disturbing activities, the County must comply with state laws relating to the disposition of Native American burials, which fall within the jurisdiction of the NAHC (PRC 5097). If human remains are discovered or recognized in any location other than a dedicated cemetery, the County will not allow further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until: ■ the Shasta County coroner has been informed and has determined that no investigation of the cause of death is required; and ■ if the remains are of Native American origin, ❑ the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC 5097.98; or ❑ the NAHC was unable to identify a descendant or the descendant failed to make a recommendation within 48 hours after being notified by the NAHC.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Planning /Pit River Tribe/Shasta County Coroner	
Geology and Soils				
Mitigation Measure GEO-1 Implement recommendations of site-specific geotechnical investigation prepared by state-licensed personnel	As part of the project design process, the Shasta County Department of Resource Management will ensure that the applicant retains appropriately qualified state-licensed professionals (G.E. and C.E.G.) to conduct site-specific geotechnical and engineering geologic investigations consistent with all currently applicable standards of professional geotechnical engineering and engineering geologic practice. The purpose of the investigations will be to provide a geologic basis for the development of appropriate project design. Investigations will address bedrock and Quaternary geology; geologic structure, including primary and secondary seismic hazards as defined by the State of California; soils; slope stability; previous history of excavation and fill placement; earthwork recommendations; and any other topics identified by Shasta County Department of Resource Management, the design engineer(s), the geotechnical engineer, or the engineering geologist as relevant. The results of the study will be presented to the Shasta County Department of Resource Management in the form of a geotechnical and engineering geology report (soils report). The report will include design and/or construction requirements to address any geologic conditions or hazards identified as posing substantial risk to life, safety, or property (including the project), as well as recommendations to ensure that project construction and operation do not exacerbate any existing geologic hazards. The applicant will be responsible for ensuring that project design and construction adheres to all recommendations of the report.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Building	
Mitigation Measure GEO-2 Ensure that the site-specific geotechnical investigation addresses landslide risks	The applicant will ensure that the site-specific geotechnical report prepared for the project evaluates landslide risks, including seismically induced landsliding, in the project area and, where appropriate, identifies mitigation to address these hazards. Any mitigation will be consistent with the current standard of care for geotechnical engineering and engineering geology, and all applicable building codes and standards. The applicant will be responsible for ensuring that all recommendations of the site-specific geotechnical report are implemented.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Building	
Mitigation Measure GEO-3	The proponent will ensure that the site-specific geotechnical report prepared for the project includes an evaluation of the potential for ridgetop shattering to affect project facilities and, if appropriate, identifies	As a condition of project	Shasta County Department of	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Ensure that the site-specific geotechnical investigation addresses ridgetop shattering risks	mitigation to address these hazards. Any mitigation will be consistent with the current standard of care for geotechnical engineering and engineering geology, and all applicable building codes and standards. The applicant will be responsible for ensuring that all recommendations of the site-specific geotechnical report are implemented.	approval; implemented prior to and during construction	Resource Management—Building	
Hazards and Hazardous Materials				
Mitigation Measure HAZ-1 Prepare a Hazardous Materials Business Plan/Spill Prevention Control and Countermeasures Plan	In accordance with the California Health and Safety Code and California Code of Regulations and as part of compliance with the NPDES General Construction Permit, the project applicant will prepare a Hazardous Materials Business Plan/Spill Prevention Control and Countermeasures Plan (Plan) to avoid spills and minimize impacts in the event of a spill. A Plan will be required from the contractor during construction and from the operator during operations. The purpose of the Plan is to ensure that adequate containment would be provided to control accidental spills, that adequate spill response equipment and absorbents would be readily available, and that personnel would be properly trained in how to control and clean up any spills. The County will review and approve the Plan prior to approval of a grading permit. The County will routinely inspect active portions of the project area to verify that the BMPs specified in the Plan are properly implemented and maintained, will immediately notify the contractor if there is a noncompliance issue, and will require compliance. The federal reportable spill quantity for petroleum products, as defined in EPA's guidelines (40 CFR 110) is any oil spill that: (1) violates applicable water quality standards; (2) causes a film or sheen upon or discoloration of the water surface or adjoining shoreline; or (3) causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines. The Plan will include the components listed below. a. The Plan must include a discussion of hazardous materials management, including delineation of hazardous material and hazardous waste storage areas, prevention and response procedures, access and egress routes, and notification procedures. b. The Plan will be provided to all contractors working on the proposed project, and one copy will be available on site at all times. c. The applicant and the applicant's contractors will store all paint, solvents, and any other hazardous materials in the manner specified by the manufacturer and in accordance with federal regulations and nationally and internationally recognized codes and standards. Small spray cans of carburetor fluid and other hazardous materials will be stored in an enclosed area in the O&M building. A material safety data sheet will be stored with each material. d. All employees must be properly trained in the use and handling of these materials. e. Should a spill of hazardous material occur, EHD and DTSC, which have spill response and cleanup ordinances to govern emergency spill response, will be notified immediately. A written description of reportable releases will be submitted to the Central Valley Water Board. This submittal will include a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form. If a reportable spill has occurred and it is determined that project activities have adversely affected surface or groundwater quality in excess of water quality standards, a detailed analysis will be performed by a Registered Environmental Assessor to identify the likely cause of contamination. This analysis will	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Environmental Health	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	conform to ASTM standards and will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the County and its contractors will select and implement measures to control contamination, with a performance standard that water quality will be returned to baseline conditions. These measures will be subject to approval by EHD and DTSC.			
Mitigation Measure HAZ-2 Conduct a Phase I investigation	The applicant will prepare a Phase I site assessment prior to approval of a grading permit. The Phase I site assessment will conform to standards of the ASTM and will include recommendations for reducing or eliminating the source or mechanisms of contamination (or pathways of exposure to such contamination) if contamination is found and remediation/control measures are determined to be necessary concerning construction-period exposure and the handling of contaminated material. The applicant will implement the recommendations of the Phase I site assessment relative to construction. This mitigation measure may be conducted in coordination with Mitigation Measure HAZ-3 as appropriate.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Planning /Environmental Health	
Mitigation Measure HAZ-3 Plan for encountering hazardous materials	The project applicant will prepare a business plan prior to approval of a grading permit, specifying the proper handling, reporting, and disposal procedures for hazardous materials used during construction. If hazardous contaminants are unexpectedly encountered during construction, construction crews will cease work in the vicinity and notify DRM. A licensed waste disposal contractor will be used to remove the hazardous materials, once identified, from the site in accordance with federal, state, and local requirements.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Planning /Environmental Health	
Mitigation Measure HAZ-4a Comply with FAA regulations	Prior to approval of construction permits, the project applicant will file an FAA form 7460-01 for each wind turbine site, and submit site coordinates based on the 1983 North American Datum (NAD) to the FAA. The applicant will then implement measures to reduce impacts on aircraft and air navigation in accordance with FAA's response and the requirements of FAA's analysis of the Form 7460-01 and Advisory Circular 70/7460-1K,*Obstruction Marking and Lighting*.	As a condition of project approval; implemented prior to and during construction	Federal Aviation Administration/ Shasta County Department of Resource Management	
Mitigation Measure HAZ-4b Comply with Caltrans Division of Aeronautics regulations	In accordance with Public Utilities Code (PUC) Section 21656, *Permit for Extension of Structure More Than 500 Feet Above the Ground*, and Section 21659, *Hazards Near Airports Prohibited*, the applicant will obtain a permit from the Caltrans Division of Aeronautics prior to approval of construction permits (unless FAA has determined that the construction does not constitute a hazard to air navigation or would not create an unsafe condition for navigation).	As a condition of project approval; implemented prior to and during construction	Caltrans Division of Aeronautics/Shasta County Department of Resource Management	
Mitigation Measure HAZ-5 Comply with legal requirements for fire prevention during construction activities	■ In accordance with the Public Resources Code, the construction contractor will comply with the following legal requirements during construction activities. ■ Earthmoving and portable equipment with internal combustion engines will be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (PRC Section 4442). ■ Appropriate fire suppression equipment will be maintained during the highest fire danger period: from April 1 to December 1 (PRC Section 4428).	As a condition of project approval; implemented prior to and during construction	Shasta County Fire	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	■ On days when a burning permit is required, flammable materials will be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor will maintain the appropriate fire suppression equipment (PRC Section 4427). ■ On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines will not be used within 25 feet of any flammable materials (PRC Section 4431).			
Mitigation Measure HAZ-6 Create and maintain adequate firebreaks and practice fire prevention	■ The applicant will be required to comply with the following measures for the duration of project operations. ■ Maintain around and adjacent to buildings and structures a firebreak made by removing and clearing away, for a distance of 100 feet as required by PRC 4290, all flammable vegetation or other combustible growth. ■ Maintain around and adjacent to the project facilities additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth that is located within 100 feet of the structures or to the property line, whichever is nearer. Grass and other vegetation located more than 30 feet from the structures and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion. ■ Provide prior to project operations and maintain at all times a screen over the outlet of every chimney or stack that is attached to any device that burns any solid or liquid fuel. The screen will be constructed of nonflammable material with openings not larger than 0.5 inch. ■ Prior to occupancy, install fire extinguishers at the O&M building. ■ Employees will be trained in using extinguishers and communicating with the SCFD. ■ The SCFD and/or Cal Fire will periodically inspect the project area. ■ Provide the SCFD and/or Cal Fire access to onsite water storage tanks, if such access is needed.	As a condition of project approval; implemented prior to and during construction	Shasta County Fire/ Department of Resource Management—Building	
Mitigation Measure HAZ-7 Prepare an Emergency Response Plan	Prior to approval of construction permits, an Emergency Response Plan will be prepared for the review and approval by Shasta County. This plan will address potential accidents or emergencies involving fires or explosions at the wind energy facility. The Emergency Response Plan will be prepared in accordance with the Integrated Contingency Planning Guidelines (sometimes referred to as the "One Plan" guidelines) issued by the National Response Team. The Plan will consist of three sections: an Introduction, a Core Plan, and Annexes. The Introduction and Core Plan should be brief and contain only essential ("high level") information. The Introduction will describe the scope of the Emergency Response Plan, key names and addresses of contacts for an emergency, a description of processes, and the general facility hazards information. The Core Plan will describe how to identify an emergency, how and who to alert if an emergency occurs, roles during an emergency, how the emergency will be controlled, and how to terminate the incident.	As a condition of project approval; implemented prior to and during construction	Shasta County Fire/ Department of Resource Management—Building	
Mitigation Measure HAZ-8 Wind turbine design and safety mechanisms	To prevent turbine or meteorological tower failure and blade and ice throw and avoid potential impacts, the project applicant will incorporate the following measures into the project design. a. Turbines will conform to international standards for wind turbine generating systems, including those set forth in International Electro technical Commission (IEC) 61400-1: Wind Turbine Generator Systems – Part I: Safety Requirements (1999), and will be certified according to these requirements to	As a condition of project approval; implemented prior to and	Shasta County Fire/ Department of Resource Management—	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
	help ensure that the static, dynamic, and defined life fatigue stresses of the blade would not be exceeded under the combined load expected at the Project Area.	during construction	Building	
	b. The project applicant will adhere to state and local building codes during turbine installation on the foundations; such adherence will also minimize the risk of rotor and tower failure.			
	c. To prevent safety hazards caused by over-speed, the project applicant will install a comprehensive protection system on each turbine to prevent excess rotor speed and turbine and tower failures, such as having rotor speed controlled by a redundant pitch-control system and a backup disk-brake system. During normal operations, the rotor speed is controlled by the generator torque microprocessors and blade pitch. When wind speeds increase to excessive levels, the rotor pitch would turn, or feather, the blades. Power control automated systems are used to constantly monitor rotor speed to ensure that it is maintained within the desired operating range. If an over-speed is detected, the control system immediately initiates a procedure to shut down the machine. The shutdown procedure will utilize a combination of generator torque applied by the power electronics unit and rapid pitching of the blades to the feather position, which is accomplished by the hydraulic pitch actuator and the hydraulic power unit. In the event of hydraulic power unit failure or loss of electrical power, the turbines will be shut down using stored pressure that will power the hydraulic actuator to the feather position and bring them to a complete stop. Additionally, critical components have multiple temperature sensors and a control system to shut the system down and take it off line if an overheat condition is detected.			
	d. To prevent safety hazards caused by tower failure, the project applicant will fulfill the requirements below. i. Design the turbine towers and foundation to withstand wind speed of 100 miles per hour to ensure stability even under extreme wind conditions at the standard height. ii. Engineer the turbines according to Zone 4 Uniform Building Code Earthquake Standards. iii. Ensure that all installed equipment meets the standards of National Electrical Manufacturers Association (NEMA), the American National Standards Institute (ANSI), and Cal-OSHA.			
	e. To prevent safety hazards caused by electrical failure, electrical systems and the substation will fulfill the requirements listed below. i. Be designed by California-registered electrical engineers. ii. Meet national electrical safety codes and other national standards, including NEMA, ANSI, and Cal-OSHA standards.			
	f. The project applicant will provide the County with manufacturers' specifications for the wind turbines, specifying that all turbines are equipped with a braking system, blade pitch control, and/or other mechanism for rotor control and have both manual and automatic over-speed controls.			

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Mitigation Measure HAZ-9 Install grounding and equipment shutoff mechanisms on project facilities	To protect workers from electrical shock and other work-related accidents during the Hatchet Ridge Wind Project, the following measures will be implemented. a. Grounding will be designed and implemented to the standards of the Institute of Electrical and Electronics Engineers. b. All turbines and utility lines will be equipped with automatic and manual disconnect mechanisms. c. Three circuit breakers that can be both manually and automatically operated will be provided between each turbine and the connection to the electrical grid. d. The electrical systems and substations will be designed by California-registered electrical engineers and will meet national electrical safety codes and other national standards, including NEMA, ANSI, and Cal-OSHA standards. e. The above mechanisms will be installed and tested before interconnection.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Building	
Mitigation Measure HAZ-10 Field Management Plan to Reduce EMF Risk	In accordance with CPUC Decision 93-11-013, PG&E and/or the project applicant will prepare a field management plan that incorporates "no-cost" and "low-cost" magnetic field reduction steps to reduce EMF risks to personnel on the project site. The field management plan will be submitted to CPUC for review and approval prior to occupancy of the site. Consistent with PG&E's Transmission and Substation EMF Design Guidelines, the field management plan will include the following project information: ■ A description of the project (e.g., cost, design, length, location). ■ A description of the surrounding land uses using priority criteria classifications. ■ No-cost options to be implemented. ■ Priority areas where low-cost measures are to be applied. ■ Measures considered for magnetic field reduction, percent reduction, and cost. These measures may include but not be limited to the following: ❑ Increased distance from conductors and equipment. ❑ Reduced conductor spacing. ❑ Minimized current. ❑ Optimized phase configuration. ■ Which options were selected and how areas were treated equivalently or why low-cost measures cannot be applied to this project because of cost, percent reduction, equivalence, or some other reason.	As a condition of project approval; implemented prior to and during construction	California Public Utilities Commission/ Shasta County Department of Resource Management	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Hydrology and Water Quality				
Mitigation Measure HYD-1 Implement measures to maintain groundwater and surface water quality in case of accidental spills	If an appreciable spill has occurred and results determine that project activities have adversely affected surface or groundwater quality, the County will be responsible for ensuring that a detailed analysis is performed by a registered environmental assessor to identify the likely cause of contamination. This analysis will conform to American Society for Testing and Materials standards and will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the project proponent and/or the County will select and implement measures to control contamination, with a performance standard that groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the County.	As a condition of project approval; implemented prior to and during construction	Shasta County Department of Resource Management—Water	
Mitigation Measure HYD-2 Ensure that the site-specific geotechnical investigation addresses septic system constraints and design	The applicant will ensure that the site-specific geotechnical report prepared for the project includes an evaluation of the site's suitability for the proposed septic system, including the potential for septic leach field use to contribute to risks of slope failure. If appropriate, the geotechnical report will also identify constraints on septic system placement and design. The applicant will be responsible for ensuring that all recommendations of the site-specific geotechnical report are implemented.	As a condition of approval of project approval, and implemented prior to and during construction	Shasta County Department of Public Works—Building	
Transportation/Traffic				
Mitigation Measure TRA-1 Develop and implement a construction Traffic Control Plan	The proposed project's construction-related traffic impacts can be mitigated through development and implementation of a Traffic Control Plan as part of the overall Construction Management Plan, in accordance with County and Caltrans policies. The Traffic Control Plan will be implemented throughout the course of project construction. This plan would include but not be limited to the elements listed below. ■ A plan for communicating construction plans with Caltrans, emergency service providers, residences located in the project vicinity, and anyone else who may be affected by project construction. ■ An access and circulation plan for use by emergency vehicles when lane closures and/or detours are in effect. If lane closures occur, provide advance notice to local fire departments and sheriff's department to ensure that alternative evacuation and emergency routes are designed to maintain response times. ■ Maintain access to existing development in the area at all times. ■ Provide for adequate parking for construction trucks and equipment within the project area and designated staging areas along Bunchgrass Lookout Road throughout the construction period. ■ Provide adequate parking for construction workers within the project area and designated staging areas. ■ Provide temporary truck crossing signs on State Route 299 during construction if allowed by Caltrans. Provide flaggers/traffic control personnel as necessary (e.g., when oversize loads must turn from State Route 299 onto Bunchgrass Lookout Road).	As a condition of project approval; implemented prior to and during construction	Caltrans/Shasta County Department of Public Works—Roads	
Mitigation Measure TRA-2	The project proponent is required to file a FAA Form 7460-1, *Notice of Proposed Construction or Alteration*,	Prior to and	Shasta County	

Mitigation Measure	Description	Timing	Monitoring Responsibility	Verification (date & initial)
Consult with FAA to meet the FAA requirements	for each wind turbine structure. FAA will issue a Determination of No Hazard to Air Navigation for each of the project turbines and meteorological towers if the project meets FAA requirements. If FAA determines that the project would potentially be an obstruction unless reduced to a specified height, the project proponent will work with FAA to resolve any adverse effects on aeronautical operations.	during construction	Department of Resource Management—Planning /FAA	
Utilities and Service Systems				
Mitigation Measure USS-1 Notify communication tower owners and site wind turbines to avoid conflicts with microwave signals	Prior to issuance of the conditional use permit for this project, the project applicant will notify all owners of frequency-based communication stations and towers within 2 miles of the proposed project. Wind turbine towers and the proposed corrugated metal O&M building will be sited to avoid potential conflict with microwave communication signals. In the event that a complaint is received regarding microwave or land mobile pathway interference, the project applicant will appropriately and satisfactorily resolve receiver interference through coordination with owners of frequency-based communication stations and towers. Possible actions include installation of high-performance antennas at nearby microwave sites, if required.	Prior to and during construction	Shasta County Department of Resource Management—Planning /Federal Communications Commission	

Appendix A

Applicant's Supplemental Information

Information in Appendix A was submitted by the applicant, RES America Developments, Inc. It does not necessarily reflect the analysis and conclusions of Shasta County or ICF Jones & Stokes.

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

February 11, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to Comments Suggesting Moving Turbines to Address Visual Impacts

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the public over visual impacts associated with the Project. Please consider this information in preparation of the Final EIR.

RES understands that there are significant visual impacts associated with the Project. Several individuals have questioned why the turbines cannot be moved back away from the edge of Hatchet Ridge to minimize the view of the turbines from the town of Burney. While this seems like a simple solution, the proposed locations of the turbines were chosen based on several factors, which are equally important in maximizing the energy output while minimizing the number of turbines.

The placement of wind turbines at Hatchet Ridge is constrained by several factors including (i) existing wind resource/wind speed, (ii) existing project boundaries, (iii) setbacks from neighboring landowners and existing transmission lines, (iv) existing microwave paths, and (v) minimum spacing between wind turbines. Each of these constraints is discussed below. When combined, the constraints provide virtually no flexibility for moving turbines upwind from their proposed locations.

Wind Resource: In order to minimize the cost of generating electricity from a wind project, turbines need to be sited at the windiest locations and within the other constraints described herein. Because the power generated by a wind turbine is a function of the cube of the wind speed, small changes in wind speed result in significant changes in power generated. As illustrated below, a 10% decrease in wind speed results in a 33% decrease in power generated.

Power Generated	=	function of velocity cubed
	=	f (Velocity^3)
	=	f (Velocity x Velocity x Velocity)
	=	f (1.10 x 1.10 x 1.10)
	=	f (1.33)

The greatest wind speeds at the Hatchet Ridge Wind Project site occur on the "downwind edge" of project site. This is common among wind project sites where the topography provides for some elevation differences (hills, ridges, mesas, etc.). At Hatchet Ridge, wind flows primarily from the southwest. Upwind of the ridge the elevation of the landscape increases in the direction of wind flow. As the wind reaches the most northeasterly portions of the ridgeline, it is "sucked" into the lower elevation area known as Goose Valley. This suction effect causes the wind flow to accelerate at the most "downwind edge" of the Project site. Wind turbines placed along this portion of the ridge will generate the greatest amount of electricity and will minimize the cost of electricity generated by the Project. Relocating turbines upwind of these positions will reduce Project output and increase cost of generating electricity, ultimately making the project economically infeasible.

Existing Project Boundaries: Hatchet Ridge Wind, LLC has obtained wind energy lease rights for a defined area. Turbine placement outside of the defined area is not permitted. In addition, only the property leased by Hatchet Ridge Wind, LLC has been subject to CEQA environmental analysis. Placement of turbines outside of the leased area would require additional CEQA analysis.

Setbacks: After consulting with Shasta County, Hatchet Ridge Wind, LLC was advised to design the Project such that the distance between wind turbines and the boundaries of leased property is no less than the tip height of the wind turbine (i.e., the height of the turbine, including the blade, when the blade tip is at its highest point). Tip height of the turbines and the associated setback from the boundaries of the leased area is estimated to be approximately 420'. In addition, Hatchet Ridge Wind has imposed 150 meter (483 feet) setbacks of existing overhead power lines within the Project area. These setbacks place additional restrictions on the location of wind turbines. When combined with the other constraints, there is virtually no flexibility for relocating wind turbines to alternative locations.

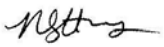
Microwave Paths: Wind turbines can interfere with the microwave paths by physically blocking the line-of-sight between two microwave transmitters. Hatchet Ridge Wind, LLC hired a third-party consultant to identify existing microwave paths at the Project site on the basis of FCC databases and field visits. The consultant identified 62 microwave paths that intersect the project area, each using a transmitter at either the Bunchgrass Communication Site at the northwestern edge of the Project area or the Hatchet Ridge Communication Site at the southeastern edge of the Project area. The presence of the multiple microwave paths severely reduces the flexibility for siting wind turbines.

Minimum Turbine Spacing: Wind turbines create wakes which propagate downwind of and laterally from the turbine location. The resulting turbulence creates additional forces and stresses on neighboring wind turbines that increase the risk of turbine component failure, increase maintenance costs and reduce the life of the machine. For these reasons, turbine manufacturers advise that wind projects be designed with minimum spacing between turbines. In fact, minimum turbine spacing is ***required*** by turbine manufacturers in order to secure a turbine warranty. For the Hatchet Ridge Wind Project, turbine manufacturers require minimum spacing of 2.5 – 3.0 times the turbine rotor diameter (238 – 285 meters; 779 – 935 feet) for turbines within the same row and approximately 7.5 times the turbine rotor diameter

(713 meters; 2335 feet; 0.44 miles) between turbine rows. These constraints provide virtually no flexibility for maintaining Project size and the associated economies of scale. Relocation of turbines will disrupt the current Project layout, reduce overall Project size and severely harm Project economics.

RES appreciates your consideration of this additionally information. If the County needs further information regarding how wind turbines are sited, please feel free to call or write.

Sincerely,



Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

February 11, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: Technical Information and Responses to PUC Comments

Dear Mr. Walker,

RES would like o assist Shasta County in addressing comments on the Draft EIR provided by the State of California Public Utilities Commission (letter dated January 28, 2008).

Chapter 2 Project Description

PUC Comment: The DEIR should include visual simulations of these components from multiple viewpoints in the environment in which they will be situated. This recommendation applies to the substation; the switching station; the 230 Kv circuit; the interconnection system; the operation and maintenance building; and any other aboveground facility.

Suggested Response: The visual simulations and analysis were conducted from key vantage points identified in the following areas: Nearby communities, including residences and businesses; areas used for recreational purposes, such as McArthur –Burney Memorial Park; and roadway travel routes. The facilities suggested by the CUP as requiring visual simulations would not be visible under the current simulation strategy. For example, Figure 3.1-12 shows and existing view and simulated view of the proposed project from SR299 in Haynes Flat. The existing Bunchgrass communications station on Hatchet Ridge is barely visible from the viewpoint, and then the only components that are visible are the largest communication towers. If we use this as a comparison, the following facilities proposed for Hatchet Ridge would also not be visible from this location, given their comparison in size and design to the communication station; the substation, switching station, 230 kV circuit, the interconnection system, and the operation and maintenance building. The same would be true of the simulated views from SR 299 at Round Mountain (Figure 3.1-11) and SR299 in Burney (figure 3.1-13).

The purpose of the simulations is to determine what the project would potentially look like from key vantage points. In order to capture the suggested facilities in visual simulations, simulations would need to be prepared from areas much closer to the project, which would potentially not be defined as key vantage points. These points would be along SR299 within 1 mile or so of the proposed facilities, where roadway travelers do not typically stop to enjoy views, and no residential or commercial zones are

located. It is unwarranted to prepare visual simulations for proposed facilities for the purpose of merely capturing these in a visual simulation unless there is a targeted view point from which to run the simulation.

Additionally, it is not a requirement of CEQA or a standard of the wind energy industry to run visual simulations on associated facilities. Also, we do not know of any visual simulations that were prepared for the existing Bunchgrass communication station or the existing 230 kV transmission line in the area. The visual simulations are typically reserved for facilities which pose direct visual impacts on key vantage points.

PUC Comment: the DEIR should include a single overhead diagram of the project that illustrates the layout of all of the project components to be developed in connection with this project.

Suggested Response: The DEIR does include a map (Figure 2-1) which shows the location of all associated facilities, with the exception of the switching station. The switching station location is identified in the DEIR as within Section 28 of Township 35N, Range 2E. The exact location of the switching station will be determined upon investigation by transmission facilities specialists and PGE before construction begins. The entire Section 28 was reviewed in the environmental analysis to determine potential impacts, given the uncertainty over the exact location of the switching station.

PUC Comment: the DEIR should include a full impact analysis of the switching facility

Suggested Response: see previous response

PUC Comment: the DEIR should indicate the type of transmission towers the applicant intends to install to support the 230 kV circuit.

Suggested Response: the DEIR states that either single steel poles or double wood poles should likely support the overhead transmission lines.

Section 2.6.3 Communication

PUC Comment: This section states that the project will include an underground fiber optic system to enable monitoring and control from "remote locations." The DEIR does not identify the location of the remote monitoring facility or whether the fiber optic intends to directly connect with this facility or interconnect to into the Public Switched Telephone Network (PSTN).

- The DIER should indicate whether the fiber optic system will be interconnected with the PSTN; and
- The DEIR should include a overhead map that indicates where trenching will take place and where conduit will be installed. The map should identify the facilities that will be directly connected to the fiber optic system.

Suggested Response: The communication cables including fiber optic for turbine monitoring and control would be located in the underground collector system trench back to the project substation. The overhead ground wire on the 230 kV line would contain the fiber optic between the project substation and the POI. No new facilities or trenches will be needed to contain the communication fiber optic system.

Section 2.6.6 Permanent Meteorological Towers

PUC Comment: Aside from noting the towers will be built, the DEIR does not appear to include the towers in any visual simulation, not does it identify the locations of these towers on the project area maps.

Suggested Response: The permanent meteorological towers will not be visible from the key vantage points used in the visual simulations due to their small size. Refer to Figure 3.1-12, the Bunchgrass communication station contains towers similar in height and build to a permanent meteorological tower that are not visible in the simulations.

The exact location of the permanent meteorological towers has not been determined and will be determined after installation of the turbines. The environmental review for the project included analysis for the installation of up to 4 meteorological towers.

Chapter 3. Environmental Analysis
Section 3.3 Air Quality

PUC Comment: this section states that greenhouse gases (GHG) are thought to be responsible for the greenhouse effect or global warming. Aside from noting that GHGs are a problem, the DEIR does not appear to estimate or forecast the amount of carbon dioxide that may be generate as a result of the project.

- The DEIR should estimate to level of carbon dioxide, methane, and nitrous oxide that may be generated as a result of the project.

Suggested Response: The following levels of carbon dioxide, methane, and nitrous oxide are expected from operation of the wind facility.
Carbon dioxide – 0
Methane – 0
Nitrous oxide – 0

Construction of the wind facility and manufacturing of the turbines and associated infrastructure will likely result in minor emissions of green house gases. These values have not been calculated, but can be considered comparative to other industrial manufacturing and large construction projects. Typical emissions associated with large construction projects include emissions from diesel construction and transfer vehicles and passenger vehicles used on site by construction crews. Though some vehicles will be on site during operations, the largest concentration of potential emissions will occur during a 9-12 month construction period. Greenhouse gas emissions from turbine manufacturing will not impact the local air quality, nor that of the State of California because the parts will be imported. Please refer to the attached AWEA fact sheet for more information on comparative emissions

RES appreciates your consideration of this additionally information. If the County needs further information regarding the information provided in this letter, please feel free to call or write.

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

Enclosures:

AWEA fact sheet on greenhouse gas emissions

WIND ENERGY FACT SHEET

American Wind Energy Association

122 C Street, N.W.
Suite 380
Washington, D.C.
20001
(202) 383-2500

Comparative Air Emissions Of Wind and Other Fuels

Wind energy's most important environmental benefit is its lack of emissions of both air pollutants and greenhouse gases when compared with alternative methods of generating electricity.

