Attachment 2

Shiloh IV Eagle Conservation Plan Environmental Assessment Comments and Response to Comments Summary

Exhibit II. Shiloh IV Eagle Conservation Plan Environmental Assessment Comments and Response to Comments Summary

In response to the *Draft Environmental Assessment: Shiloh IV Wind Project Eagle Conservation Plan*, we received 32 comment letters: 1 from the U.S. Environmental Protection Agency, 3 from tribes, 6 from nongovernmental organizations (NGOs), and 22 from the public. Three NGO comment letters combined comments from multiple organizations. The first letter represented 2 environmental groups, the second represented 6 environmental groups, and the third represented 2 industry associations.

In total, the 32 comment letters contained approximately 125 individual comments. These comments generally fell under one of five main categories: effects, Advanced Conservation Practices (ACPs), mitigation, monitoring/reporting, and general.

The comment letters concerning effects addressed a variety of issues including age of the birds killed, number of fatalities, local population effects, cumulative effects, other sources of fatalities, and overall population numbers. Letters concerning ACPs addressed the Technical Advisory Committee (TAC), seasonal shutdowns, transparency of the process and future ACPs, project design, and seasonal curtailment. Letters concerning mitigation addressed methods for calculating mitigation requirements, monitoring of retrofits, location of retrofits, value of retrofits, and additional alternative measures (e.g., using new technologies, capturing and relocating, and promoting new nest establishment). Letters concerning monitoring and reporting addressed frequency, detection, control studies, survey detail, third-party verification, the reporting system, and monitoring length. General comments were primarily from the public and many reflected opposition to issuance of an eagle take permit.

Overall, the comments raised important issues regarding the opportunities and challenges associated with issuing eagle take permits and provided useful suggestions for conducting this and future analysis. We made minor changes to the FEA based on these comments, namely clarifying that the TAC was intended to include only Service staff as overseers of the permit, adding information on the electric pole retrofit process for mitigation, the Resource Equivalency Analysis (REA) process used to calculate mitigation, and on climate change. Based on the comments, and in light of the record, we believe that substantial revisions and new analysis are not required for the FEA.

Detailed responses to specific comments are provided in the attached Table 1. Comment letters follow.

Table 1. Shiloh IV ECP DEA Response to Comments

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
Federal	**FED**		
U.S. Environmental Protection Agency	1-1	Analyze the impact of taking adult versus juvenile birds.	The age classes of eagles killed in the Montezuma Hills, as in most WRAs, is not known well enough to make predictions of impacts on age classes. However, the Service's REA does include assumptions about various age class impacts and benefits associated with mitigation actions. The REA assumes that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% subadult, 45% adult). These estimates come from information contained in the 2009 Environmental Assessment for the Eagle Rule. In the REA, this age distribution is used in both the debit and credit sides of the calculations. Through the adaptive management process, we will learn more about the actual age distribution of eagles that are taken at wind facilities, and we will use this information to improve the models
	1-2	Modify text to acknowledge that younger birds benefit more from retrofits.	Juveniles and sub-adults outnumber adults in the population, so some bias toward younger age classes would be expected if removal by electrocution were random. Moreover, mortality rates overall are higher for younger eagles, especially juveniles, than for adults, and this fact is taken into account in our REA. The REA and fatality estimates both consider the age of the eagle in their calculations. They assume that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% subadult, 45% adult). These estimates come from information contained in the 2009 Environmental Assessment for the Eagle Rule. In the REA, this age distribution is used in both the debit and credit sides of the calculations. Through the adaptive management process, we will learn more about the actual age distribution of eagles that are taken at wind facilities, and we will use this information to improve the models.
	1-3	Describe PG&E's program in more detail.	The comment is noted. FEA Section 2.2.5.3 has been revised to include information on PG&E's retrofit program and monitoring requirements.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
Non-Governmental Organization	**ORG**		
Save the Eagles International	1-1	Recommends against issuing a permit.	The Service has provided a framework for wind companies to obtain permits and believes there is sufficient information to make an informed decision on permit issuance. In this case, the alternative of not issuing a permit would not prevent eagle fatalities from the project, nor would it allow the Service to require avoidance, minimization, and mitigation measures to further reduce impacts on eagles. This comment is noted and will be retained in our administrative record.
	1-2	There are serious flaws with how the wind industry collects mortality data and conducts its assessments.	All wind facilities permitted to take eagles will need to conduct fatality monitoring to ensure compliance with regulatory requirements as described in Appendix H of our ECP Guidance (Service 2013). We anticipate that in most cases, intensive monitoring to estimate the true annual fatality rate will be conducted for at least the first year or two after permit issuance, followed by less intense monitoring in accordance with monitoring requirements at 50 CFR 22.26(c)(2). However, additional intensive, targeted monitoring may be necessary to determine the effectiveness of additional conservation measures and ACPs implemented to reduce observed fatalities. Additionally, the Service and USGS are investing significant resources into research for testing and assessing postconstruction monitoring approaches.
	1-3	Nesting territory impacts in the local area are substantial.	Wind projects in this area have likely reduced nesting success for eagles that decide to nest in this area and could remain a sink for eagles. However, the project is surrounded on three sides by other similar projects. We will require ongoing monitoring to inform us when eagle fatalities occur. If fatalities increase, ACPs will help further avoid impacts. We will continue to encourage measures to reduce mortality from the sources identified in the Section 4.2.1.2.2 of the FEA, including the Shiloh IV project and at neighboring wind facilities. The ACPs and mitigation described in the applicant's EA are intended to minimize ongoing take at Shiloh IV and ensure the project results in no-net-loss at the population level.
	1-4	Cumulative effects are under-estimated from wind farm studies.	Windfarm impacts on birds have been well studied in both the Montezuma Hills and the Altamont Pass WRAs. The Service has conservatively estimated cumulative impacts on the local area population based upon the best scientific information available. See FEA Section 4.2.1.2.2 for our full cumulative effects analysis on golden eagles and FEA Section 4.2.3.4.5 for our sensitive bird species impacts analysis under the subheading, *Mortality Due to Turbine Collision.*

