

AWEA / Audubon Workshop:

Understanding and Resolving

Bird and Bat Impacts

January 10-11, 2006

Debs Park Audubon Center

Los Angeles

Workshop Proceedings
produced/distributed by the

American Wind Energy Association
Audubon California
Center for Energy Efficiency and Renewable Technologies
February 2006

Acknowledgments

Audubon California and the American Wind Energy Association gratefully acknowledge the generous support of:

The California Energy Commission
The Energy Foundation

AES SeaWest, Inc.
EnXco, Inc.
FPL Energy
Horizon Wind Energy
PPM Energy

We also thank the following individuals who generously contributed their time to the Planning Committee:

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Executive Summary

Audubon California and the American Wind Energy Association (AWEA) held a workshop entitled “Understanding and Resolving Bird and Bat Impacts” from wind power development on January 10-11, 2006 at the Debs Park Audubon Center in Los Angeles. The sixty-four workshop participants included wind developers, government officials, researchers, conservation organizations and other experts who came together to share the best current data on wind power’s impacts on birds and bats in California and to consider statewide guidelines for the study, siting and operation of wind power facilities to prevent and minimize such impacts. (See Appendix A for workshop agenda. See Appendix B for a list of participants and their contact information.) The workshop was sponsored by the California Energy Commission, the Energy Foundation, AES SeaWest, enXco, FPL Energy, Horizon Wind Energy, and PPM Energy.

The workshop provided an opportunity for stakeholders, regulators and experts to share technical and practical information to build better understanding of the issues, constraints and options for moving forward. Participants recognized the importance of wind power to reduce global warming emissions, air pollution and other harms from continued reliance on fossil fuels. Participants also recognized that in some locations wind power can have significant impacts on birds, bats and other wildlife that can and should be reduced with better siting and mitigation tools. By the end of the 2-day workshop, there was general agreement to develop an ambitious research plan to remove much of the scientific uncertainty surrounding these issues, and to develop statewide guidelines for the study, siting, operation and mitigation of wind power to reduce its impacts on birds and bats.

Topics Covered by Panelists / Speakers

The Workshop Planning Committee invited a total of 31 people with a wide range of expertise and experience to prepare presentations on the following topics:

- Importance of Wind Energy in California
- Importance of Birds in California
- The Legal Framework for Wind and Wildlife
- Wind Siting and Development Process in California
- Impacts of Wind Energy on Birds in California
- “Putting it All in Perspective”
- Pre-construction Site Evaluation
- Adaptive Management, Mitigation, and Future Siting
- New Technology for Assessing Avian and Wind Resources
- What Can We Learn From Past Studies?

- Impacts to Bat Ecology Related to Wind Development and Lessons Learned About Impacts to Bats from Wind Development
- Guidelines and Other Recommendations
- Guidelines in Practice: Washington State
- “Balancing the Needs to Expand Wind Power and Protect Wildlife”

Abstracts of these panel presentations and individual speeches are included in this meeting summary, along with summaries of the discussions following each presentation. (Slide presentations are available in pdf format as a companion files to these proceedings. See Appendix C for a complete list of pdf-formatted slide presentations.)

Plenary Session: Brainstorming

On the afternoon of the second day of the workshop, participants held a brainstorming session to identify research and policy needs, and to come up with next steps in addressing those needs. A detailed summary of this discussion is also included in the meeting summary. Key points are outlined here.

Identification of Research and Data Gaps: key issues that need to be better understood to inform siting, permitting and mitigation of wind projects include:

- Better understanding of bird and bat populations, their location, timing and behavior patterns
- Use of appropriate research tools and protocols: how good are our metrics and methods, and are they being applied?
- What do we do with the data: what is the decision-making framework, how does adaptive management work, and how is it supported?
- Post-construction monitoring to assess accuracy of pre-construction studies and projections
- Effectiveness of various mitigation approaches
- What other policy and strategic issues and opportunities need to be addressed?

Should California develop guidelines to reduce and mitigate impacts on birds and bats? If so, how and for what purpose?

- What would the goals of guidelines be?
- How would a California effort relate to the collaborative effort to revise US Fish and Wildlife Service (US FWS) guidelines?
- Should guidelines address bats and birds only, or other wildlife too?

It was generally agreed that an initial focus on avian and bat impacts was acceptable.

- Should guidelines be binding or voluntary?

The general sense of participants was that guidelines should be “somewhere on the continuum between voluntary and mandatory,” offering developers some degree of increased certainty in the permitting process, and allowing for guidelines to evolve as we learn more.

Next Steps

Workshop participants discussed the following possible next steps.

- Representatives of the California Department of Fish and Game (CDFG) and the California Energy Commission (CEC) have both indicated that their agencies are interested in pursuing these issues. Workshop participants generally agreed that CDFG and CEC should move forward with statewide guidelines.
- Participants agreed that the CEC should consider funding a multi-year, comprehensive research proposal to address many of the scientific uncertainties that make siting, operation and mitigation more difficult and contentious.
- It’s not realistic to think that a smaller group is going to be able to develop guidelines. It’s not possible for Audubon or the Center for Energy Efficiency and Renewable Technologies (CEERT) or any one organization in this room to convene such an effort. CEC should enter into a Memorandum of Understanding as quickly as possible with CDFG to get the process up and running. Any process to develop guidelines must be transparent and include meaningful input from the range of stakeholders interested in these issues.
- Who will take on continuing a dialogue among smaller group of parties? (CEERT?)

In summary, the workshop participants agreed as follows:

- There is interest in a joint DFG/CEC effort to develop voluntary guidelines to reduce and mitigate wind energy impacts on birds and bats.
- The process of developing guidelines should include the stakeholders who participated in this meeting as well as others interested in being here who couldn’t be included for space reasons.

Abstracts and Summary of Discussions Following Presentations

Importance of Wind Power

John Geesman, Commissioner, California Energy Commission (*no slide presentation*)

In the wake of 2001 energy crisis, the California Legislature directed the California Energy Commission (CEC) to return to an energy planning/policy recommendation role. California has set aggressive renewable energy goals. The CEC, California Power Authority and the California Public Utilities Commission (CPUC) reached consensus on a California Energy Action Plan that calls for accelerating those goals. The governor has called for a 2020 target of 33% of energy sales from renewables. Wind energy is key to meeting these goals. Wind is the cheapest form of renewable energy, with or without the federal tax incentives that exist. Utility CFOs are going to start realizing that wind is an attractive asset to own. There are, however, extraordinary constraints to developing the wind resource: 1) enormous land use conflicts associated with establishing transmission corridors to remote-sited wind generation locations; 2) integration of intermittent resource into utility grid – this problem will be overcome, but will require new control technology and improved storage capacity.

Discussion Summary: Importance of Wind

Developing the wind resource in Tehachapi and other less populated locations raises problems about storage and long transmission lines. What about incentives for producing more power in places like LA where you need the power?

Response: We're probably in a situation where we need to proceed aggressively on all fronts. Generation near load is a great idea, but if we can't, the current paradigm is relying on remotely-sited coal plants, which nobody really wants, but there it is.

Comment: Energy efficiency is ridiculously under-utilized in this state. You can't look at anything in isolation, sure, but the best way for metropolitan areas to generate their own power is to increase efficiency.

Response: True. A study a couple of years ago estimated 5400 cost-effective MW from energy efficiency improvements – and that was at 2003 energy prices, which of course have gone up significantly. There is large energy savings potential in areas where we haven't really looked for 25-30 years.

Does wind being cheaper than other renewables include cost of transmission?

Response: Yes. 70-90% of natural gas price is fuel cost, which utility just passes through. Transmission costs associated with wind are substantial, but spread out over the generation expected from those wind farms, it results in wind not being as expensive as other renewables.

For California utilities to meet their RPS goals, do the renewables have to be generated in California?

Response: No. They can buy renewable power from out of state to meet their goals.

What, briefly, is the current status of offshore wind development on the west coast?

Response: Currently offshore wind development is focused on the east coast and the Gulf coast. Water gets deep very quickly off the Pacific coast. Current technology can only be built at a maximum of 30 m depth. We may be looking at floating wind platforms at some point, but that's maybe 20 years from now.

What about siting wind turbines on abandoned oil platforms?

Response: That's a bit dicey, structurally, but someone might try it. They would have to re-engineer the platform.

Importance of Birds in California

Pete Bloom, Biologist (for Brian Walton): [Bloom Importance of Birds.pdf](#)

Birds are obviously all around us. We value them for reasons of beauty and aesthetics. They also have economic importance to California. A couple of billion dollars are spent in California on waterfowl hunting, birdwatchers' expenditures – not to mention the enjoyment these activities provide. In addition, birds are an integral part of the state's ecosystem. They eat mosquitoes, rodents, and other pests. Many bird species are legally protected, both at the federal and at the state level. Of eight major bird groups, only waterfowl populations are stable. Some non-listed species are losing habitat, and their numbers are in decline, making them vulnerable. Other bird groups all are in decline, with various numbers of their species listed (notably raptors, shorebirds and songbirds). Birders have labeled "important bird areas" of the state, but many other areas also provide important habitat or migrating range for birds. The major threats to birds in California include: 1) habitat loss/degradation; 2) competition or predation from exotic species (including exotic plant species); 3) contaminants; 4) illegal shooting; 5) electrocution; 6) collisions with stationary objects; 7) collisions with moving objects; 8) windfarms; and 9) global warming.

Discussion Summary: Importance of Birds

Could global warming change migration timing and patterns, and [if so] are we seeing this yet?

Response: Yes. We used to regularly see 12-30 rough-leg hawks in the Antelope Valley in the winter, but in the last 15 years, those birds have not shown up there. There is no logical reason for that population to have declined for other reasons; we are speculating that global warming may have changed the species' distribution – it doesn't need to move as far south.

Response: Yes. USFWS is seeing migration and breeding seasons starting earlier, measured in weeks. Our guess is that a warming trend is the reason.

Response: In the Arctic, there has been a warming of 8-9 degrees – much greater than the change we're seeing at lower latitudes. All the global climate change impacts are frightening. Seabird populations off Alaska and Canada are collapsing as water gets warmer.

Response: The rough-leg hawk nests in the Arctic Circle. Changes there are probably affecting populations we see here in California.

When you mentioned the threats to birds in California, were those ranked in order of importance?

Response: Apart from the most significant threats (#1 - habitat loss and #2 - exotic species), I don't have good information as to the relative threat posed by the other threats I listed

(contaminants, illegal shooting, electrocution, collisions with stationary and moving objects, including wind turbines, global warming).

The Legal Framework for Wind and Wildlife

Patricia Rogers, USFWS Enforcement Office (*no slide presentation*)

The legal framework for bird protection is provided by the Endangered Species Act (ESA). The ESA serves as an “umbrella” for the Migratory Bird Treaty Act (MBTA), which prohibits all take (“big hammer” approach), and for the Bald and Golden Eagle Protection Act – under which a first offense is a misdemeanor, and a second is a felony. However, the US Fish and Wildlife Service (USFWS) is no longer focused on taking cases to court. We have a new strategic plan with the overall goal of achieving voluntary compliance by being at the table with our service providers. I’m not sure we’re at the table when it comes to wind. In the Pacific NW, we are sending out a template letter early on (may come from endangered species MB office) asking to be part of the dialogue. We want to start an administrative record to prevent take whenever possible, and minimize it when it’s not possible.

Bill Yeates, Law Offices of Bill Yeates (*no slide presentation*)

The purpose of the California Environmental Quality Act (CEQA) is to prevent or minimize significant environmental harm. It applies to private actions subject to permitting or other authority granted by public agencies. CEQA is very transparent, its process opens up what a project’s potential for significant environmental harm might be. Environmental Impact Reports filed under CEQA include an evaluation of a project’s direct, indirect, and cumulative effects on the environment, and also of mitigation measures, including alternatives to the project as proposed (different location, different way of operating a facility, different type of facility to achieve same purpose). State permitting agency is required to respond to questions raised by the EIR. The State holds title to its wildlife resource for the benefit of all (public trust doctrine). State code prohibits taking of fully-protected or MBTA-listed birds, or birds of prey. In addition to three federal statutes that prohibit take of birds, California has its own endangered species act, with the Fish and Game Commission determining which species are listed.