The American Wind Energy Association (AWEA) has developed a set of statistics to quantify the comparative emissions of wind and other fuels, based on data gathered by the U.S. Department of Energy's Energy Information Administration (EIA)[1], which collects information on the U.S. utility industry.

This, and similar fact sheets, can be found online at http://www.awea.org/pubs/factsheets.html.

For carbon dioxide (CO_2), the leading greenhouse gas associated with global warming, comparative emissions during electricity generation are as follows:

Fuel	CO_2 Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	CO_2 Emitted, Total Generation (billion pounds)
Coal	2.13	1,788	3,807
Natural Gas	1.03	283.6	291
Oil	1.56	77.8	122
U.S. Average Fuel Mix [2]	1.52	3,494	5,313
Wind	--0--	3.4	--0--

For sulfur dioxide (SO_2), the leading precursor of acid rain:

Fuel	SO_2 Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	SO_2 Emitted, Total Generation (million pounds)
Coal	0.0134	1,788	24,028
Natural Gas	0.000007	283.6	2
Oil	0.0112	77.8	870
U.S. Average Fuel Mix [2]	0.0080	3,494	27,914
Wind	--0--	3.4	--0--

For nitrogen oxides (NOx), another acid rain precursor and the leading component of smog:

Fuel	NOx Emitted Per Kilowatt-hour (kWh) Generated (in pounds)	KWh Generated, 1997 (billions)	NOx Emitted, Total Generation (million pounds)
Coal	0.0076	1,788	13,668
Natural Gas	0.0018	283.6	504
Oil	0.0021	77.8	162
U.S. Average Fuel Mix [2]	0.0049	3,494	17,112
Wind	--0--	3.4	--0--

A single 750-kilowatt wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of carbon dioxide, 14,172 pounds of sulfur dioxide, and 8,688 pounds of nitrogen oxides, based on the U.S. average utility generation fuel mix.[3]

AWEA has prepared a spreadsheet which permits calculations based on these and other air emissions statistics and which can be e-mailed to researchers on request.

NOTE

1. Emissions data in this fact sheet are based on statistics provided in the EIA's *Annual Energy Review 1998.* (Washington, D.C.: Energy Information Administration, DOE/EIA-0384 ((98)), July 1998.) The Annual Energy Review can be accessed on the Web at <http://www.eia.doe.gov/aer>.

2. The numbers for kilowatt-hours generated and emissions for "Coal," "Natural Gas," and "Oil" are based on U.S. electric utility generation. The numbers for kilowatt-hours generated and emissions for "US Average Fuel Mix" and "Wind" are the totals for all U.S. generation, including nonutility plants."

3. Estimate derived by AWEA using data from *Renewable Energy Technology Characterizations*, published by the U.S. Department of Energy and the Electric Power Research Institute, December 1997.

American Wind Energy Association
122 C Street NW, Suite 380, Washington, DC 20001

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

February 13, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to CADFG Comments

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the California Department of Fish and Game in their letter to you dated January 25, 2008. The following information was gathered from scientists and project developers with years of experience working in the wind industry. Please consider this information in preparation of the Final EIR.

DFG Comment: DFG recommends the applicant be required to provide these reports (monitoring reports) to DFG by December 31st of any operating year in which turbines operate.

Response: This is a standard mitigation measure in the wind industry. HRW recommends more frequent reporting of monitoring reports considering the high number of comments received from concerned citizens and conservation groups. We feel that open, frequent analysis of actual impacts will help address concerns and alleviate fears of unaddressed impacts.

DFG Comment: DFG suggests that the time frame for mortality monitoring be established as the operational period for the project.

Response: This is not an industry standard, and is not supported by the CEC Guidelines, adopted in 2007. The Guidelines specifically recommend against open-ended mitigation and provide recommendations for monitoring studies based on potential impacts ascertained from pre-construction impacts studies. According to the CEC Guidelines, Hatchet Ridge would be considered a Category 2 or 3 site. The CEC Guidelines recommend monitoring for 2 years post-construction at such sites.

DFG Comment: DFG recommends monitoring per the CEC Guidelines must continue as this plantation forest matures to assure that increased bird use of the site does not result in mortality of protected bird species.

Response: The CEC Guidelines recommend monitoring for 2 years post-construction for a project such as Hatchet Ridge. The argument that the area will see an increase in bird use as the trees around the project mature is unsubstantiated. The site is currently managed as a tree plantation and the project will not change that use, nor does it propose to change the current land management practices. Mature trees in the project area will be harvested by the property owners when commercially viable. The current land management of the site has the effect of periodic large-scale disturbance, which creates suitable habitat for a suite of species while eliminating it as habitat for others. For example, spotted owls, which generally occupy mature or old growth forests, are unlikely to occur on site as over the long-term the forest characteristics are not suitable for spotted owl. The land management of the site has the general effect of reducing potential mature forest habitat in the area, resulting in a less than likely scenario for impacts to protected bird species.

DFG Comment: DFG recommends a requirement for avian use surveys during early project operations be added to MM BIO-6.

Response: HRW does not support the recommendation for use surveys during early project operations. The CEC Guidelines state that the primary goals of operations monitoring are to determine "whether estimated fatality rates described in pre-permitting assessment were reasonably accurate; whether the avoidance, minimization, and mitigation measures implemented for the project were adequate or whether additional corrective action or compensatory mitigation is warranted; whether overall bird and bat fatality rates are low, moderate, or high relative to other projects." The CEC Guidelines do suggest one year of post-construction bird use count studies; however, the pre-project studies did not document high use of the site by sensitive bird resources which could be targeted with bird use surveys for assessing indirect effects. The results of the pre-project surveys do not support using bird use surveys in the post-construction monitoring. HRW does, however, recommend reconsidering this mitigation measure if results from carcass searches vary considerably from the data acquired during pre-construction use count studies.

DFG Comment: DFG suggests that other forms of mitigation including other minimization schemes and compensatory mitigation may be available.

Response: HRW supports this recommendation. Shasta County was provided with a list of potential mitigation measures including compensatory mitigation that are consistent with the CEC Guidelines. (See comments submitted by David Young, WEST, Inc., January 28, 2008.)

DFG Comment: DFG recommends reconfiguring turbine layout.

Response: The DEIR identified no impacts to wildlife which are directly linked to or mitigated by a change in the currently proposed layout. Additionally, the pre-construction studies did not identify any sensitive resources or high use areas that would warrant a change in the turbine layout. HRW has provided a letter explaining the reasons why the proposed layout is optimal for maximizing energy output, while minimizing environmental impacts to the extent feasible. (See HRW's letter regarding alternatives analysis, January 28, 2008.)

DFG Comment: DFG recommends considering repowering using latest technology, utilizing alternative designs, or adjusting the height of the rotor sweep of constructed or yet-to-be constructed turbines.

Response: HRW feels that this mitigation measure is too open-ended to be feasible. It is impossible to require a developer to change project components when new technology becomes available without knowing what that new technology would be or whether the new technology is appropriate for addressing the specific environmental concern. Additionally, the DEIR considered potentially appropriate alternatives for the project, including alternative technologies, an alternative layout, and changes in the height of turbines, but none were considered feasible because they do not meet the key objectives of the project and are therefore not viable. (See HRW's letter regarding alternatives analysis, January 28, 2008.)

DFG Comment: DFG recommends consideration of lighting schemes which may reduce bird attraction.

Response: Several studies have been conducted at operating wind farms that have analyzed potential impacts associated with lit versus unlit turbines. Results of these studies indicate that there are no correlations between turbine lighting schemes and avian fatalities. The current lighting requirements of the FAA do not appear to influence bird or bat mortality at turbines. The following studies addressed the issue of lit turbines and avian and bat mortality.

Arnett, E.B, W.P. Erickson, J. Kerns, and J. Horn. 2005. 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. Prepared for the Bats and Wind Energy Cooperative, March 2005.

Erickson, W.P., B. Gritski, and K. Kronner. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002 – August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.

Johnson, G., W. Erickson, J. White, R. McKinney. 2003. Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Plant, Sherman County, Oregon. Technical report prepared for Northwestern Wind Power, Goldendale, Washington. March 2003.

Young, Jr., D.P., J.D. Jeffrey, W.P. Erickson, K.J. Bay, and V.K. Poulton. 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004 – February 2005. Prepared for Eurus Energy America Corporation and Combine Hills Technical Advisory committee, Umatailla County, Oregon. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, Wyoming and Walla Walla, Washington, February 21, 2006.

Young, Jr., D.P., W.P. Erickson, J.D. Jeffrey, and V.K. Poulton. 2007. Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report, January - December 2006. Technical report for Puget Sound Energy, Dayton, Washington and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, Washington. Western EcoSystems Technology, Inc. Cheyenne, Wyoming, and Walla Walla, Washington. 25pp.

DFG Comment: DFG states that any mortality of special status raptors should result in implementation of avoidance measures.

Response: A comprehensive mitigation plan for impacts to birds has been presented that is consistent with the CEC Guidelines and which considers raptors. Mortality thresholds for raptors were provided in the recommended mitigation that would trigger additional mitigation if exceeded. This mitigation plan is comprehensive following an adaptive management approach and includes coordination with the agencies when determining additional necessary measures. Mortality of any special status species will be reported to the Technical Advisory Committee and/or the CADFG and USFWS during the post-construction monitoring. Additional appropriate measures for mitigation of impacts to special status species may include drawing upon the compensatory mitigation fund, habitat alterations, or additional research. Additional research may be warranted to determine what the actual cause of the impact is before appropriate mitigation may be determined.

DFG Comment: DFG believes that take of golden eagle is likely, and that impacts to golden eagle should be considered potentially significant.

Response: David Young, of WEST, Inc., submitted a comment letter discussing the inconsistencies between actual point count data and the information provided in Table 3.4-3. This comment from CDFG is a good example of the erroneous conclusions that are drawn by readers of the DEIR if based solely on the rankings in the table. CDFG concluded that there would be a high potential for impact based on the table, while in fact, the high ranking does not equate to high risk or high potential impact. While there was actually only one golden eagle seen at the site over a 12-month period, Table 3.4-3 suggests there is a high potential for occurrence of golden eagle. Additionally, the table indicates there is no suitable habitat for golden eagle; therefore, a determination that there is a high potential for golden eagle to occur or be impacted is inconsistent with the available information. Similar inconsistencies are found elsewhere in this table. HRW suggests revising the table to more accurately reflect the true potential for occurrence as reflected in the actual point count data. Potential for occurrence should be based upon best available data for the project area, not on the regulatory status of a species or existing regulations for protection.

DFG Comment: DFG suggests impacts to sandhill crane migration (related to the overhead transmission line) could be significant, since cranes are known to have particular difficulty in avoiding collisions with high voltage power lines.

Response: The concern that sandhill cranes will be impacted by the overhead transmission line is unfounded due to the lack of habitat for this species in the project area. While sandhill cranes were observed flying high over the site during migration, there are no site characteristics or habitat that would attract sandhill cranes to the site and put them in close proximity to the transmission line. Additionally, the transmission line will be located in a treed area, where migrating birds are unlikely to be impacted because they are flying over at an elevation much higher than the tree line and proposed transmission line. Sandhill cranes have been known to collide with power lines, but these collisions are generally reported in areas where transmission lines are near roosting habitat such as wet meadows, sandbars, or agricultural fields utilized by cranes (Brown et al. 1987, Morkill and Anderson 199, Lewis et al 1992, Brown and Drewien 1995). Most documented crane collisions with powerlines occur when they are flushed or disturbed from roosts. It is highly unlikely that sandhill cranes will roost on the site due to lack of habitat, and sandhill cranes flying over the HRW site will be well above the transmission line and unlikely to be exposed to potential risk of collision.

Brown, W. M., Drewien, R.C., & Bizeau, E.G. 1987. Mortality of cranes and waterfowl from power line collisions in the San Luis Valley, Colorado. In J. C. Lewis, (Ed.), Proc. 1985 Crane Workshop (pp. 128-136). Grand Island, NE: Platte River Whooping Crane Habitat Maintenance Trust.

Brown, W. M., & Drewien, R.C. 1995. Evaluation of two power line markers to reduce crane and waterfowl collision mortality. Wildlife Society Bulletin, 23:217-227.

Lewis, J.C., Kuyt, E., Schwindt, K.E., & Stehn, T.V. (1992a). Mortality in fledged cranes of the Aransas-Wood Buffalo population. In D.A. Wood, (Ed.), *Proc. 1988 N. Am. Crane Workshop* (pp. 145-148). Tallahassee, FL: Florida Game and Fresh Water Fish Commission.

Morkill, A.E. and S. H. Anderson. 1991. Effectiveness of marking powerlines to reduce sandhill crane collisions. Wildlife Society Bulletin 19: 442 – 449.

DFG Comment: DFG recommends protection of riparian areas for cascades frog, yellow warbler, and willow flycatcher protection

Response: There were no riparian areas identified in the area of impact for the proposed project and therefore no mitigation buffer is required.

DFG Comment: DFG requests a minimum of 200-foot buffer around nesting willow flycatchers and yellow warblers instead of 100 feet. DFG further notes that if willow flycatcher impacts are expected, an incidental take permit is needed.

Response: There were no riparian areas identified in the area of impact for the proposed project and therefore no mitigation buffer is required. No willow flycatchers were observed during the per-construction studies. They are not expected to occur on site due to lack of habitat and the project will not affect willow flycatcher.

DFG Comment: The EIR needs to provide details and locations of stream crossings.

Response: This information was provided and can be found in Appendix C-3 Wetlands and Other Surface Waters Report.

DFG Comment: DFG suggests performing nocturnal surveys for owls

Response: HRW previously submitted a letter to Shasta County in response to the late comments on the NOP received from the CADFG. (See attached.) In this letter, HRW explained why the area is marginal habitat for owls and not suitable for northern or California spotted owls. Current timber harvest operations have been approved in this area without the requirement of nocturnal owl surveys. The project would have no further impact on potential or future habitat for owls than current or future timber harvest operations.

RES appreciates your consideration of this additional information. If the County needs further information regarding wildlife concerns as they relate to wind projects, please feel free to call or write.

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

Enclosures (1)

Hatchet Ridge Wind, LLC
an affiliate of
RES
RES America Developments, Inc.

1 SW Columbia St.
Suite 460
Portland, OR
97258 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

September 17, 2007

Bill Walker
Shasta County Dept of Resource Mgmt
1855 Placer Street, Suite 103
Redding, CA 96001-1759

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to inform the County of our proposed measures for addressing concerns raised by California Department of Fish and Game (CADFG) and the US Fish and Wildlife Service (USFWS) regarding additional studies recommended for the proposed Hatchet Ridge Wind Energy Project (the Project). Concerns over the Northern Spotted Owl and Bald Eagle were addressed in the revised Biological dates September 4, 2007; therefore, recommendations and proposed studies concerning these species will not be discussed in this letter.

Rare, Threatened, Endangered Plants
The CADFG requested in their NOP comment letter that a study be conducted to determine whether sensitive plant species are present. This study was conducted by WEST and the results of the study were incorporated into the Revised Baseline Ecological Study.

During the rare plants survey, one rare plant was identified. The Butte County morning glory is listed as CNPS 1B.2, which is defined as "fairly threatened in California." The WEST report concluded, "The density of the plant and propensity for it to occur in disturbed areas, precludes implementing effective avoidance mitigation measures. Construction activity will impact individuals and patches of the plant but will not affect the population viability due to the large area over which the species occurs. It is likely that natural recruitment of plants in disturbed construction areas will include Butte County morning glory throughout the area where it occurs. Reclamation measures should include consideration for maintaining low overall vegetative plant cover in this area to facilitate the natural recruitment of the species." (Young et al. 2007)

Critical Deer Habitat
HRW understands that the project area is in critical deer habitat as suggested by the CADFG in their NOP comment letter. CADFG requested that no fencing be included in the project proposal that will cause harm or allow jumping attempts. HRW plans to place fencing around facilities that pose electrocution threats, this includes the substation and switching station. The fencing will be approximately 15 feet tall and will enclose a very small area with limited browse which could attract deer. HRW feels that the proposed fencing plan will not harm deer, including fawns.

Wetlands, Stream Crossings
HRW commissioned a study of wetlands and waters potentially impacted in the project area. The results of these studies are included in Wetlands and Surface Waters Report, submitted September 17, 2007.

No wetlands were located in the project area. One potentially jurisdictional waterway was identified in the proposed project area. The waterway appears to be an intermittent stream that is currently crossed by the existing access road. A request for jurisdictional status letter will be drafted and sent to the Army Corps of Engineers. If the waterway is determined jurisdictional a 404 permit may be required if alterations to the existing culvert are needed.

Existing Vegetation Community
CADFG suggests in their NOP comment letter that the existing vegetation community of the project has been misrepresented in discussions and documents submitted thus far in the environmental review process. The primary concern of CADFG was that the existing vegetation community be represented in the EIR and supporting documents. HRW feels that the existing vegetation community has been correctly represented in documents submitted to the County thus far. Please refer to the section entitled Study Area in the Ecological Baseline Study for a description of the existing vegetation community. HRW has also provided a planting map and aerial photos of the project area provided by Sierra Pacific Industries, as an attachment to this document (Appendix A). HRW does not feel that any additional work is necessary to revise the existing vegetation community description for the EIR and supporting documents.

CEC Draft Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development
CADFG suggests in their NOP comment letter that a comparative analysis be prepared to evaluate the protocols used for the avian studies at Hatchet Ridge with the recommended studies provided in the Draft CEC Guidelines (the Guidelines). HRW would first like to point out that the CADFG approved the proposed avian study protocols for the Project in the fall of 2005. Secondly, the Guidelines are currently in draft form and are not a citeable document at this point. CADFG should not be requesting compliance with the Guidelines as they are in draft form and will most likely be revised prior to finalization of the draft EIR. In a 1999 California court case (See *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal. App. 4th 931) it was determined that a lead agency should not rely on an unadopted general plan for CEQA purposes. Regardless of the legality of the CADFG's request, it is unfair to expect HRW to apply new, unadopted, draft Guidelines to previously approved study protocols and a project that has already been in the permitting process for 2 years. HRW therefore asks that CADFG reconsider and rescind its request in light of the draft status of the Guidelines. Were the County to do as CADFG requests and improperly rely on the draft Guidelines, the County could be legally vulnerable in litigation challenging the agency's CEQA compliance, as in the *County of Amador* case. Furthermore, the California Supreme Court recently confirmed that agencies may not rely on future, unadopted planning documents and EIRs for the purposes of conducting their CEQA analysis (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (40 Cal.4th 412, 440); the same principle would hold true for reliance on draft regulatory documents such as the Guidelines.

Owls
The USFWS and CADFG have requested that nocturnal acoustic surveys be conducted to determine the presence of owls in the Project area. HRW has looked into the issue and has identified several concerns with this recommendation: First, the appropriate season for conducting owl surveys is typically May-July (Owl breeding season). HRW feels strongly that the publication of the Final EIR should not be put on hold for nine to eleven months to satisfy the demands of the agencies who failed to submit timely

comments in response to the NOP; these comments came 109 days after the deadline the County set for responses to the NOP.

Second, HRW and WEST feel that the Project area currently should not be classified as prime owl habitat due to the relatively young age of the plantation. A study for northern spotted owl which was conducted in the two sections of land directly north of the Project area resulted in zero owl identifications (the results of this study are referenced in the Revised BA submitted September 4, 2007). Additionally, there should be no concerns for impacts to future owl habitat since trees planted after construction of the project is completed will be allowed to grow to full commercial potential. Any future timber harvest conducted by the landowners in the Project area will be subject to environmental requirements identified in the Timber Harvest Plan and will be the responsibility of the landowners.

Finally, few pre-project studies of wind projects in the U.S. have addressed presence of owls and usually this is limited to species of concern such as the burrowing owl. Furthermore, in post-construction studies conducted at other wind energy projects in the northwest and eastern U.S., where forest dwelling species are common, it was determined through carcass studies and pre-construction surveys that owls and in particular forest dwelling species were unlikely or very rarely impacted by wind energy projects (see Erickson et al. 2001; Johnson et al. 2000; Nicholson 2002, 2003; Kerns and Kerlinger 2004; Koford et al. 2005; Arnett et al. 2005; Jain et al 2007.) Owls typically remain within the canopy of the forest and it is unlikely that they will be travelling within the rotor-swept area. For these reasons, HRW and its expert consultants feel that the available evidence does not support a determination to conduct nocturnal acoustic owl studies prior to finalizing the EIR. HRW would not be opposed to conducting the studies during post-construction monitoring if additional evidence leads to a determination that such monitoring is warranted; however, considering the results of the previous studies mentioned earlier, HRW questions the necessity.

Radar Surveys
HRW has hired WEST to conduct radar surveys to address concerns over potential impacts to nocturnal migrants. The results of these studies will be available before the EIR is finalized.

Thank you for taking the time to review the attached document, if you have any questions please feel free to call me directly at 503-341-0185.

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist

Cc:
Bruce Webb, CADFG, Staff Environmental Scientist, 601 Locust Street, Redding, CA 96001
Bruce Deuel, CADFG, Staff Environmental Scientist, 601 Locust Street, Redding, CA 96001
Amy Fesnock, USFWS, Senior Wildlife Biologist, Endangered Species Division
2800 Cottage Way, Suite W-2605, Sacramento, CA 95825
John Forsythe, Senior Project Manager, Jones and Stokes, 2600 V Street
Sacramento, CA 95818

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Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
Suite 210
Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

February 13, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to Wintu Audubon Society Comments

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the Wintu Audubon Society in their letter to you dated January 22, 2008. The following information was gathered from scientists and project developers with years of experience working in the wind industry. Please consider this information in preparation of the Final EIR.

Wintu Comment: A study for monitoring nocturnal avian migrants must be implemented.

Response: A final study will be available prior to issuance of the final EIR. Consistent with the results of the other pre-project baseline studies, the results of the nocturnal migration study suggest that the project will not result in significant impacts to nocturnal migrants flying over the site. The vast majority of the targets recorded during the study were flying higher than the proposed turbines and the turbine exposure index ranged from only 1 to approximately 16 targets per day. HRW's biological consultant, Mr. David Young of WEST, Inc., is currently preparing a technical memorandum that further explains how the risks of turbine exposure and potential collision translate into actual impacts. We hope to be able to provide you with that additional information very soon.

Wintu Comment: The project must reduce impacts to Butte County morning glory by altering locations of turbines.

Response: Mr. Young submitted a comment letter to Shasta County dated January 28, 2008. In this letter, Mr. Young, who oversaw the sensitive plant study for the project, suggested that the impact analysis of the Butte County morning glory is overstated in the DEIR, and the DEIR did not take into account the abundance, distribution, and current status of the species when determining recommended mitigation measures. Additionally, current Timber Harvest Plans in the project vicinity (reviewed by the California Department of Fish and Game) have been approved with no restrictions on harvest operations in or near known Butte County morning glory populations. Also, the CDFG made no mention of concern for the species in its comment letter on the DEIR. The agency's silence on this issue suggests that the

agency's stance on the species in regards to potential impacts from tree harvesting may differ from Audubon's. It has been determined through recent studies that the species thrives in areas where ground-disturbing activities have taken place and survives frequent herbicide applications in transmission line right-of-ways. (See Mr. Young's comment letter, January 28, 2008.) For these reasons, the project is actually likely to have a net increase in habitat for the species, and therefore avoidance measures are unwarranted. The project will have an overall beneficial effect on Butte County morning glory.

Wintu Comment: Use of alternative technology (VAWT manufactured by Terra Moya Aqua)

Response: HRW submitted a comment letter to Shasta County on January 28, 2008 which describes the infeasibility of using a technology such as vertical axis wind turbines as suggested by the Wintu Audubon Society. The VAWT suggested by the Wintu Audubon Society is not only not commercially available, but is also not manufactured in capacities which are considered viable for a utility-scale wind energy project such as the one HRW proposes. Even if the technology were commercially available, use of the VAWT would require a significantly greater number of machines to produce the minimum feasible output of 102 MW, which would in turn have a greater environmental impact. (See HRW's comment letter regarding alternatives analysis, dated January 28, 2008, page 3, footnote 1.)

Furthermore, HRW is unaware of any peer-reviewed impact studies that have been undertaken for this technology. The manufacturer's website claims the technology reduces impacts, but those claims are unsupported by any references to the kinds of peer-reviewed analysis sufficient to support a conclusion that the technology is in fact superior to the turbines proposed for the project site. In light of the fact that the technology is commercially unavailable for a project of this size, the footprint impacts of such technology would be greater than with the turbines HRW proposes to use, and the claimed environmental benefits are unproven, HRW would consider it irresponsible to require VAWT technology to be used on this site.

WINTU Comment: Establish a concrete and meaningful mitigation plan which includes compensatory mitigation, detailed monitoring methodologies and requirements, adaptive operations and mitigation mechanisms

Response: Mr. Young provided Shasta County with a list of suggested mitigation measures in his comment letter dated January 28, 2008. These mitigation measures are consistent with the CEC Guidelines and fulfill the recommendations of the Wintu Audubon Society by providing concrete, meaningful mitigation measures, options for compensatory mitigation, and monitoring methods and requirements.

WINTU Comment: Contract with the CEC to manage the implementation of the mitigation measures.

Response: CEC is not the permitting authority for this project, and therefore, it is not the appropriate agency to handle oversight of environmental mitigation measures. The CEC Guidelines suggest cooperation with the CADFG, USFWS, and the permitting agency (here, the County) to ensure appropriate mitigation measures are in place and are followed. As explained in Mr. Young's comment letter, the mitigation measures HRW has suggested for potential impacts from the project on birds and bats are consistent with the CEC Guidelines.

WINTU Comment: Incidental take permit and habitat conservation plan for northern spotted owl

Response: The project will not affect northern spotted owls and needs no further review under the ESA for potential impacts to federally listed species. According to information from the U.S. Fish and Wildlife Service, the Pit River north of the project area is the southern boundary for northern spotted owls. Spotted owls occurring north of the Pit River are listed as threatened under the ESA. Spotted owls south of the Pit River are considered California spotted owls and, while a species of concern, are not listed under the ESA and no incidental take permit is required. In addition, the site is currently managed as a tree plantation and the forest characteristics on site are not considered suitable habitat for spotted owls. Further, surveys for spotted owls by the land owner have not documented either species in the project area. Land management practices for the site will not be affected by the project, and thus, it will continue to be unsuitable or marginal habitat at best for spotted owls.

WINTU Comment: Cumulative impacts (other wind farms projects in the immediate vicinity need to be analyzed).

Response: HRW is not aware of any proposals or applications for permits for other wind projects in the region. Since there are no pending applications for review of proposed wind farm developments in the vicinity, there are no other wind projects to include in an analysis of potential cumulative impacts.

RES appreciates your consideration of this additional information. If the County needs further information regarding wildlife concerns as they relate to wind projects, please feel free to call or write.

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

WEST, Inc.
Western **E**co**S**ystems **T**echnology, **I**nc. 2003 Central Ave., Cheyenne, WY 82001
Phone: 307.634.1756 Fax: 307.637.6981 Web site: www.west-inc.com

MEMORANDUM

Date: February 19, 2008

Subject: Avian Risk Assessment – Hatchet Ridge Wind Project, California

To: Bill Walker, Shasta County

From: David Young, WEST, Inc., Senior Biologist

At the request of Shasta County the following memorandum presents an evaluation of expected impacts to birds from the Hatchet Ridge wind project based on (1) the results of site specific field studies and (2) what we know about impacts from wind turbines from results from other studies at existing wind projects.

Impacts from wind projects on birds and bats are often erroneously equated with risk or exposure to turbines. True impacts are not known until a project is built and the impacts can be observed or measured. Risk is often used as a description or an estimate of impacts for projects that have not been built. In most cases risk is greater than true impacts, for example, more birds are at risk of collision than actually collide with turbines because of reasons such as behavioral avoidance or simple chance of flying through the rotor swept area in areas not occupied by the blades at the time of exposure.

One common method of estimating risk is to quantify how many birds or bats are exposed to potential collision with turbines based on data collected during field surveys at a site. Studies to observe the number (abundance) of birds in the project area and/or behavioral patterns are means of estimating risk. We have taken the approach of calculating a standardized "use" estimate for species observed in the project area as the number for each species observed during a standard length survey within a standard plot size. This provides a relative estimate of abundance for a species compared to all species observed during the study. Use provides a measure for which species will likely be the most exposed to turbines either because they are very abundant or occur very frequently on the site but does not take into account behavior. To account for behavior, which includes flight characteristics, we calculate an exposure index that factors in the percent of time a species is observed flying, the percent of time it is observed flying in the zone of risk (height of the rotor swept area), and the relative abundance. The use and exposure indices provide measures of risk but do not equate to true impacts (actual collisions).

For nocturnal migration studies, the common metrics that are measured to provide a measure of risk are: (1) the passage rate, defined as the number of targets passing overhead for a given period of time and that cross a given length of migratory front; and (2) flight altitude, providing a measure of the relative percent of targets passing overhead within the zone of risk (height of the rotor swept area).

For bats the common metric measured with field studies is the number of bat detections (often called passes) per detector-night. Because of the difficulty of observing bats at night, it is difficult to gather specific information such as flight height for bats. With the AnaBat detector data the assumption is made that all the bats recorded are generally exposed to turbines because they are recorded in the project area in locations where turbines are likely to be built.

Results of monitoring studies at existing wind projects have shown that not every bird or bat that is exposed to turbines (or at risk) is actually impacted (see Erickson et al 2001 for a discussion of impacts from wind turbines). A number if modern wind projects in the Pacific Northwest and California have been monitored and results have been fairly consistent (Table 1). The overall range of avian mortality was approximately 0.9 to 3.1 birds per MW of capacity per year with an overall average of approximately 2.0 birds per MW per year.. Mortality express as the number per MW adjusts for differences in turbine sizes and the corresponding rotor swept area (zone of risk). For all the studies turbine size ranged from 660 kW to 1.8 MW.