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	1-5	Retrofitting should occur immediately.	Shiloh IV will conduct 133 retrofits within the first year of permit issuance to offset the deaths of up to 5 eagles as described in the description of our Selected Alternative in the EA's Finding of No Significant Impact.
Friends of the Swainson's Hawk and American Bird Conservancy	2-1	Recommends issuing take for three eagles, not five, over a 5-year period based on applicant's estimate.	The Service has conservatively estimated the impact of up to five eagles. We proposed take authorization of up to five eagles to avoid underestimating take and to secure commitments for adequate mitigations. The stepwise ACP adaptive management approach includes measures to address additional avoidance measures to be implemented as eagle incidents occur.
	2-2	TAC should be composed of additional experts and meet more than once a year.	Because this authorization will be issued and overseen by the Service, we have determined that the term "TAC" was misused in the DEA. That language has been rectified in the FEA (see Section 2.2.5.4). Instead, our National Eagle Programmatic Permit Implementation Team (EPPIT) team will be involved in permit oversight and decisionmaking as appropriate. The EPPIT is composed of eagle permit coordinators and raptor biologists from each of our nine Service Regions. This team includes topical experts and scientists from the Service and the USGS as needed. The Service's Pacific Southwest Region will consider recommendations from the EPPIT, although we retain all decisionmaking authority over this permit and its adaptive management process. Therefore, a defined process cannot be established at this time because new information and data influences our decisions on an annual basis. We have provided a framework for the initial steps and have a team in place to ensure they will be effective. Updates will be provided to the public via the CA-NV Golden Eagle Working Group, the Solano County TAC for the Montezuma Hills WRA, and our Pacific Southwest Region's website. CA/NV Golden Eagle Working Group *http://www.dfg.ca.gov/wildlife/nongame/GEWG/* Solano County Wind Turbine Projects Avian Reports *http://www.solanocounty.com/depts/rm/planning/commercial_wind_turbine_avian_behavior_n_mortality_reports.asp* Pacific Southwest Region's Website Eagle Page *http://www.fws.gov/cno/conservation/MigratoryBirds/EaglePermits.html*
	2-3	Recommends final permit requires searching 100% of the turbines for the first 3 years.	Comment noted. This option is evaluated in Alternative 3.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	2-4	Include Swainson's hawk in list of special interest species considered in the analysis.	The analysis did consider all raptors, although Swainson's hawk was not specifically called out because of the limited number of fatalities. It is also included in the BBCS. No changes are proposed to the FEA.
	2-5	Need more discussion on how the number of retrofits was derived.	The Service used its REA spreadsheet tool (as described in Appendix G of the ECP Guidance [Service 2013]) to estimate the number of retrofits. This tool allows the Service to calculate the number of retrofits needed to offset the potential impacts of a project based on temporal losses and gains to the population. Additional information on the REA conducted for the Shiloh IV project is provided in the FEA (Appendix D).
	2-6	Support the additional 3 years of fatality monitoring.	Comment noted. Additional monitoring may be triggered based on fatalities.
	2-7	Include seasonal shutdown as part of the adaptive management mitigation.	The Service considered seasonal curtailment in Alternative 4 of the EA. Curtailment is also an adaptive management element in the stepwise table (Table 2-2), but that is only after multiple fatalities and other measures have proven ineffective.