Annie Mudge, Morrison and Foerster (*no slide presentation*)

Local (city and county) agencies are the gatekeepers for permitting wind projects. Unlike some other states, there is no one agency with authority over all energy facility siting. Wildlife agencies comment, but counties are the permitting entities. Wind-specific zoning ordinances have been developed in five areas determined to have commercially-developable wind. With the exception of Kern County, the main tool is a Conditional Use Permit (CUP). A wind farm CUP is *discretionary*, and therefore subject to the California Environmental Quality Act (CEQA) which requires the permitting agency to identify environmental impact AND to impose all feasible mitigation measures. For wind projects requiring an EIR, the determinant of significant environmental impact is whether there is a “substantial” adverse effect or interference. If you have a significant biological impact, what feasible mitigation measures can you take? Repowering, potential relocation or removal of high-impact turbines, seasonal shut-downs are all very expensive mitigation measures. Off-site measures, such as conservation easements and mitigation fees, are more feasible. A non-binding protocol for studying risk could be useful.

Discussion Summary: Legal Framework for Wind and Wildlife

There was some discussion following the presentation of the legal framework for protecting birds about whether repowering is an effective mitigation strategy. Participants asked for clarification about what was meant by repowering, and also whether it might be something companies would want to do for economic reasons.

Comment: We have no evidence yet that repowering will reduce bird kills; therefore I wouldn't refer to it as a mitigation strategy.

Response: My understanding is that repowering is being required of wind companies within a certain time frame as part of mitigation.

Response: Yes, this is the case.

Response: However, keep in mind that as a way to reduce bird kills, it is still experimental.

Comment: Repowering is not considered economic in the Altamont for most companies right now.

Response: FPL has been around a long time; we repowered 800 projects during the mid- and late-90s on contracts that were signed in the 1980s. There really are only a few windows of opportunity. Technology has to repay for itself over its useful life. If you have a 30-year purchase contract with 7 years left, that is not enough time for repowering to pay for itself. So no, repowering usually is not economical. Also, power purchase contract (20-70 pp documents) are very restrictive, and often prohibit repowering.

Response: I was using repowering to mean replacing turbines with more advanced technology in more or less the same spot.

Response: Repowering means removing the existing turbines and installing newer, modern higher capacity turbines. For example, a single 750 kW turbine may replace three 100 kW turbines.

Response: In some cases there may be a 7:1 or 8:1 replacement ratio – not necessarily in the same location. Repowering left the companies with options of where to locate new turbines.

Response: Our company has taken out 90 turbines and repowered with 6 modern turbines. The point is not just that you are replacing older machines with new ones, but also that the new machines are larger and fewer, *and* that they are sited using what we have learned about how to siting considerations. In Altamont you'll see 6-10 to 1 ratio of replacement (limit of 1 MW turbine).

Comment: Wind development started in Tehachapi in the 1980s; we have wanted to repower for a number of years, but we can't do that without transmission infrastructure, so we're focused more on that.

When Annie Mudge stated that the local permitting process is “generally working,” what did she mean by that?

Response: The process works in the sense that it is transparent, subject to CEQA, and in the sense that it is allowing wind power to be built after reasonable disclosure and mitigation of impacts. CEQA is lengthy process, weeks and months of preparing documents, and of public scrutiny period.

Hasn't the National Wind Coordinating Committee (NWCC) established an “allowable bird kill”

figure – 2 bird kills per MW, or something like that?

Response: No. The NWCC did discuss this, and debated about it, and no, we haven't established any such standards.

Comment: I want to emphasize that if folks are concerned about preventing, avoiding, and minimizing take, USFWS is available to have a dialogue. We invite people to come and talk to us; we support wind power.

Wind Siting and Development Process

Kenneth Stein, FPL Energy: [Kenny Stein.pdf](#)

The purpose of this presentation is to lay out the basic siting and development process, including timing, and shed some light on the numerous factors in addition to avian and bat risks that drive siting decisions and limit number of wind projects in California. The first step is to map the wind and find the resource. Next comes a site visit, including a preliminary environmental screen. If you are looking at a site near where an existing wind project is operating, a lot of your homework is already done. If the first screen is passed, the developer begins collecting wind data, seeking landowner agreements, and investigating transmission capacity. A second environmental screen must be passed before a power contract is negotiated and the permitting process (detailed environmental studies) are undertaken. The final step prior to procuring equipment and beginning construction is to arrange financing. If all goes well, we can expect a wind project to be developed in about 4 years. However, there is a lot of variation. Avian and bat risks are only one of many potential hurdles a project must pass to be developed, but if these risks are significant, they can stop a project.

Brenda LeMay, Horizon Energy (no slide presentation)

Horizon Energy is based in Houston, Texas, and we are a relative newcomer to wind energy and particularly in California. When we look at areas for potential wind energy development, we start with a map of California and apply a series of screens. The first screen rules out National Parks, Areas of Concern, wilderness and proposed wilderness areas – federal land designations where wind energy cannot be developed. The second screen rules out military base and training areas. (Military land and airspace issues also training flight routes and areas where the military does not want anything built that is over 200 feet high.) The third screen rules out areas that aren't windy enough to consider. Applying these three screens leaves less than five percent of the land area in the state, and even then there are further considerations to make: Are there wetlands? Are the ridgelines perpendicular to the wind resource? Are there tribal issues? Substructure issues? Clean-up issues? Transmission issues? And of course wildlife issues? So wind developers are really very limited in what areas they can consider for development.

Discussion Summary: Wind Siting and Development Process

Where do avian consequences rank in proportion to the other hurdles on the developer's list?

Response: [In terms of timing], I'm going to start talking to folks about what level of study an area would need in terms of an avian study right after we know that there is wind.

Response: [In terms of proportional consequences], anything that has the potential to kill the project becomes the most important issue. All the issues are potentially equally important.

Response: As developers, we all do a lot of research. The initial screening process is incredibly important these days, and it's mostly a desktop screening. The question of proportionality is very site specific. If we're doing a project in the Altamont, avian issues are #1. In the Mojave Desert, those issues are still extremely high, but military issues are right up there.

Questions about map Brenda LeMay presented, showing primary wind resource areas overlaid with land use restrictions that would prohibit commercial wind development:

What overall capacity could be put on the limited land area defined by [Brenda's] map?

Response [B. LeMay]: The overlays shows areas that are non-starters for us, where we can even begin to consider siting wind.

Response [J. Geesman]: California has enough land mass and wind potential to produce 7500-7600 MW of wind power.

What about critical habitat – for example, for the desert tortoise?

[*Response*]: If it's publicly available information, it goes on the map.

[*Response*]: Barstow sites are critical habitat

[*Response*]: Those areas have not been identified as non-starters yet, and we're only trying to put up met towers right now.

[*Response*]: How does industry decide which are the areas that you're going to have to worry about? BLM said that they didn't think the tortoise and bighorn sheep would be endangered by wind development, but the bighorn is very averse to human activity of any kind.

[*Response*]: There is not a single site that doesn't have issues. We're always going to try to find an area that has the least impact to every species of concern. Have to consider them in terms of seriousness of what we know: state and federal laws, public concern and enthusiasm. We work with biologists to help determine this.

Isn't a lot of the land publicly owned? How attractive is it to go after public land?

Response: BLM programmatic environmental impact statement is more attractive for a known environment, but given the limited land resource, we're looking at all options, public and private.

In the context of your four-year development process – wouldn't it be smarter to start avian studies earlier, so that you don't have to prolong the process later?

Response: You have to have some idea whether you have wind resource before you commit resources to environmental studies.

If there were partners to fund studies, couldn't longer studies be done?

Response: It's not just the economic burden of the environmental studies, but the timing of that burden. Also, we're learning all the time. You learn about what the issues are, who the interested parties are as you go through the EIR process. Kenny's 4-year process took into account a 1-year environmental impact study. If you do a three-year pre-construction study, that becomes a 6-year time horizon.

Response: If the federal tax credit doesn't get extended, we won't be able to do longer studies, because we may not be able to access the tax credit for that project.

Impacts of Wind on Birds in California

Dick Anderson, WEST, Inc.: [Anderson--Impacts.pdf](#)

A number of potential impacts to birds from wind need to be considered. In California, the focus is on collisions with turbines, power lines, and guy wires. Variables that affect risks to birds include: *species* – not all birds have problems with wind turbines; bird *behavior and use* of an area; *habitat* type and quality; *topography*; *technology* (i.e., types of turbines). Metrics need to be clearly defined and consistently used, so that we can be clear how we're talking about bird use (# birds/unit time), fatality rates (e.g., carcasses), and risk (fatalities related to use). A comparison of bird use, mortality, and risk variation at Tehachapi and San Geronio WRAs, for example, shows us that San Geronio had the highest bird use, but the lowest proportion of raptor use. Collision risk is disproportionately higher for raptors than for other types of birds. To get a good picture of what's going on in terms of bird use, fatalities and risk, it is necessary to look at different times of year, as there can be a lot of seasonal variation in one location. There also may be a lot of variation within a wind resource area in terms of habitat type and which types of birds using which areas.

Al Manville, US Fish & Wildlife Service: [Manville.pdf](#)

Whether we meet our objectives for renewables or not, we are looking at exponential wind energy development growth. Larger, slower-moving turbines are replacing small, fast-moving, lower turbines. Tip speeds remain high, and rotor swept areas are larger, which may be a particular concern for night-migrating birds in poor-visibility weather conditions. Many bird species are in trouble. Collision is not the only concern; habitat loss is also an issue, albeit perhaps not as much in most of California as in other parts of the West and in the East. There are direct effects, indirect effects, and cumulative effects.

The US Fish and Wildlife Service (US FWS) supports wind energy, but we want to see it done right. Location is critical, both for site selection and for turbine location within a site. We need to be able to reliably assess risk prior to construction and use scientifically-valid pre-, during- and post-construction monitoring protocols. US FWS warned of avian problems in Altamont Pass before construction began in early 1980s, and those warnings were not heeded. Lessons learned in Altamont (and on eastern mountain ridges) can be useful elsewhere. We can learn from what some other countries are doing in terms of requirements for assessing impacts. The Avian Power Line Interaction Committee is a good model for us to consider.

Shawn Smallwood (for Monica Parisi, CDFG): [smallwood impact assessment.pdf](#)

California Wildlife Habitat Relationships (CWHR) is a useful tool for screening potential wind farm sites. Rigorously developed, it contains comprehensive wildlife information (using the California Natural Diversity Database points, among several data sets) and provides a predictive modeling system. CWHR is a “matrix” type of model, rating habitat functions (feeding, cover, reproduction) as low, medium, high or unsuitable for various species. Ecological indicators approach: vulnerability, legal ramifications, susceptibility, species impact, project impact. The model assumes that wildlife species and abundance are strongly influenced by habitat conditions, and that suitability is uniform for habitat type across a species' entire range. CWHR is not perfect, but is a very useful “first cut” tool for screening potential wind farm sites. Anyone can

use CWHR; it is affordable and fairly good at predicting project impact, despite some shortcomings. The next step is to overcome those shortcomings. Data and tools are available for environmental impact assessment and are constantly being updated. As we learn more about why birds and bats collide with turbines, we can integrate that knowledge into the model.

Discussion Summary: Impacts of Wind on Birds in California

Of 300 million to 100 billion birds killed annually in US, how many killed by turbines?

Response: Anywhere from 10,000 to 40,000 or so, but this is based on assessments at 12 facilities (and there is bias, because mortality is assessed only every two weeks). Probably wind turbines are killing relatively few birds – on the order of 2.2 birds per turbines per year. It's a relatively low number, but we have to keep in mind (though we're never going to be able to do this study) the cumulative impacts of an exponentially growing industry, which is itself part of an exponential increase in the number of tall structures (including cellular communications towers) being put up.