A good example for illustrating that not all birds or bats exposed to potential turbine collision are actually impacted is to compare: (1) the nocturnal radar study from the site to show the total number of targets passing overhead and exposed to turbines; and (2) the results of monitoring studies at existing modern wind projects which show that only a tiny fraction of the migrants passing overhead actually collide with turbines.

- The nocturnal migration study of the Hatchet Ridge project area recorded on average 290 targets per kilometer per hour passing over the site. If we assume that there was 10 hours of night migration per night, then an average of 2,900 targets passed over per kilometer per night.
- The prevailing direction of targets was southwest, which is roughly perpendicular to the Hatchet ridgeline and the line of proposed turbines. The proposed turbine string is approximately 9 km long. Therefore approximately 26,100 targets passed over the proposed development area per night. [290 x 10 x 9 = 26,100]
- The study was run for a 39-day period. Over the course of the study, approximately 1,017,900 targets passed overhead.
- Based on the flight altitudes recorded during the study, on average 8% of the targets were below 125 m – the approximate height of turbines or the zone of risk. Over the course of the study, approximately 81,432 targets passed overhead in the zone or risk. [1,017,900 x 8%] (Note: this percentage assumes a rotor swept area of 125 m so it actually overestimates the number of targets exposed to turbines; the true rotor swept area will be between approximately 87 and 104 m depending on the turbine used for the project).
- Based on nine recent monitoring studies at modern wind projects in the Washington, Oregon and California (see Table 1), on average 0.51 nocturnal migrant fatalities occurred per MW of capacity per year of operation. If mortality rates at these studies are

similar to what will occur at Hatchet Ridge, then on average 51 nocturnal migrant bird fatalities would be expected per year if a 100 MW wind project is constructed. Under the assumption that one-half of the nocturnal migrant mortality occurs in the spring and one-half occurs in the fall, this equates to approximately 0.03% of the total number of fall migrants passing over the site within the zone of risk [(51/2) / 81,432 = 0.000313], and an immeasurably small fraction of all migrants passing overhead during the nocturnal migration study [(51/2) / 1,017,900 = 0.000025]

The major assumptions for this exercise are that the mortality of nocturnal migrants calculated in the other studies will be representative of that at Hatchet Ridge and that all the migrant mortality would occur during the migration season as defined by the study period. Additionally, this estimate is based on data that was collected under typically good weather conditions (the conditions during sampling). Risk and impacts could change under adverse weather conditions that could affect behavior of birds and put them at greater risk during certain periods. Further, the number of targets passing overhead is based on the airspace up to 1.5 km above ground and is considered an index to the true number of birds passing overhead. Studies have shown that many migrants fly even higher than 1.5 km and not all targets represent a single bird. Some targets were likely flocks of birds flying close together so the mean number of birds per target is likely greater than one. Also, the typical migration season is longer than 39 days and an unknown percentage of the targets were likely migrant bats, although based on the sampling period, this percentage is believed to be minimal. In general, the evaluation represents a 'worse-case scenario' as the true number of migrant birds passing over the site is undoubtedly greater than the calculated numbers (see Young and Erickson 2006 for further discussion of risk to nocturnal migrants). Under this worse case scenario, it is not expected that impacts from the HRW project on migrant birds would be greater than results from other modern wind projects that have been studied.

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Table 1. Avian fatality estimates for modern wind power projects in the Washington, Oregon and California

Wind Project	Project Size		Turbine Characteristics			All Bird Mortality		Raptor Mortality		Nocturnal Migrants		Source
	No. turbs	No. MW	Rotor Diameter	Rotor Area	MW	No. per turb/yr	No. per MW/yr	No. per turb/yr	No. per MW/yr	No. per turb/yr	No. per MW/yr	
High Winds, CA	90	162	80 m	5027 m^2	1.80	2.45	1.36	0.76	0.42	0.41	0.23	Kerlinger et al. 2006
Diablo Winds, CA	31	20	47 m	1735 m^2	0.66	1.40	2.12	0.37	0.56	0.03	0.27	WEST, Inc. 2006
Stateline, OR/WA	454	300	47 m	1735 m^2	0.66	1.93	2.92	0.06	0.09	0.48	0.73	Erickson et al. 2004
Vansycle, OR	38	25	47 m	1735 m^2	0.66	0.63	0.95	0	0	0.21	0.32	Erickson et al 2000
Combine Hills, OR	41	41	61 m	2961 m^2	1.00	2.56	2.56	0	0	0.27	0.27	Young et al. 2005
Klondike I, OR	16	24	65 m	3318 m^2	1.50	1.42	0.95	0	0	0.53	0.35	Johnson et al. 2003b
Klondike II, OR	50	75	65 m	3318 m^2	1.50	4.71	3.14	0.17	0.11	2.30	1.54	NWC and WEST 2007
Hopkins Ridge, WA	83	150	80 m	5027 m^2	1.80	2.21	1.23	0.25	0.14	0.82	0.46	Young et al. 2007
Nine Canyon, WA	37	48	62 m	3019 m^2	1.30	3.59	2.76	0.07	0.05	0.59	0.45	Erickson et al. 2003b
Sum/Average	**840**	**845**	**62 m**	**3097** m^2	**1.21**	**2.32**	**1.99**	**0.19**	**0.15**	**0.63**	**0.51**	

April 24, 2008
Prepared by: Patrick Pyle – Meteorologist

Shasta County, California Zone of Visual Influence Assessment

Per the request of Shasta County for the Project Applicant of the Hatchet Ridge Wind Project to come up with a site plan that would eliminate views of the Project from the town of Burney, Babcock and Brown, LP meteorological and technical team (B&B) has; 1) investigated the zone of visual influence (ZVI) for the town of Burney, CA using the proposed Hatchet Ridge Project turbine layout and 2) calculated the production that would occur from relocating the turbines. Based upon the proposed site plan of forty three 2.4 MW MHI turbines mounted on 80 meter towers, as shown on Figure 1, many of the turbines are visible on the ridgeline when viewed from the Burney area looking west.

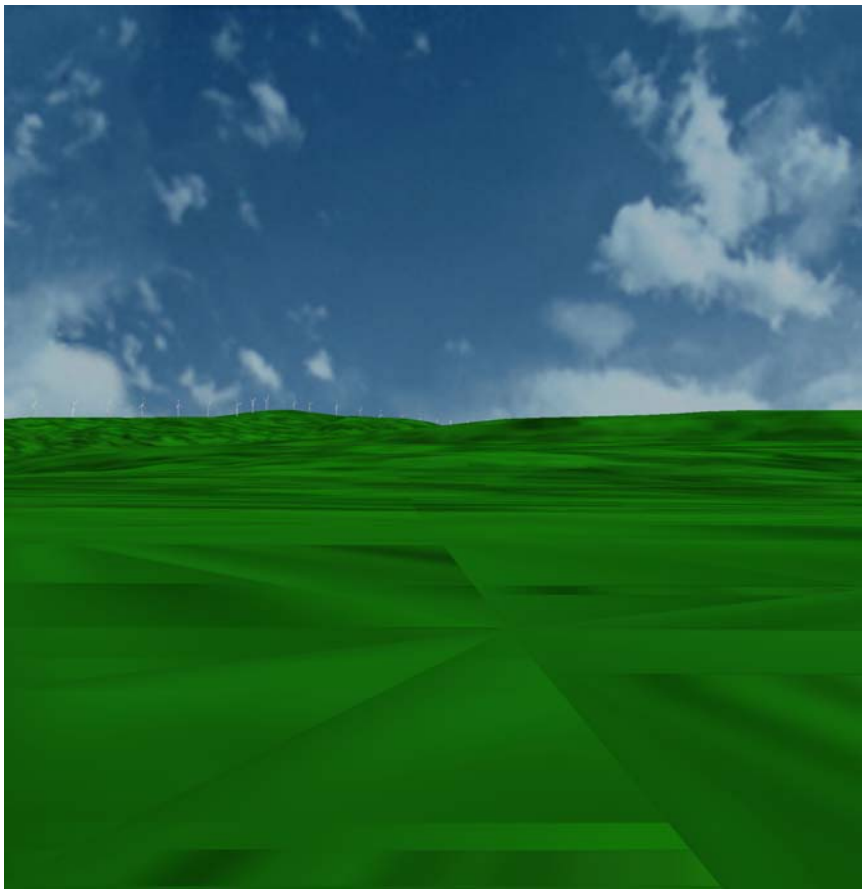


Figure 1. View looking West from Burney (current proposed MWT95 2.4 MW Layout)

To remove the turbines from the Burney area zone of visual influence, B&B performed a ZVI turbine location analysis that would eliminate all views of turbines from Burney. To achieve this goal, all turbines would have to be moved southwest approximately one mile and off the main ridgeline. Figure 2 shows a map of the current proposed layout (green dots), and the new layout with the turbines off the ridgeline and longer visible from Burney (red stars).

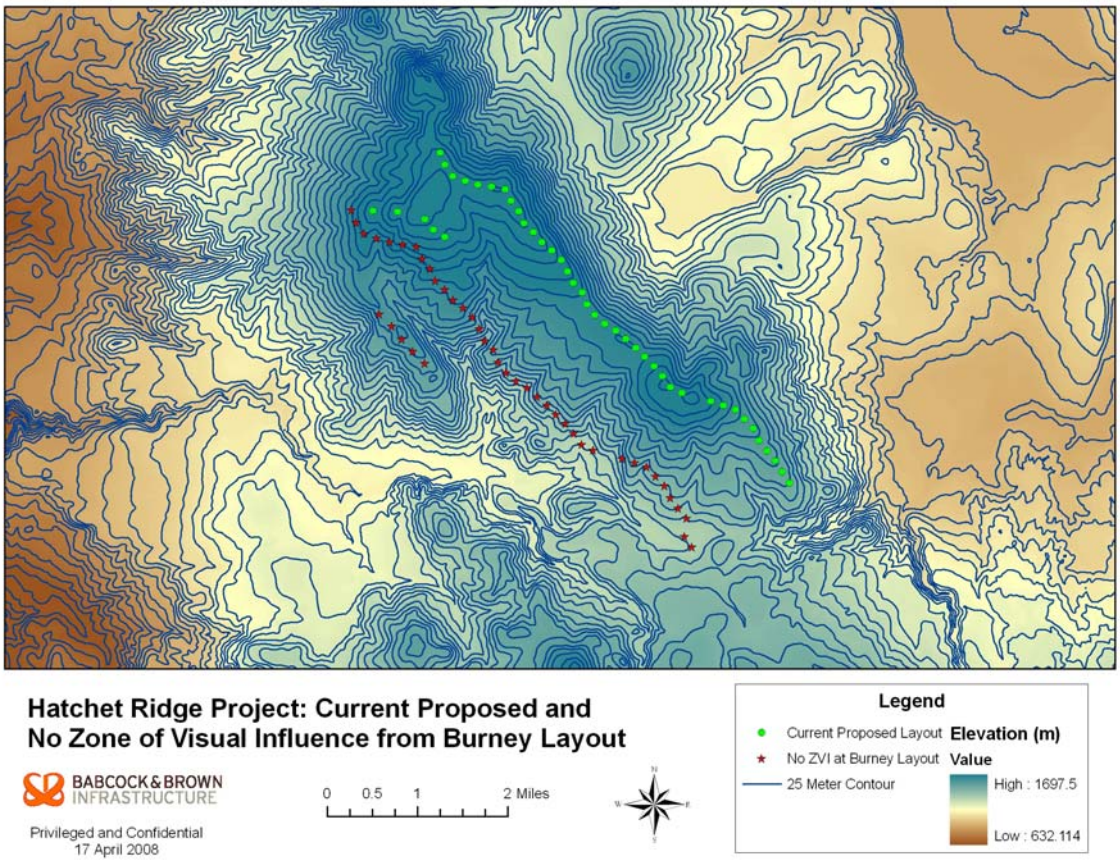


Figure 2. Hatchet Ridge Project current proposed layout with no impact on Burney.

Figure 3 shows the same viewpoint as from figure 1 with the new layout (red stars).

Figure 3. View looking West from Burney (No ZVI Layout)

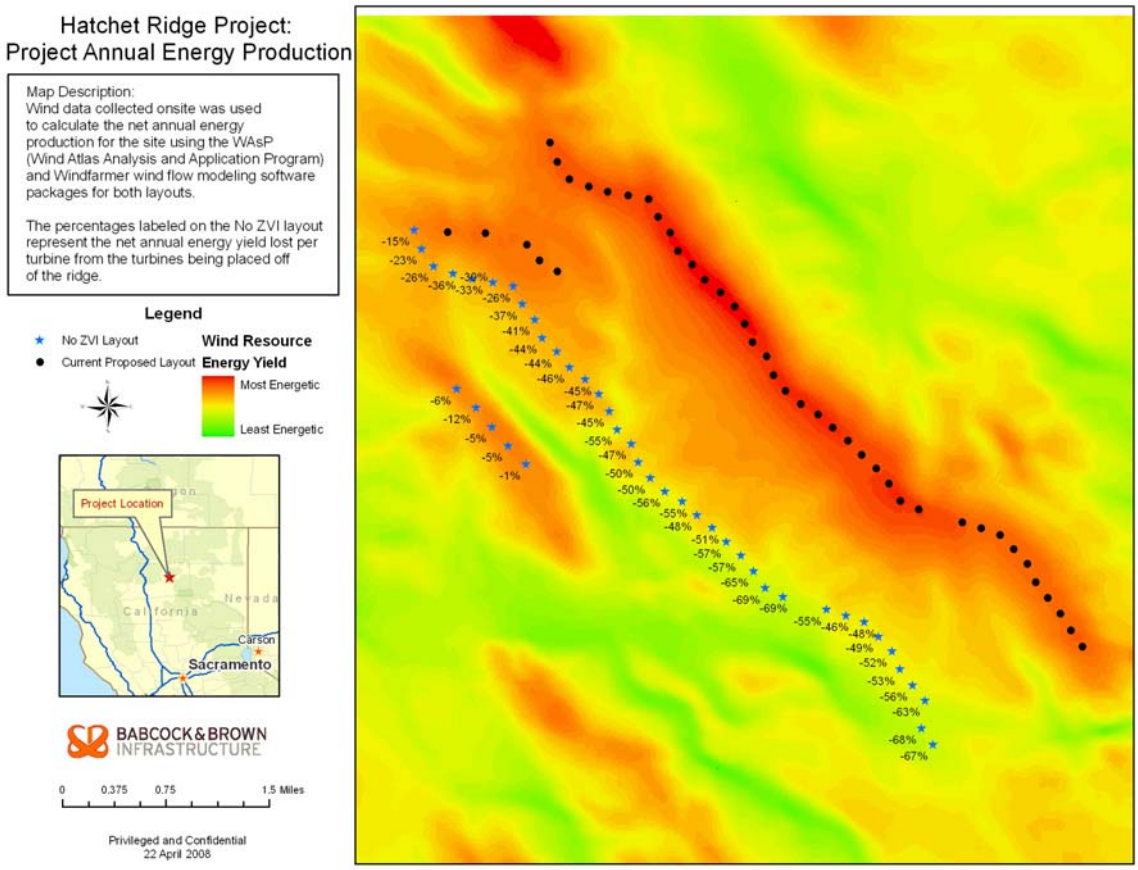
TECHNICAL AND ECONOMIC FEASIBILITY OF NO ZVI SITE PLAN

There are at least three issues associated with moving the turbines to this new location. They include; 1) the wind resource and resulting energy production at the new location, 2) constructability of the new area and, 3) environmental and/or property setback issues. This report is not qualified to comment on environmental or property

setback issues that might arise from the new site plan. However, B&B's in-house technical department is well versed in employing standard, well understood and accepted wind industry modeling software. Specifically, with multiple years of on-site wind data at Hatchet Ridge and using the Wind Atlas Analysis and Application Program (WAsP) and WindFarmer software packages, we are able to produce wind speed distributions for each turbine location at 25 m grid spacing across a project area. This data is then used to generate net annual energy production estimates for the entire project using the wind turbine's respective power curve and then making appropriate deductions for availability, electrical, icing, wake and other operational losses.

As mentioned earlier, wind speed information was produced for the entire site at each turbine location; however, due to the confidentiality of the data, a map showing relative annual energy production was produced (Figure 4). Results from the analysis indicate that the much lower wind speeds at the new turbine locations, the annual energy production of this layout would be approximately 40% less than our proposed layout (with a standard deviation of 10% plus or minus based on model error). In addition, the steep slope of the new turbine locations would be extremely problematic to build if not technically unfeasible. Figure 4 shows a map of the annual energy production for site with the two layouts overlaid. The negative percentages on the No ZVI layout represent the percent change in annual energy production from moving the turbines off of the ridge.

April 24, 2008
Prepared by: Patrick Pyle – Meteorologist



In conclusion, moving the turbines sufficiently off the ridgelines as to make them invisible in Burney renders the Project economically and technically unfeasible. Please do not hesitate to call me if you have any questions and/or comments.

Patrick Pyle

713 308 4292

Appendix B

Nocturnal Migration Study

Information in Appendix A was submitted by the applicant, RES America Developments, Inc. It does not necessarily reflect the analysis and conclusions of Shasta County or ICF Jones & Stokes.

A RADAR STUDY OF NOCTURNAL BIRD AND BAT MIGRATION AT THE PROPOSED HATCHET RIDGE WIND PROJECT, CALIFORNIA, FALL 2007

TODD J. MABEE

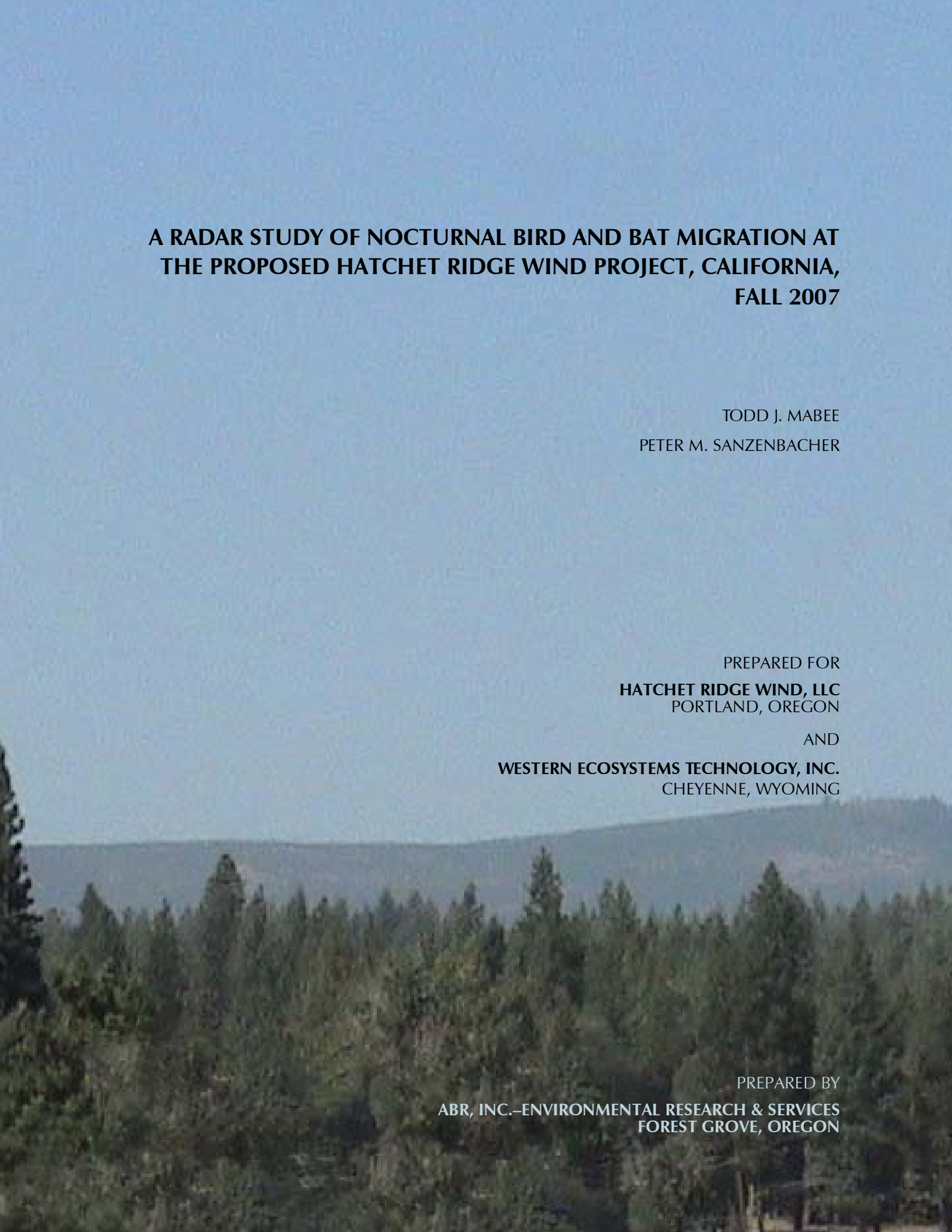
PETER M. SANZENBACHER

PREPARED FOR

HATCHET RIDGE WIND, LLC
PORTLAND, OREGON

AND

WESTERN ECOSYSTEMS TECHNOLOGY, INC.
CHEYENNE, WYOMING



PREPARED BY

ABR, INC.–ENVIRONMENTAL RESEARCH & SERVICES
FOREST GROVE, OREGON

A RADAR STUDY OF NOCTURNAL BIRD AND BAT MIGRATION AT THE PROPOSED HATCHET RIDGE WIND PROJECT, CALIFORNIA, FALL 2007

FINAL REPORT

Prepared for

Hatchet Ridge Wind, LLC
700 SW Taylor Street, Suite 210
Portland, Oregon 97205
and
Western EcoSystems Technology, Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001

Prepared by

Todd J. Mabee
and
Peter M. Sanzenbacher

ABR, Inc.—Environmental Research & Services
P.O. Box 249, Forest Grove, Oregon 97116

February 2008


Printed on recycled paper.

EXECUTIVE SUMMARY

- This report presents the results of radar studies of fall nocturnal bird and bat migration conducted from 7 September–15 October 2007 at the proposed Hatchet Ridge Wind Project, located in Shasta County, California. Each night we sampled at two stations (North and Saddle) within the proposed development area.
- The primary goal of this study was to collect information on the nocturnal migration characteristics of birds and bats (i.e., targets) during the peak of passerine migration during fall. Specifically, the objectives of this study were to: (1) collect baseline information on migration characteristics (i.e., flight direction, migration passage rates, flight altitudes) of nocturnally migrating targets; and (2) estimate the number of targets that would pass within the rotor-swept area of the proposed wind turbines during the migratory season. We also evaluated the influence of weather and date on migration passage rates and flight altitudes.
- The mean nocturnal flight direction of radar targets was 191° at North, 196° at Saddle, and 194° at both stations combined.
- The mean nocturnal passage rate was 231 ± 31 targets/km/h and 351 ± 39 targets/km/h at North and Saddle respectively. The overall mean passage rate at the combined stations was 290 ± 26. Nightly mean passage rates ranged from 31–1,159 targets/km/h.
- Altitude-specific passage rates (i.e., passage rates below 125 m agl) were 17 ± 3 targets/km/h at North and 39 ± 7 targets/km/h at Saddle. The overall mean altitude-specific passage rate at the combined stations was 28 ± 4. Across all study dates altitude-specific passage rates ranged from 0–171 targets/km/h.
- The mean nocturnal flight altitude was 474 ± 5 m agl at North and 463 ± 4 m agl at Saddle. Across all stations the mean nocturnal flight altitude was 468 ± 3. Mean flight altitudes among all nights ranged from 50–1,206 m agl.
- The percentage of targets recorded below 125 m agl was 7% at North, 9% at Saddle, and 8% across all stations.
- During fall migration passage rates were higher at the Saddle station and increased later in the season. Flight altitudes increased under favorable synoptic conditions (i.e., with tailwinds).
- Assuming an average of 10 nocturnal h/d, we calculated a turbine passage rate of 41–389 nocturnal migrants/turbine at North, 94–898 nocturnal migrants/turbine at Saddle, and 67–640/turbine at the combined stations over the course of our 39 day study period. Calculated as a daily index this equates to 1.1–10.0 nocturnal migrants/turbine/d at North, 2.4–23.0 nocturnal migrants/turbine/d at Saddle, and 1.7–16.4 nocturnal migrants/turbine/d at the combined stations.
- The key results of our study were as follows: (1) the mean passage rate was 231 ± 31 targets/km/h and 351 ± 39 targets/km/h at North and Saddle stations, respectively, and 290 ± 26 across both stations; (2) mean nightly passage rates were variable among nights and ranged from 31–1,159 targets/km/h; (3) mean flight altitude was 474 ± 5 m agl and 463 ± 4 m agl at the North and Saddle stations, respectively, and 468 ± 3 across both stations; (4) the percentage of targets passing below 125 m agl was 7% and 9% at the North and Saddle stations, respectively, and 8% across both stations; (5) the target passage rate below 125 m agl was 17 ± 3 targets/km/h and 39 ± 7 targets/km/h at the North and Saddle stations, respectively, and 28 ± 4 across both stations; (6) the estimated turbine passage rate of nocturnal migrants passing within the airspace occupied by each proposed turbine was 1.1–10.0 nocturnal migrants/turbine/d at North, 2.4–23.0 nocturnal migrants/turbine/d at Saddle, and 1.7–16.4 nocturnal migrants/turbine/d across both stations.

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ACKNOWLEDGMENTS

We thank Hatchet Ridge Wind, LLC for funding this study and WEST, Inc., for the opportunity to participate in this study. In particular we thank Dave Young (WEST) for assistance with project coordination and logistics. We appreciate the efforts of ABR employees Jeff Barna, Bob Burgess, and John Shook for their help with radar data collection. Also at ABR, Susan Cooper, and Delee Spiesschaert helped with office logistics and project coordination, Rich Blaha prepared report maps, Jon Plissner provided statistical assistance, and Pam Odom helped with report preparation.

INTRODUCTION

Wind energy is one of the fastest growing sources of energy production in the United States (GAO 2005). Studies examining the impacts of windfarms on birds in the United States and Europe suggest that fatalities and behavioral modifications (e.g., avoidance of windfarms) occur in some, but not all, locations (Winkelman 1995, Anderson et al. 1999, Erickson et al. 2001). In the United States both resident and migratory birds sometimes collide with wind turbines (Erickson 2004, NWCC 2004) with the overall fatality rate being similar (~2.3–3.5 avian fatalities/MW/yr) on a regional scale in the United States (NRC 2007).

The makeup of these fatalities varies for some species groups, although passerines ("songbirds") comprise ~ 70–85% of the known bird collisions at wind power developments throughout the US (Erickson et al. 2001, Strickland and Johnson 2006). Neotropical migratory species of passerines such as thrushes (Turdidae), vireos (Vireonidae), and warblers (Parulidae) have a long history of colliding with above-ground structures (Kerlinger 2000, Longcore et al. 2005) and seem to be the most vulnerable to collisions during their nocturnal migrations (Manville 2005). This pattern also holds true at wind-energy developments, with ~50% of the fatalities at windfarms involving nocturnal passerine migrants (Erickson et al. 2001). This makes sense both because of poorer visibility at night and because passerines tend to migrate at lower altitudes than do other groups of birds (e.g., shorebirds, waterfowl; Kerlinger 1995, Alerstam 1990).

The paucity of general information on nocturnal bird migration in most areas has generated interest in conducting preconstruction studies of nocturnal migration at the growing number of proposed wind power developments throughout the country (CEC guidelines, Kunz et al. 2007a). Consideration of potential wind power impacts on nocturnal bird migration is particularly important because more birds migrate at night than during the daytime (Gauthreaux 1975, Kerlinger 1995) and frequently a large proportion (ranging from 0–80%) of the fatalities at wind-energy developments are from nocturnal passerine migrants (Erickson et al. 2001).

Bat fatalities have also occurred at wind farms in the United States with recent data from Appalachian ridgetops in the eastern US (Arnett 2005, Erickson 2004, Kerns 2004, Kunz et al. 2007a), the Tug Hill Plateau region in New York (Jain et al. 2007), prairie locations in both the US and Canada (see references in Barclay et al. 2007, Kunz et al. 2007a), indicating that substantial bat kills are possible at some wind power projects. Most of the bat fatalities documented at windfarms have been associated with migratory tree-roosting species during seasonal periods of dispersal and migration and the majority of these collisions occurred during the late summer and fall migratory periods (Arnett 2005, Barclay et al. 2007, Kunz et al. 2007a). There are many hypotheses as to why bats may collide with wind turbines (Kunz et al. 2007a) and ongoing research may yield patterns at a later point in time.

Hatchet Ridge Wind, LLC proposes to develop the Hatchet Ridge Wind Project (HRWP), a ~100 MW wind power development in Shasta County in northern California (Fig. 1). The development would consist of ~42 wind turbines, each with a generating capacity of up to ~2.4 MW. Characteristics of the proposed wind turbines include a monopole tower ~80 m in height and three rotor blades each extending ~47.5 m equating to a rotor area ~95 m in diameter. Thus, the total maximal height of each turbine will be ~127.5 m with a blade in the vertical position.

The proposed HRWP is located in a region with little information on the migratory pathways of nocturnal migrants such as passerines and bats. Within ~100–150 km to the north-northeast of the proposed development are a series of lakes and wildlife refuges (Fig. 1) that provide habitat for large numbers of migratory waterfowl, shorebirds, and songbirds (USFWS 1995) raising the possibility that birds from these regions may pass over HRWP en route to the Sacramento Valley and other over wintering areas during fall migration. We conducted the current study to provide baseline information on nocturnal migrants at the proposed HRWP during fall 2007.