	2-8	Mitigation should be at the site and not just within the regional population.	There have been some enhancements onsite including undergrounding of electric collection lines. As outlined in the Service's eagle permit Final Rule FEA (Service 2009), and our ECP Guidance (Service 2013), we put in place measures to ensure that local-area eagle populations remain stable. We specified that take rates must be carefully assessed, both for individual projects and for the cumulative effects of other activities causing take, at the scale of the local-area eagle population (a population within a distance of 43 miles for bald eagles and 140 miles for golden eagles). This distance is based on the median distance to which eagles disperse from the nest where they are hatched to where they settle to breed. Young birds may wander extensively, especially subadults during summer. In addition, mature eagles of breeding age but without territories—called floaters—move through the area and may occupy territories that are vacant. The applicant worked with the Service and with a utility to identify a location within that distance that was considered a high-priority for retrofits due to documented previous fatalities and nearby eagle population density, and which had the number of poles needed. We believe that the site chosen, although on the edge of the 140-mile distance defined in the 2009 FEA, best meets the requirements in this specific case.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	2-9	Additional offsite habitat compensation should be part of the adaptive management plan mitigation measures.	Shiloh IV's BBCS (Appendix B) summarizes conservations measure commitments made as part of its permitting and environmental compliance process prior to construction. The project provided offsite mitigation habitat suitable to support raptors, including golden eagles as required by their Solano County Conditional Use Permit. We have retained some flexibility with respect to implementation of ACPs. However, we currently believe the mitigation proposed will be the most effective to manage for no net loss to eagle populations and mitigating the effects of the project.
	2-10	Do the newer larger turbines make the area less desirable to nest?	This comment is beyond the scope of this analysis. The Service can only hypothesize about the reasons for potential reduced nesting success in this WRA. As the comment indicates, there are many factors including number of nest trees, foraging habitat quality, number and type of turbine, sources of fatality.
	2-11	Retrofit poles in the Montezuma Hills first.	This response is similar to 2-8 above because similar issues are raised. There have been some enhancements onsite including undergrounding of electric collection lines. As outlined in the Service's 2009 eagle permit regulation Final Rule FEA, we consider local area population effects within the species-specific natal dispersal distances, which is 140 miles for golden eagles. Thus, the applicant worked with the Service and with a utility to identify a location within that distance that was considered a high-priority for retrofits due to documented previous fatalities and nearby eagles population density, and which had the number of poles needed. We believe that the site chosen, although on the edge of the 140 mile distance defined in the 2009 FEA, best meets the requirements in this specific case.
	2-12	Ensure appropriate tracking and reporting of fatalities.	The Service will require monitoring and reporting, and fatalities will trigger the conditions in the stepwise table (FEA Table 2-2).
	2-13	Include mitigation for Swainson's hawks.	Shiloh IV's BBCS (Appendix B) summarizes conservations measure commitments made as part of its permitting and environmental compliance process prior to construction. The project provided offsite mitigation habitat suitable to support raptors, including Swainson's hawk and golden eagles and other raptors as required under the Solano County Conditional Use Permit.
	2-14	Adaptive management should be triggered if take of any state or federally listed species occurs.	Previous environmental analysis was conducted for the project; these analyses are available in *Final Environmental Impact Report—Shiloh IV Wind Energy Project* (Solano County 2011b) and *Final Environmental Assessment for the Shiloh IV Wind Project Habitat Conservation Plan* (Service 2012). Commitments to avoid, minimize, and mitigate for take of State and Federally listed species were addressed through those processes and authorizations.