Response: Keep in mind that Dick's risk metrics were relative risk numbers, ratios of use measurements to observed fatalities per year. This definition of risk is not the same as the probability of an individual bird dying.

Al [Manville]'s presentation said that a 1.5 MW turbine had a rotor-swept area of nearly 3 acres? I think the largest turbines have rotor-swept areas of about 4,500-6,000 square meters?

Response: Main point to take away is that the rotor-swept areas are getting bigger with new turbine designs, and that has to be taken into account.

Dick [Anderson] was saying that nothing is known for sure in terms of design of wind turbines or wind farm layout to mitigate bird fatalities, but Al [Manville] seemed to suggest that we do know some modifications that we can do on existing sites to make a difference. Can you clarify or explain this discrepancy?

Response: When a problem develops at an existing wind farm, we haven't (yet) shown that we know we can do something to reduce that (apart from feathering¹ the turbine blades). However, we do have studies showing that we can use what we have learned to make a difference when site and lay out a new facility (e.g., at Foote Creek Rim, WY, pre-construction surveys suggested moving turbines back slightly from the rim edge would reduce raptor impacts; subsequent post-construction mortality monitoring has shown low raptor mortality).

Response: We're drawing inferences from patterns of dead birds and bats found at existing sites. By and large, the measures proposed that have been drawn from those inferences have not yet been implemented.

Response: Seasonal shutdowns have been shown to work.

Regarding Al Manville's mention of the UK Department of Environment, Food and Rural Affairs (DEFRA)'s *Nature Conservation Guidance on Offshore Windfarm Development*.²

¹ Feathered blades are turned so that they are not catching the wind. The turbine is not "locked" (this can be damaging to the machinery for mechanical reasons) – blades can "free-wheel" – but they don't spin.

² In March 2005, DEFRA put out a guidance note on the implications of the EC Wild Birds and Habitats Directives for developers undertaking offshore windfarm developments: <http://www.defra.gov.uk/wildlife-countryside/ewd/windfarms/windfarmguidance.pdf>.

Comment: Regarding Al's mention of adopting some elements of DEFRA from the UK. Over a ten-year period, projects that had power purchase contracts in the UK could not get built because of the kinds of protocols and requirements. I would caution that by just picking and choosing from other regulatory structures you don't necessarily get a good outcome.

Response: DEFRA is regulatory, whereas USFWS guidelines are just that, guidelines. But there may be some things we can learn from their scientific rigor.

Comment: I'd like to know more about [DEFRA]. We're here to build trust by making sure that everyone's concerns and interests are being addressed. I'm a little put off by notion that we shouldn't be looking at what they're doing in Europe, when they're ramping up wind energy development even faster than we are.

Response: At Cape Wind workshop [in Massachusetts], we had testimony from a British government scientist on what they have been able to do with radar studies. This has proved very useful.

Comment: If there is experience elsewhere, we should look at it.

Does DEFRA cover offshore wind development only? If it covers land-based wind, does it require 3 years pre-construction studies for that as well?

Response: DEFRA covers land-based wind development as well; not sure what requirements.

Lunch Keynote Address: "Putting it All in Perspective"

Winston Hickox, Former CalEPA Secretary, Audubon California Board member and Advisor to CalPERS on Green Investing

When I was at CalEPA, I went to meetings with regulators and regulated industries, and NGOs. The people you never saw at those meetings were investors – banks, companies, retirement funds and other institutional investors. Command and control regulation has been successful, but increasingly we are seeing battles between my lawyers v their lawyers, my scientists v. their scientists. The idea is not to get rid of the command and control approach, but to look beyond it. If we channeled our energy into encouraging businesses to use environmental management tools to get ahead of regulatory requirements, into getting pension funds to regard "sustainability" as part of their fiduciary responsibility, there is potentially a very large pool of capital to be invested in clean technologies, including wind energy. As a large institutional investor, CalPERS will continue to pursue greater transparency with respect to companies' carbon footprints, because we believe that is going to matter more and more over time.

Preconstruction Site Evaluation

Mike Green, US Fish & Wildlife Service: [M Green.pdf](#)

Three reasons to monitor potential wind turbine sites before construction are: 1) to understand seasonal and annual variation in movements and site use by birds & bats in order to *predict effects from the development on wildlife*; 2) to provide 'before' data to compare with data collected after construction; and 3) to modify placement/operation or turbines to avoid take before it occurs. The FWS recommends 3 years of pre-construction monitoring, particularly in

“new” habitats where not much is known. Nocturnal studies using radar and acoustical methods are important. The FWS has joined with USGS to form a new Radar group, to examine what NEXRAD and marine radar can tell us about where the birds are. Eventually, we hope to devise analysis tools that will allow for ‘real-time’ response to bird migrations. Pre-construction surveys should be designed to predict effects, avoid conflicts; inform site design. Developers should engage the USFWS and State agencies early in the process of site development for information about endangered and threatened species, migratory birds, and for information on other potential wildlife impacts.

Wally Erickson, WEST, Inc.: [ericksonaudubon.pdf](#)

Avian use is measured using diurnal and nocturnal survey techniques. Daytime surveys are more prominent in the West, while nocturnal surveys are more used in the east, with radar being the main tool. One of benefits of using standard metrics is that you can compare data from various sites. Observations at existing sites can help us to make informed predictions about proposed sites (e.g., Altamont and Solano, both of which have high raptor use). An example where this proved useful is Foote Creek Rim in Wyoming. The original Kenetech plan had turbines sited right along the rim edge, but pre-construction observations led to relocating turbines 50 m in from edge.

Sue Orloff, Ibis Environmental, Inc.: [Orloff.pdf](#)

We conducted an evaluation of recent pre-construction surveys to assess how these studies are doing in following the standardized protocols (NWCC 1999 and USFWS 2003). We were able to gather and review 19 pre-construction studies that have been conducted since the protocols were published. The criteria used to assess these studies were those that were emphasized most in the protocols. We found another 20 projects (mostly in the Midwest and East) that conducted no detailed bird studies at all. Of the projects that conducted pre-construction surveys, in California an average of 55 percent of studies met criteria, Pacific Northwest studies averaged 73 percent, and Midwest and East averaged only 41 percent. Although the majority of the studies met most of the criteria, there is room for significant improvement. The methods and techniques most in need of improvement are: 1) nocturnal surveys, 2) data used to guide the siting process, 3) BACI design, 4) random site selection, 5) USFWS site evaluation, 6) adaptive management, and 7) cumulative impact analysis. In addition, the studies we reviewed have been conducted using a variety of techniques and with vastly different levels of effort. This makes it difficult to make comparisons and to assess impacts. Standardizing the methods and techniques used would be extremely useful.

Pete Bloom, Biologist: [BloomPre_construction.pdf](#)

Pre-construction avian surveys are used to assist in the prediction of impacts and to enable post-construction analysis. The developer hopes that a pre-construction study will convince someone that the impacts will be minimal. How to provide more robust evidence? Pre-construction surveys should use standard ornithological survey methods employing multiple, complementary, scientifically defensible survey techniques. The Southern California environment has not been studied well. Mist netting and radar could add a lot to what we know about California avian activity. It is important to plan enough time and people to conduct the surveys thoroughly, using biologists with known expert qualifications. If what you’re concerned with is a rare event (e.g.,

flock of birds migrating through), a ten-minute sampling period twice a day is not going to catch it. Non-profit organization bird counts are more reliable, because people are spending whole days counting. Consider doing three years of study and contrasting with other studies. Huge fluctuations of avian abundance do occur from year to year. Results should be presented so that they can be appreciated and understandable to anyone – especially to project critics – and all results must be available for peer analysis.

Discussion Summary: Preconstruction Site Evaluation

Projects in the Pacific NW have been relatively consistent in use of survey protocols. In Minnesota, Buffalo Ridge wind resource area is fairly homogenous, and the state has said that existing information can be applied. Under what conditions might you not need 3 years of pre-construction data?

Response: If you're looking at extending or building close to an existing site where there is good data, no one's going to ask for 3 years, but it depends on the site.

Response: The idea is that there should be a process for determining when it is appropriate to use existing information.

Response: Sue [Orloff's] review is a good start. There were two years of pre-construction data at Buffalo Ridge Phase II and three years at Phase III. We have yet to have a radar study at an existing facility. Everything is pre-construction radar data. New York State has 15 studies, but we've yet to see a study done with radar at an existing site to see how well the pre-construction studies predict what we'll see at a developed site.

Response [S. Orloff]: None of the studies I looked at had 3 full years of pre-c data.

NWCC is moving forward to do a night metrics and methods guide, but if so few people are using the existing metrics and methods docs, why bother?

Response: Wouldn't conclude that nobody's using the existing guidance. In some cases certain components of the protocols are being used. BACI was used at Foote Creek Rim and other places. Stateline had a BACI design to look at one particular component.

Response: Keep in mind that the guidance documents the NWCC produced were intended as resources, not requirements.

Comment: They're really both just primers on statistics.

Response: [In drafting the NWCC guidance] we didn't want to put a "cookbook" together because there are too many site-specific issues to deal with, and individual states and local governments have their own requirements which will direct what studies get done.

Is study that was done in San Gorgonio WRA available to the general public? And does it include night-time radar analysis?

Response: Yes, it was conducted through the National Renewable Energy Laboratory (NREL), and can be found on NREL's publications website:

<http://pix.nrel.gov:8020/BASIS/nich/www/public/SDF>³

Response: In the early 1980s, Southern California Edison did a small study, and McCrary did some nighttime radar work showing passerines in San Gorgonio, but this was never published.

³ Reference for this study: Anderson, R., et al. (2005). Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 - May 29, 1998; Phase II Field Work: August 18, 1999 - August 11, 2000. 138 pp.; NREL Report No. SR-500-38054.

Mist-netting data that Pete is recommending – how do you use that information for post-construction operation risk?

Response: We haven't got that far – but mist-netting will be used again post-construction in conjunction with point-counts. The reason to use mist-netting is to identify birds that migrate through high enough to be at risk of collision during the night, but which fly low during the day and so might not be seen by someone doing a point-count.

Comment: If the goal is to have the least impact, developers can't use 10-year old data, can't do half-baked analyses. If industry doesn't want regulation, then industry has to prove they're going to do what's right.

Adaptive Management, Mitigation, and Future Siting

William Kendall, US Geological Survey: [Bill Kendall What is ARM.pdf](#)

My role is to help define adaptive management as a conceptual framework for making decisions and linking monitoring programs into those decisions. The premise of Adaptive Resource Management (ARM) is that we have to make decisions in the face of uncertainty. ARM is not equivalent to experimentation, but it does follow the structure of the scientific method: 1) *state management objectives explicitly*; 2) identify alternative management *actions*; 3) *predict response* of a system to each action – might involve competing hypotheses; 4) choose and implement what appears to be the *optimal* decision; 5) *monitor system response* with respect to both your objectives, and your predictions; and 6) *feedback to next iteration* of the decision-making process, make new predictions, etc. The first step is the most difficult. Ideally, management objectives should meaningfully reflect values of stakeholders; effectively connect values with the ecology of population; and be expressed so that the outcome can be measured against the objectives. An objective might be to maximize power production while keeping bird/bat kills under a certain number, or it could be to minimize bird/bat kills while keeping wind power production above a certain threshold. Each has very different implications. ARM is not a panacea. It does not eliminate argument, but rather structures the decision-making process and focuses argument to make it more useful, and provides for an informed decision process.

Shawn Smallwood, Ecologist: [Shawn Smallwood Mitigation.pdf](#)

The California Environmental Quality Act (CEQA) presents types of mitigation in order of general preference, from avoiding impacts to compensating for them. When we talk about avoiding impacts, we are really talking about minimizing them – any structure that is erected is going to kill something sometime. However, it is much better to avoid impacts than to try to rectify a situation once wind turbines are already up and running. Mitigation measures are costly; it is best to gather sufficient data (the more the better – more observation periods over more seasons over multiple years) and to screen potential alternative sites for species likely to occur and their susceptibility to collision or adverse habitat effects. Preconstruction data characterizing bird and bat abundance and flight behaviors throughout the year can be used in siting design and operations planning to minimize impacts. Rigorous post-construction monitoring is also essential, not only for identifying impacts that may need to be rectified, but also for identifying

the factors associated with turbine-caused fatalities so that these can become the basis for mitigation measures. Any measures to compensate for losses should be performance-based.