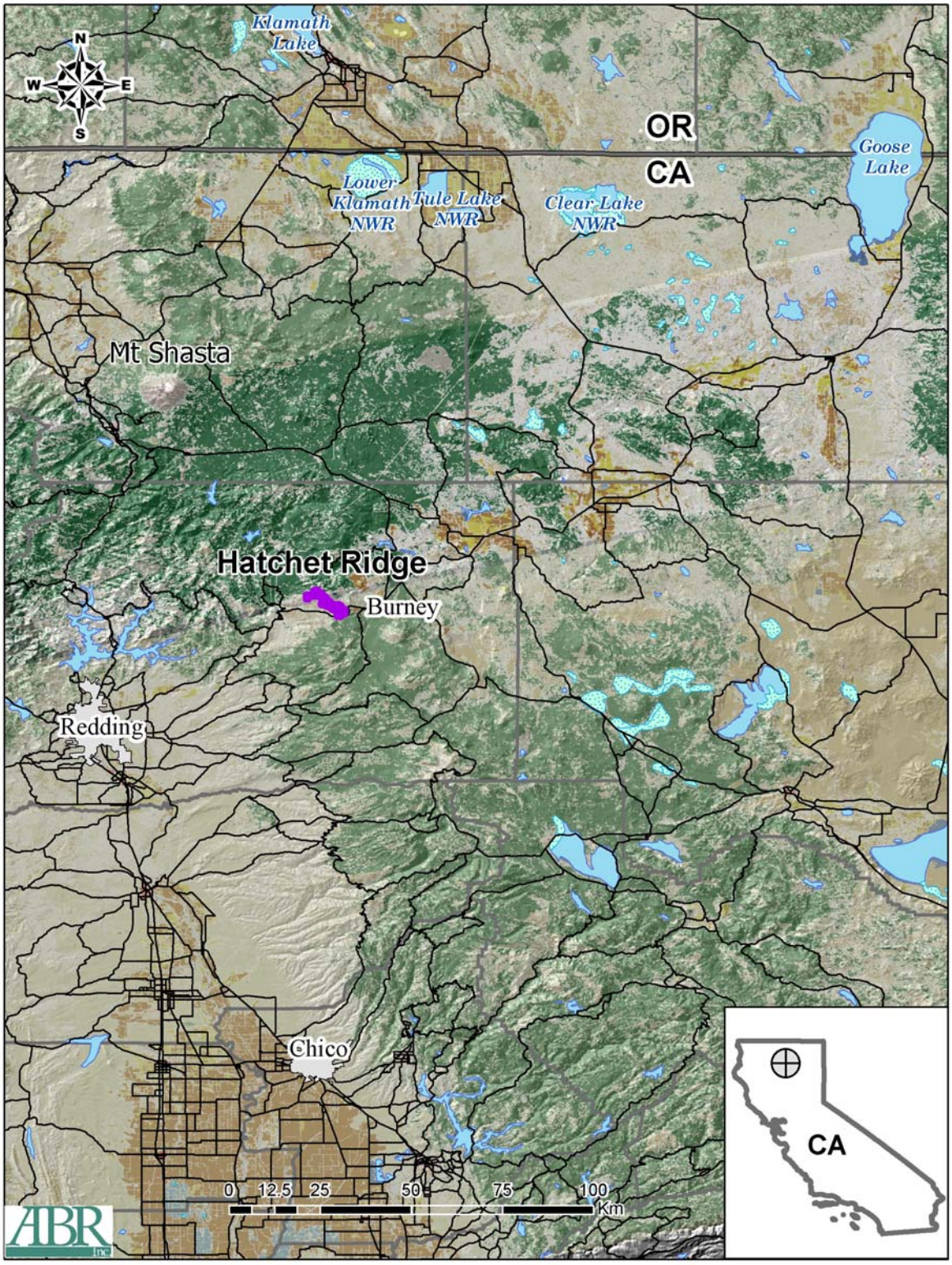

Figure 1. Map of the proposed Hatchet Ridge Wind Project and surrounding landscape features of Shasta County, California.

OBJECTIVES

The primary goal of this study was to collect information on the nocturnal migration patterns of targets (i.e., birds and bats) during the peak period of fall passerine migration at the proposed Hatchet Ridge Wind Project (HRWP). Specifically, the objectives of this study were to: (1) collect baseline information on migration characteristics (i.e., flight direction, migration passage rates, and flight altitudes) of nocturnal migrants; and (2) determine the number of targets that would pass within the rotor-swept area of the proposed wind turbines during the migratory season. We also evaluated the influence of weather on migration passage rates and flight altitudes.

STUDY AREA

The proposed Hatchet Ridge Wind Project (HRWP) is located along Hatchet Ridge in a rural area of Shasta County in northern California (Fig. 1). The development is located ~8 km west of the town of Burney, California and ~64 km northeast of Redding, California. Highway 299 runs along the southern boundary of the project area. Hatchet Ridge is situated along the southern edge of the Cascade Range. The general orientation of the ridgeline is northwest to southeast and elevations within the project area range from ~1,670 m asl in the northwest section to ~1,310 m asl in the southern portion near Hatchet Mountain Pass. The topography of the project area is primarily flat, broad ridge-top with moderate to steep side slopes. Average annual rain fall is ~127 cm and the average annual temperature is ~6°C. The natural dominant vegetation community is mixed conifer that includes a combination of white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and black oak (*Quercus velutina*). Large portions of the ridgeline and project area burned in the Fountain Fire of 1992 and areas were replanted in 1996 with white fir and ponderosa pine.

Our study included two radar sampling stations located in open areas along Hatchet Ridge within the area of the proposed development (Fig. 2). The North station (N40.90863, W121.82530 WGS84) was located ~1,683 m asl in the northwest section of the development whereas the Saddle station (N40.88871, W121.79435 WGS84) was lower in elevation, ~1,541 m asl, and situated in the central portion of the proposed development.

METHODS

STUDY DESIGN

We conducted nightly radar observations at both sampling stations on 39 nights during fall 2007 (7 September to 15 October) during the general peak of passerine migration in this region (Harris 2005). This timing was chosen when it would be expected that many birds would be migrating through the area including passerines, shorebirds, waterfowl, and potentially bats.

We obtained useable data from radar observations during 36 and 34 nights at the North and Saddle stations, respectively. On the remaining nights, we were unable to conduct radar observations because of inclement weather (rain and snow). Each night we split sampling time between the two sampling stations to capture potential spatial variation in migration characteristics in the project area and we alternated the starting location on a nightly basis to reduce bias. Sampling started ~45 min after sunset and continued for a total of 7 h/night on most nights. Our sampling schedule provided coverage during the peak hours of nocturnal passerine migration within a night (Lowery 1951, Gauthreaux 1971, Alerstam 1990, Kerlinger 1995, Mabee et al., 2006a).

RADAR EQUIPMENT

Our mobile radar laboratory consisted of a marine radar that was mounted on the roof of a van and that functioned as both a surveillance and vertical radar. When the antenna was in the horizontal position (i.e., in surveillance mode), the radar scanned the area surrounding the lab (Fig. 3), and we manually recorded information on flight direction, flight behavior, passage rates, and groundspeeds of targets. When the antenna was placed in the vertical position (i.e., in vertical mode), the radar scanned the area in an arc across the top of the lab (Fig. 4), and we manually measured flight altitudes of targets with an index

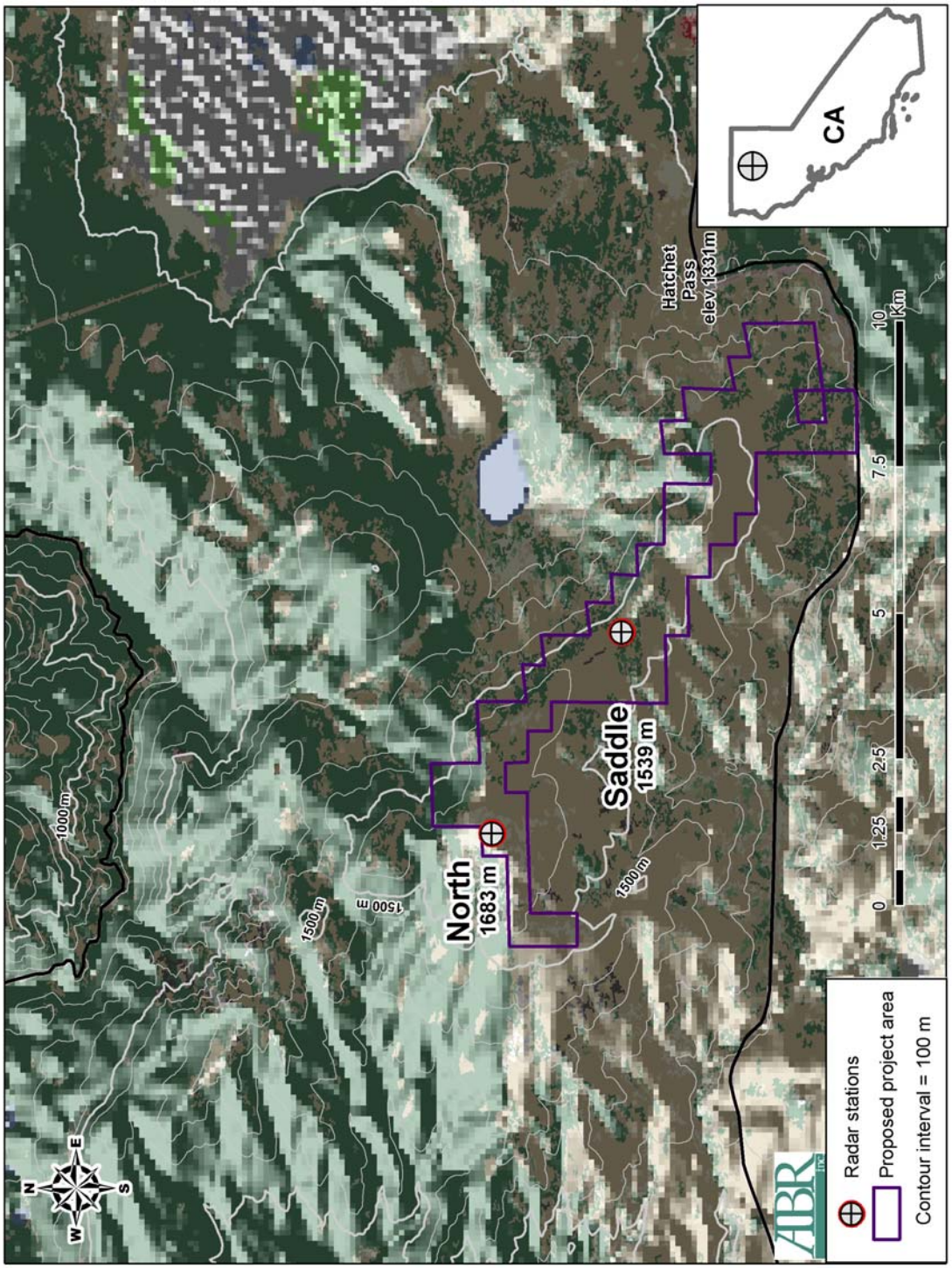

Figure 2. Map of the proposed Hatchet Ridge Wind Project and radar sampling stations in Shasta County, California, fall 2007.

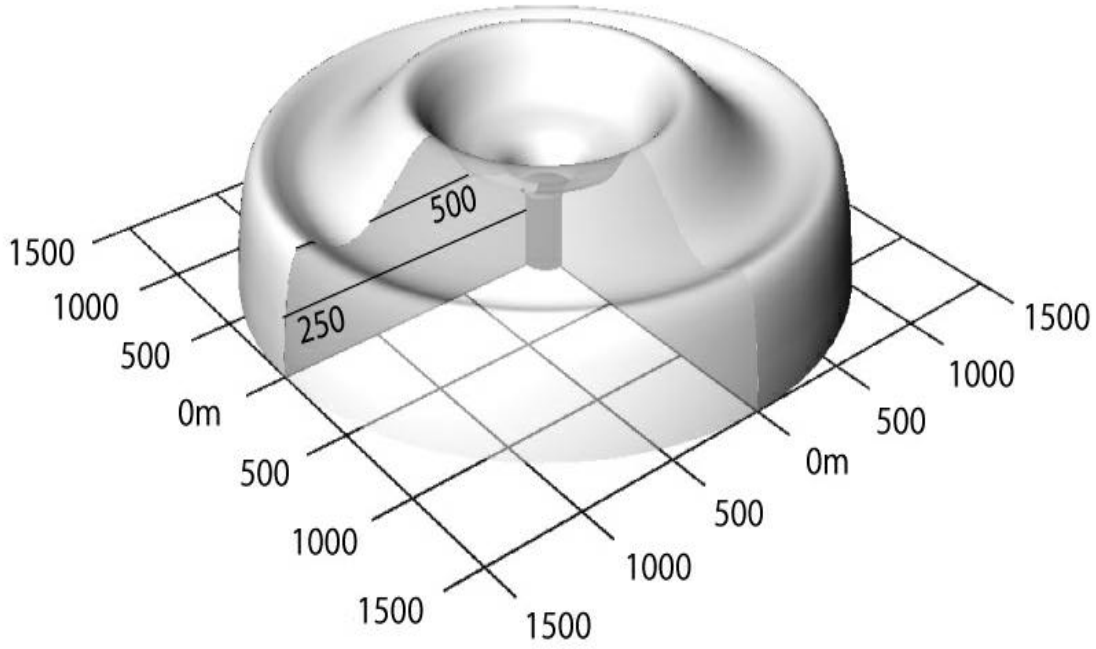

Figure 3. Approximate airspace sampled by Furuno FR–1510 marine radar when operating in the surveillance mode (antenna in the horizontal orientation) as determined by field trials with Rock Pigeons. Note that the distribution of the radar beam within 250 m of the origin (i.e., the darkened area) was not determined.

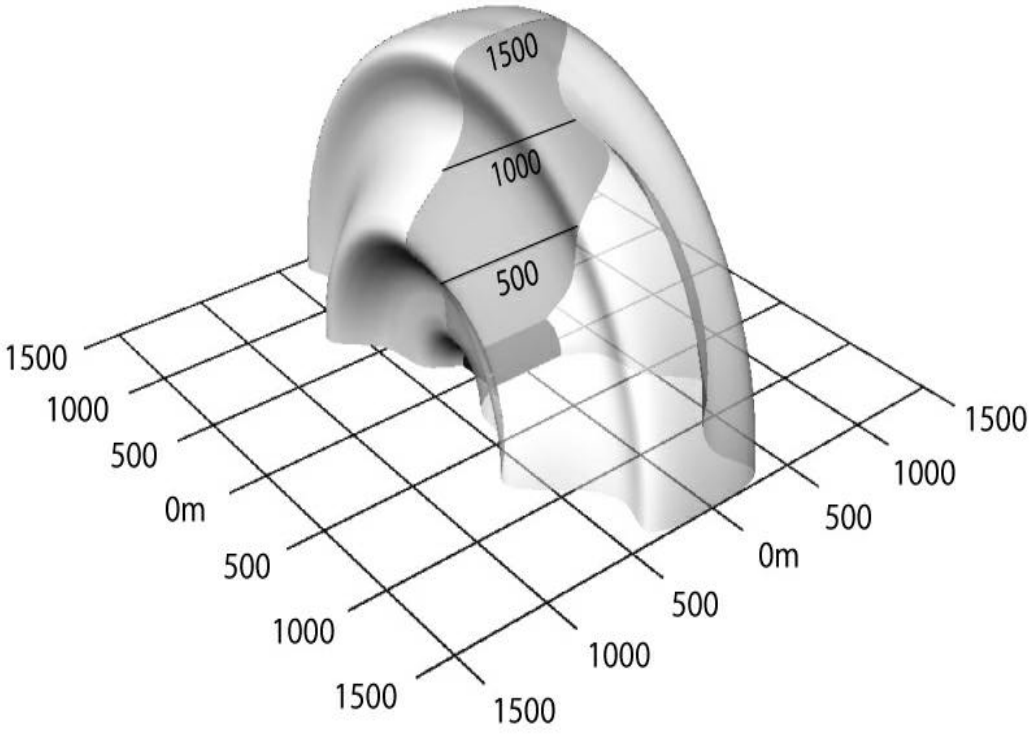

Figure 4. Approximate airspace sampled by Furuno FR–1510 marine radar when operating in the vertical mode (antenna in the vertical orientation) as determined by field trials with Rock Pigeons. Note that the distribution of the radar beam within 250 m of the origin (i.e., the darkened area) was not determined.

line on the monitor. All data were recorded manually into a laptop computer. A description of a similar radar laboratory can be found in Gauthreaux (1985a, 1985b) and Cooper et al. (1991), and a similar vertical radar configuration was described by Harmata et al. (2003) and Mabee et al. (2006a).

The radar (Furuno Model FR-1510 MKIII; Furuno Electric Company, Nishinomiya, Japan) is a standard marine radar transmitting at 9.410 GHz (i.e., X-band) through a 2-m-long slotted waveguide (antenna) with a peak power output of 12 kW. The antenna had a beam width of 1.23° (horizontal) × 25° (vertical) and a sidelobe of 10–20°. Range accuracy is 1% of the maximal range of the scale in use or 30 m (whichever is greater) and bearing accuracy is ± 1°.

This radar can be operated at a variety of ranges (0.5–133 km) and pulse lengths (0.07–1.0 μsec). We used a pulse length of 0.07 μsec while operating at the 1.5-km range. At shorter pulse lengths, echo resolution is improved (giving more accurate information on target identification, location, and distance), whereas, at longer pulse lengths, echo detection is improved (increasing the probability of detecting a target). An echo is a picture of a target on the radar monitor; a target is one or more birds (or bats) that are flying so closely together that the radar displays them as one echo on the display monitor. This radar has a digital color display with several scientifically useful features, including True North correction for the display screen (to determine flight directions), color-coded echoes (to differentiate the strength of return signals), and on-screen plotting of a sequence of echoes (to depict flight paths). Because targets plot every sweep of the antenna (i.e., every 2.5 sec) and groundspeed is directly proportional to the distance between consecutive echoes, we were able to measure ground speeds of plotted targets to the nearest ~10 km/h with a hand-held scale.

Energy reflected from the ground, surrounding vegetation, and other solid objects that surround the radar unit causes a ground-clutter echo to appear on the display screen. Because ground-clutter echoes can obscure targets, we minimized their occurrence by elevating the forward edge of the antenna by ~15° and by parking the mobile radar laboratory in locations that were surrounded by low trees or low hills, whenever possible. These objects act as a radar fence that shields the radar from low-lying objects farther away from the lab and that produces only a small amount of ground clutter in the center of the display screen. Both sampling stations at the proposed Hatchet Ridge Wind Project were ideal for radar and allowed for maximal radar coverage with minimal ground clutter. For further discussion of radar fences, see Eastwood (1967), Williams et al. (1972), Skolnik (1980), and Cooper et al. (1991).

Maximal distances of detection of targets by the surveillance radar depends on radar settings (e.g., gain and pulse length), target body size, flock size, flight profile, proximity of targets in flocks, atmospheric conditions, and, to some extent, the amount and location of ground clutter. Cooper et al. (1991) found that flocks of waterfowl routinely were detected at distances of 5–6 km, individual hawks usually were detected to 2–3 km, and single, small passerines were routinely detected out to 1–1.5 km (Cooper et al. 1991).

DATA COLLECTION

TARGET IDENTIFICATION ON RADAR

The species composition and size of a flock of birds or bats observed on the radar usually was unknown. Therefore, the term "target," rather than "flock" or "individual," is used to describe animals detected by the radar. Based on the study period and target size, it is likely that the majority of targets that we observed were individual passerines, which generally do not migrate in tight flocks (Lowery 1951, Kerlinger 1995). Targets were initially classified as small (<4mm diameter or length) or large (4mm diameter or length) in the field, although after analyzing the data target sizes were lumped together because only a small percentage (3.6%) of the targets were "large" in this study. Large targets were believed to be either shorebirds or waterfowl based on their size and speed (relative to typical passerine targets) and their small contribution to the overall numbers suggest that these taxa (shorebirds and waterfowl) were not common migrants during this study. It also is likely that a smaller number of targets were migratory bats, although this proportion is unknown.

Differentiating among various targets (e.g., birds, bats, insects) is central to any radar study, especially with X-band radars that can detect small flying animals. Because bat flight speeds overlap with flight speeds of passerines (i.e., are >6 m/s; Tuttle 1988, Larkin 1991, Bruderer and Boldt 2001, Kunz and Fenton 2003; Cooper and Day, ABR Inc., unpubl. data), it was not possible to separate bird targets from bat targets based solely on flight speeds. We were able to exclude foraging bats based on their erratic flight patterns; however, migratory bats or any bats not exhibiting erratic flight patterns were included in our data.

Of primary importance in target identification is the elimination of insect targets. We reduced insect contamination by (1) omitting small targets (the size of gain speckles) that only appeared within ~500 m of the radar and targets with poor reflectivity (e.g., targets that plotted erratically or inconsistently in locations having good radar coverage); and (2) editing data prior to analyses by omitting surveillance and vertical radar targets with corrected airspeeds <6 m/s (following Diehl et al. 2003). The 6 m/s airspeed threshold was based on radar studies that have determined that most insects have an airspeed of <6 m/s, whereas that of birds and bats usually is ≥ 6 m/s (Tuttle 1988, Larkin 1991, Bruderer and Boldt 2001, Kunz and Fenton 2003; Cooper and Day, ABR Inc., unpubl. data).

SAMPLING DESIGN

Each of the seven, one-hr radar sampling sessions consisted of: (1) one 10-min session to collect weather data and adjust the radar to surveillance mode; (2) one 10-min session with the radar in surveillance mode (1.5-km range) for collection of information on migration passage rates; (3) one 15-min session with the radar in surveillance mode (1.5-km range) for collection of information on groundspeed, flight direction, tangential range (minimal perpendicular distance to the radar laboratory), transect crossed (the four cardinal directions—north, south, east, and west), species (if known), and the number of individuals (if known); (4) one 10-min session to collect weather data and adjust the radar to vertical mode; and (5) one 15-min session with the radar in vertical mode (1.5-km range) to collect information on flight altitudes, speed, and direction. The exception was session four when following surveillance radar data collection we traveled between stations and then finished the hour with an abbreviated 10-min vertical radar data collection.

For each vertical radar session, the antenna was oriented parallel to the main axis of migration (determined by the modal flight direction seen during the previous surveillance radar session) to maximize the true flight speed of targets. True flight speeds of targets can be determined only for those targets flying parallel to the antenna's orientation because slower speeds are obtained when targets fly at an angle to this plane of orientation. We also examined the flight behavior of vertical radar targets during by recording whether targets were ascending from the ground clutter, ascending at a steep angle above the ground clutter (extrapolated flight path would have intersected the ground clutter on the monitor), flying at a level altitude, descending at a steep angle (extrapolated flight path would have intersected the ground clutter on the monitor), and descending into the ground clutter.

Weather data collected twice each hour consisted of the following: wind speed (in KPH, collected with a Kestrel® weather instrument [Nielsen-Kellerman Company, Boothwyn, PA]); wind direction (measured with a compass to the nearest 5°); cloud cover (estimated to the nearest 5%); ceiling height (in m agl; 1–50, 51–100, 101–150, 151–500, 501–1,000, 1,001–2,500, 2,501–5,000, >5,000); minimal visibility in a cardinal direction (in m; 0–50, 51–100, 101–500, 501–1,000, 1,001–2,500, 2,501–5,000, >5,000); precipitation level (no precipitation, fog, drizzle, light rain, heavy rain, snow flurries, light snowfall, heavy snowfall, sleet, hail); barometric pressure (in in Hg measured with a Kestrel® weather instrument); and air temperature (measured to the nearest 1°C with a Kestrel® weather instrument). We also obtained weather data (wind speed and wind direction) from a 60-m high meteorological tower located within the project boundary. We could not collect radar data during rain because the electronic filtering required to remove the echoes of the precipitation from the display screen also removed those of the targets of interest.

DATA ANALYSES

RADAR DATA

We entered all radar data into MS Access databases. Data files were checked visually for errors after each night and then were checked again electronically for irregularities at the end of the field season, prior to data analyses. All analyses were conducted with SPSS statistical software (SPSS 2005). For quality assurance, we cross-checked results of the SPSS analyses with hand-tabulations of small data subsets whenever possible. The level of significance (α) for all statistical tests was set at 0.05.

Radar data were not corrected for differences in detectability with distance from the radar unit. Correcting for differences in target detectability is confounded by several factors, including but not limited to the following: (1) variation in target size (i.e., species) across the study period; (2) an assumption that there is an equal distribution of targets throughout the sampling area (which would be violated if migrants responded to landform or microsite features on the landscape); (3) variation in the shape and size of the effective radar-sampling beam (see our preliminary assessment of the shape of our radar beam under one set of conditions in Figures 3 and 4). Thus, our passage rate estimates (and other estimates derived from passage rates) should be considered an index of the actual number of birds and bats passing through the area, useful for comparisons with our previous studies and other radar studies that use similar equipment and methods.

Airspeeds (i.e., groundspeed corrected for wind speed and relative direction) of surveillance-radar targets were computed with the formula:

$$V_a = \sqrt{V_g^{\,2} + V_w^{\,2} - 2V_g V_w \cos\theta}\,,$$

where V_a = airspeed, V_g = target groundspeed (as determined from the radar flight track), V_w = wind velocity, and θ is the difference between the observed flight direction and the direction of the wind vector. Targets that had corrected airspeeds <6 m/s (17.8% at North, 14.7% at Saddle, and 16.2% overall from surveillance data) were deleted from all analyses.

We calculated mean and median flight directions of radar targets to provide insight on the orientation of bird movements. Equally important, we present a metric to describe the dispersion of flight directions. This metric, the mean vector length (r), varies from a value of 0 (maximal dispersion) to 1 (maximal concentration). Mean flight directions coupled with high r values indicate strong patterns in flight orientation whereas mean flight directions coupled with low r values indicate weak to no directionality in flight movements. We analyzed flight-direction data following procedures for circular statistics (Zar 1999) with Oriana software version 2.0 (Kovach 2003).

Migration passage rates are reported as the mean ± 1 standard error (SE) number of targets passing along 1 km of migratory front/h (targets/km/h ± 1 SE). Passage rates of targets flying <125 m in altitude were derived for each hourly period by multiplying passage rates recorded from surveillance radar by the percentage of targets on vertical radar having flight altitudes <125 m, correcting for the hypothetical maximal height of the surveillance radar beam (861 m). All flight-altitude data are presented in m agl (above ground level) relative to a horizontal plane passing through the radar-sampling site. Actual mean altitudes may be higher than those reported because an unknown number of birds fly above the 1.5-km range limit of our radar (Mabee and Cooper 2004).

For calculations of the daily patterns in migration passage rates and flight altitudes, we assumed that a day began at 0700 h on one day and ended at 0659 h the next day, so that a sampling night was not split between two dates. We summarized and presented radar data separately for each station because of potential differences in migration activity at the two sampling stations. We used paired t-tests (SPSS 2005) to compare nightly passage rates (overall and <125 m agl) and flight altitudes between stations. We used a PROC MIXED repeated-measures analysis with an AR1 covariance structure and adjustment for small sample sizes (SPSS 2005), to compare passage

rates and flight altitudes among hours of the night for nights with data collected during all sessions. Factors that decreased our sample size of the various summaries and analyses included insect contamination and precipitation. Sample sizes therefore sometimes varied among the different summaries and analyses.

EFFECTS OF WEATHER ON MIGRATION PASSAGE RATES AND FLIGHT ALTITUDES

We modeled the hourly influence of weather and date separately on the dependent variables passage rates and flight altitudes. We obtained our weather data (i.e., wind speed and direction) from a 60-m meteorological tower located near the radar sampling sites. All wind categories except the calm category had a mean wind speed of ≥2.2 m/s (i.e., ≥5 mph) and were categorized as the following during fall: tail winds WNW to ENE (i.e., 293°–068°), head winds ESE to SSW (i.e., 113°–248°), eastern crosswinds (069°–112°), western crosswinds (249°–292°), and calm (0–2.1 m/s).

Prior to model specification, we examined the data for redundant variables (Spearman's r_s>0.70) and retained eight parameters for inclusion in the passage rate model set and seven parameters in the altitude model set. We examined scatterplots and residual plots to ensure that variables met assumptions of analyses (i.e., linearity, normality, collinearity) and did not contain presumed outliers (>3 SE). We used a natural logarithm transformation on the dependent variables "passage rate" and "flight altitude" to make the data normal. We specified 45 models for passage rates and 34 models for flight altitudes: a global model containing all variables and subset models representing potential influences of three small-scale weather variables (wind direction, the interaction of wind direction and wind speed, and ceiling height [including fog]), one large-scale weather variable (synoptic —that reflected the position of pressure systems relative to our study site [Fig. 5]), one variable reflecting the number of days between favorable migration conditions (i.e.,

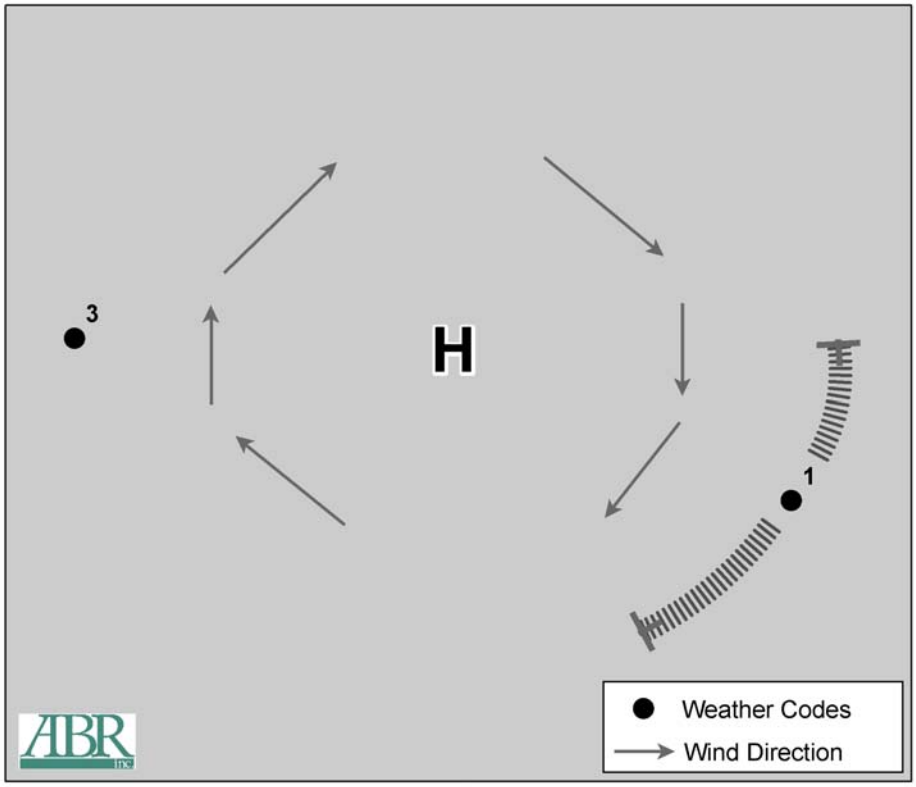

Figure 5. Synoptic weather codes used to depict the position of the study site relative to a high pressure system. Code 1 = study site situated to the east or southeast of a high pressure system, Code 2 = no well-developed pressure system in the vicinity of the study site (not visually depicted), Code 3 = study site situated to the west of a high pressure system.

the number of days since last tail wind, used only in passage rate models), one variable describing the percent of the moon illuminated and visible on a given night (the interaction of percent moon illumination and cloud cover), one variable to account for geographic and topographic differences (station), and date on migration passage rates and flight altitudes (Appendix 1).