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Audubon California, Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, Santa Clara Valley Audubon Society, Golden Gate Audubon Society	3-1	Urgent need for more comprehensive and fully transparent approach to eagle permitting - this includes meaningful analysis and management on a regional population scale, as well as guaranteed opportunities for the public to understand and engage on monitoring, mitigation, and adaptive management prescriptions throughout the life of the permit.	Comment noted. We are committed to providing a comprehensive and transparent approach to eagle permitting. We believe we are providing this beginning with the 2009 Final Rule and subsequent guidance notices and comment periods in the Federal Register. The Service is charged with protecting eagle populations and we will use our authority to ensure monitoring, mitigation, and adaptive management prescriptions are protective of eagle populations. We will keep the public informed through the CA-NV Golden Eagle Working Group, the Solano County TAC for the Montezuma Hills WRA, and our Pacific Southwest Region's website.
	3-2	We suggest the purpose and need be revised to reflect the conservation of eagles drives the permitting process.	We agree the broad purpose of our regulations are to facilitate the preservation of eagles through issuance of permits that comply with the issuance criteria. However, the specific purpose of the EA is to disclose the environmental effects associated with this permit application and to evaluate if it meets the issuance criteria, as is currently described in the purpose and need.
	3-3	Set forth a specified timeline for completing and incorporating regional information, and/or demonstrate how new information justifies that this is a sustainable harvest rate for the local area population.	We used the best available science and the analytical tools as described in our National ECP Guidance (Service 2013) to assess local and regional impacts. Our assessment indicates that permit issuance will offset eagle population impacts caused by the operations of Shiloh IV, helping us to manage for stable or increasing eagle populations. We will continue to factor in regional information when individual eagles are killed and adaptively manage this permit as described in the FEA. Prior to considering re-issuance of this permit once it expires after 5 years, new data would be considered in our permit evaluation. A broader analysis and review of sustainable harvest rates is beyond the scope of this project and EA.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-4	FWS should encourage an application for one permit for the entire wind resource area through cooperation of each developer and outline a strategy for how this will be accomplished.	Regional permit issuance is beyond the scope of this action. The Service cannot require that multiple private entities seek a permit, but we have provided a framework to seek permits and are encouraging multiple applicants to come together to consider regional permitting. We understand that some stakeholders prefer an alternative permit framework based on the concept of comprehensive "regional eagle conservation plans" where permits are issued based on regional population levels. Further, some stakeholders have suggested that the Service should work to develop these "regional eagle conservation plans" before beginning to issue 30-year permits. The Service agrees that the regional approach envisioned by such plans is appropriate and believes it has a permitting process that will ensure conservation at regional and local scales.
	3-5	Provide greater clarity on how to achieve a net benefit standard. Incorporate a net conservation benefit into the DEA analysis and permit terms, including adequate mechanisms for ensuring a sustained reduction in take throughout the life of the project as well as procedures for engaging in applied research activities to fill priority data gaps.	Eagle take permits may be issued only in compliance with the conservation standards of the Eagle Act. This means that the take must be compatible with the preservation of each species, defined (in USFWS 2009) as "consistent with the goal of stable or increasing breeding populations" or no-net-loss. The permit regulations standards do not require a net benefit. ACP implementation is designed to reduce take throughout the permit duration. We anticipate the applicant will request a permit renewal and seek eagle take coverage for the duration of the project. Requiring the applicant to engage in applied research, beyond that may be necessary to monitor the effectiveness of the ACPs is not required under our permit regulations. We will work to integrate data collected for subsequent experimental ACP implementation to help inform data gaps. Because take will be offset though compensatory mitigation, and implementation of experimental ACPs may reduce the amount of actual take (compared with our take estimates for the project), issuance of the permit will result in no-net loss and may result in a net benefit to the local-area eagle population.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-6	The DEA should analyze the direct and indirect effects of take on different types of eagles in order to calculate thresholds for these different types, and assign them values and mitigation requirements and analyze the relationship of the loss of each type of eagle to the overall population.	The EA analyzed the direct and indirect effect on eagles (see EA Section 4.2) and 4.2.2.6. However, there is not sufficient data to conduct a detailed age class analysis. The age classes of eagles killed in the Montezuma Hills, as in most WRAs, is not known well enough to make predictions of impacts to age classes. However, the Service's REA does include assumptions about various age class impacts and benefits associated with mitigation actions. The REA assumes that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% sub-adult, 45% adult). These estimates come from information contained in the 2009 Environmental Assessment for the Eagle Rule. Through monitoring and the adaptive management process, we may learn more about the actual age distribution of eagles that are taken at wind facilities, and we will use this information to improve the models.