Dick Curry, Curry & Kerlinger: [dick curry.pdf](#)

The role and function of post-construction monitoring/surveys is not just to count fatalities, but to try to understand conditions and relate that to causes, and to evaluate the effectiveness of mitigation measures. Post-construction monitoring can provide data for determining biological significance, and also can inform the development of other, comparable wind energy sites. Post-construction surveys can look at how species adapt to facility development; for example, a species may be displaced for a time and then come back.

Mike Azeka, AES Seawest: [Mike Azeka.pdf](#)

Adaptive resource management (ARM) presents a number of economic challenges for developers. Every project has a power purchase agreement (PPA) which establishes the amount of energy as well as the price that will be paid for it, over a 30-year period. Contracts include penalties if the project owner fails to deliver the amount of energy contracted, or if the owner misses energy delivery targets that must be provided to the Independent System Operator on an hourly basis. This means that measures such as shutting down or moving turbines to less windy locations can have serious economic consequences for a project, not just because the developer is getting paid less for less power, but because of these punitive terms. In the worst case, the project owner could be considered in default of the PPA, and lose the customer. And, because PPAs are competitively priced/structured, there is not a lot of “wiggle room” built in to the contract terms. Therefore, if an ARM approach is to be taken, it should: 1) emphasize proven (testable) approaches; 2) balance other public benefits and impacts, including the environmental benefits of wind; and 3) clear criteria for sufficiency should be established.

Discussion Summary: Adaptive Management, Mitigation, and Future Siting

Mike, what other measures do you consider to be proven approaches?

Response: Do sufficient studies before you build a project. Seasonal shut-downs – we do agree to this in the Altamont, because the time with greatest fatalities is also the season of lowest productivity. What measures are effective is site-specific, turbine-specific, species-specific. Need to try what seems like the most appropriate for a given situation, and then evaluate, iterate.

Are post-construction monitoring reports made available to the public, and if so, how? What is the peer-review process for those monitoring studies, if any?

Response: Presentations to technical advisory commissions (rep from FWS, Calif Dept of Fish and Game, some independent biologists who consult to the TAC). Sometimes submit to peer-reviewed journal, but not always.

Re statement that relocation of turbines is too expensive – this refers to relocating one turbine to another spot, which is different from repowering?

Response: There was a two-year window when repowering made economic sense, when we were repowering projects built in the 1980s that were no longer receiving high payments. It hasn't made economic sense since.

Response: It may happen with older, smaller turbines, but unlikely to happen with newer, larger turbines.

How do you do adaptive management (AM) if moving turbines is not an option? How do we deal with inability to move existing turbines?

Response: Moving turbines is not a prerequisite to AM. If moving a turbine is extremely costly, not realistically an option, then you take that off the table and evaluate your remaining options for achieving your management objectives. AM is a decision-modeling process, not a set of mitigation measures.

Comment: The case has been eloquently stated for inflexibility of changing design or shutting down turbines. So why not develop a system of trading credits? If you've done what you can in terms of avoiding and minimizing risk, and it still isn't enough to accomplish the fatality reduction objectives, what about a compensatory system of trading "fatality credits" – within a WRA, for example – much the way pollution credits are traded?

Response: This is an idea that's ahead of its time, but it is a good one.

We've heard [developers] say that being required to do AM would involve moving towers from the windiest site, which is not economically feasible. Why can't AM contingency be built in to the budget as a stewardship piece?

Response: Moving towers once they're up and running is not generally feasible. But consider the case of Foote Creek Rim. We decided in advance, based on pre-construction data, to move an entire turbine string back 50 m from the edge of the rim. This is a good example of iteration taking place in response to environmental considerations. We've re-designed projects two to three times prior to building them in response to pre-construction findings.

Comment: AM can be useful for addressing environmental uncertainty, but it introduces economic uncertainty that developers have difficulty dealing with. Why can't these economic uncertainties go into the modeling, along with all the other uncertainties: technological, environmental, etc. The process is the same, no matter how many stakeholders and how many different objectives there are.

Response: A lot of industries are dealing with this. There are many examples out there.

Response: The idea is to set some boundaries around AM objectives – e.g., minimize avian fatalities subject to some maximum operational threshold for the wind project (the financial risks of operational changes need to be "book-ended" before projects are constructed so that developers can understand the extent of financial risk).

Comment: Would have to incorporate this kind of principle into the language of future power purchase agreements (PPAs).

Regarding the extrapolation of mortality estimates from existing wind sites to proposed sites. How much can you extrapolate? What are the constraints on extrapolating from fatalities at an existing site to make predictions about another site?

Response: Anytime you try to extrapolate you have to plan on making corrections later on. It's only meant to be a starting point.

AM was proposed as a strategy for implementing salmon recovery measures in Washington

state. Yet people manage to get around the requirements. What can we learn from that experience?

Response: People do end-arounds on the duck harvest regulations all the time, using Congressional influence. Environmental uncertainty is big, but the human dimension is huge – if the humans involved cannot agree on the management objectives, all bets are off.

There seems to be an assumption that there's going to be AM with every project, no matter how well sited and built. But there's been no mention of fact that these projects are displacing fossil fuel projects...

Response: But they're not displacing fossil fuel plants. Fossil fuel plants are also growing at an exponential rate.

Response: Renewables as a proportion of California generation has been flat over the last ten years, while the proportion of coal generation has been increasing.

Response: New renewables are not replacing existing fossil fuel plants. The question is whether new renewables can displace new fossil fuel generation to meet expanding exponentially growing demand.

Comment: There are some concrete examples of displacement, however. The City of LA (DWP) has accelerated the city's RPS, and it cancelled its investment in a coal plant expansion.

New Technology for Assessing Avian & Wind Resources

Lee Neher, Lawrence Livermore National Laboratory: [Lee Neher.pdf](#)

Geographic Information Systems (GIS) are often thought of as a tool for making visual presentations, but their value lies primarily in their usefulness as an analytic tool. The California Wind Resource Analysis Site is one such tool. By looking at the topography of a wind resource area (such as Altamont Pass) together with avian study results (flight preferences of kestrels and other birds, including height above ground at which birds were observed and wind direction), we can conduct a “critical zone” analysis for all bird observations. (The “critical zone,” or CZ, is the elevation corresponding to the turbine's rotor-swept area.) By narrowing down the data statistically, we can model bird behavior around turbines in a wind resource area, apply the model as a predictive tool, and then see how well it works.

What Can We Learn from Past Studies?

Jim Walker, EnXCo: [Jim Walker.pdf](#)

As an explosively growing industry, wind energy has to deal with “problems of success.” If wind is to make an impact on global warming – which is why there is so much interest – it will impact other things as well, including birds and wildlife. So: what about avian mortality? Policy-making is all about conflicting objectives. Scientists should not decide what trade-offs to make, but a well-planned decision-making process must integrate scientific results. In its policy-making process (which culminated in a decision in September 2005), Alameda County took into account available science, stimulated development of new mitigation measures, made informed judgements about other factors, was an open, extended process. It moved the industry position substantially, and it incorporated procedures that recognize uncertainty (AM approach). Seasonal shutdown is an example of a potentially good idea that emerged from the Alameda process, and

it came from industry. What could be done better? Fully vet and peer review the science before the policy decision, not after. Deal more explicitly with uncertainties at core of debate. We have not found a way to responsibly address economic impacts of mitigation measures – independent power producers aren't like utilities that can go bankrupt and still stay in business. Also, we need to find ways to reduce the “quadruple jeopardy” situation – county, courts, state, federal – without denying all parties due process. Above all, it is important to keep wind energy's impacts – and benefits – in perspective.

Bob Thresher, National Renewable Energy Laboratory [Bob Thresher.pdf](#)

The world's demand for energy is growing dramatically, especially in developing countries. The US currently generates less than 1% of its electricity from wind energy – most of our energy is carbon-based. However, wind technology is evolving rapidly and becoming more cost effective compared to conventional generation sources. Turbine size has increased dramatically, and these larger turbines are expected to be less of a hazard to birds. Progress is being made in understanding avian-wind energy interactions and tools are being developed to estimate the level of bird fatalities caused by wind farms, so that avian fatalities can be minimized through good siting practices and wind farm layout. A modest investment in environmental R&D now could make these impacts negligible, giving us a carbon-free energy generation source that could meet at least 20% of our needs. The DOE and NREL have been working with the wind industry and environmental group through the National Wind Coordinating Committee for the past ten years to address avian interaction issues. Information is available on the NWCC website:

www.nationalwind.org. The National Renewable Energy Laboratory website has an avian literature database, which may also be helpful: www.nrel.gov/wind/nwtc_library.html.

Dick Curry, Curry & Kerlinger [dick curry.pdf](#)

Post-construction monitoring/surveys serve several purposes: 1) provide accounting of avian and bat wind turbine-related fatalities; 2) add to our understanding of why birds and bats collide with turbines; 3) help to eliminate or validate assumptions of what constitutes a high level of risk to specific species or risk elements of specific sites; 4) allow us to assess the effectiveness of preventive measures; and, 5) help us answer questions about the significance of the impacts of a specific project. The principal tool of post construction monitoring is the carcass survey, the scope and design of which generally reflect feasibility and fiscal constraints and site-specific conditions respectively. The interval between searches is governed by the questions that one is trying to resolve. The longer the interval, the harder it is to make inferences from the finds. Searcher efficiency (ability to find carcasses) is affected by factors of species size and the height of ground cover. Scavenger removal rates also have to be taken into account, and are site and species specific. Post-construction surveys reinforce Dick Anderson's maxim that fatalities are species-, site- and turbine-specific, and that they help to establish a level of proportionality of the impacts of wind energy vis-à-vis other forms of power generation and other human activities that impact avian habitat and fatality rates.

Garry George, Los Angeles Audubon (*no slide presentation*)

This is the story of how a nonprofit with limited resources got drawn into litigation against the Los Angeles Department of Water and Power and some others on the Pine Tree project. Studies on songbirds during spring migration published in the EIR for that project consisted of two days

of afternoon point counts between April 1 and May 30. We felt that was inadequate. By the time Audubon read the EIR, the project was in “full steam ahead” mode. Litigation was a last resort, but that’s how concerned we were about the millions of night-migrating songbirds flying through the Pacific Flyway. We found very few studies that used radar to detect migrating birds, and the scientists who had conducted them had signed agreements that the information was proprietary, so we conducted our own study using radar from Edwards Air Force Base. In the future, we would like to get involved in site selection as early as possible. Specifically, we would like to: 1) help wind companies put together financial research partnerships to do three-year studies on migratory songbirds if they are present on a site before the siting decisions get made; 2) see radar and acoustic monitoring, and mist-netting; 3) create a map that shows the whole state or the wind resource areas and how birds use the airspace, perhaps identifying “no-build” zones, areas requiring three-year study, areas requiring night radar studies; and, 4) we would like to see radar equipment on-site that can identify migration events and shut down turbines during those events.

Discussion Summary: What Can We Learn from Past Studies?

Regarding account of Audubon’s lawsuit against DWP (and other parties) questioning adequacy pre-construction studies of bird usage for the Pine Tree project:

Comment: [Developer] would argue with some of the facts in this presentation.

Comment: [According to Garry’s account], Audubon read the EIR and got concerned.

Organizations in Los Angeles county read the EA and realized that the studies were poorly done. If we could get everyone in the industry to commit to good studies, the companies wanting to do right wouldn’t suffer such intense scrutiny.

What about fines for birds killed? Wouldn’t that help create the incentive for companies to do the proper siting work?

Response: Prosecution of the electrocution of 16 MBTA protected birds at Moon Lake got the full attention of the power industry. APLIC guidelines came out of this. Now we have an avian mortality reporting network; industries are willing to cooperate with us, and we agree to not come after them to the full extent of the law. There has to be full disclosure, however, and yes, it’s frustrating. Took about two years to develop template, but voluntary compliance can help us address impacts in a proactive way.