Synoptic weather codes were based on Gauthreaux (1980) and Williams et al. (2001) but were modified to reflect the movement of pressure systems along the Pacific coast. The synoptic classification reflects the position of our study site relative to a high pressure system—1) situated to the east or southeast of a high pressure system, 2) no well-developed pressure system near our site, 3) situated to the west of a high pressure system (Fig. 5). We analyzed all model sets with linear mixed models that treated nights as subjects and hourly sessions within a night as the repeated measure. This treatment of the data allows the full use of hourly sessions while properly modeling the appropriate covariance structure for this variable. Because the hourly sessions within a night were temporally correlated, we used a first-order autoregressive structure with heterogeneous variances for the covariance structure for both the passage rate and altitude models.

Because the number of sampling sessions for both passage rates (n = 225) and flight altitudes (n = 223) was small relative to the number of parameters (K) in many models (i.e., $n/K < 40$), we used Akaike's Information Criterion corrected for small sample size (AIC_c) for model selection (Burnham and Anderson 2002). We ranked all candidate models according to their AIC_c values and considered the best-approximating model (i.e., most parsimonious) to be that model having the smallest AIC_c value (Burnham and Anderson 2002). We drew primary inference from models within 2 units of the minimal AIC_c value, although models within 4–7 units may have some empirical support (Burnham and Anderson 2002). We calculated Akaike weights (w_i) to determine the weight of evidence in favor of each model (Burnham and Anderson 2002). All analyses were conducted with SPSS software (SPSS 2005).

TURBINE PASSAGE RATE INDEX

To describe migration passage rates within the potential turbine area we developed the turbine passage rate index (the number of nocturnal migrants flying within the turbine area each night). The turbine passage rate index is comprised of several components, including: (1) *passage rate of targets flying <125 m agl* (calculated by multiplying passage rates from surveillance radar by the percentage of targets on vertical radar with flight altitudes <125 m agl, correcting for the maximal height of the surveillance radar beam); (2) *turbine area* that migrants would encounter when approaching turbines from the side (parallel to the plane of rotation) or from the front (perpendicular to the plane of rotation); (3) *study period* (number of nights during the migration sampling period); and (4) *number of hours of migration/night* (estimated as the number of nocturnal hours). These factors are combined as described to produce the turbine passage rate index.

We consider these estimates to be indices because they are based on several simplifying assumptions that may vary among projects. The assumptions for this specific project include: (1) minimal (i.e., side profile) and maximal (i.e., front profile, including the area from the ground up through the entire rotor-swept area) areas occupied by the wind turbines relative to the flight directions of migrants, (2) a worst-case scenario of the rotor blades turning constantly (i.e., used the entire rotor swept area, not just the area of the blades themselves), (3) a 39-d migration sampling period, and (4) an average of 10 nocturnal hours/day of migration during fall migration.

RESULTS

FLIGHT DIRECTION

Most nocturnal radar targets were traveling in seasonally appropriate directions for fall migration (i.e., southerly), with a mean flight direction of 191° at North (mean vector length = 0.49; median = 205°; n = 3,581 targets; Fig. 6a), 196° at Saddle (mean vector length = 0.51; median = 210°; n = 3,950 targets; Fig. 6b), and 194° across both stations (mean vector length = 0.50; median = 210°; n = 7,531 targets; Fig 6c). A large proportion (48%) of targets was traveling in a southerly

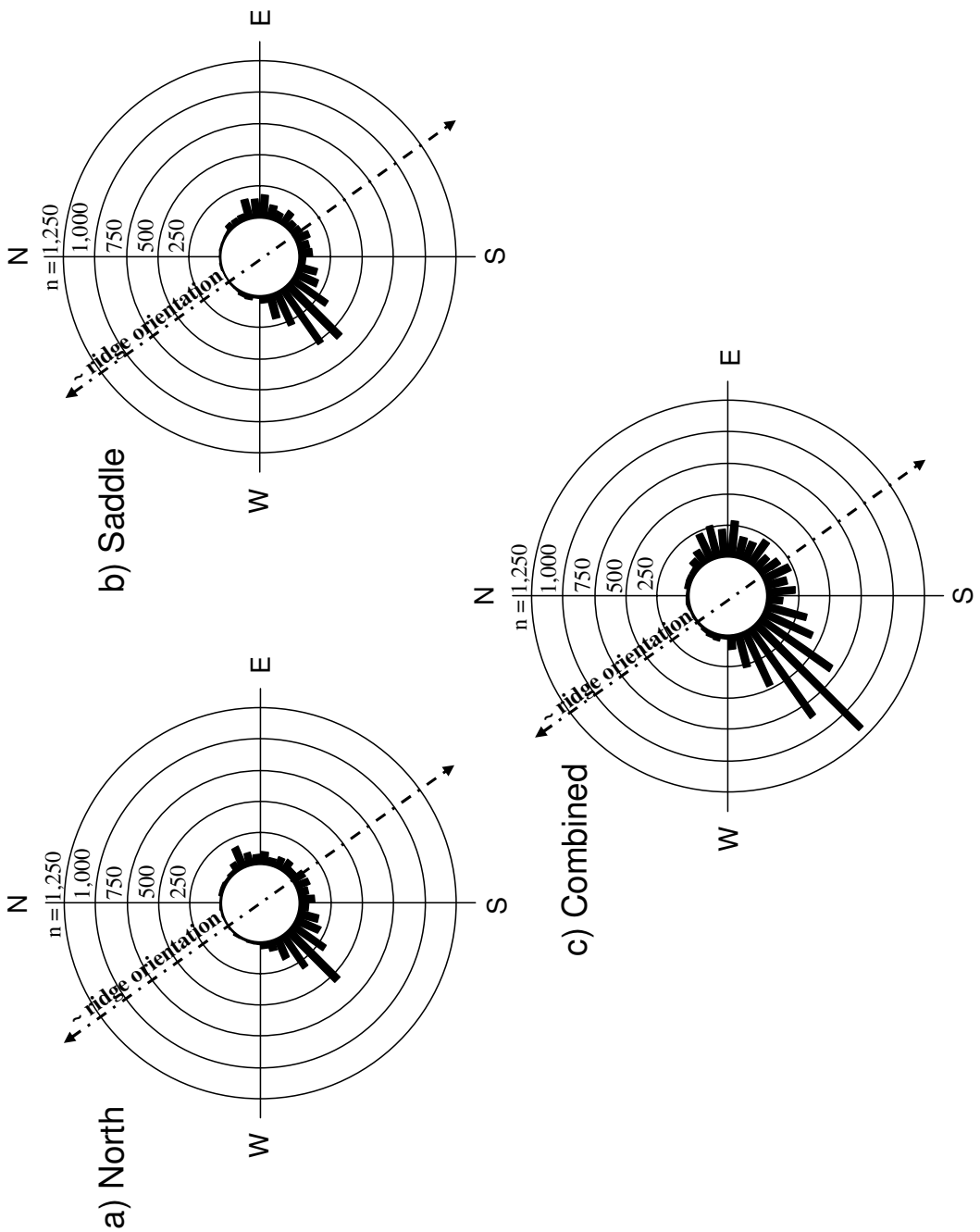

Figure 6. Flight directions of radar targets at the a) North, b) Saddle, and c) combined radar sampling stations of the proposed Hatchet Ridge Wind Project, California, fall 2007. Lines with arrows indicate approximate orientation of the ridgeline.

direction between SE (135°) and SW (225°) across both stations. Most targets were traveling in a direction nearly perpendicular to the ridge and hence were crossing, rather than following the ridge (Fig. 6).

PASSAGE RATES

The mean nocturnal passage rate for the fall season was 231 ± 31 targets/km/h (n = 36 nights) at North and 351 ± 38 targets/km/h (n = 35 nights) at Saddle stations with an overall rate of 290 ± 26 across both stations. Nightly comparisons indicate mean passage rates differed significantly between the North and Saddle stations (Z_{paired} = -3.770, P = <0.001, n = 29 paired nights). Overall, mean nightly passage rates were highly variable among nights at both North (range = 34–936 targets/km/h; Fig. 7a) and Saddle (range = 31–1,159 targets/km/h; Fig. 7b) stations as well as during different time periods of the migratory season (Appendix 2). Passage rates increased throughout the season on a bi-monthly basis for both stations (Appendix 2), however, the Saddle station rates tended to increase more in the final two weeks of the season than the North station rates. Passage rates did not vary among nocturnal sampling hours ($F_{6,119.6}$ = 0.934, P = 0.473, n = 29 nights; Fig. 8).

FLIGHT ALTITUDES

The mean nocturnal flight altitude at North was 474 ± 5 m agl (n = 3,747 targets; median = 412 m agl) and at Saddle stations was 463 ± 4 m agl (n = 4,371 targets; median = 408 m agl) with a mean flight altitude of 468 ± 3 m agl (n = 8,118 targets; median = 410 m agl) across both stations. There was no difference in mean nightly flight altitudes between the North and Saddle stations (mean difference = 40 ± 22 m agl, Z = -1.410, P = 0.158, n = 34 paired nights). Mean flight altitudes observed on vertical radar (1.5-km range) were moderately variable among most nights, with occasional nights of higher altitudes (Fig. 9). Flight altitudes ranged from 272–950 m agl at North (Fig. 9a) and from 243–578 m agl at Saddle (Fig. 9b) stations.

Flight altitudes also were variable among different two-week segments of the migratory season (Appendix 2) with altitudes decreasing at North as time progressed but not at the Saddle station. Mean flight altitudes did not vary among nocturnal sampling hours ($F_{6,145.7}$ = 1.4; P = 0.211; n = 30 nights; Fig. 10).

The overall distribution of targets in 100-m categories of nocturnal flight altitudes at North varied from 16.0% in the 201–300 m agl interval to 0.1% in the interval from 1,401–1,500 m agl and at Saddle varied from 14.8% in the 201–300 m agl interval to 0.1% in the interval from 1,401–1,500 m agl (Table1). Across both stations flight altitudes varied from 15.4% in the 201–300 m agl interval to 0.1% in the interval from 1,401–1500 m agl (Table 1).

We provide a detailed examination of the cumulative percentage of targets within 250 m agl (by 25-m categories) for both stations and sampling periods in Appendix 3. We determined that the percentages of targets flying <125 m agl (i.e., within the approximate maximal height of the wind turbines selected for the proposed HRWP) were 7.2% of all targets at North, 9.3% of all targets at Saddle, and 8.3% of all targets across both stations.

LOW ALTITUDE PASSAGE RATES

We combined our passage rate and flight altitude data to produce altitude specific passage rates of targets flying <125 m agl (Fig 11). The mean <125 m agl passage rate at North was 17 ± 3 targets/km/h (n = 34 nights) and at Saddle was 39 ± 7 targets/km/h (n = 33 nights). At both stations combined the mean <125 m agl passage rate was 28 ± 4 targets/km/h (n = 34 nights). Mean <125 m agl passage rates were significantly different between the North and Saddle stations (Z = -2.92, P = <0.01, n = 31 paired nights) and nightly differences averaged 22 ± 8 targets/km/h higher at Saddle than North.

Overall, mean <125 m agl passage rates were highly variable among nights at North (range = 0–61 targets/km/h; Fig. 11a) and at Saddle (range = 0–171 targets/km/h; Fig. 11b) stations. Mean passage rates below 125 m also varied among different two-week segments of the migratory season with consistently higher rates at the Saddle station and with rates highest at both stations during the last sampling segment (Appendix 2).

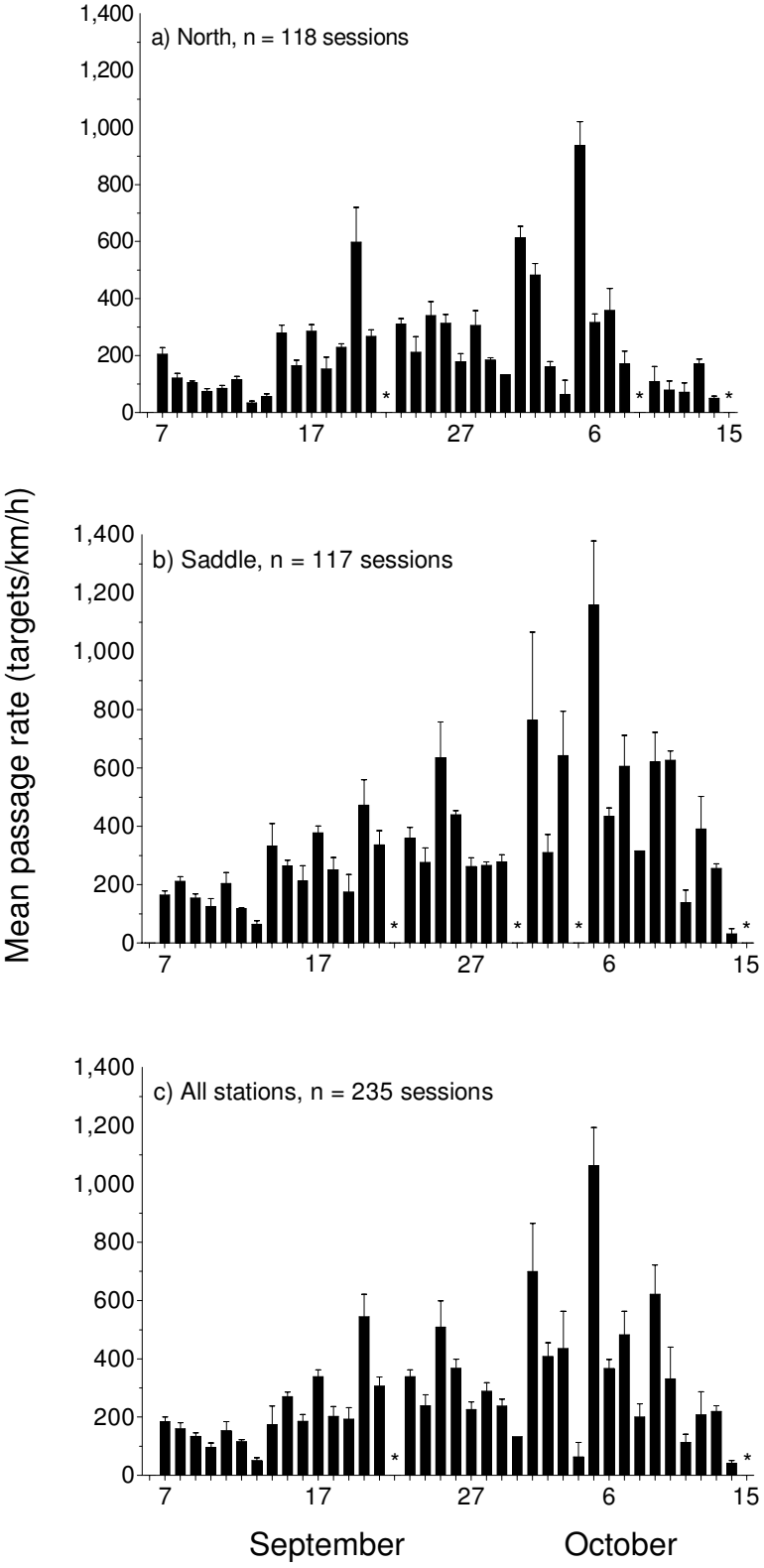

Figure 7. Mean ± 1 SE nightly passage rates (targets/km/h) at the a) North station, b) Saddle station, and c) all stations combined at the proposed Hatchet Ridge Wind Project, California, fall 2007. Asterisks (*) denote nights not sampled because of rain.

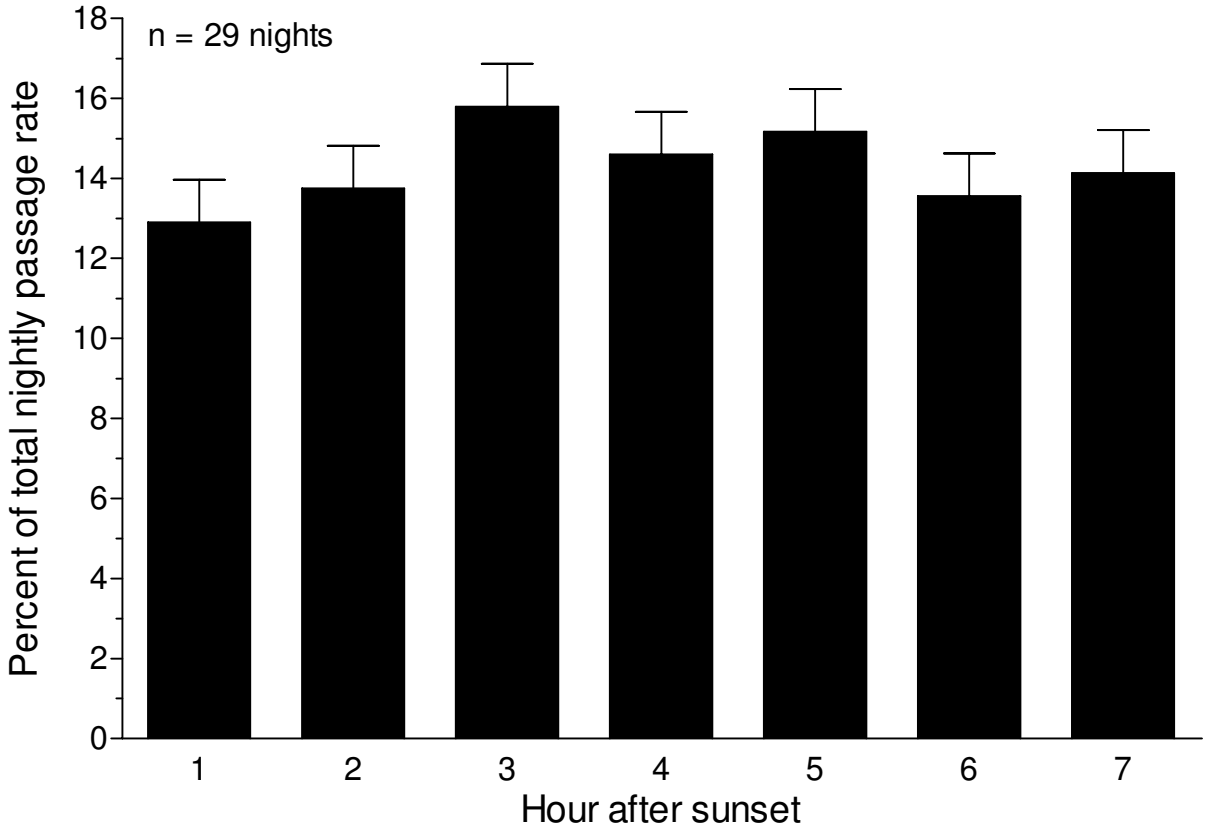

Figure 8. Percent of nightly passage rate (± 1 SE) relative to time past sunset for nights with full sampling at both radar stations at the proposed Hatchet Ridge Wind Project, California, fall 2007.

EFFECTS OF WEATHER ON MIGRATION

We investigated the importance of weather (i.e., wind direction, wind speed, ceiling height [including fog], synoptic weather, and days since favorable migration [passage rate models only]), lunar illumination, and date on both the passage rates and flight altitudes of nocturnal migrants by building a series of models (combinations of the various weather variables and date), and then using a model-selection technique (AIC) to quantify the statistical strength of those models. The AIC method allows one to (1) rank and identify the "best" model(s) (i.e., the most statistically supported models) from the full set of models, and (2) assess the statistical strength and relative importance of individual variables composing the "best" models.

PASSAGE RATES

The best-approximating model explaining migration passage rates of nocturnal migrants during fall migration at the proposed development was the model containing the variables date and station (Table 2). This model contained significant positive associations with date and station (Table 3) indicating that passage rates increased later in the season and were higher at the Saddle station. The second-best model was the global model containing all model variables but was not well supported ($\Delta AIC_c = 6.01$; Appendix 4). The weight of evidence in favor of the "best" model ($w_{best}/w_{second\ best}$) was > 20 times that of the second-best model (Burnham and Anderson 2002). The complete passage rate model can be found in Appendix 4 for the reader interested in examining all models and their associated statistical metrics.

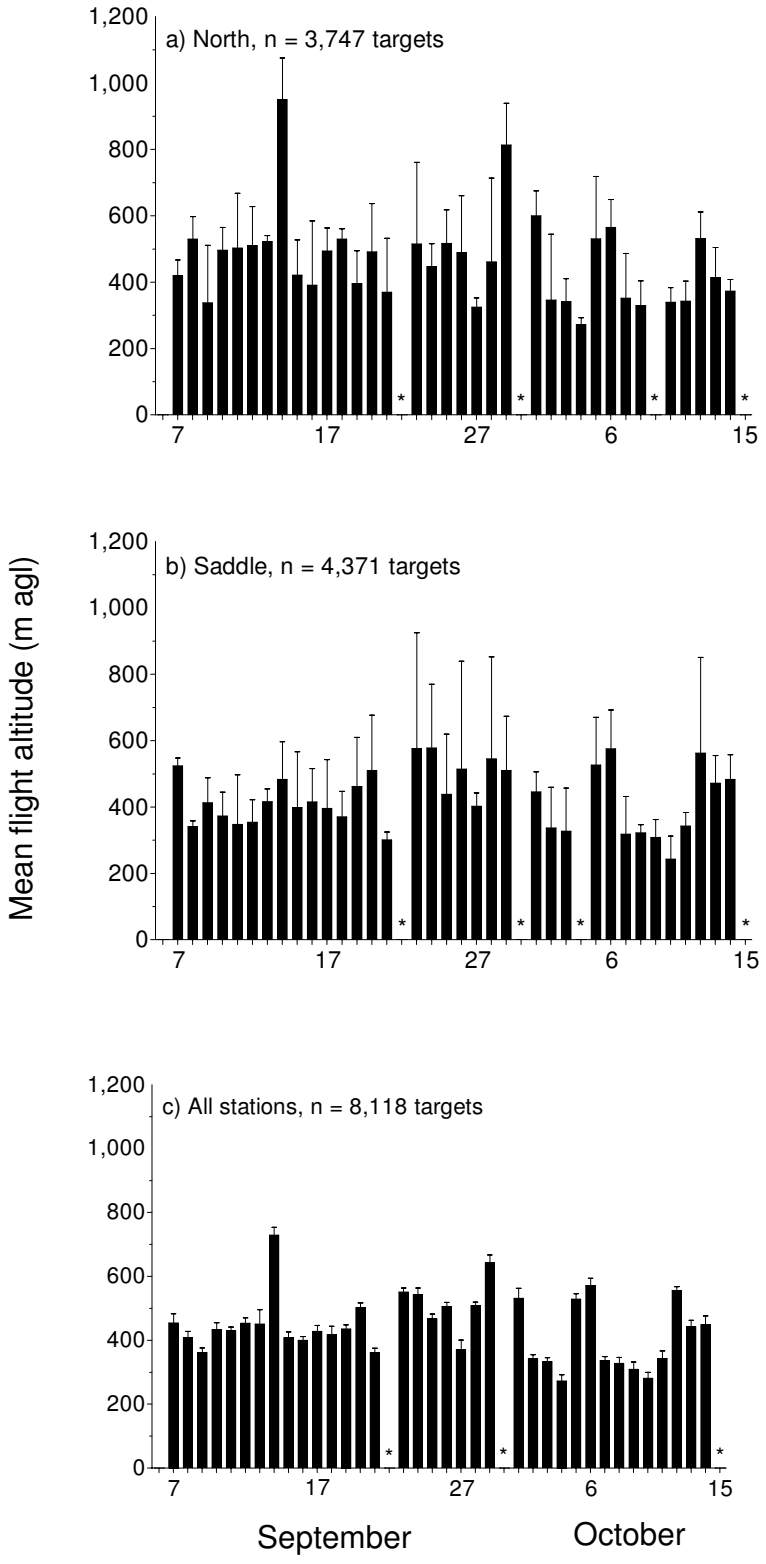

Figure 9. Mean ± 1 SE nightly flight altitude (m agl) of radar targets at the a) North station, b) Saddle station, and c) all stations combined at the proposed Hatchet Ridge Wind Project, California, fall 2007. Asterisks (*) denote nights not sampled because of rain.

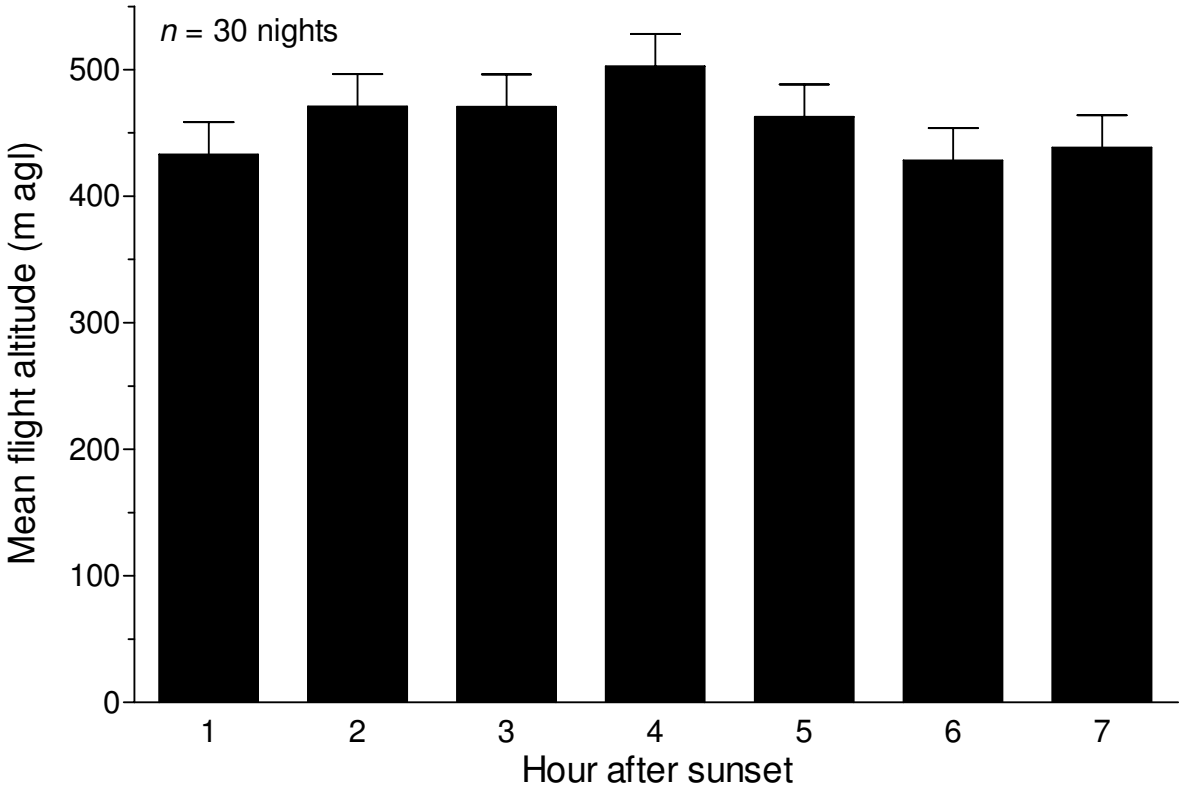

Figure 10. Mean flight altitude (± 1 SE) relative to time past sunset for nights with full sampling at both radar stations at the proposed Hatchet Ridge Wind Project, California, fall 2007.

Table 1. Nocturnal flight altitudes of radar targets (% of all targets) detected at the 1.5-km range at the proposed Hatchet Ridge Wind Project, California, fall 2007, by 100 m agl flight altitude category and station.

	Percent of radar targets		
Flight altitude (m)	North (n = 3,747 targets)	Saddle (n = 4,371 targets)	All stations (n = 8,118 targets)
1–100	5.0	5.8	5.4
101–200	11.7	14.0	12.9
201–300	16.0	14.8	15.4
301–400	15.4	14.5	14.9
401–500	13.2	12.8	13.0
501–600	11.6	11.0	11.3
601–700	6.9	6.7	6.8
701–800	5.2	5.7	5.5
801–900	4.4	5.2	4.8
901–1,000	3.2	3.5	3.4
1,001–1,100	2.4	3.1	2.8
1,101–1,200	2.2	1.7	1.9
1,201–1,300	2.0	0.7	1.3
1,301–1,400	0.7	0.4	0.5
1,401–1,500	0.1	0.1	0.1

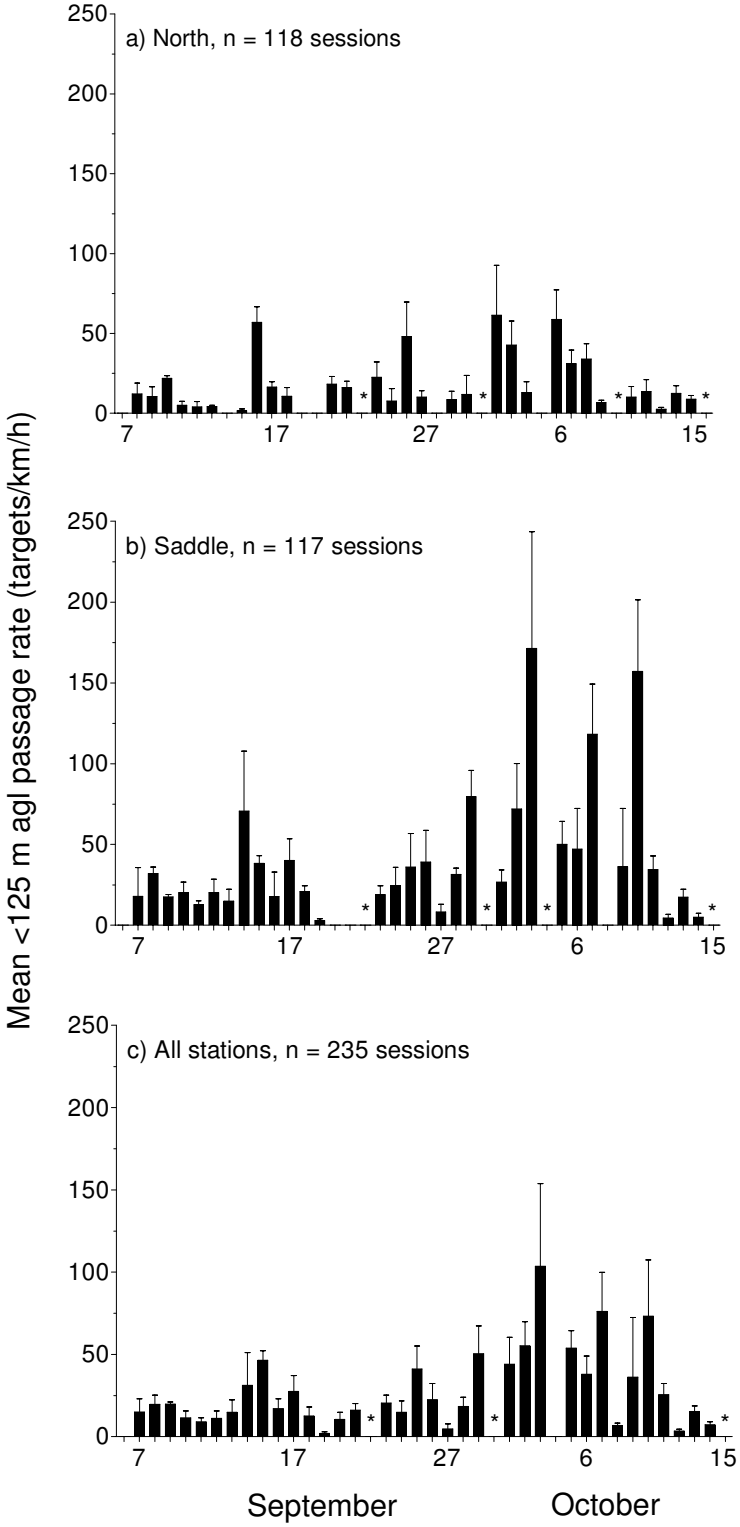

Figure 11. Mean ± 1 SE nightly below 125 m agl passage rates (targets/km/h) at the a) North station, b) Saddle station, and c) all stations combined at the proposed Hatchet Ridge Wind Project, California, fall 2007. Asterisks (*) denote nights not sampled because of rain.

Table 2. Linear mixed model estimates from competitive models ($AIC_c \leq 2$) explaining the influence of environmental factors on passage rates (surveillance radar, n = 225 sampling sessions) and flight altitudes (vertical radar, n = 223 sampling sessions) of radar targets at the proposed Hatchet Ridge Wind Project, California, fall 2007. Model weights (w_i) were based on Akaike's Information Criterion (AIC).

Analysis/Model	-2 Log Likelihood[a]	K[b]	AIC_c[c]	Δ AIC_c[d]	w_i[e]
Rates					
Date + station	345.94	12	371.41	0.00	0.81
Flight altitudes					
Synoptic	-86.01	11	-62.75	0.00	0.41
Synoptic + station	-88.17	12	-62.68	0.07	0.39
Synoptic + date	-86.80	12	-61.31	1.44	0.20

[a] Calculated with the Maximum Likelihood method.
[b] Number of estimable parameters in approximating model (see methods for explanation).
[c] Akaike's Information Criterion corrected for small sample size.
[d] Difference in value between AIC_c of the current model versus the best approximating model with the minimal AIC_c value.
[e] Akaike weight—probability that the current model (i) is the best approximating model among those being considered.

Table 3. Model-averaged parameter estimates from competitive models (Δ $AIC_c \leq 2$) explaining the influence of environmental factors on passage rates and flight altitudes of radar targets at the proposed Hatchet Ridge Wind Project, California, fall 2007.

Analysis/parameter	B[a]	SE[b]
Rates		
Intercept	4.263	0.396*
Date	0.134	0.035*
Date (quadratic)	-0.003	0.001*
Station = Saddle	0.374	0.174*
Flight altitude		
Intercept	5.883	0.056*
Date	-0.003	0.003*
Station = Saddle	-0.050	0.033*
Synoptic weather = SE to E of a high pressure system	0.192	0.057*
Synoptic weather = W of a high pressure system	0.521	0.118*

[a] Coefficients (B) of the categorical variables, station and synoptic weather were calculated relative to the Saddle station and to no nearby pressure system, respectively.
[b] Asterisks (*) indicate 95% confidence intervals that do not overlap zero.

FLIGHT ALTITUDES

The best-approximating model explaining flight altitudes of nocturnal migrants during fall migration at the proposed development was the model containing the variable synoptic (Table 2). The second-best model contained the variables synoptic and station ($\Delta AIC_c = 0.07$; Table 2), and a third model with the variables synoptic and date ($\Delta AIC_c = 1.44$) also received some empirical support (Table 2). These models contained strong positive associations with both synoptic conditions indicating that altitudes increased under both favorable and unfavorable conditions and decreased when there was no pressure system nearby (Table 3). These models contained slight negative associations with date and station indicating that flight altitudes decreased later in the season and were lower at the Saddle station (Table 3). The weight of evidence in favor of the "best" model ($w_{best}/w_{second\ best}$) was 1.1 times that of the second-best model (Burnham and Anderson 2002). The complete flight altitude model set can be found in Appendix 4 for the reader interested in examining all models and their associated statistical metrics.

TARGETS WITHIN THE PROPOSED TURBINE AREA

We made several assumptions to estimate the turbine passage rate (i.e., the number of targets that would pass within the area occupied by each proposed turbine): (1) the minimal area occupied by the wind turbine (i.e., side profile), (2) the maximal area occupied by the wind turbine (i.e., front profile, including the entire rotor-swept area), (3) a worst-case scenario of the rotor blades turning constantly, (4) 39 d in the study during fall, and (5) an average of 10 nocturnal hours/day across the fall study period. If all migrants approached the turbines from the side, an estimated 41 migrants at North, 94 migrants at Saddle, and 67 across both stations would have passed within the area occupied by one turbine (Appendix 5). If all migrants approached the turbines from the front, an estimated 389 migrants at North, 898 migrants at Saddle, and 640 across both stations would have passed within the area occupied by one turbine during our fall study period (Appendix 5). An alternate way to look at this relationship is on a per day basis; these estimates would be equivalent to an estimate of 1.1–10.0 migrants at North,

2.4–23.0 migrants at Saddle, and 1.7–16.4 across both stations passing through the area of a single turbine each day (Appendix 5).

DISCUSSION

Wind energy is a promising source of renewable energy and one of the fastest growing sectors of energy production in the United States (GAO 2005, EIA 2007). In an increasing number of states there are mandates to encourage development of alternative energies and increase the proportion of energy derived from renewable sources. For instance, the state of California has mandated that investor owned utilities generate at least 20 percent of their electricity from renewable sources (e.g., wind) by the year 2010 (State Bill 107, Rogers 2006). In light of the potential for bird and bat fatalities at new and existing wind generating facilities the state of California has published a set of voluntary guidelines for reducing impacts to birds and bats from wind energy development (CEC and CCDFG 2007). However, predictions of the effects of wind power development on migratory birds and bats are hampered by a lack of basic information on their relative abundance at low altitudes, their flight altitudes relative to wind turbine RSA's, and their flight behaviors around turbines (i.e., their ability to detect and avoid structures), and the causal relationship between their abundance and fatalities at wind turbines. In this study, we addressed some of these issues and documented some of the key characteristics of nocturnal migration of birds at the proposed project site.

Our results can be compared with those of similar studies in the region as an initial assessment of geographic differences in migration characteristics; however, additional assumptions must be considered before making this assessment. Methodological differences among studies often hamper appropriate comparisons of results and such differences may include type of radar used, radar settings (e.g., gain and ground clutter reduction), data collection techniques (manual vs. automated), criteria for removal of insects, and data analyses. The overall comparability among studies can be determined by assessing the methodological similarities, the study period, the sampling effort, and the study location in Appendix 6.

TIMING OF MIGRATION

Understanding the timing of animal movements at multiple temporal scales (e.g., within nights, within seasons, and seasonally within years) allows the determination of patterns of peak movements that may be useful information for both pre-construction siting decisions and for operational strategies to reduce fatalities (if animal abundance and fatalities are correlated). Several radar studies have found a pattern similar to that observed in this study, in which the intensity of avian nocturnal migration begins to increase ~30–60 min after sunset, peaks around midnight, and then either levels off (Mabee et al. 2005b, 2006a, 2006b; Plissner et al. 2005, 2006a, 2006b, 2006c) or declines steadily thereafter until dawn (Lowery 1951, Gauthreaux 1971, Kerlinger 1995, Farnsworth et al. 2004, Mabee et al. 2006a).

The proposed HRWP is located in an area with a diverse community of migratory bird species including songbirds, shorebirds, and waterfowl and the timing and intensity of migration will differ among these avian species groups. Based on the fact that songbirds comprise the majority of known collisions with wind farms (Osborn et al. 1996; Erickson et al. 2001, 2002; Manville 2005) we selected our span of study dates (9 September–15 October) to coincide with the peak of songbird migration through the region (Burnett and King 2004, Harris 2005). Our observations indicate a general pattern of increasing nightly passage rates until early October and then a decrease until the end of the study, suggesting that we captured a major peak of the fall songbird migration.

Within a season, migration generally occurs in pulses and the intensity of migration may differ greatly from one night to the next (Alerstam 1990, Mabee and Cooper 2004, Mabee et al. 2006a). Clearly this was the case during fall migration at the proposed HRWP. We recorded mean nightly passage rates >2 SD of the seasonal mean on two nights at the North station (1, 5 October) and on seven nights at the Saddle station (25 September and 1, 3, 5, 7, 9–10 October). Overall, nightly

spring migration rates at both stations peaked on 5 October with 936 targets/km/h at North and 1,159 targets/km/h at Saddle.

PASSAGE RATES

Passage rates are an index of the number of targets (birds and bats) flying past a location and are a widely-used metric in studies of migration activity at proposed wind power developments (Mabee et al. 2006a). Thus, documenting passage rates allows for comparisons of relative bird use among different sites and regions. In this study, we derived passage rates both separately for the two sampling stations and across both stations and used the passage-rate data in two ways: (1) to examine the passage rate of all migrants passing over our study site, and (2) to examine the passage rate of migrants within the height of the proposed wind turbines (<125 m agl). Although both metrics are useful for characterizing bird activity at proposed wind power developments and existing windfarms, the second metric is especially well-suited for these comparisons since it describes migration activity within the vertical range of new generation wind turbines such as those proposed for installation at the HRWP.

In this study, mean passage rates across both stations were 290 ± 26 targets/km/h and rates differed between the North (231 ± 31 targets/km/h) and Saddle (351 ± 39 targets/km/h) stations, although they were situated only ~3.2 km apart along the ridge. The cause of these differences in rates is unknown, although multiple potential explanations exist, including: 1) differences in station elevation and topography (i.e., higher use of the saddle in the ridgeline); 2) variation in the radar sampling coverage; and 3) stations were not paired in time (i.e., stations were sampled sequentially, not simultaneously) and that by chance alone, sampling occurred at the Saddle station under conditions with higher migration rates.

Of these potential explanations (and others may exist), the first possibility (differences in station elevation and topography) is possible because the saddle station is ~ 144 m lower than the North station) and nocturnal migrants may choose this "pass" when traveling through the mountains; the second possibility (variation between radar sites) is unlikely because both sites had excellent coverage of the area; the third possibility (higher rates explained by chance) is also unlikely because the station differences (i.e., greater passage rates at Saddle than North station) were consistent throughout the study periods (see Appendix 2). This pattern of differences in passage rates on a small scale has also been observed in other studies (Mabee et al. 2006).

Ultimately, it may be most appropriate for assessing site use to simply acknowledge the potential variation between these stations and use the combined metric to evaluate the overall use of this site by nocturnal migrants. The combined station rate from HRWP (290 targets/km/h) was similar to the only other study available for comparison in California, the proposed Bear River Ridge wind development (i.e., 269 targets/km/h; Appendix 6). Bear River Ridge is a coastal site located ~200 km to the west of HRWP. We emphasize the lack of additional studies for comparison in this region, highlighting the general lack of information on nocturnal migration rates in the Western US, and warranting the cautious interpretation of results. For comparison at a continental scale, fall passage rates ranged from 64–661 targets/km/h at 18 sites in Eastern US and 19–269 targets/km/h at three sites in the Pacific Northwest (Appendix 6).

Within the range of the proposed turbine heights (<125 m agl) the mean altitude-specific passage rates (i.e., targets <125 m agl) during our study was 28 ± 4 targets/km/h across both stations, with differences at the North (17 ± 3 targets/km/h) and Saddle (39 ± 7 targets/km/h) stations, mirroring the differences observed in overall passage rates between these stations. The low-altitude passage rates observed across both stations in this study were lower than that observed at the Bear River Ridge wind development (33.0 targets/km/hr) in coastal California.

Beyond California, the only other fall migration studies with comparable altitude-specific data includes the following: New York (11–38 targets/km/h; Mabee et al. 2005c, Mabee et al. 2006c); Pennsylvania (two sites with16 targets/km/h, Plissner et al. 2005, 2006b; one site with 10 targets/km/h, Plissner et al. 2006c); and Virginia and West Virginia (56 targets/km/h, Plissner et al. 2006a, 36 targets/km/h, Mabee et al.

2006a, 72 targets/km/h, Plissner et al. 2006b). In the Eastern US, fall turbine passage rate estimates are higher at sites in the southern Allegheny Mountain areas than further north. Differences in these rates may reflect differences in overall numbers of birds moving through an area, differences in flight altitudes, or both. We emphasize the same caution as previously mentioned when making comparisons with the California data.

FLIGHT ALTITUDES

Flight altitudes are critical for understanding the vertical distribution of nocturnal migrants in the airspace. In general, passerines migrate at lower flight altitudes than do other major groups of over-land migrants such as shorebirds and waterfowl (Kerlinger 1995). Large kills of birds at tall, human-made structures (generally lighted and guyed communications towers; Avery et al. 1980) and the predominance of nocturnal migrant passerines at such kills (Manville 2000; Longcore et al. 2005) indicate that large numbers of these birds fly <500 m agl on at least some nights and their flight altitude may be influenced by lights on the towers. Based on radar studies, however, most nocturnal migration occurs below ~ 1–1.5 km agl (Larkin 2006, Mabee and Cooper 2004, Mabee et al. 2006a, CUROL 2007). Our results from the vertical distribution of radar targets in this study and those from other published studies indicate that the majority of nocturnal migrants fly below 600 m agl (Bellrose 1971; Gauthereaux 1972, 1978, 1991; Bruderer and Steidinger 1972; Cooper and Ritchie 1995, Kerlinger 1995).

Flight altitudes of migratory bats are poorly known, especially for the migratory tree-roosting bats that appear more prone to collisions with wind turbines (Reynolds 2006). Hoary bats, Eastern red bats, and Silver-haired bats are all long-range migrants that have been killed at wind power projects during their migratory periods, suggesting that at least some bats migrate below ~ 125 m agl. Allen (1939) observed bats migrating during the daytime near Washington, D.C., at 46–140 m agl, Altringham (1996) reported that at least some bats migrate well above 100 m agl, and Peurach (2003) documented a Hoary bat collision with an airplane at an altitude of 2,438 m agl over Oklahoma during October 2001.

Similar to our migration studies elsewhere (Cooper and Ritchie 1995; Cooper et al. 1995a, 1995b; Cooper and Mabee 2000; Mabee and Cooper 2004; Mabee et al. 2006a), we recorded large among-night variation in mean flight altitudes at both sites during fall migration, although mean flight altitudes always were above the proposed turbine heights. Daily variation in mean flight altitudes may have reflected changes in species composition, vertical structure of the atmosphere, and/or weather conditions. Variation among days in the flight altitudes of migrants at other locations has been associated primarily with changes in the vertical structure of the atmosphere. For example, birds crossing the Gulf of Mexico appear to fly at altitudes where favorable winds minimize the energetic cost of migration (Gauthreaux 1991). Kerlinger and Moore (1989), Bruderer et al. (1995), and Liechti et al. (2000) have concluded that atmospheric structure is the primary selective force determining the height at which migrating birds fly.

Flight altitudes were similar between sampling stations and the mean flight altitude across both stations was (468 ± 3 m agl), ~343 m higher than the height of the proposed turbines (~125 m). Mean flight altitudes from the fall sampling period were higher than the Bear River Ridge wind project along coastal California (329 m agl), were lower than studies at two sites in the Pacific Northwest (606–647 m agl; Appendix 6), and fell in the middle of values from studies in the Eastern US (333–532 m agl; Appendix 6).

We also examined the percentage of targets below the proposed maximal turbine height (i.e., <125 m agl) and calculated that 7% of targets at North, 9% at Saddle, and 8% across both stations flew <125 m agl during the sampling period (Appendix 6). These percentages were similar to those from the Bear River Wind project, California (11%), two sites in the Pacific Northwest (3–9 %), and within the range of those from the Eastern US (4–13%; Appendix 6).

MODELING MIGRATION PASSAGE RATES AND FLIGHT ALTITUDES

PASSAGE RATES

It is a well-known fact that general weather patterns and their associated temperatures and winds affect migration (Richardson 1978, 1990, Gauthreaux et al. 2005). In the Northern Hemisphere, air moves counterclockwise around low-pressure systems and clockwise around high-pressure systems. Thus, winds are warm and southerly when an area is affected by a low to the west or a high to the east and are cool and northerly in the reverse situation. Clouds, precipitation, and strong, variable winds are typical in the centers of lows and near fronts between weather systems, whereas weather usually is fair with weak or moderate winds in high-pressure areas. Numerous studies in the Northern Hemisphere have shown that, in fall, most bird migration tends to occur in the western parts of lows, the eastern or central parts of highs, or in intervening transitional areas. In contrast, warm fronts, which are accompanied by southerly (unfavorable) winds and warmer temperatures, tend to slow fall migration (Lowery 1951, Gauthreaux 1971; Able 1973, 1974; Blokpoel and Gauthier 1974, Richardson 1990, Gauthreaux et al. 2005). Conversely, more intense spring migration tends to occur in the eastern parts of lows, the western or central parts of highs, or in intervening transitional areas.

We examined the influence of weather (i.e., wind direction, wind speed * wind direction, ceiling height [including fog], synoptic weather, [days since favorable migration—passage rate models only]), lunar illumination (percent illumination * cloud cover), station, and date on migration passage rates and flight altitudes. During the fall sampling period, passage rates were higher at the Saddle station and increased later in the season. The strong station differences (discussed previously) had the strongest influence explaining relationships between passage rates and all variables modeled in this study. That passage rates increased later in the season simply reflects the general increase in migratory activity during this time.

FLIGHT ALTITUDES

Radar studies have shown that wind is a key factor in migratory flight altitudes (Alerstam 1990). Birds fly mainly at heights at which head winds are minimized and tail winds are maximized (Bruderer et al. 1995). Because wind strength generally increases with altitude, bird migration generally takes place at lower altitudes in head winds and at higher altitudes in tail winds (Alerstam 1990). Most studies (all of those cited above except Bellrose 1971) have found that clouds influence flight altitude, but the results are not consistent among studies. For instance, some studies (Bellrose and Graber 1963, Hassler et al. 1963, Blokpoel and Burton 1975) found that birds flew both below and above cloud layers, whereas others (Nisbet 1963, Able 1970) found that birds tended to fly below clouds.

In this study, flight altitudes appeared to increase under both favorable and unfavorable synoptic conditions (i.e., with tailwinds and with headwinds). Flight altitudes tend to increase under tailwind conditions (Alerstam 1990) consistent with our findings, but the reverse was surprising. A closer examination of the data revealed that the normal relationship was built from a large sample size (~ 2/3 of the data set) whereas the reverse relationship was built on a very small sample size—raising the possibility that the contrary finding was a spurious result. Flight altitudes decreased later in the season and were lower at the Saddle station (although by only 11 m, not biologically meaningful).

Although no strong association was apparent between ceiling height (including fog) and flight altitudes in this study, the need to understand how nocturnal migrants respond to fog and low ceiling height conditions is warranted. The largest single-night kill for nocturnal avian migrants at a wind power project in the US occurred on a foggy night during spring migration, when 27 passerines fatally collided with a turbine near a lit substation at the Mountaineer wind power development in West Virginia (Kerlinger 2003). Fatality events of this magnitude are rare at wind power developments, although large kills of migratory birds have sporadically occurred at other, taller structures (e.g., guyed and lighted towers >130 m

high) in many places across the country during periods of heavy migration, especially on foggy, overcast nights in fall (Weir 1976, Avery et al. 1980, Evans 1998, Trapp 1988, Erickson et al. 2001) and have occurred under similar conditions at an offshore platform in Germany (Huppop et al. 2006).

SPECIES COMPOSITION

Observations at existing windfarms and other tall man-made structures indicate that certain species groups are at greater risk of collision with structures, particularly migratory songbirds and bats (Manville 2005). Determination of species-specific risks to nocturnal migrants at existing and proposed developments requires the identification of species migrating through the area of interest. Although supplemental techniques such as night vision optics (Kunz et al. 2007a) to identify low-altitude migrants were not used in this study, we did initially categorize targets as "small" (most likely individual passerines or bats) and "large" (most likely groups of shorebirds or waterfowl) to help assess coarse differences in targets. Only small proportions (3.6%) of targets were "large" during the fall season, suggesting that the majority of targets were likely individual passerines or bats. Large targets such as shorebirds and waterfowl may be expected to approach from the ~ NE from major staging areas in the Lower Klamath NWR, Tule Lake NWR, Clear Lake NWR, and Goose Lake (Warnock et al. 1998, USFWS 2008) and head in a southwesterly direction to over wintering areas in the Sacramento Valley, coastal California, and beyond.

TARGETS WITHIN THE PROPOSED TURBINE AREA

In this study we calculated a turbine passage rate index (number of birds and bats passing within the area occupied by each turbine each night) at both sampling stations and averaged across both stations. Differences among stations mirrored the differences in overall passage rates (i.e., Saddle > North). Across both stations the estimated turbine passage rate was 1.7–16.4 nocturnal migrants/turbine/d (Appendix 5).

Estimated turbine passage rates may be considered as a starting point for developing a complete avian and bat risk assessment. Currently, however, it is unknown whether the abundance of either birds or bats is strongly correlated with fatality rates at wind power developments. There are a variety of factors (e.g., weather) that may correlate more strongly with fatality rates than do numbers of individuals present prior to project construction. Studies of concurrent bird/bat use, weather, and fatality data at operational wind power developments would be necessary to determine whether bird use and/or weather conditions can be used to predict the likelihood of bird/bat fatalities at such developments.

In addition to these questions about the unknown relationships among abundance, weather, and fatality, there also are few data available on the proportion of nocturnal migrants that (1) do not collide with turbines because of their avoidance behavior (i.e., birds that alter either their flight paths or altitude to avoid colliding with turbines) and (2) safely pass through the turbine blades by chance alone—a proportion that will vary with the speed at which turbine blades are turning as well as with the flight speeds of individual migrants. The accuracy of fatality estimates relies heavily upon avoidance rates (Chamberlain et al. 2006). The proportion of nocturnal migrants that detect and avoid turbines is currently unknown in the US (but see Winkleman 1995 and Desholm and Kahlert 2005 for studies in Europe), and there are no empirical data that predict a species' ability to pass safely through the rotor-swept area of a turbine (but see Tucker 1996, Desholm et al. 2006, Whitfield and Madders 2006, and Band et al. 2007 for proposed methods to address this question). We speculate, however, that most birds are able to detect and/or avoid turbines, considering the low avian fatality rates reported at existing wind power developments in the US (Erickson et al. 2002, Strickland and Johnson 2006) and the high percentage of waterbirds that avoided an offshore windfarm in Denmark (Desholm et al. 2006).

CONCLUSIONS

This study focused on nocturnal migration patterns of targets (i.e., birds and bats) during the peak period of fall passerine migration, at the proposed Hatchet Ridge Wind Project in California. The key results of our study were as

follows: (1) the mean passage rate was 231 ± 31 targets/km/h and 351 ± 39 targets/km/h at North and Saddle stations, respectively, and 290 ± 26 across both stations; (2) mean nightly passage rates were variable among nights and ranged from 31–1,159 targets/km/h; (3) mean flight altitude was 474 ± 5 m agl and 463 ± 4 m agl at the North and Saddle stations, respectively, and 468 ± 3 across both stations; (4) the percentage of targets passing below 125 m agl was 7% and 9% at the North and Saddle stations, respectively, and 8% across both stations; (5) the target passage rate below 125 m agl was 17 ± 3 targets/km/h and 39 ± 7 targets/km/h at the North and Saddle stations, respectively, and 28 ± 4 across both stations; (6) the estimated turbine passage rate of nocturnal migrants passing within the airspace occupied by each proposed turbine was 1.1–10.0 nocturnal migrants/turbine/d at North, 2.4–23.0 nocturnal migrants/turbine/d at Saddle, and 1.7–16.4 nocturnal migrants/ turbine/d across both stations.

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Appendix 1. Full model set from analyses employing Akaike's Information Criterion (AIC) to investigate the influence of environmental factors on passage rates of radar targets at the proposed Hatchet Ridge Wind Project, California, fall 2007. The full model set examining flight altitudes was the same with the exception that models with the quadratic form of date and the variable for favorable migration were excluded.

Model
Global: wind direction + wind direction*wind speed + favorable migration(d) + ceiling height + lunar illumination*cloud cover + synoptic + date + station
Wind direction
Wind direction + wind direction*wind speed
Wind direction + favorable migration (d)[a]
Wind direction + ceiling height
Wind direction + lunar illumination*cloud cover
Wind direction + date
Wind direction + station
Wind direction + wind direction*wind speed + favorable migration (d)[a]
Wind direction + wind direction*wind speed + ceiling height
Wind direction + wind direction*wind speed + lunar illumination*cloud cover
Wind direction + wind direction*wind speed + date
Wind direction + wind direction*wind speed + station
Wind direction + wind direction*wind speed + favorable migration (d) + date[a]
Wind direction + wind direction*wind speed + ceiling height + date
Wind direction + wind direction*wind speed + lunar illumination*cloud cover + date
Wind direction + wind direction*wind speed + ceiling height + lunar illumination*cloud cover[b]
Wind direction + wind direction*wind speed + ceiling height + lunar illumination*cloud cover + date[b]
Wind direction + wind direction*wind speed + favorable migration (d) + ceiling height[a]
Wind direction + wind direction*wind speed + favorable migration (d) + ceiling height + date[a]
Wind direction + wind direction*wind speed + favorable migration (d) + ceiling height + lunar illumination*cloud cover[a]
Wind direction + wind direction*wind speed + favorable migration (d) + ceiling height + lunar illumination*cloud cover + date[a]
Wind direction*wind speed
Wind direction*wind speed + favorable migration (d)[a]
Wind direction*wind speed + ceiling height
Wind direction*wind speed + lunar illumination*cloud cover
Wind direction*wind speed + date
Wind direction*wind speed + station
Favorable migration (d)[a]

Appendix 1. Continued.

Model
Favorable migration (d) + ceiling height[a]
Favorable migration (d) + lunar illumination*cloud cover[a]
Favorable migration (d) + date[a]
Favorable migration (d) + station[a]
Ceiling height
Ceiling height + lunar illumination*cloud cover
Ceiling height + date
Ceiling height + station
Ceiling height + lunar illumination*cloud cover + date
Lunar illumination*cloud cover
Lunar illumination*cloud cover + date
Lunar illumination*cloud cover + station
Synoptic
Synoptic + date
Synoptic + station
Date
Date + station
Station

[a]Indicates model not included in flight altitude analyses.
[b]Indicates model not included in passage rate analyses.

Appendix 2. Mean passage rates, altitude specific passage rates (<125 m agl), and flight altitudes of nocturnal radar targets observed at the 1.5-km range during half-month periods of fall migration and over the full sampling season at the proposed Hatchet Ridge Wind Project, California, fall 2007.

Station/metric	September		October	Total
	7–15	16–30	1–15	
North				
Passage rate (targets/km/h)	119	262	275	231
<125 m agl passage rate (targets/km/h)	15	13	23	17
Flight altitude (m agl)	522	483	425	474
Number nights sampled[a]	9	14	13	36
Saddle				
Passage rate (targets/km/h)	182	334	484	351
<125 m agl passage rate (targets/km/h)	27	27	62	39
Flight altitude (m agl)	392	502	441	463
Number nights sampled[a]	9	13	13	35
All stations				
Passage rate (targets/km/h)	150	297	380	290
<125 m agl passage rate (targets/km/h)	21	30	41	28
Flight altitude (m agl)	460	494	433	468
Number nights sampled[a]	9	14	13	36

[a]We were unable to sample 1–2 nights at each station in September and October because of rain.