Response: There was a big public investment when we learned that birds of prey were being killed in the Altamont. Now there’s a new wave of understanding that night-migrating songbirds have to be studied. It’s time for a corresponding wave of public investment to understand where the migratory corridors intersect those “white” areas on Brenda’s map. Audubon is willing to partner with industry to get that information developed. That’s how Audubon could be part of the solution.

Response: We’d much rather spend the money on good science than on litigation.

Comment: We’ve got goals we’re trying to meet in the next wave of wind development. We need to get away from Altamont and look at how we can make the next wave happen right.

Comment: We should consider and learn from positive as well as from negative examples. EnXco’s project in Antelope Valley, hired one of the state’s top ornithologists to use all the tools in the toolbox to confirm that indeed the site is not going to be problematic. Then consulted Audubon and other folks, and followed our suggestion to consult a condor expert. This is a

positive model of an acceptable level of study, of the right way to do outreach, of getting (and using) input and suggestions early on.

Comment: We need to come up with constructive suggestions for ways we can eliminate barriers (such as those posed by restrictive PPA language to implementing AM) to experimentation to solve problems.

Impacts to Bat Ecology

Ed Arnett, Bat Conservation International: [Arnett.pdf](#)

To date, no listed bat species fatalities have been found at wind farms. However, bat-wind energy interactions have not been well studied at all, relative to birds and wind energy development. Only 13 studies report bat fatality estimates, using long search intervals, with only 7 studies using bat carcasses to assess bias corrections. To date, no pre- or post-construction assessments on bats have been reported from the Southwest US, a rich bat environment. Bat fatalities do seem to be skewed to migratory, tree-roosting species (Eastern red, silver-haired and hoary bats), but we need to learn more about other species, particularly the Mexican free-tail bat. Bat mortality peaks appear to coincide with late summer and early fall migratory activity. The Bats and Wind Energy Cooperative (BWEC), started in 2003, is a partnership between NREL, AWEA, BCI, and the US FWS. BWEC defined common ground and pulled resources together to do research. Next steps include doing extensive post-construction fatality searches over “full season” (April-October). We want to get a better understanding of the context of bat fatalities, including how indices of abundance, weather and other variables relate to fatalities. We want to understand whether bat mortality is in fact relatively low in the west (2 bats/turbine) compared to the east, or whether mortality rates are comparable but bat use is lower. We want to learn whether pre-construction monitoring and the other tools we have can be used to predict post-construction fatalities? Finally, we want to conduct extensive experiments to test mitigation ideas – in particular acoustic deterrents.

Bill Rainey, California Bat Expert, UC Berkeley [Bill Rainey.pdf](#)

Twenty-five of the 45 species of bats found in the US are found in California. The three families of bats in this state are: 1) the *Vespertilionidae*, which are widely distributed and capable of hibernation; 2) four species of *Molossidae* – including the Mexican free-tail bat; and 3) three species of *Phyllostomidae*, which do not hibernate, and are mostly limited to the Los Angeles Basin. Most of California’s bats have some listing status. These are long-lived mammals with few predators, experiencing greatest mortality during their first year. In many respects, they are like small, flying, insectivorous primates. Matrilinear colonies vary in size from 10 to 100,000 bats. Compared to birds of similar body size (5 g), bats operate over a large (over 5 km) nocturnal range. Geographic distance between roosts and foraging sites can be quite large. Some species do elevational migration, moving upslope in the fall/winter to hibernate. Known hibernacula in CA are small (less than 300 animals). Species subject to turbine mortality include the red bat, the hoary bat, and the Mexican free-tail, which have large, persistent colonies in the Central Valley, migrate towards the coast or move south, and have significant economic value to people in terms of pest management. Threats to California bats include: habitat alteration; alien species (forest pathogens that destroy roosting habitat); roost disturbance; contaminants/water

quality; human-induced mortality; and global warming-related declines of riparian availability in lowland areas, demise of natural flood regimes, flood control levees and dams.

Discussion Summary: Impacts to Bat Ecology

What is the prospect for proposed experiment to test effectiveness of feathering blades to reduce bat mortality?

Response: In the east there were no post-construction fatality searches conducted in 2005 (unlike in 2004). We were focused on pre-construction studies at the Casselman Project in Pennsylvania, and once that facility is built we'll follow up with post-construction research to determine how successful our pre-construction work was as a prediction tool. We're having discussion with an operator about doing some feathering experiments, possibly with future phases. Someone in Canada may have done something along these lines; TVA is considering doing something at an existing site.

What kind of research being done here in California along lines of what Bats and Wind Energy Cooperative is doing in other parts of the country? It would be helpful to get some of these kinds of studies done in the west.

Response: You have to start off with determining what question you want to answer. If you want to get a correlation between wind speed or weather and fatalities, that requires a daily sampling protocol. But if you want to make comparisons among sites in overall bat mortality numbers, that's another protocol that requires less frequent searches.

Comment: We have to do more rigorous study around the country. Rigor doesn't always mean daily searches.

Response: If we could pool resources to do extensive work (on the order of \$300-400,000 studies) at a couple of representative sites, it could provide good information for a lot of other sites. Need to look not only at fatalities, but also at context – what's the chance of x number of bats going through the airspace being killed?

In the context of CEQA, we need to understand bat population dynamics in order to think about how we go about studying impacts. Not just what fatalities do we predict, but what is the significance of those fatalities in terms of the populations?

Response: What is your population is always the big contextual question. For bats, a given level of added mortality is more significant than for, say, wood rats. However, it is truly challenging to assess what populations you are drawing from. Therefore it is hard to get beyond very crudely modeling relative risks to some of the taxa.

Response: It is tough, but when we're working in the CEQA context, we need to be able to say whether the impact is having a substantial adverse effect.

Response: It is tough to put boundaries on those kinds of numbers.

Comment: It's not clear that these are significant impacts.

Response: But we know that the bat populations are declining. Where we can deal with an issue we need to deal with it.

Response: So post-construction monitoring may be the most appropriate "mitigation" effort?

Comment: It's not exactly mitigative.

Comment: It may not matter what the significance is if our research to figure out effective deterrents is successful.

If you're not even sure that the pre-construction monitoring is predictive, how does a responsible developer who wants to do what's right make a call as to whether the impacts will be significant or not?

Response: More work has to be done to link between pre-construction study data and post-construction fatalities. We need access to sites to get the information to learn from what exists today. There needs to be more work done to identify the objectives.

Response: But unless you do the pre-construction studies, you'll never be able to make the predictive links. You don't have to do all the most expensive pre-construction studies to get some useful information. It's the post-construction monitoring that is more labor intensive.

SO the questions are: If developers are interested – what should they be doing?
What common metrics and methods will help us to eventually make comparisons?
How do you define bat populations, how define “substantial adverse effect”?

Comment: Sounds like we need to understand much more about bats' population dynamics in California. Broader biological research may be something we need, especially in the areas that may be of interest to wind industry (both primary and secondary WRAs).

Response: Because bats are long-lived species with low reproductive rates, our feeling is that any fatalities from wind turbines are additive, not compensatory. If you start projecting numbers out, they're going to get significant.

Could we focus on the areas identified as commercially developable wind resource sites, and develop the data proactively about species that use or migrate through those areas?

Response: We've been talking about is it possible to “get ahead of the curve” by doing essentially this kind of pre-construction surveying. We know little about patterns of activity in the white spots on [Brenda LeMay's] map – mostly south of transverse range. But there are a few spots in the Eastern Sierras worth looking at.

Response: Yes, we could look at Brenda's map and focus on those areas.

Comment: [Brenda LeMay's] map started with primary wind resource areas, places with the highest wind speeds for commercial development – but much of these primary WRAs are already developed. Secondary wind resource areas may be the next wave of development; the state is looking at these regions using stationary (NEXRAD) radar to look at potential bird ranges. CEC is talking with BWEC about using same effort to also look at bat activity.

Are there any general guidelines that could be helpful: stay x meters away from cottonwood groves, or from riparian habitat?

Response: Obviously you want to stay away from important hibernacula, but bats cover a lot of distance, so it's hard to give ranges.

Response: Answer is maybe; gets to a level of detail we can't go into.

Kelly: The public is just starting to hear that there may be a bat problem with wind in California. Some folks say “there's only been one bat study done in California” and other people say, “oh, we've seen studies showing no impact from wind turbines in the desert.” Are those credible studies, or is that just anecdotal evidence from bird studies? We need to get a clear definition of

what constitutes a bat study, and what can we say, so that we're all saying the same thing about what has and hasn't been studied.

Response: I'd have no confidence that actual studies have been done at projects in the California desert (not multiple studies showing no impact).

Guidelines and Other Recommendations

Tim Cullinan, Audubon Washington (no slide presentation)

Near the end of the public comment period (summer 2005) on the U.S. Fish and Wildlife Service (US FWS)'s *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines*, representatives from wildlife conservation organizations active in the National Wind Coordinating Committee held a conference call with four representatives of the wind power industry to discuss opportunities for resolving disagreements over provisions in the interim guidelines. We agreed that we could probably find some common ground on at least some parts of the guidelines, and should continue the dialogue, preferably with the participation of the Fish and Wildlife Service. These and other conversations led to Audubon's participation in efforts to establish a collaborative process for developing recommendations for revising the interim guidelines. The process evolved to include state agencies and clean energy advocates, and to broaden its scope to consider processes for siting guidance beyond the original voluntary guidelines. Organizers envision a one- to two-year collaborative process to seek consensus on procedures and protocols for reducing both mortality and habitat risks to wildlife, and regulatory risk to the wind generation industry.

Mark Sinclair, Clean Energy States Alliance: [mark sinclair.pdf](#)

The Clean Energy States Alliance (CESA) is an association of 14 state clean energy programs, including the California Energy Commission, which seeks a reasonable and coordinated state and federal approach to resolving avian and wind siting issues so that wind development can go forward to help meet state renewable energy goals. CESA proposed that the USFWS enter a collaborative process with the states and major stakeholders to explore and develop a more practical approach for ensuring wind project compliance with wildlife laws on a national, state, and site-specific basis. As California goes forward in addressing this challenge, this national collaborative effort could inform the state approach.

There are several reasonable and flexible models that California and the national collaborative process may want to consider. The Avian Power Line Interaction Committee (APLIC) is addressing avian risk from power lines using a toolbox and guiding principles from which a utility can select and tailor a utility-specific program designed to reduce avian mortality from power lines. Innovative legal and mitigation approaches used to implement the federal Endangered Species Act offer another "tool-kit" approach, offering a menu of mitigation approaches that are road-tested and validated through pilot projects. A third useful approach to consider is the Bureau of Land Management (BLM)'s 2005 programmatic EIS, which established economically-feasible best management practices (BMPs) to address potential impacts for all wind projects proposed for BLM lands, including wildlife impacts. BLM also will revise the programmatic BMPs over time, based on adaptive management strategies. CESA is available to assist California stakeholders in examining these models as you go forward.

Dick Anderson, WEST, Inc.: [Anderson2-Guidelines.pdf](#)

Ten years ago, the National Wind Coordinating Committee (NWCC) was having many of the same discussions about birds and wind energy development that we are just now beginning to have about bats and wind energy. In response, the NWCC Wildlife Committee developed a guidance document, which has since been revised. The guidance document is not a set of guidelines, but a resource. Its objective is to provide information to help people do studies in a more standard way so that we can learn from experience, and thus begin to use pre-construction utilization counts to make predictions. (NWCC has also developed guidance on the siting and permitting of wind turbines.) This document has influenced what we do and the way we do it. At least 20 studies have used it, and there are another 8-9 studies that have used the guidance for design of post-construction fatality studies.