Appendix 3. Nocturnal flight altitudes of radar targets (% of all targets) detected at the 1.5-km range at the proposed Hatchet Ridge Wind Project, California, fall 2007, by 25 m agl flight altitude category and station.

	Cumulative % of radar targets		
Flight altitude (m agl)	North (n = 3,747 targets)	Saddle (n = 4,371 targets)	All stations (n = 8,118 targets)
1–25	0.3	0.2	0.3
1–50	1.0	1.3	1.2
1–75	2.3	3.3	2.9
1–100	5.0	5.7	5.5
1–125	7.2	9.2	8.4
1–150	10.2	12.4	11.5
1–175	13.6	16.4	15.3
1–200	16.7	19.6	18.4
1–225	20.7	22.8	22.0
1–250	24.8	26.8	26.0
1–1,500	100.0	100.0	100.0

Appendix 4. Linear mixed models with weights (w_i) >0 explaining the influence of environmental factors on passage rates (surveillance radar, n = 225 sampling sessions) and flight altitudes (vertical radar, n = 223 sampling sessions) of radar targets at the proposed Hatchet Ridge Wind Project, California, fall 2007. Model weights (w_i) were based on Akaike's Information Criterion (AIC).

Analysis/Model	-2 Log Likelihood[a]	K[b]	AIC_c[c]	ΔAIC_c[d]	w_i[e]
Rates					
Date + station	345.935	12	371.407	0.00	0.81
Global: wind direction + wind direction*wind speed + favorable migration(d) + ceiling height + lunar illumination*cloud cover + synoptic + date + station	315.739	27	377.414	6.01	0.04
Ceiling height + station	352.132	12	377.603	6.20	0.04
Station	356.784	10	377.812	6.40	0.03
Favorable migration (d) + station	356.101	11	379.340	7.93	0.02
Lunar illumination* cloud cover + station	351.288	13	379.013	7.61	0.02
Synoptic + station	353.642	12	379.114	7.71	0.02
Ceiling height + date	352.019	13	379.744	8.34	0.01
Flight altitudes					
Synoptic	-86.005	11	-62.754	0.00	0.41
Synoptic + station	-88.170	12	-62.684	0.07	0.39
Synoptic + date	-86.799	12	-62.313	1.44	0.20

[a] Calculated with the Maximum Likelihood method.
[b] Number of estimable parameters in approximating model (see methods for explanation).
[c] Akaike's Information Criterion corrected for small sample size.
[d] Difference in value between AIC_c of the current model versus the best approximating model with the minimal AIC_c value.
[e] Akaike weight—probability that the current model (i) is the best approximating model among those being considered.

Appendix 5. Calculation of turbine passage rate indices (estimated number of targets passing within the area occupied by each proposed turbine) during nocturnal periods of fall 2007, at the proposed Hatchet Ridge Wind Project, California.

Calculation parameter	North	Saddle	All stations
WIND-TURBINE CHARACTERISTICS			
(A) Total turbine height (m)	127.5	127.5	127.5
(B) Blade radius[a] (m)	47.5	47.5	47.5
(C) Height below blade (m)	32.5	32.5	32.5
(D) Approximate front-to-back width (m)	6	6	6
(E) Minimal (side profile) area (m^2) = A × D	765	765	765
(F) Maximal (front profile) area (m^2) = (C × D) + ($\pi \times B^2$)	7,283.2	7,283.2	7,283.2
PASSAGE RATE			
(G) Mean rate below 125 m agl (targets/km/h)	17.13	39.50	28.15
(H) Area sampled below 125 m agl = 125 x 1,000 (m^2)	125,000	125,000	125,000
(I) Mean passage rate per unit area (targets/m^2/h) = G/H	0.000137	0.000316	0.000225
TURBINE PASSAGE RATE INDEX			
(J) Duration of study period (# nights)	39	39	39
(K) Mean number of hours of darkness (h/night)	10	10	10
(L) Minimum number of targets/km/h in zone of risk = E x I	0.104836	0.241740	0.172278
(M) Maximum number of targets/km/h in zone of risk = F x I	0.998095	2.301502	1.640185
(N) Minimum number of targets in zone/d = K x L	1.1	2.4	1.7
(O) Maximum number of targets in zone/d =K x M	10.0	23.0	16.4
(P) Minimum number of targets in zone of risk during 39-night study period = J x K x L	41	94	67
(Q) Maximum number of targets in zone of risk during 39-night study period = J x K x M	389	898	640

Appendix 6. Results of fall migration studies conducted at proposed (pre-construction) US wind power development areas, using X-band mobile radar systems.

Project	Study period	Nights	Passage rate ± SE (targets/km/h)	Methods[a]	Flight altitude ± SE (m agl)	% Targets ≤125 m agl	Methods[a]	Source
EASTERN U.S								
Bliss, NY	9/09 – 10/31/05	8	444	3	411	13	3	Yonker & Landon 2005
Chautauqua, NY	9/02 – 9/25/03, 10/05 – 10/10/03	29	238 ± 48	2	532 ± 3	4	2	Cooper et al. 2004
Clinton County, NY	8/15 – 10/13/05	57	197 ± 31	1	333 ± 1	12	1	Mabee et al. 2006c
Copenhagen, NY	9/02 – 10/09/94	29	371 ± 85	2	na	na	3	Cooper et al. 1995a
Dairy Hills, NY	8/15 – 10/15/05	57	64 ± 3	2	466 ± 2	10	2	Young et al. 2006
Harrisburg, NY	9/02 – 10/01/98	13	135 ± 42	2	na	na	3	Cooper & Mabee 2000
Howard, NY	9/01 – 10/15/98	39	481 ± 52	2	491 ± 14	2% < 91m	2	Woodlot 2005
Maple Ridge, NY	8/05 – 10/03/06	57	158 ± 21	1	415 ± 2	8	1	Mabee et al. 2005c
Martinsburg, NY	9/02 – 10/09/94	6	661 ± 353	2	na	na	3	Cooper et al. 1995a
Prattsburgh, NY	8/26 – 11/03/04	30	193 ± 21	2	516 ± 17	3	2	Roy et al. 2005
Prattsburgh–Italy, NY	8/15 – 9/30/04	41	200 ± 12	1	365 ± 3	9	1	Mabee et al. 2005b
Wethersfield, NY	9/02 – 10/01/98	19	175 ± 42	2	na	na	3	Cooper & Mabee 2000
Bedford County, PA	8/16 – 10/14/06	29	438 ± 67	1	379 ± 3	10	1	Plissner et al. 2007
Casselman, PA	8/15 – 10/15/04	30	174 ± 31	1	436 ± 3	7	1	Plissner et al. 2005
Fayette County, PA	8/15 – 10/13/05	26	297 ± 61	1	426 ± 3	5	1	Plissner et al. 2006b
Somerset County, PA	8/16 – 10/14/06	29	316 ± 60	1	374 ± 3	8	1	Plissner et al. 2007
Swallow Farm, PA	8/16 – 10/14/05	58	166 ± 17	1	402 ± 2	5	1	Plissner et al. 2006c
Mt. Storm, WV[b]	9/03 – 10/17/03	40	241 ± 33	1	410 ± 2	13	1	Mabee et al. 2004
Preston County, WV	8/15 – 10/13/05	26	379 ± 91	1	420 ± 4	10	1	Plissner et al. 2006b
Highland New Wind, VA	8/16 – 10/14/05	58	385 ± 55	1	442 ± 3	12	1	Plissner et al. 2006a
WESTERN U.S.								
Bear River Ridge, CA	8/16 – 10/14/06	60	269 ± 11	1	329 ± 2	11	1	Sanzenbacher et al. 2007
Hatchet Ridge, CA	**9/07 – 10/15/07**	**39**	**290 ± 26**	**1**	**468 ± 3**	**8**	**1**	**Current study**
Cotterel, ID	8/31 – 10/14/03	30	32 ± 9	1	565 ± 6	3	1	Cooper et al. 2004
Vansycle, OR	8/24 – 10/17/00	29	19 ± 2	2	na	na	3	Mabee & Cooper 2004
Vansycle, OR	9/04 – 10/17/01	23	26 ± 3	2	606 ± 8	9	2	Mabee & Cooper 2004
Nine Canyon, WA	9/4 – 10/9/00	9	273 ± 122	3	472 ± 7	na	3	Mabee & Cooper 2000
Stateline, WA	8/24 – 10/17/00	29	21 ± 2	2	na	na	3	Mabee & Cooper 2004
Stateline, WA	9/4 – 10/17/01	23	22 ± 3	2	647 ± 7	3	2	Mabee & Cooper 2004

[a]1 = equipment and methods similar to current study (comparable), 2 = differences in radar settings, method of data collection, or data analysis (unknown comparability), 3 = major differences in equipment or methods (not comparable). Overall comparability of studies must also consider study period and duration.

Appendix C

Evaluation of Nocturnal Migration Study

The information in Appendix C was submitted by ABR, Inc., on behalf of the Wintu Audubon Society of Redding, CA. The information does not necessarily reflect the analysis and conclusions of Shasta County or ICF Jones & Stokes.

EVALUATION OF THE NOCTURNAL BIRD MIGRATION STUDY PERFORMED BY ABR, INC. ON HATCHET RIDGE, SHASTA COUNTY, CALIFORNIA

In its response to the draft EIR for the proposed Hatchet Ridge wind power project, Wintu Audubon Society of Redding, California, noted the inadequacies of bird studies performed at the site and incorporated in the EIR. In particular, the absence of any studies of actively migrating birds during both day and night, especially under adverse weather conditions that could increase risk of collision with turbines and other structures was noted as an important deficiency.

Subsequent to the submission of the EIR and the Wintu Audubon response thereto, a radar study of nocturnal migration performed at the Hatchet Ridge site by ABR, Inc. of Forest Grove, Oregon, has been placed on the record. This study presents data obtained over 36 nights between 7 September and 15 October, 2007, with a marine radar stationed at two sites on the ridge. I have been asked by Wintu Audubon to evaluate this study and its results with respect to their adequacy to address the concerns raised by Wintu Audubon in its original response to the EIR.

Technology and Analysis Employed in the Study – The equipment and methods employed in this study seem to be in line with current standards in the industry. The data appear to have been collected properly and have been analyzed appropriately. The interpretations of the results presented by ABR are mostly straightforward and reasonably conservative. There are a number of important cautionary statements and caveats contained within the ABR report that should be noted.

As noted in the ABR study, radar has a number of inherent limitations as a source of the kind of information needed for a thorough bird collision risk assessment. First, radar provides very little information concerning the identity of the bird targets presented on its arrays (indeed, it is rarely certain that the targets are even birds). A target that appears large on the radar screen could be the reflection of a single large bird or the reflection of a large flock of small birds. In short, one cannot be certain whether one is detecting swans or sparrows. Second, radar by itself provides no reliable information on the number of birds being detected. Radar energy is emitted in pulses. Each pulse encompasses a given volume of airspace (referred to as the radar pulse volume). Whenever the volume of reflective material (birds, bats, insects, rain drops) within that pulse volume reaches the threshold for detection by the radar, a target or echo will be produced on the radar display. Adding any number of additional reflectors to that pulse volume will not change the appearance of the display. A very weak echo likely indicates a small reflector, although other factors complicate this simple relationship (e.g., the angle at which a bird is flying with respect to the radar beam). A large echo or target, on the other hand, could represent a single large bird, a small flock of medium-sized birds, or a large flock of small birds. In reality, most migratory flights comprise a mixture of flocked and more dispersed migrants. Without some independent data on the distribution of flock sizes within the migrant population aloft, estimating the actual number of birds passing overhead is impossible. This problem has plagued radar studies of bird migration from

their beginnings and where flocked migrants are involved, there is still no satisfactory solution.

Impact studies of bird migration often employ thermal imaging technology or night vision equipment as an independent source of information on the identities of birds detected by radar. Such information would have been useful in this study to shed some light on the types of birds being detected, to confirm that the targets were in fact birds, and to provide some information on flocking and flock sizes. Similarly, it would be useful to have audio recordings of nocturnal flight calls from birds passing overhead. Such recordings can provide the most unambiguous feasible data on the identity of the birds being detected.

The altitudinal distribution of nocturnal migrants – In terms of the risk of migratory bird collisions with wind turbines, we are obviously concerned with birds flying at the lowest altitudes AGL, i.e., within the area occupied by rotors and towers. Using radar to attempt to estimate the number or proportion of birds flying very near the ground can be fraught with problems. The most serious of these is that radar energy can be reflected from objects on the ground, producing echoes or targets on the display called "ground clutter". Ground clutter can completely obscure echoes from birds or bats flying in that portion of the airspace nearest the ground. Although the report states (p.16) that ground clutter at the study sites was minimal, no photos of the radar ppi are presented to document this, and the authors noted that the antenna was elevated 15° above horizontal during surveillance operation in order to get the beam above most of the ground clutter. If ground clutter is significant within 15° of the ground, estimates of the numbers of presumed bird targets in the lowest altitudinal bins presented in the study will not be reliable and will likely be biased on the low side.

In order to be compelling concerning the numbers of bird targets in the lowest altitudes AGL, the study needs to present data on the detectability of birds flying at the lowest altitudes, precisely how altitude measurements of targets were made, the nature and dimensions of the sampling space at the lowest altitudes, the minimum distance at which the radar can detect birds of a given size, and some estimates of the error associated with the altitude measurements. Because birds flying below 250 m AGL, where collision is likely, are the most critical, the reliability of and biases inherent in the low-altitude target density estimates need to be addressed.

Timing of the study and weather conditions – The dates of the study were selected to correspond with the presumed peak of passerine migration in the region (Executive Summary, p. 5). As the study notes (p. 31), there is a general paucity of information on nocturnal migration in the western United States and that this warrants "the cautious interpretation of results." Passerine migration in this region of inland, northern California is generally rather diffuse and of relatively low magnitude compared to many localities in the eastern United States, for example. However, this region is characterized by very large migratory movements of sandhill cranes, tundra swans, several species of geese, and numerous species of ducks and shorebirds traveling between breeding areas and major overwintering sites in the Central Valley of California and the Pacific coast.

Without compelling evidence to the contrary, one can make the argument that it is these species that would be at the greatest risk of collision with wind turbines on Hatchet Ridge.

Importantly, the migration of most of these waterbirds occurs late in the fall season and well into winter when the probability of encountering unfavorable weather in the form of low clouds or fog over the ridge is greater. The report itself notes (p.33) "….the need to understand how nocturnal migrants respond to fog and low ceiling height conditions is warranted." Indeed, this is the most critical inadequacy of this study. The data were collected during a time of the year prior to the main migration period of large, flocked waterbirds, and the data were collected entirely under typically good weather conditions. It is when poor visibility conditions coincide with a large migration of birds that major mortality is most likely to occur. Those are the conditions that need to be studied, but have not been. Especially in the late fall and into the winter, migrations of water birds are often triggered by Pacific storm systems. It is these situations in which large numbers of birds find themselves flying in low cloud cover or fog, the conditions in which flocks of large birds numbering in the hundreds might pass over the ridge within the airspace occupied by the turbines.

Recommended studies

The ABR study presents a large amount of information. While perhaps interesting in its own right, much of that information is largely irrelevant to the goal at hand, i.e., to assess the potential for migrating birds to collide with the wind turbines and associated structures. Because the study was of relatively short duration and took place on nights with little variation in weather conditions, the analysis tells us nothing about what might happen at other times or under other conditions that are likely to occur.

Studies are needed that cover the entire fall and spring migration seasons. At this location, "fall" migration extends well into winter (through December and even into January). Both nocturnal and diurnal migration needs to be examined. Sandhill cranes are diurnal migrants, and tundra swans and geese often migrate both day and night. Low ceiling conditions atop Hatchet Ridge will not be confined to the nighttime period. During these studies, particular emphasis should be placed on understanding the flight behavior of birds under poor visibility conditions at the ridge-top. If there is sufficient moisture in the clouds or if there is precipitation, radar will be unlikely to be useful in detecting birds. Under these conditions, only visual observations or auditory recording are likely to provide the necessary information. It must be emphasized that although the kinds of data described here are the most difficult to obtain, they are the only ones that will enable a reasonable assessment of the risk of mortality to migrating birds.

The ABR study suggested a larger number of birds passing the Saddle site versus the North site. Inasmuch as the Saddle is located near the center of the proposed wind turbine array, future work should concentrate at that site.

Kenneth P. Able, Professor Emeritus

Department of Biological Sciences
University at Albany, State University of New York
Albany, New York 12222

Present address:
Bob's Creek Ranch
535-000 Little Valley Road
McArthur, California 96056

CURRICULUM VITAE

KENNETH P. ABLE, Professor
Department of Biological Sciences
The University at Albany
State University of New York
Albany, New York 12222

Office phone: 518-442-4330
FAX phone: 518-442-4767
Home phone: 518-872-1791
e-mail: kpa@cnsunix.albany.edu

PERSONAL DATA:

Born, February 5, 1944, Louisville, Kentucky. Married. One child.

EDUCATION:

B.A. University of Louisville, 1966 (Biology)
M.S. University of Louisville, 1968 (Biology)
Ph.D. University of Georgia, 1971 (Zoology)

HONORS:

Sigma Pi Sigma (Physics); Woodcock Soc., Univ. of Louisville (univ.-wide honor society); N.V. LeBre Award (Biology); Ford Fndn. Accelerated M.S. Degree Program; Phi Kappa Phi; Sigma Xi; Marcia Brady Tucker Award, Amer. Ornithol. Union, 1970; Wilson Award, Wilson Ornithol. Soc., 1971; Fellow, Amer. Ornithologists' Union, 1981; Corres. Fellow, Deutsche Ornithologen-Gesselschaft, 1988; Fellow, Animal Behavior Soc., 1993; work featured in National Geographic, Aug., 1979, June, 1991; New York Times, 9 Oct. 1990, 28 Sept. 1993; Washington Post, 25 Mar. 1991; New Scientist, 4 Sept. 1993, 9 Nov. 1996; Science News, 7 Aug. 1993; J. NIH Research, Nov. 1993; Frontiers (NSF), Sept. 1996; Wm. Brewster Medal, Amer. Ornithologists' Union, 1996; Award for Excellence in Research, Univ. at Albany, 1997.

EMPLOYMENT:

Professor Emeritus of Biology, University at Albany, 2003-.
Professor of Biology, University at Albany, 1984-2003.
Adjunct Professor, University of Mississippi, 1996-2001.
Associate Professor of Biology, Univ. at Albany, 1977-84 (tenured).
Director, Cranberry Lake Biol. Station, SUNY, 1973.
Assistant Professor of Biology, Univ. at Albany, 1971-1977.
Fellowship, Institute of Ecology, University of Georgia, 1971.
Research Assistant, University of Georgia, 1969-1970.
Museum field expedition to Peru, Louisiana St. Univ., summer, 1968.
Teaching Assistant, Louisiana State Univ., 1968-1969.
Teaching Assistant, University of Louisville, 1966-1968.

RESEARCH INTERESTS:

Animal migration and orientation, esp. of birds; behavioral ecology

TEACHING INTERESTS:

Animal Behavior, Behavioral Ecology, Ecology, Ornithology, Evolution

UNIVERSITY SERVICE:

College Council, 1982-84; Library Council, 1983-85; President's Budget Panel, 1985; College Comm. Academic Standing, 1984-87; Inst. Animal Care & Use Comm., 1986-2001, Chair, 1995-1998, 1999-2001; College Comm. on Promotion and Continuing Appointment, 1987-89; Graduate Academic Council, 1989-90; Science Research Advisory Comm.; Biology Dept. representative to Univ. in High School program; Mentoring undergraduate students, 1995-96; College of Arts and Sciences Comm. on Promotion and Continuing Appt, 1996-97, 1997-98, 2000-2001; Search Comm. for Dean, College of Arts and Sciences, 1997-98; Search Comm. for Research Compliance Officer, 1999-2000.

PROFESSIONAL SOCIETIES AND SERVICE:

Amer. Ornithologists' Union (Fellow, 1981; Treasurer, 1981-85; Council member 1999-2002); Amer. Soc. of Naturalists (elected, 1974); Animal Behavior Soc. (fellow, 1992); Cooper Ornithological Soc.; International Soc. for Behavioral Ecology; Wilson Ornithological Soc.

Host chairman, Northeast Regional Anim. Behav. Meeting, SUNYA, Nov. 1985.
Member, N.S.F. national committee on use of wild birds in research.
Member, Birdlife Advisory Comm., N.Y.S. Park Commission.
Member, Steering Committee, Rienow Center for the Environment.
Director, Amer. Birding Assoc., 1986-95, 1999-.
Organizer of symposium, N.Y.S. Museum Natural History Conference, April, 1992.
Member, Advisory Board, N.S.F. Public Participation in Ornithology (National Science Experiment), Cornell Laboratory of Ornithology, 1992-94.
Member, New York State Avian Records Committee.
Editor, Monographs in Field Ornithology, Amer. Bird. Assoc. , 1989-.
Advisory panel on endangered species listing, NYS Department of Environmental Conservation, 1993.
Advisory committee for NY Heritage Program-Nature Conservancy study of bird migration along the Lake Ontario shoreline, 1993-94.
Member, Steering Comm., Animal Navigation Group, Royal Inst. of Navigation, London, 1993-.
Member, Section on Fish & Wildlife Resources and Section on Ecology, Nat. Assoc. of State Universities and Land-grant Colleges, 1994-.
Member, Section on Ecology, Nat. Assoc. of State Universities and Land-grant colleges, 1999-.
Member, Migratory Bird Advisory Comm., proposed Conte National Wildlife Refuge, 1994.
Editorial Board, Bird Behavior, 1995-.
Member, A.O.U. comm. on use of wild birds in research, 1995.
Advisory Committee, NY Important Bird Areas project, Nat. Audubon Society, 1996-.
Science Advisor, Earth & Sky program, National Public Radio, 1996-.
Organizer, Winter Animal Behavior Conference XIX, 1997.
Editorial board, North American Birds, 2000-.
Consulting Editor, Cornell University Press, 2000-.

Member, National Technical Committee, Important Bird Areas Program, Nat. Audubon Society, 2001-.

REVIEWER:

Manuscripts: Amer. Birds; Amer. Naturalist; Animal Behaviour; Auk; Avian Biol.; Behav. and Brain Sciences; Behav. Ecol. Sociobiol.; Biol. Bull.; Condor; Current Ornithology; Ecology, Ethology, Evolution; Ethology; J. Comp. Physiol.; J. Comp. Psychol.; J. Exper. Biol.; J. Field Ornithol.; Magnetite Biomineralization and Magnetoreception in Organisms; Nature; Ornithol. Monogr.; Perception; Proc. Nat. Acad. Sci. USA; Proc. Royal Soc. Lond.; Q. Rev. Biol.; Science; Scientific Amer. Books; Trends in Ecology & Evolution; Wilson Bull.

Grant Proposals: NSF, NIH, F.M. Chapman Mem. Fund, Nat. Geog. Soc., Smithsonian Inst., Whitehall Foundation, NSERC (Canada), Israeli Science Foundation.

Textbook Manuscripts: Animal Behavior; The Biology of Animal Behavior; Perspectives on Animal Behavior; Biology.

Outside Reader, Theses: A. McLean, Ph.D., Univ. Rochester, 1980; U. Munro, Ph.D., Univ. of New England, Australia, 1992; C. Simms, Ph.D., Univ. of Mississippi, 1996-.

Consultant: Encyclopedia of North American Birds, Knopf.

GRANT SUPPORT:

Research Fndn. of SUNY Grant-in-Aid: 1972 - $3,200; 1973 - $2,700.

N.S.F.: Field Studies of the Orientation of Free-flying Bird Migrants, 1974-76, $35,000.

Field Studies of Migratory Orientation, 1976-78, $50,000.

Field-experimental Studies of Avian Migratory Orientation and Navigation, 1980-83, $105,000.

Travel grant to attend XVIII Intern. Ornithol. Congress, Moscow, 1982.

Experimental Analysis of the Avian Migratory Orientation and Navigation System, 1983-86, $75,000.

Ontogeny of Orientation Mechanisms in Birds, 1986-89, $181,000.

Development of Migratory Orientation, 1989-90, $30,000.

Interactions and Flexibility in the Orientation System of Migratory Birds, 1992-95, $255,000.

The Orientation of a Night-migrating Songbird, 1995-98, $186,000.

National Research Council: travel grant to attend XVII Intern. Ornithol. Congress, West Berlin, 1978.

NYS/UUP: Experienced Faculty Travel Award to attend XX Intern. Ornithol. Congress, Christchurch, N.Z., 1990.

INVITED LECTURES:

Plenary Lecture: North American Ornithological Conference, Sept., 2002, New Orleans
Keynote speaker: Mass. Audubon Society 5th Annual Birders' Mtg., 1993
Vermont Bird Conference, 1995
New York State Federation of Bird Clubs, 1996
Kentucky Ornithological Society, 2001
Cornell Univ., 1971, 1982, 1984, 1999
SUNY at Potsdam, 1973
Utica College, 1974, 1996
Kansas State University, 1974
Bennington College, 1974
University of Rhode Island, 1974
Princeton University, 1975, 1998
Colgate University, 1975
SUNY at Stony Brook, 1977
SUNY at Binghamton, 1978
Siena College, 1978, 1990, 1997
Skidmore College, 1978, 1984, 1991
Pennsylvania State University, 1979
Rockefeller University, 1979, 1996
Linnaean Society of New York, 1979, 1994
Middlebury College, 1979
N.Y.S. Museum, 1979, 1980, 1983
Williams College, 1980
SUNY at Geneseo, 1981
University of Illinois, 1981
University of Maine, 1984, 2001
Bowdoin College, 1984
NASA Langley Research Laboratory, 1984
Vassar College, 1985
University of Massachusetts, 1988
Union College, 1990
Ithaca College, 1992
St. Lawrence University, 1992
Ithaca College, 1992
University of North Carolina, 1994
Clemson University, 1994
University of Vermont, 1995
Dartmouth College, 1998

Swarthmore College, 1999
University of California, Davis, 2000
University of Nevada, Reno, 2000

INVITED SYMPOSIA:

1971. Symposium on Bird Migration in the Region of the Gulf of Mexico, Dauphin Island, Alabama.
1974. Conference on the Biological Aspects of the Bird/Aircraft Collision Problem, Clemson University.
1977. Animal Orientation and Navigation, Tubingen, West Germany (K. Schmidt-Koenig and W.T. Keeton, chairmen).
1978. International Ornithological Congress, West Berlin (S.T. Emlen and W. Wiltschko, convenors).
1980. Mini-symposium on Bird Migration, Orientation and Homing, Rockefeller University, Millbrook, New York.
1981. International Symposium on Avian Navigation, Tirrenia, Italy (F. Papi and H.G. Wallraff, Chairmen).
1982. XVIII International Ornithological Congress, Moscow, USSR (W. Wiltschko and I. Vilks, convenors).
1983. Migration: Mechanisms and Adaptive Significance. Centennial Symposium, University of Texas.
1986. XVIX International Ornithological Congress, Ottawa, (W. Wiltschko and K.P. Able, convenors).
1987. Winter Animal Behavior Conference IX, Park City, Utah.
1987. XX International Ethology Congress, Madison, Wisconsin.
1988. Winter Animal Behavior Conference X, Park City, Utah.
1988. Recent Developments in the Study of Animal Migration, Amer. Soc. of Zoologists, San Francisco.
1990. XX International Ornithological Congress, Christchurch, N.Z.
1993. Winter Animal Behavior Conference XV, Jackson Hole, WY.
1993. Symposium, Soc. for Experimental Biology, Canterbury, Kent, England.
1993. Orientation and Navigation. Birds, Humans and Other Animals. Royal Inst. of Navigation, Oxford, England.
1994. Winter Animal Behavior Conference XVI, Jackson Hole, WY.
1994. XXI International Ornithological Congress, Vienna, Austria (K.P. Able and K. Schmidt-Koenig, conveners).
1995. Animal Navigation Symposium, Company of Biologists, Cambridge, England.
1997. Winter Animal Behavior Conference XIX, Jackson Hole, WY.
1997. Orientation and Navigation. Birds, Humans and Other Animals. Royal Inst. of Navigation, Oxford, England.
1998. XXII International Ornithological Congress, Durban, South Africa (Symposium convener and speaker).
2001. Symposium on Avian Migration, Radolfzell, Germany.

PUBLICATIONS:

<u>Papers:</u>

Able, K.P. 1962. The cyclic occurrence of some winter birds in the B.O.S. study area.

Prothonotary, 28:18-23, 127- 131.
Able, K.P. 1962. A note on the migration of the parasitic jaeger in the B.O.S. study area. Prothonotary, 28:110-111.
Able, K.P. 1963. Television tower mortality in the Niagara Frontier during fall, 1962. Kingbird, 13:192-195.
Able, K.P. 1965. Summer birds of Shelby County. Indiana Audubon Quart., 43:96-111.
Able, K.P. 1966. Television tower mortality near Louisville. Kentucky Warbler, 42:27-28.
Able, K.P. 1968. Some aspects of the ecology of Henslow's sparrow in Kentucky. M.S. thesis, Univ. of Louisville.
Monroe, B.L., Jr., and K.P. Able. 1968. Recent additions to the avifauna of Kentucky. Kentucky Warbler, 49:55-57.
Able, K.P. 1970. A radar study of the altitude of nocturnal passerine migration. Bird-Banding, 41:282-290.
Gauthreaux, S.A., Jr., and K.P. Able. 1970. Wind and the direction of nocturnal songbird migration. Nature, 228:476-477.
Gauthreaux, S.A., Jr., and K.P. Able. 1971. Nocturnal songbird migration. Nature, 230:580.
Able, K.P. 1971. Environmental influences on the nocturnal migration and orientation of birds. Ph.D. dissertation, Univ. of Georgia.
Able, K.P. 1972. Fall migration in coastal Louisiana and the evolution of migration patterns in the Gulf region. Wilson Bull., 84:231-242.
Able, K.P. 1973. The role of weather variables and flight direction in determining the magnitude of nocturnal bird migration. Ecology, 54:1031-1041.
Able, K.P. 1974. Environmental influences on the orientation of nocturnal bird migrants. Anim. Behav., 22:225-239.
Able, K.P. 1974. Wind, track, heading and the flight orientation of migrating songbirds. Proc. Conf. on Biol. Aspects of the Bird/Aircraft Collision Problem, pp. 331-357.
Able, K.P., and S.A. Gauthreaux, Jr. 1975. Quantification of nocturnal migration with a portable ceilometer. Condor, 77:92-96.
Able, K.P., and B.R. Noon. 1976. The structure of avian communities along elevational gradients in the northeastern United States. Oecologia, 26:275-294.
Able, K.P. 1977. The orientation of songbird migrants following displacement by the wind. Auk, 94:320-330.
Able, K.P., and P.M. Dillon. 1977. Sun compass orientation in a nocturnal migrant, the white-throated sparrow. Condor, 79:393-395.
Able, K.P. 1978. Field studies of the orientation cue hierarchy of nocturnal songbird migrants. In K. Schmidt-Koenig and W.T. Keeton, eds., Animal Migration, Navigation and Homing, pp. 228-238. Springer-Verlag, Berlin.
Noon, B.R., and K.P. Able. 1978. A comparison of avian community structure in the northern and southern Appalachian Mountains. Forest Serv. Gen. Tech. Rep. SE-14, pp. 98-117. U.S. Dept. Agriculture.
Bingman, V.P., and K.P. Able. 1979. The sun as a cue in the orientation of the white-throated sparrow, a nocturnal migrant. Anim. Behav., 27:621-622.
Able, K.P. 1980. Mechanisms of orientation, navigation, and homing. In S.A. Gauthreaux, Jr., ed., Animal Migration, Orientation and Navigation, pp. 283-373.

Academic Press, N.Y.
Able, K.P. 1980. Migratory behavior. McGraw-Hill Encyclopedia of Science and Technology.
Able, K.P. 1980. Evidence on migratory orientation from radar and visual observations: North America. Proc. XVII Intern. Ornithol. Congr., pp. 540-546.
Gould, J.L., and K.P. Able. 1981. Human homing: An elusive phenomenon. Science, 212:1061-1063.
Bingman, V.P., K.P. Able, and P. Kerlinger. 1982. Wind drift, compensation, and the use of landmarks by nocturnal bird migrants. Anim. Behav., 30:49-53.
Able, K.P. 1982. Field studies of bird migration--a brief overview and some unanswered questions. Cont. Birdlife, 2:101-110.
Able, K.P. 1982. Field studies of avian nocturnal migratory orientation. I. Interaction of sun, wind and stars as directional cues. Anim. Behav., 30:761-767.
Able, K.P., V.P. Bingman, P. Kerlinger, and W.F. Gergits. 1982. Field studies of avian nocturnal migratory orientation. II. Experimental manipulation of orientation in white-throated sparrows released aloft. Anim. Behav., 30:768-773.
Able, K.P. 1982. The effects of overcast skies on the orientation of free-flying nocturnal migrants. In F. Papi and H.G.Wallraff, eds., Avian Navigation, pp. 38-49. Springer-Verlag, Berlin.
Able, K.P. 1982. Skylight polarization patterns at dusk influence the migratory orientation of birds. Nature, 299:550-551.
Able, K.P. 1982. Ivory gull visits a bird feeder in Saratoga Springs. Kingbird, 32:75-77.
Able, K.P., S.B. Terrill, and J.D. Cherry. 1982. Not by mirrors. Nature, 298:510.
Able, K.P. 1983. Commentary--Bird Navigation. In A.H. Brush and G.C. Clark, eds., Perspectives in Ornithology, pp. 542-548. Cambridge Univ. Press.
Able, K.P., W.F. Gergits, J.D. Cherry, and S.B. Terrill. 1984. Homing behavior of wood thrushes (Hylocichla mustelina): a radio tracking study. Behav. Ecol. Sociobiol., 15:39-43.
Able, K.P., and J.D. Cherry. 1985. Laboratory and field studies of avian migratory orientation. In M.A. Rankin, ed., Migration: Mechanisms and Adaptive Significance, pp. 516-525. Contrib. Marine Sci. Suppl., vol. 27. Marine Science Institute, Univ. of Texas.
Able, K.P., and W.F. Gergits. 1985. Human navigation: Attempts to replicate Baker's displacement experiment. In D.S. Jones, B.J. MacFadden, and J.L. Kirschvink, eds., Magnetite Biomineralization and Magnetoreception in Organisms, pp. 569-572. Plenum, New York.
Kerlinger, P., V.P. Bingman, and K.P. Able. 1985. Comparative flight behavior of migrating hawks studies with tracking radar during autumn in central New York. Can. J. Zool., 63:755-761.
Able, K.P. 1985. Radar methods for the study of hawk migration. In M. Harwood, ed., Proc. IV Hawk Migration Conf., pp. 347-354.
Able, K.P. 1985. The contribution of radar and visual techniques to orientation research. Acta XVIII Congr. Intern. Ornithol. (V.D. Ilyichev and V.M. Gavrilov, eds.), pp. 293-299. Nauka, Moscow.
Cherry, J.D., and K.P. Able. 1986. An alternative method for the analysis of Emlen funnel data. Auk, 103:225-227.

Able, K.P., and J.D. Cherry. 1986. Mechanisms of dusk orientation in white-throated sparrows (Zonotrichia albicollis): Clock-shift experiments. J. comp. Physiol., 159:107-114.
Able, K.P., and S.B. Terrill. 1986. A release cage for the study of migratory orientation: Technique and preliminary results. Auk, 104:135-139.
Able, K.P., and V.P. Bingman. 1987. The development of orientation and navigation behavior in birds. Q. Rev. Biol., 62:1-29.
Able, K.P. 1987. Geomagnetic disturbance and migratory bird orientation: Is there an effect? Anim. Behav., 35:599-601.
Able, K.P., and V.P. Bingman. 1988. The development of migratory orientation. Acta XIX Intern. Ornithol. Congr., pp. 1932-1940, Univ. Ottawa Press.
Terrill, S.B., and K.P. Able. 1988. Bird migration terminology. Auk, 105:205-206.
Holberton, R.L., K.P. Able and J.C. Wingfield. 1989. Status signalling in dark-eyed juncos, Junco hyemalis: experimental manipulations and hormonal correlates of dominance. Anim.Behav., 37:681-689.
Able, K.P. 1989. Skylight polarization patterns and the orientation of migratory birds. J. exp. Biol., 141:241-256.
Able, K.P., and M.A. Able. 1990. Ontogeny of migratory orientation in the Savannah sparrow, Passerculus sandwichensis: mechanisms at sunset. Anim. Behav., 39:1189-1198.
Able, K.P., and M.A. Able. 1990. Ontogeny of migratory orientation in the Savannah sparrow, Passerculus sandwichensis: calibration of the magnetic compass. Anim. Behav., 39:905-913.
Able, K.P. 1990. Experimental studies of the development of migratory orientation mechanisms. Experientia, 46:388-394.
Holberton, R.L., R. Hanano and K.P. Able. 1990. Age-related dominance in dark-eyed juncos: effects of plumage and prior residence. Anim. Behav., 40:573-579.
Able, K.P. 1990. Comparison of vanishing bearings, orientation directions and ringing recoveries of spring migrant white-throated sparrows (Zonotrichia albicollis). J. f. Ornithol., 131:317-323.
Able, K.P. and M.A. Able. 1990. Calibration of the magnetic compass of a migratory bird by celestial rotation. Nature, 347:378-380.
Able, K.P. 1991. Common themes and variations in animal orientation systems. Amer. Zool., 31:157-167.
Able, K.P. 1991. The development of migratory orientation mechanisms. In P. Berthold, ed., Orientation in Birds, pp. 166-179.
Able, K.P. 1991. Maps, compasses and birds. In J. Grier and T. Burk, The Biology of Animal Behavior, pp. 242-243. Times Mirror/Mosby.
Holberton, R.L. and K.P. Able. 1992. Circannual cycle of a migratory bird persists in constant dim light. J. comp. Physiol., A, 171:477-481.
Able, K.P. 1992. Migratory behavior. Pp. 196-198, McGraw-Hill Encyclopedia of Science and Technology.
Able, K.P. and M.A. Able. 1993. Magnetic orientation in the Savannah sparrow. Ethology, 93:337-343.
Able, K.P. and M.A. Able. 1993. Interactions and flexibility in the orientation system of migratory birds. In Orientation and Navigation. Birds, Humans and Other

Animals. Royal Inst. Nav., London, Paper no. 9.
Able, K.P. and M.A. Able. 1993. Daytime calibration of magnetic orientation in a migratory bird requires a view of skylight polarization. Nature, 364:523-525.
Able, K.P. and M.A. Able. 1993. Interactions and flexibility in the orientation system of migratory birds. J. Navigation, 46:353-358.
Able, K.P. 1993. Orientation cues used by migratory birds: A review of cue-conflict experiments. Trends in Ecology and Evolution, 8:367-371.
Able, K.P. 1994. Magnetic orientation and magnetoreception in birds. Progress in Neurobiology, 42;449-473.
Able, K.P. 1995. Orientation and navigation: A perspective on fifty years of research. Condor, 97:592-604.
Able, K.P. and M.A. Able. 1995. Manipulations of polarized skylight calibrate magnetic orientation in a migratory bird. J. comp. Physiol., A, 176:351-356.
Able, K.P. and M.A. Able. 1995. Interactions in the flexible orientation system of a migratory bird. Nature, 375:230-232.
Able, K.P. and M.A. Able. 1996. The flexible migratory orientation system of the Savannah sparrow (Passerculus sandwichensis). J. exper. Biol., 199:3-8.
Able, K.P. 1996. Large-scale navigation. J. exper. Biol., 199:1-2.
Able, K.P. 1996. The debate over olfactory navigation by homing pigeons. J. exper. Biol., 199:121-124.
Able, K.P. 1996. In memoriam: Burt L. Monroe, Jr., 1930-1994. Auk, 113:924-927.
Able, K.P. and M.A. Able. 1996. Migratory orientation: autumn calibration of magnetic orientation is not evident in spring. Naturwissenschaften, 83:517-518.
Gaunt, A.S., L.W. Oring, K.P. Able, D.W. Anderson, L. Baptista, J.C. Barlow, and J.C. Wingfield. 1997. Guidelines for the use of wild birds in research. Ornithol. Council, Washington, D.C., vii + 52 pp.
Able, K.P. and M.A. Able. 1997. Development of sunset orientation in a migratory bird: no calibration by the magnetic field. Anim. Behav., 53:363-368.
Able, K.P. and M.A. Able. 1997. The orientation system of migratory birds: innate information, learning rules and adaptive plasticity. In Orientation and Navigation - Birds, Humans and Other Animals. Royal Inst. of Navigation, London.
Able, K.P. and M.A. Able. 1998. The roles of innate information, learning rules and plasticity in migratory bird orientation. J. Navigation, 51:1-9.
Able, K.P. and J.R. Belthoff. 1998. Rapid Aevolution@ of migratory behaviour in the introduced house finch (*Carpodacus mexicanus*) of eastern North America. Proc. Royal Soc. Lond. B, 265:2063-2071.
Able, K.P. and M.A. Able. 1999. Migratory orientation: learning rules for a complex behaviour. In: Adams, N.J. and R.H. Slotow (eds.), Proc. 22nd Int. Ornithol. Congress, Durban, pp. 2356-2365. Johannesburg: Birdlife South Africa.
Able, K.P. and M.A. Able. 1999. Evidence for calibration of magnetic orientation in Savannah sparrows reared in the field. Proc. Royal Soc. Lond. B, 266:1477-1481.
Bingman, V.P., K.P. Able, and J.J. Siegel. 1999. Hippocampal lesions do not impair the geomagnetic orientation of migratory Savannah sparrows. J. comp. Physiol. A, 185:577-581.
Holberton, R.L. and K.P. Able. 2000. Differential migration and an endocrine response

to stress in wintering dark-eyed juncos (Junco hyemalis). Proc. Royal Soc. Lond. B, 267:1889-1896.

Able, K.P. 2001. The concepts and terminology of bird navigation. J. Avian Biol., 32:174-183.

Able, K.P. 2002. Homing and migration. The New Book of Knowledge, Grolier Educational Publ., pp. 195-200.

Able, K.P. 2002. Avian migration and navigation. Grzimek=s Animal Life Encyclopedia, Gale Grp., pp.

Schneider, K.J. and K.P. Able. 2002. An analysis of breeding birds of the Hudson River Valley and their suitability for natural resource injury studies. Report submitted to the Hudson River Natural Resources Trustee Council.

Bingman, V.P. and K.P. Able. 2003. Maps in birds: Representational mechanisms and neural bases. Curr. Opinion Neurobiology, in prep.

Holberton, R.L. and K.P. Able. 2005. In memoriam: Eberhard Gwinner. Auk, 122:1013-1015.

Books and Text Chapters:

Able, K.P. 1998. Eight species accounts in Bull=s Birds of New York State. Cornell Univ. Press.

Able, K.P. 1999. (Editor and author of three chapters) Gatherings of Angels: Migrating Birds and Their Ecology. Cornell Univ. Press, xiv + 194 pp.

Able, K.P. 2004. Chapter 5, Birds on the Move: Flight and Migration. *In* Handbook of Bird Biology (S. Podulka, R. Rohrbaugh, Jr., and R. Bonney, eds.). Cornell Lab of Ornithology, Ithaca, New York.

Able, K.P. Mechanisms of Bird Navigation. In preparation for Monographs in Behavior and Ecology series published by Princeton Univ. Press (contract signed Aug., 1999)

Abstracts:

Able, K.P. 1970. Nocturnal bird migrants: Two methods of flight orientation? Bull. Ecol. Soc. Amer., 51:43.

Able, K.P. 1973. Tracking radar studies of migratory orientation in birds. Amer. Zool., 13:1263.

Able, K.P. 1975. Avian community structure along elevational gradients in the northwestern United States. Bull. Ecol. Soc. Amer., 56:21.

Able, K.P. and M.A. Able. 1994. The development of migratory orientation mechanisms. J. f. Ornithol., 135:372.

Able, K.P. and W. Wiltschko. 1998. Summary: Adaptive plasticity in migratory orientation mechanisms. Ostrich, 69:54.

Able, K.P. and M.A. Able. 1998. Migratory orientation: Learning rules for a complex behaviour. Ostrich, 69:123.

Reviews and Semipopular Articles:

Able, K.P. 1972. The changing seasons. The fall migration, 1971. Amer. Birds, 26:25-30.
Able, K.P. 1973, 1974. The changing seasons. Amer. Birds, 27:19-23; 28:22-27.
Able, K.P. 1974. Review: The Visible Migration of Birds at Ottenby, Sweden. C. Edelstam, ed. Bird-Banding, 45:290- 291.
Able, K.P. 1975. Review: Visible Bird Migration at Falsterbo, Sweden. S. Ulfstrand, G. Roos, T. Alerstam, and L. Osterdahl, eds. Bird-Banding, 46:97.
Able, K.P. 1975. Review: Autumn Hawk Flights. D.S. Heintzelman. Bird-Banding, 47:89-91.
Able, K.P. 1976. Review: Birds of New York State. J. Bull. Bird-Banding, 47:89-91.
Able, K.P. 1979. Review: The Evolutionary Ecology of Animal Migration. R.R. Baker. Amer. Sci., 67:355-356.
Able, K.P. 1979. Review: Bird Flight. G. Ruppell. Bios, 50:99-100.
Able, K.P. 1980. The changing seasons. Amer. Birds, 34:249-252.
Able, K.P. 1981. Review: The Mystery of Migration. R.R. Baker. Q Rev. Biol., 59:59.
Able, K.P. 1982. Review: Animal Migration. R.D. Aidley, ed. Q. Rev. Biol., 57:340-341.
Able, K.P. 1983. Trends in the state list of New York birds. Kingbird, 33:6-12.
Able, K.P. 1983. The limits of technology. Point Reyes Bird Observ. Newsletter 61.
Able, K.P. 1983. A migratory bird's baedeker. Natural History, 92:22-27.
Able, K.P. 1983. Chips from the night sky. Living Bird Quart., 2:10-13.
Able, K.P. 1984. Review: Weather and Bird Behaviour. N. Elkins. Wilson Bull., 96:367-368.
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Appendix D

Fire Safety Requirements

SHASTA COUNTY FIRE DEPARTMENT

MEMORANDUM

DATE: May 22, 2008
BW

TO: Russ Mull, Director
Department of Resource Management

FROM: Mike Chuchel
Shasta County Fire Warden

SUBJECT: 14 FIRE PREVENTION
14.3 Fire Safety and Land Use Planning
Use Permit 06-16 / Hatchet Ridge Wind LLC

PROJECT LOCATION: Hatchet Mountain
PROJECT DESCRIPTION: Wind Energy Project

The above referenced project is located within the California Department of Forestry and Fire Protection / Shasta County Fire Department (CAL FIRE / SCFD) jurisdiction. CAL FIRE / SCFD has reviewed the proposal and submits the following requirements. (Note: The Resource Management Division of CAL FIRE will also be submitting comments.)

CONDITIONS

----- Roadways and turnarounds shall be constructed in accordance with Section 6.12 of the Fire Safety Standards prior to the construction of any portion of the proposed facility.

----- The facility shall be identified with a street address marker located on the proposed building and adjacent to facility access road at Highway 299. The address numbers shall be a minimum of four inches in height, reflectorized, and shall contrast in color with the background. The address shall be clearly visible at all times.

----- Roofing shall have a Class A rating as per the Shasta County Fire Safety Standards and the California Building Code.

----- All buildings constructed on parcels one acre or larger in size shall be setback a minimum of 30 feet from all property lines and road easements in accordance with the Shasta County Fire Safety Standards, but a 100 foot setback is recommended in order to comply with the defensible space requirement.

7.9 Chimneys and flues shall be equipped with an approved spark arrestor as defined in Section 6.53 of the Fire Safety Standards.

----- Fire protection water for the proposed buildings shall be in compliance with Section 6.43 of the Fire Safety Standards.

----- Due to the large size of the proposed project, vegetation cleared for construction and/or land development purposes shall be disposed of on a regular basis. Accumulation of vegetation debris shall be minimized. Disposal shall be in accordance with Air Quality Management Regulations and State or local Fire Department Burning Permit Regulations. Prior to the final inspection by the Shasta County Building Division and CAL FIRE / SCFD, all cleared vegetation shall be properly disposed of.

7.16 Storage, use, and dispensing of flammable/combustible liquids shall be in accordance with the adopted edition of the California Fire Code. Plans shall be submitted to CAL FIRE / SCFD for review and approval prior to construction, storage, or use.

7.19 Portable fire extinguisher(s) for the proposed buildings shall be provided in accordance with the adopted edition of the California Fire Code.

----- All welding and storage of cylinders shall be in accordance with the adopted edition of the California Fire Code. In addition to welding, other high risk activities such as cutting and grinding shall require welding curtains, and shall be restricted based on fire weather indices as determined by the CAL FIRE / SCFD.

7.23 Accumulations of waste paper, weeds, combustible waste material, waste petroleum products, tires, or rubbish of any type shall be prohibited.

7.24 Rags, cloth, or paper towels saturated with oil, solvent, or petroleum products shall be kept in a metal can with a tight fitting cover.

----- The applicant shall provide and maintain “Defensible Space” around all buildings in accordance with Public Resources Code 4291.

7.26 All mobile and stationary equipment with non-turbocharged internal combustion engines shall be equipped with a properly functioning, approved spark arrestor.

----- All field work vehicles, including sub-contractors, which engage in field operations, and routinely access the site, shall be provided with:

1. A means for reporting emergencies.

2. At least one round point shovel at least 46 inches in length.

3. One 5 gallon backpack water pump.

4. A minimum of one 2-A:10-B:C fire extinguisher.

----- Vehicles shall not travel off-road or upon roads which have not been maintained free of flammable vegetation except when necessary because of an immediate hazard to life or property.

7.28 The CAL FIRE / SCFD shall sign the improvement plans for this project.

7.29 Advisory note: The project is located in an area designated as a "VERY HIGH" Fire Hazard Severity Zone under Section 4203 of the Public Resources Code of the State of California.

----- If applicant installs an automatic fire extinguishing system in the proposed buildings, plans shall be submitted for CAL FIRE / SCFD review as part of the building permit.

----- All fires shall be reported immediately to CAL FIRE even though they may have been extinguished.

----- Applicant shall provide the following vegetative modification:

1. Turbine Ridge Road (TRR):

    - Provide a 100 foot shaded fuel break on the western side of the TRR.
    - From the centerline of the TRR going east, provide a 50 foot clear zone.
    - From the easternmost edge of the clear zone, provide an additional 100 foot shaded fuel break.

2. Turbines:

    - From the outer edge of each tower, going in all directions, provide a 30 foot clear zone
    - From the outer edge of the clear zone, going in all directions, provide an additional 70 foot shaded fuel break.

3. Definitions:

- Turbine Ridge Road (TRR) is a 20 foot wide surfaced road with 5 foot shoulders on both sides. It is the easternmost road within the project that is adjacent to all of the turbines located on Hatchet Ridge. For the purposes of this condition, TRR does not access the cluster of 5 turbines located west of the Hatchet Ridge.

- Clear zone: Remove all brush, trees and slash.

- Shaded fuel break:

    - Trees planted at 20 foot spacing.

    - Existing tree stands to be reduced to 20 foot spacing.

    - Tree pruning:

        - Begins when the trees are 18 feet tall.

        - Prune one-third of the live crown or up to 12 feet, whichever is less.

    - Brush and slash must be kept less than one foot high.

----- Applicant shall provide the necessary equipment and necessary training (or funding for equipment and training) to CAL FIRE / SCFD for the training of employees for the extinguishment of facility specific fires and rescue. The rescue equipment shall include items such as ropes, hardware, harnesses, personal protective safety gear, and rescue basket. The applicant shall provide a secure on-site location for the storage of the rescue equipment, to be accessible by CAL FIRE / SCFD personnel only. The purchased property shall become the property of CAL FIRE / SCFD, and the equipment shall be maintained by CAL FIRE / SCFD. Replacement equipment shall be purchased by the current owner and provided to CAL FIRE / SCFD as necessary. This shall continue for the life of the facility.

----- All electrical systems shall be designed and maintained in accordance with the California Public Utilities General Order 95 and corresponding underground standards.

----- All electrical distribution and collection components shall be underground where possible. Where above ground installations are necessary, the latest standards for raptor and rodent protection shall be incorporated.

----- In accordance with PRC 4292, all electrical distribution and collection components

shall be “exempt” if existing, and designed for high wind conditions.

----- Water storage facilities of not less than 5,000 gallons shall be provided for firefighting purposes in strategic locations within the site. Such locations shall be noted on the road map plan. The number and location of such water supplies shall be determined in cooperation with CAL FIRE / SCFD and the applicant. The risk of freezing shall be considered when determining the type and location of water storage facilities.

----- The applicant shall provide CAL FIIRE / SCFD a current copy of the facility fire prevention plan. CAL FIRE / SCFD will review this plan and if necessary require modification. The elements of the plan shall include the following:

1. A description of the operating area along with a map showing major access routes, significant hazards, firefighting water supply locations, and a 24 hour emergency contact phone number.

2. An analysis of fire causes going back a minimum of five years, or to the first day of construction, whichever is less. List any trends indicated by the fire causes along with a plan of correction/proposed solutions for preventing these fire causes. Provide an implementation and completion date for all plans and correction.

3. Procedures pertaining to reporting of emergencies, curtailment of hazardous activities during high and very high fire danger periods, weather monitoring for establishing the fire danger, and company action for fire suppression.

4. The training/orientation program for the facility employees and contactors pertaining to fire safety, fire suppression, and emergency notification.

5. A list of state and local fire laws applicable to the facility operations, and any conditions of approval pertaining to fire safety along with the facility operating procedures which indicate your compliance with these laws and/or conditions of approval.

6. Staffing and equipment assignment and inventories as follows:

    a. Company emergency incident manager and 24 hour contact telephone number.

    b. General staff and specialist responsibilities.

    c. Available motorized equipment for firefighting and support operations.

d. Location, type and number of firefighting tools and equipment.

----- No person shall conduct any hazardous operation (mowing, welding, cutting, grinding, or other tool or equipment from which a spark, fire or flame may originate), or operate any motor, engine, any time flammable vegetation exists (such as dry grass and dead vegetative litter), without meeting all of the following requirements: (This condition does not apply to: 1) the operation of the wind turbine, 2) the operation of the electrical transmission system, 3) the regular maintenance of the turbines within the area cleared of vegetation, and 4) the use of motorized vehicles to access the turbines on the maintained access road system.)

1. Vegetation clearances of 15 feet shall be provided in all directions around the area of operation. An additional 15 feet shall be cleared or wet down. If wetting down is chosen, the area shall be maintained wet throughout the operation and the water used for wetting shall not diminish the backpack pumps capacity.

2. Two serviceable round point shovels at least 46 inches in length and a minimum of two 5 gallon water backpack fire pumps shall be maintained within 25 feet of the operation.

3. A fire watch shall be maintained within 25 feet of the hazardous operation. The fire watch shall have a radio or equivalent shall be available at the operation site in which to report emergencies.

Hazardous operations (as defined above) shall not be permitted in during the following periods:

1. Anytime flammable ground vegetation exists (unless mitigated as specified above) and if any one of the following conditions exist:

    a. The air temperature is 90 degrees Fahrenheit or greater.

    b. The wind speed is 8 miles per hour (mph) or greater.

    c. The relative humidity is 20% or less.

    d. Exceptions:

        i. When the wind speed is 15 mph or less and the relative humidity is 60% or greater.

ii. When the wind speed is 15 mph or greater and the relative humidity is 80% or greater.

2. Anytime during the declared fire season when the wind speed is 25 mph or greater.

3. Anytime during the declared fire season when the relative humidity is 10% or less.

4. Anytime CAL FIRE declares a Red Flag Warning.

----- Applicant shall provide a "Risk Manager" to be available on site whenever construction activities are in progress. The Risk Manager shall have oversight authority and shall be the point of contact for the CAL FIRE / SCFD.

----- Smoking shall only be permitted in vehicles parked in areas cleared of flammable vegetation and in designated smoking areas at building sites.

----- Prior to each fire season and upon hire of new employees or sub-contractors, an orientation concerning fire hazards, fire safety, emergency notification procedures, use of fire safety equipment, fire safety rules and regulations, and the conditions of approval shall be provided by the employer.

----- Any installation which results in a fire hazard, shall be addressed by the applicant or designee, and measures shall taken to prevent or mitigate the problem. CAL FIRE / SCFD may also require measures to mitigate or correct any such problem.

----- All initial project clearing shall be done between November 1st and May 1st. Extensions may be allowed based on weather conditions as determined by the CAL FIRE Battalion Chief assigned to that area.

----- Applicant shall provide to CAL FIRE / SCFD the telephone number of the control center that has the ability to shut down the windmills. When the control center is notified by CAL FIRE / SCFD, the control center shall immediately shut down facility as necessary when in the opinion of the Incident Commander, the continued use of the windmills is detrimental to the mitigation of an incident located in proximity of the windmills.

----- Nothing in these conditions are intended to diminish the responsibility of the applicant or their designee from taking any additional responsibility and reasonable measures necessary to preclude the ignition and rapid spread of fire.

Further questions or comments may be directed to County Fire Marshal Jim Diehl at (530) 225-2423.

Sincerely,

Mike Chuchel
County Fire Warden

By

Jim Diehl
County Fire Marshal

cc: RES American Developments, Hughes

STATE OF CALIFORNIA THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, *Governor*

DEPARTMENT OF FORESTRY AND FIRE PROTECTION

P.O. Box 944246
SACRAMENTO, CA 94244-2460
Website: www.fire.ca.gov
(916) 653-7772

May 27, 2008

Bill Walker
Shasta County Department of Resource Management
1855 Placer Street, Suite 103
Redding, Ca. 96001

Subject: Hatchet Ridge Wind Project, SCH # 2007042078

Dear Mr. Bill Walker,

On May 13, 2008, CAL FIRE and Shasta County Fire met with the project proponents. The purpose of the meetings was to discuss the concerns of CAL FIRE and Shasta County Fire's pertaining to the above referenced project. The meeting resulted in an agreement between all parties to the fire protection concerns of CAL FIRE and Shasta County Fire. CAL FIRE is in concurrence with the letter dated May 16, prepared by Jim Diehl, Shasta County Fire Marshall.

Item 8 of my original letter dated January 29, 2008 is still correct. The statement on page 3.2-5," The project area, or portions of the project area may be determined to be exempt from TCP requirements upon evaluation by Cal Fire under 14 CCR 1104.1(b) or (c), which allows for the "harvesting of trees in order to construct or maintain a right of way by a public agency, public or private utility that is exempt from the requirements to obtain a TCP or file a THP.", is correct and several portions of the project have defined right-of-way clearances established in 14 CCR 1104.1 (d), (e), (f), and (g). Other portions of the project do not have established right-of-way widths (the turbines), and some portions of the project may not be covered by the exemption (permanent roads outside the right-of-ways and the O&M building). A Timber Conversion Permit (TCP) may still be required. The project proponent will need to obtain the appropriate timber harvesting permits prior to project construction.

Sincerely,

Benjamin Rowe
Forester I, RPF #2686
CAL FIRE, Shasta-Trinity Unit
(530)225-2508