Studying Wind Energy/Bird Interactions: A Guidance Document (aka “Methods & Metrics”) can be found on the NWCC website:

http://www.nationalwind.org/publications/avian/avian99/Avian_booklet.pdf

Brian Milsap (by phone, for Benjamin Tuggle), US FWS: [Ben Tuggle.pdf](#)

The US Fish and Wildlife Service (USFWS) has taken an interest in wildlife impacts of wind since 2002, when there was a commitment to expand wind development on BLM land. A set of voluntary guidelines prepared by the USFWS divisions “to avoid and minimize wildlife impacts from wind energy development” elicited some good substantive comments. Industry felt the guidelines were not sufficiently flexible, and did not have enough scientific input. Environmental groups were concerned about their voluntary nature, and that they didn’t assess risks with habitat loss, cumulative impacts. We spent time looking for ways to increase involvement by stakeholders to revise the guidelines. Our hope is that a truly collaborative effort among industry, non-governmental organizations, and FWS can arrive at solutions that we can mostly agree on as being adequate – and that can serve as a national framework for addressing wildlife impacts of wind energy. We recognize that it needs to be applied regionally, and that the end-product(s) may not be in the format of a guidance document. The format is not important, so long as FWS can meet its trust and statutory responsibilities to protect wildlife resources. The Service has high hopes that this provides a real opportunity to reach consensus and move forward.

Tim Cullinan, Audubon Washington (no slide presentation)

Last summer, near end of the US Fish & Wildlife (USFWS) public comment period on their guidance document, Audubon Washington talked to group of bird (non-governmental) organizations (NGOs), and also to a number of people from the wind industry, to try to find any common ground we might have on the guidance. From these conversations we learned that industry representatives were trying to get a dialogue going with the Clean Energy States and the USFWS. If those dialogues are being proposed, the environmental NGOs want to be a part of it. However, it is difficult for any one person or organization to represent the broad environmental community, because there is such a range of concerns, and a wide diversity of opinions among environmental groups.

Discussion Summary: Guidelines and Other Recommendations

Regarding USFWS collaborative with states, industry, NGOs, etc. - does this represent the

Service caving on the Interim Guidelines, and what is in place in the meantime? What's the incentive for environmental groups to participate in lengthy discussions that may result in another set of voluntary guidelines that are not enforceable?

Response: FWS received comments from both sides – our hope is that by involving both science and policy groups, we will meet trust and statutory responsibilities. The guidelines are still out there; they contain useful information, and they are and have always been voluntary. Given public comments, there are issues on all sides that need to be addressed, and we're hoping collaborative will address those. Trying to keep as open a mind as possible on outcomes of collaborative. May need something that is more enforceable, but APLIC is voluntary, and looks like a good model. Nothing has been ruled out, no preconceived ideas.

What's the timeline for this USFWS-industry-NGO guidelines collaborative?

Response: We are hoping for 12-24 months, but don't yet know. We're still figuring out who's going to be at the table, and who's going to pay for the effort.

It comes down to the FWS budget – not just for implementing guidelines, but even to develop guidelines – do you have the resources to do the work?

Response: These days, nobody has the budget to do anything. We've come out of a shortfall situation, and we have made a financial commitment to get this collaborative up and running, but the long-haul costs are going to be much greater.

Comment: Then what strategy can we put together to get that funding – because if we go together as a group to Congress to lobby for adequate funding, we can make it happen.

Comment: AWEA is one of the partners in this effort, and we're looking to raise a lot of industry funding to make this happen.

Comment: This will be an interesting exercise, but I'm not sure how relevant it will be to California. I have zero confidence in national approaches that involve the Bush Administration. They've relentlessly undermined California's ability to regulate automobiles in our own state, even joining suits against the state. I commend you all for recognizing the need, but we need to do what we need to do in this state, not wait for the federal government.

Response: I'm hearing that from a lot of people in the environmental community. Why bother – especially if they're just voluntary guidelines?

Response: For better or for worse, the wind industry isn't "blessed" with this Administration's interest in the same way the automobile industry is. While not arguing that California should wait on the federal government, keep in mind that at the federal level there are more career people than political appointees focused on this. Industry has come to the environmental community to work together. Let's not disparage the work before it is started, especially if we can maintain the transparency that has characterized how this is starting.

Comment: Yes. Consider the North American Waterfowl Plan, which was first implemented in California's Central Valley during the Reagan-Watt years. Over the last 20 years, this program that started at a time when environmental groups were most embattled has restored 40% of the wetlands – and we've secured the future of 10 million waterfowl in the face of growing state population. Defenders of Wildlife came to the table and worked with Ducks Unlimited, with the hunters, which was then unprecedented. In it was very similar to the situation we face with wind and bird/bat impacts today – but because an unusual group of organizations came together and

were willing to trust and work together, we got a lot accomplished in spite of federal government.

Guidelines in Practice: Washington State

Greg Hueckel, Washington Department of Fish and Wildlife: [Greg Hueckel.pdf](#)

The Washington State Department of Fish and Wildlife (WDFW, or the Department), in consultation with representatives from the wind power industry and environmental groups, has developed Wind Power Guidelines that achieve ways to reconcile support for renewable wind power projects with the need to protect wildlife and the State's habitat. Adopted in August 2003, the Guidelines include innovative provisions to not only protect our native habitats, but also greatly improve habitat value with mitigation expenditures. The Guidelines, used by the Department to shape its comments on wind power projects through the State Environmental Policy Act process, are divided into three sections: 1) Baseline Monitoring Studies for Wind Projects; 2) Wind Project Habitat Mitigation (conventional); and 3) Wind Project Alternative Habitat Mitigation Pilot Program. As there is little operational experience with wind projects in Washington State, the Guidelines are designed to add important studies and operational knowledge to our understanding of how to site, design, and operate wind projects to avoid and minimize impacts. The Wind Power Guidelines themselves will be re-evaluated after five years and adapted as needed. They provide wind project applicants with clarity and streamlined processes, require mitigation to maintain our native wildlife and their habitats, and provide an option to partner with WDFW to protect and improve some of Washington State's most important native habitats.

A complete copy to Washington State's Wind Power Guidelines can be obtained over the Internet at: <http://wdfw.wa.gov/hab/engineer/windpower/intex.htm>

Andy Linehan, PPM (no slide presentation)

From the perspective of the wind industry, the Washington State Wind Power Guidelines came about in part because the wind industry was getting very different responses from different offices of the Washington Department of Fish and Wildlife (WDFW). The convening process could have been done better, but it's hard to know how to pick organizations to represent the environmental groups. After considering avian strike v. habitat impacts, the conclusion that habitat disruption and loss was the biggest issue in Washington State. So we focused on minimizing impacts to high-value (shrub-steppe) habitat – impacts related not just to the footprint of a project, but also to the long-lasting impacts of project construction in this dry landscape.

Our experience to date suggests the process points in the right direction. For the 250 MW Bighorn project in Klickitat County, a year of pre-construction point counts and habitat mapping resulted in acquisition of a 200-acre canyon area that has been grazed by cattle, and will now be a conservation easement for life of the project. Another result was that turbines were relocated within the project site design, away from deep canyons to “safer” locations. The Technical Advisory Committee (TAC), which includes Audubon, WDFW, USFWS, and the landowner, will review post-construction fatality/mortality monitoring. Knowing what measures will be required if we do exceed projected mortality helps us plan for uncertainty. These are voluntary

guidelines, but WDFW says if you follow the guidelines, the agency will consider that you have met the State Environmental Protection Act (SEPA) requirements.

Nina Carter, Audubon Washington (*no slide presentation*)

Audubon Washington (AW) has 26 chapters; there are half a dozen groups in Southeast Washington working closely with industry on the Stateline project. AW wrote a policy paper in 2001 stating that we support wind power when it is appropriately sited. From our perspective, we congratulate the Washington Department of Fish and Wildlife (WDFW) for taking the initiative in developing these Wind Power Guidelines. That said, we do have several critiques of the Guidelines. First, it is important to make sure that you have the right environmental organizations at the table, and that everyone is brought “up to speed” on wind power. The Guidelines call for 6 months pre-construction monitoring – we feel that you need more like three years. Statements such as “we encourage the protection of ” are too vague. Bats not mentioned, and sage grouse and other ground-nesting birds are not much addressed. There is no discussion of contextual thresholds. Ratios for habitat restoration are lighter than we would like to see. We would rather see a heavier emphasis on siting to avoid impact rather than mitigation. Cumulative impacts – considering all the wind energy built, planned, and proposed for the Columbia River Gorge – are not addressed. In conclusion, our advice is: 1) collect the right group of people with the right backgrounds at the table and in your agencies; 2) hire a facilitator to take you thru the process of developing guidelines; 3) involve the county or local permitting people, because they are the ones who deal with permit applications; and, 4) make sure that your state agency has the right staff with the right training to implement the guidelines.

Discussion Summary: Guidelines in Practice

Comment: Developers (in all areas, not just wind) get conflicting messages from the federal government (NOAA, US FWS) and from WDFW biologists. The more closely we can work – if we can avoid the dueling biologists scenario – the more helpful that will be for developers who want to do things right.

Why no mitigation required for cropland – does this make sense for birds?

Response: We wanted to give wind developers an incentive to develop in corn. (We do ask coal-fired plants to mitigate for cropland.)

Response: Because of this guidance, we have redesigned projects so that a good chunk of our projects are on wheat cropland.

Response: We have a mitigation policy, but we do begin with steps to avoid impacts altogether. Mitigation comes after that in the sequence.

Are you doing post-construction surveys and what are you doing with the data?

Response: Projects are monitored for 2-3 years post-construction, and the data are reviewed by TAC and shared with the agencies. RNP posts study results on their site. [As a developer], I am a strong believer in post-construction monitoring, because I think rigorous studies will support what we’re doing.

Response: Post-construction monitoring at Stateline Project did show higher mortality than expected at a few turbines. The project owner has agreed to some turbine operations changes there..

Response: APLIC has created a voluntary avian mortality data base; we could use the APLIC model and develop a separate website along similar lines for wind fatality and avian mortality data – maybe at NWCC. (Include reports, indicate whether or not they are peer-reviewed – basically a library.)

Comment: Literature is one thing, data is another.

Response: It might be worth learning more about what APLIC has done, see what applies.

Lunch Address: “Balancing the Needs to Expand Wind Power and Protect Wildlife”

Ralph Cavanaugh, NRDC

This workshop has an extraordinarily rich agenda. There is a real sense of possibility: a mutual recognition that all the environmental issues are important. We have a common adversary: coal. Since 1990, electric generation has been the dominant source of global warming pollution. Coal generates more than half of this country’s electric generation – mostly increased utilization of existing (old, dirty) coal plants – many of them looking for buyers in the west. The carbon plants that will be built over next 25 years could put out more emissions than all of recorded human history. Can wind make a difference?

The coal industry is counting on the CEC’s policy of not making any more investments in coal-fired electricity being too costly for California to implement. But we have to prove that wrong. California is a leader – the one jurisdiction that has established the goal of reducing carbon emissions back to 1990 levels by 2020. We will have to get emissions down by 145 million tons. Many agencies are looking at how to do that. It will require significant improvements in energy efficiency; but wind is going to be necessary too.

We have to resolve critical scientific uncertainties about pre-construction studies, mitigation, and post-development monitoring. Wind cannot possibly meet the hopes and expectations we have for it unless we unite in support of resolving the scientific uncertainties. How do we move forward together? There exist the resources – dedicated funds for public interest energy research – needed for a statewide assessment of opportunities and perils. A proposal that put forward a comprehensive research program \$5 million for five years that had support of people in this room would likely be funded by California Fund. There is an opportunity for California not only to respond to solve outstanding research issues here, but to be a leader for other states. We keep hearing about “train wrecks” – but the fact that you know each other, and have some mutual recognition and trust – is what gets complex environmental problems addressed constructively. We have a chance to do this right. If the talent in this room can come together, you will have the support of California Energy Commissioners Geesman and Rosenfeld, and the full support of the NRDC.

Brainstorming: How to Move Forward in California?

Identification of Research and Data Gaps: What are the key issues that need to be better understood to inform siting, permitting and mitigation of wind projects and that would be the appropriate use of research funding if available?

Better understanding of bird and bat populations and behavior patterns

- More/better-developed understanding of bird and bat flight behavior on multiple landscapes.
- Mapping of routes that are used by migrating birds – and something about the variability of those patterns in response to short-term weather and geographic changes
- Population and migration studies for bats
- Impact of habitat fragmentation, disturbance, etc. on sage grouse and ground-nesting birds
- Focus on wind resource areas, both developed and potentially developable WRA's
- Regional database on bird populations for different avian groups for each WRA, so that we can use that data for projects within a given WRA
- Need more research focused on nocturnal species, like owls.
- What's the impact of wind energy development on species populations?
[Need to look at the impact of individual projects, but also at the cumulative impacts of wind projects, both compared to and in the context of cumulative impacts of all anthropomorphic activity (and natural mortality?)]
- What do we know about how different wind turbine characteristics affect birds and bats?

Use of appropriate research tools and protocols: how good are our metrics and methods, and are they being applied?

- Songbird mortality data- how good is it? Need to test the “poofing” principle: what happens when a small bird is hit by a rotating blade: Are the search radii being used adequate? Or are bodies being obliterated (in which case how do we get accurate fatality counts)?
 - Higher resolution thermal imagery should be able to answer “poofing” question.
 - WEST has some expertise on this and has evaluated the percentage of carcasses falling within different distances of various turbine sizes
- Replicate rigorous bat mortality studies that have been done in the east here in CA – intensive searches at existing sites
- Valid risk assessment protocol that is robust, and scientifically reviewed
- Protocols for pre-, during, and post-construction monitoring
- Research to support differentiated site selection study protocols for higher and lower risk areas.
 - This would be a subset of risk assessment – protocol starts with a decision point – is this a high or low risk site?
 - Wind development has always been able to act quickly in areas that clearly make sense. The ability to continue doing that is incredibly important to wind industry.
 - Research on habitat and physical association between risk and topography. Is there research we can do to identify the (habitat, topographic, geographic) characteristics of a site that qualify it as low risk?
 - Identify levels of studies for higher and lower risk areas.

- Replicate what is being done in New York State: rigorous simultaneous study of use and fatalities, so as to be able to correlate use patterns and weather events with fatalities
- Correlation between weather events and timing of bird and bat fatalities (day and night)
- Useful to have a robust peer-reviewed fatality study of areas other than the Altamont.
- Radar resources – inventory and evaluate existing military and civilian radar resources
 - There's a whole team of players working on the tools available: see Ron Larkin's presentation (Lansdowne, November 2004)
 - Synergy needed in methods development
 - Use well-placed radar sets to define migration patterns (spatial and temporal) – USFWS and US GIS working together?
- Do baseline studies in the Altamont and Solano; need comprehensive survey of Kern and Tehachapi where next wave of development will be taking place.
- Use of GIS to help depict these issues, to use the information we have to best effect

What do we do with the data: what is the decision-making framework and how is it supported?

- What do we do with the data that comes out of \$25 million research program? We need a much better mechanism for data sharing.
- Need pool of money to support involvement of under-funded stakeholders:
 - participation of environmental groups in research review;
 - involvement of government agencies that don't have staffing and other resources to commit to research projects.
- Set up validation process to compare pre-construction risk analyses to post-construction mortality
- Create a database so we can develop a model to project impact on bird and bat species of full build-out of wind energy to achieve full (statewide) renewable portfolio standards goal
- Create a decision structure for incorporating off-site mitigation (as with Washington State's guidelines) – one that presumes that you avoid first, minimize next, and mitigate as a last resort.

Mitigation approaches

- Develop use of technology such as radar to predict bird and bat [migration] movements through wind farm areas (so as to be able to prevent fatality events?)
- Vertical buffer zones? Spatial and temporal use of airspace for birds and bats.
- We can't write off the Altamont as something that happened in the past. How do we work with what is going on now at Altamont on the science side?
 - We've made some recommendations on mitigation measures, now a matter of testing those and monitoring for results.
 - Need to do rigorous assessment of mitigation measures both in the Altamont and elsewhere (can't assume Altamont lessons will necessarily be applicable).
 - Applied study of mitigation measures has to look at species-specific impacts; can't assume, for example, that measures that reduce raptor fatalities will also work for bats.
- Given the challenge involved in implementing mitigation measures on an existing operating project, may be better to do phased implementation of new projects with monitoring to get

useful information about effective measures without companies having to shut down turbines after they've been committed to operation.

- Habitat conservation planning can be used to identify/research potential mitigation sites (for off-site mitigation approaches).
- BACI studies (such as what BWEC is doing with bat acoustic deterrent) of risk reduction measures such as layout, visual cues, prey base reduction
- Continue ongoing research on ways to minimize lighting as an attractant to birds and bats
- Influence of livestock grazing around wind facilities.

Have we filled in the data gaps if we do all these things?

Always going to come up with more gaps, and answers will lead to more questions

What other policy and strategic issues and opportunities need to be addressed?

- Engage with power purchasers (e.g., PGE and other utilities) on issue of power purchase agreements (PPAs) and contract flexibility:
 - to facilitate repowering the Altamont
 - to adopt PPAs that don't impose the kinds of penalties that now prevent developers from agreeing to adaptive management
- Create incentives for developers to do pre-construction monitoring – use resources to help subsidize companies that agree to use protocols and make their results public.
- In case of Tehachapi, coordinated phasing of transmission with project development is the key issue. (Have to take into account environmental impacts of transmission development.)
- For projects being considered in areas where there is potential for developing both wind and other renewables, work together when scoping research needs. There may be regional corridors for renewables development. (Imperial and Tehachapi are two obvious examples.)
- Potential use of the ESA tool kit to identify the areas (within those renewables development corridors) where you want to minimize disturbance and maximize development. If there's a public component to the research plan, part of the package may be long-term protection of biologically important corridors.
- How will secondary WRAs be developed as wind technologies get refined? Brenda's map focused on primary WRAs only, but there are other lower-wind areas that are likely to be developed as wind technology advances and the primary WRAs get developed.
- [Encourage DOE to look at] energy storage technologies that can a) compensate for wind being an intermittent resource, and b) give developers the ability to shut down for X hours during a migration event without having to default on their power delivery obligations.

Should California develop guidelines to reduce and mitigate impacts on birds and bats? If so, how and for what purpose?

What would goal of guidelines be?

- Purpose:
 1. Reduce impacts on birds bats, etc, with emphasis on siting
 2. Encourage development of wind energy in California to meet RPS goals
- Makes sense for guidelines to be developed jointly with CEC and CDFG, because of their enforcement role.

How would a California effort relate to the collaborative effort to revise USFWS guidelines?

- We don't want to find ourselves at odds with federal guidelines. Developers don't want to have to respond to different sets of guidelines that don't match up.
- People working on guidelines at state and federal levels have to communicate. If you see a looming inconsistency, try to work it out.
- One of the comments US FWS received on its interim guidance was that state and local permitting has to feed in; the idea of this collaborative revision is to provide framework that state guidelines would feed into.
- States will be represented [in USFWS collaborative revision] as well. Will be looking for ideas and other peoples' experience. Don't wait, get started in California, and then use what you're doing to inform national guidelines development, and vice versa.
- California should go ahead – CEC and CDFG should work together, and people here should work collectively to endorse and provide that guidance to counties, siting agencies.
- We will have to develop guidelines relevant to California laws.
- There is not yet agreement among steering committee members as to what is going to come out of this. Go forward, and stay in communication.
- Where possible, there should be coordination between USFWS principles and what state agencies do. Idea is that states can always be more protective if they want to be.
- Federal agency coordination is important – Forest Service, BLM, not just USFWS. Especially with regard to parts of California other than the Altamont. Especially considering the importance of building transmission capacity for wind to go forward.
- 2005 Energy Commission Integrated Energy Policy Report recommendations are out there already, and we have to deal with it on a statewide level. Has to be part of the conversation. We as stakeholders can try to get ahead of it, but that horse is out of the barn.
- There is a lot of interest from [CDFG] HQ on providing voluntary state-level guidance for a statewide conservation plan.
- It's clear we need to come up with guidelines, whether informing policy or whatever. We need a common set of standards, common metrics. It's going to take at least two years and we haven't got two years.

Bats and Birds Only, Or Other Wildlife Too?

- The focus has been on bats and birds, but what about other kinds of wildlife, especially as we look into the desert – desert tortoise, Mojave ground squirrel, etc. – habitat impacts will become important.
- Funds are derived from all the ratepayers [for fund Ralph was talking about]. Habitat acquisition and mitigation issues are going to go well beyond birds – especially when you consider transmission lines that will need to be built.
- Trying to cover all wildlife with one set of guidelines could be problematic.
- US FWS guidelines address both direct and indirect (habitat) impacts – relevant to all trust species, not just birds and bats.
- There is a fair amount of understanding about the issues/needs of some of the endangered species (like desert tortoise), but less known about what to do for birds and bats.
- It would be irresponsible to put together a plan that addressed some species, not all ESA and special concern species. There is readily applicable information on some of these other species.
- Yes, but bighorn sheep – we don't know how wind will impact this species. We know that it avoids human activity. Can't just focus on bats and birds, or just use what we already know about some of these species, because for some we just don't know.
- I agree that if you are looking at siting and mitigation guidelines for wind, it has to be more encompassing. If not, then we lose opportunities, especially with respect to mitigation. There are significant terrestrial species research questions to be answered.
- US FWS guidelines are already vague. If we broaden it out, we'll get even more vague. Maybe work on this in phases, starting with avian and bat, and with a commitment to coordinate with existing laws regarding endangered species. Maybe eventually develop specific guidelines.
- So what is the point of the guidelines? Is it to create efficiencies in the siting process? If so, need to include other species.
- We're all here because we are concerned about conflict with wind, birds, and bats. It's the biggest hurdle. The other wildlife issues are already being addressed.
- Washington state guidelines note that ESA-species are separately addressed by species-specific studies required by the ESA.
- Species of special concern should be included, at least at some point, because otherwise they're not covered.
- Most wind developers do the fatal flaw analysis to begin with. Maybe that's where species of special concern come in.
- Stick to what to do with bird and bat problems with wind turbines; all these other species are going to be part of screening process anyway.
- As far as FPL is concerned, CEQA process obligates us to id impact on any species of special concern.
- There are different interpretations between the agencies, NGOs, courts, even with listed species. It would be wise to get wide perspectives.

Can all live with focusing initially on avian and bat impacts?

Response: generally agreed

Comment: We don't have the expertise here to address impacts on anything else anyway.

Binding v. voluntary?

Assuming that we had good guidelines, there remains the question of mandatory-voluntary continuum. What does industry really want? A “Finding of No Significant Impact” from the California Environmental Quality Act (CEQA) perspective?

- Guidelines should be binding – because of what we saw from Sue’s study – existing study protocol guidance is not being used. The more effective we can make guidelines, the less likely we find ourselves back here in two years having same conversation.
- Not a case of mandatory v. voluntary; there really is a whole continuum of possible models.
- The first round of both WA state and FWS guidance ran into trouble because they weren’t developed by stakeholders. CDFG could say, if you follow these guidelines, you’ve provided the necessary info we need to satisfy CEQA obligation, and counties could do the same.
- More voluntary, less antagonistic, more collaborative, but provide an incentive that gives them weight, like “you do this, you will be considered to have complied with CEQA”
- Even if it’s voluntary, it’s the industry’s interest to work with the NGOs because ultimately they don’t want to end up in court.
- But when rules and regulations are voluntary, you penalize the well-intentioned, high-minded, high quality companies.
- But the other company is susceptible to lawsuits
- Very flip to say that if you don’t follow protocol you’ll be sued. It’s expensive to sue; environmental groups don’t sue lightly.
- “Certification” is another way of getting compliance.
- Making something mandatory requires authority. It’s the counties that issue the permits.
- In this context, not sure regulations make sense. Too much we don’t know to be trying to impose rules. Focus on incentives for voluntary compliance and back it up with enforcement clout provided by trust responsibilities.
- CDFG position is that guidelines are going to be voluntary, like it or not. Washington State got direction to reduce requirements.
- USFWS plan is voluntary, but there is a regulatory stick there as well (MBTA, etc.)
- There is a wide range of skepticism among environmental groups about voluntary standards.
- What other incentives besides CEQA compliance?
- Environmentalists want to get assurance that people will play and follow the rules; industry wants to avoid having to run the regulatory gauntlet. Consequences don’t have to be regulatory. As noted above, one idea is to agree that if you follow the protocol, you are certified by an agency as being in compliance for CEQA submissions. An additional carrot might be that you have access to funding resources for extra year of pre-construction monitoring.
- Whatever incentives we come up with have to be linked to the permitting process. That’s the carrot that matters to developers.
- We’ve been talking about adaptive management, because we’re still learning. Want to be sure that companies would be open to guidelines being revised as we learn more.
- IF the wind industry has a way of agreeing with each other – say, that certain corridors are “no-build” so that competitive element not an issue.

Summary: something between voluntary and mandatory, and offers developers some degree of increased certainty in the permitting process, and allows for guidelines to evolve as we learn more

Next Steps

Planning Committee raised funds, spent time to organize this meeting. What next?

We've heard that CDFG is pursuing, that CEC is pursuing. We might agree as a group that CDFG and CEC should move forward.

- Move forward as fast as possible, but it should be a stakeholder process.
- But it's got to be led by the state agencies.
- There's no money. People are interested, but there's no time or money.

Is it realistic for CEC to put together a small working group of stakeholder representatives?

- Maybe most helpful thing we can do is give CEC and CDFG a list of participants from this meeting who are interested in being part of this.
- Most important is that we keep talking to each other in these kinds of environments – planning group that met in Berkeley, this meeting. Would suggest we go to a smaller group – a subcommittee with representatives who meet periodically.
- Agree that the next step is a smaller group with wide representation of stakeholders.

It's not realistic to think we're going to be successful by going to a smaller group to develop guidelines. It's not possible for Audubon or CEERT or anyone in this room to convene this. CEC should enter into an MOU as quickly as possible with CDFG to get the process up and running.

- CEC Siting Office has worked more on siting guidelines in the past.
- CDFG will be more involved in this issue than it has been in the past.
- All these examples are of interest, but we're really talking about creating something new – given CEQA – I think the bigger question is what standards we agree to. Better role for CEC is to be among the stakeholders and collaborators. Kern County is going to be the big player, because they're the ones who will be permitting. Transparency is the key thing.

Who will take on continuing a dialogue among smaller group of parties? (CEERT?)

- Could be a smaller group of people who would like to get together and come up with a straw man proposal – something based on what we've discussed these past two days
- Not a straw man proposal for guidelines, a strawman proposal for process.
- Get a summary of this afternoon's discussion first.
- CEERT will produce a summary of this afternoon's discussion and convene a small group of interested parties to come up with a straw man proposal for a process for coming up with guidelines.
- If we're going to talk with CDFG and CEC, ask them what they would like to get from this meeting to help them move forward with process.

Facilitator: The message back to CEC and CDFG is that there is interest in a joint agency effort, and that you include the stakeholders who participated in this meeting as well as others interested in being here who couldn't be included for space reasons.

Appendix A: Participant Contact Information

Last Name	First Name	Organization	Office Phone	Email
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[continued]

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Appendix B: Meeting Agenda

Purpose: To share the best current data on wind energy impacts to birds and bats in California and consider statewide guidelines for the study, siting and operation of wind power facilities to prevent and minimize such impacts.

DAY 1

8:00 – 8:15	Coffee and Buffet Breakfast
8:15 – 8:45	<p>Introductions: Julia Levin, Audubon California Laurie Jodziewicz, AWEA Abby Arnold, RESOLVE</p> <ul style="list-style-type: none"> • What are the questions that bring us to this meeting? • What are the goals of the meeting? • Format and Ground rules of Workshop
8:45 - 9:10	<p>Importance of Wind Power in California John Geesman, CEC Commissioner</p> <ul style="list-style-type: none"> • The future of renewable energy in California and why it matters • What the RPS requires and why • How wind power will help fill the RPS • What are current alternatives to renewable procurement
9:10 – 9:30	<p>Importance of Birds in California Brian Walton, Santa Cruz Predatory Bird Research Group, UCSC</p> <ul style="list-style-type: none"> • Why are birds important to California • Different types, status, trends, major threats
9:30-10:15	<p>The Legal Framework for Wind and Wildlife Patricia Rogers, USFWS Enforcement Office Annie Mudge, Morrison and Foerster Bill Yeates, Law Offices of Bill Yeates</p> <ul style="list-style-type: none"> • ESA, CESA and Fully Protected Species • Federal Migratory Bird Treaty Act and Bald and Golden Eagle Act • NEPA, CEQA and mitigation requirements • Local planning and land use laws <p>Q&A</p>
10:15-10:30	BREAK

10:30-11:15	<p>Wind Siting and Development Process in California Brenda LeMay, Horizon Kenneth Stein, FPL Energy</p> <ul style="list-style-type: none"> • Kenny Stein, FPL Energy Typical wind industry criteria for site selection • Process, timing and competitive issues in wind project development • Practices and methodologies currently used in California to assess risk to birds and bats • How has this process evolved and what factors have contributed to this evolution? • Costs and time associated with various techniques of risk assessment • Financing, objectivity, & peer review issues • How is the repower process different from developing a new project? <p>Q&A</p>
11:15-12:30	<p>Impacts of Wind on Birds in California Dick Anderson, WEST Al Manville, USFWS Monica Parisi, CDFG</p> <ul style="list-style-type: none"> • What are the key threats to birds from wind power and how does this differ across the state? • What is the state of mapping and data about the presence, habits, habitats, etc. of birds in California • What do we know about bird use and behavior (volume, timing, frequency, routes) in different resource areas in CA? • How do the different wind energy technologies affect avian mortality? • What do we know about cumulative impacts? • Are there bird/bat trade-offs? <p>Q&A</p>
12:30-1:30	<p>Lunch - Putting it All in Perspective Keynote speaker - Winston Hickox, Former Secretary of CalEPA, Board Member of Audubon California and Advisor to CalPERS on Green Investing</p>
1:30-2:30	<p>Preconstruction Site Evaluation Mike Green,, USFWS Wally Erikson, WEST Sue Orloff, Ibis Consultants Pete Bloom</p>

	<ul style="list-style-type: none"> • Pre-siting studies – how, when, where • How do studies vary among different types of birds (ie, migratory, songbird, raptor, breeding, etc.) • What pre-construction evaluation techniques are available and how can they be improved? • How much pre-construction monitoring is enough ? <p>Q&A</p>
2:30-2:45	BREAK
2:45 – 4:15	<p>Adaptive Management, Mitigation, and Future Siting William Kendall, USGS Shawn Smallwood Dick Curry Mike Azeka, AES SeaWest</p> <ul style="list-style-type: none"> • What is adaptive management and what are the protocols? • How to design an effective adaptive management program • How to mitigate for bird and bat impacts • Onsite versus offsite mitigation • Ongoing (post-construction) research and monitoring protocols • Where are existing projects being monitored for bird and bat mortality and what are their results? • Economic challenges of adaptive management <p>Q&A</p>
4:15 – 4:30	<p>New Technology for Assessing Avian and Wind Resources Lee Neher, Lawrence Livermore National Lab</p>
4:30 - 5:30	<p><i>What Can We Learn From Past Studies?</i> Jim Walker, EnXco Bob Thresher, NREL Garry George, Los Angeles Audubon</p> <ul style="list-style-type: none"> • What processes work and what could we do better? • Who should be involved/consulted and when? • How to foster competition and keep info confidential? <p>Q&A</p>
7:00pm	Dinner at Smitty’s Grill

DAY 2

8:30-9:00	Recap of Day 1, Discussion and Left-Over Questions
9:00-10:00	<p>Impacts to Bat Ecology Related to Wind Development and Lessons Learned About Impacts to Bats from Wind Development Ed Arnett/Bat Conservation International Bill Rainey, CA Bat expert, UC Berkeley</p> <ul style="list-style-type: none"> • What does research done in the East tell us about direct and indirect impacts to bats that may be applicable to California • What are the questions the Bat Wind Energy Cooperative is addressing? What are preliminary results of the BWEC research in 2004 and 2005? • What appear to be risk factors? • Status of bats/threats to bats in California <p>Q&A</p>
10:00-10:15	BREAK
10:15-11:15	<p>Guidelines and Other Recommendations Tim Cullinan, Audubon Washington Mark Sinclair, Clean Energy States Alliance Dick Anderson</p> <ul style="list-style-type: none"> • Development of USFWS guidelines • Various Audubon state offices' guidelines • BLM, NWCC, other guidelines • How guidelines have been developed, binding or voluntary, implemented or not, sufficient or not <p>Q&A</p>
11:15-12:15	<p>Guidelines in Practice: Washington State Greg Hueckel/Washington Department of Fish and Wildlife Andy Linehan, PPM Nina Carter, Audubon Washington</p> <ul style="list-style-type: none"> • What was the impetus and the process for adopting • How are they working • What would you do differently? <p>Q&A</p>
12:15-1:15	LUNCH – Balancing the Needs to Expand Wind Power and Protect Wildlife

	Ralph Cavanagh, Natural Resources Defense Council
1:15- 4:00	<p>How to Move Forward in California</p> <ul style="list-style-type: none"> • What are the most serious information gaps and research needs? • What is necessary for a successful, meaningful study? • Does California need statewide guidelines and, if so, what issues should they address? <ul style="list-style-type: none"> - pre-siting studies - siting criteria - technology requirements - monitoring - data sharing - adaptive management - mitigation (on- and off-site) • Do some issues need to be addressed on a regional basis? • What should be the process for developing guidelines? <p>Next Steps</p> <p>Adjourn Meeting</p>

Appendix C: List of Slide Presentation Files

Importance of Wind in California

No slide presentation

Importance of Birds in California

Pete Bloom (for Brian Walton): [Bloom Importance of Birds.pdf](#)

The Legal Framework for Wind and Wildlife

No slide presentations

Wind Siting and Development Process in California

Kenneth Stein: [Kenny Stein.pdf](#)

Brenda LeMay: no slide presentation

Impacts of Wind on Birds in California

Dick Anderson: [Anderson--Impacts.pdf](#)

Al Manville: [Manville.pdf](#)

Shawn Smallwood (for Monica Parisi): [smallwood impact assessment.pdf](#)

Preconstruction Site Evaluation

Mike Green: [M Green.pdf](#)

Wally Erickson: [ericksonaudubon.pdf](#)

Sue Orloff: [Orloff.pdf](#)

Pete Bloom: [BloomPre_construction.pdf](#)

Adaptive Management, Mitigation, and Future Siting

William Kendall: [Bill Kendall What is ARM.pdf](#)

Shawn Smallwood: [Shawn Smallwood Mitigation.pdf](#)

Dick Curry: [dick curry.pdf](#)

Mike Azeka: [Mike Azeka.pdf](#)

New Technology for Assessing Avian and Wind Resources

Lee Neher: [Lee Neher.pdf](#)

What Can We Learn from Past Studies

Jim Walker: [Jim Walker.pdf](#)

Bob Thresher: [Bob Thresher.pdf](#)

Garry George: no slide presentation

Impacts to Bat Ecology Related to Wind Development and Lessons Learned About Impacts to Bats from Wind Development

Ed Arnett: [Arnett.pdf](#)

Bill Rainey: [Bill Rainey.pdf](#)

Guidelines and Other Recommendations

Brian Milsap (by phone, for Benjamin Tuggle): [Ben Tuggle.pdf](#)

Tim Cullinan: no slide presentation

Mark Sinclair: [mark sinclair.pdf](#)

Dick Anderson: [Anderson2-Guidelines.pdf](#)

Guidelines in Practice

Greg Hueckel: [Greg Hueckel.pdf](#)

Andy Linehan: no slide presentation

Nina Carter: no slide presentation