	3-7	Other sources of fatalities should be included in the cumulative impact analysis. In the same way that the FWS uses a Bayesian model to calculate risk to eagles at a wind project with many unknowns, FWS could use a similar model to calculate cumulative impacts from all sources using best available data in order to analyze population level impacts in the DEA.	This comment is noted and will be retained in our administrative record. We provided a detailed and thorough cumulative impact analysis (see FEA Section 4.2.1.2.2). For this analysis, we determined the quality of data did not allow for reasonable extrapolations about other sources of mortality in the local-area population.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-8	The sensitivity of the Bayesian fatality estimation model to the inconsistent and incomplete data inputs described above is unknown and has been insufficiently explored in the DEA. Perform a sensitivity analysis to document that the Bayesian mortality model is insensitive to the data inputs used for eagle exposure and collision probability, these inputs were constructed using data incompatible and/or inconsistent with the ECP Guidelines, and insufficient evidence has been presented that this is not affecting the mortality estimates produced by the model. If data inputs strongly affect results, FWS should perform the studies needed to obtain more precise mortality model inputs.	We used the existing data and best science available to predict risk. The ECP analyzed risk using observed collision rates developed from postconstruction monitoring results at adjacent wind projects in the Montezuma Hills WRA. These data were extrapolated to predict projected collision rates at the Shiloh IV project of 0.5 eagle per year. Our Bayesian risk model used available eagle observational data to predict risk. We conservatively predicted a collision rate of 1 eagle per year. Therefore, we are comfortable with the data used for the model inputs and believe fatalities were conservatively estimated under this approach. While an additional sensitivity analysis will not be conducted at this time, the Service encourages project developers or operators to develop additional candidate models (both a priori and post hoc) for direct comparison with, and evaluation of, the baseline model and modeling approach as described in out ECP Guidance (Service 2013). Our ability to learn over time and reduce uncertainty by incorporating new information into our modeling approach through an adaptive management framework enables us to improve site-specific estimation of eagle fatalities, reduce uncertainty in predictions, and, ultimately, improve management decisions relating to eagles and wind energy in a responsible and informed way. Rigorous postconstruction monitoring is a critical component of evaluating model performance over time.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-9	The FWS should set a precedent for a national approach to estimating golden eagle population and trend that is based on sound data, which accumulates certainty over time. Areas where wind development and eagle use coincide must be prioritized for golden eagle population surveys that follow the WGES protocol and provide sufficient sampling to provide usable population estimates, and do so within a shorter time frame so as to provide a robust foundation for eagle take permits.	This comment is beyond the scope of the analysis in this EA. The Service is using population estimates developed to support the 2009 Final Rule for eagle permitting and subsequent guidance. As additional population surveys and data become available, we will refine and update our population estimates.
	3-10	Estimates of fatalities within the local area population must be improved through mandatory eagle mortality monitoring and reporting for all WRAs, as well as comprehensive estimation process that includes all sources of mortality, including vehicle collisions, illegal hunting, and poisoning.	Comment noted. This comment is beyond the scope of this analysis. Most new projects do conduct mortality studies. Wind facility operators within the Montezuma Hills WRA are required by Solano County to conduct 3 years of mortality monitoring. In the Altamont Pass WRA, efforts to reduce mortality have resulted in ongoing mortality monitoring studies. For newer projects, Kern County also requires mortality monitoring studies for projects within the Tehachapi WRA. In addition, many projects apply for bird carcass collection/salvage permits. As conditions of these permits, the operators are required to report dead or injured birds to the Service. For this project, the applicant's ECP includes fatality monitoring, and this will inform the need for ACP implementation and mitigation. The permit will require the operator to report any fatalities. We will continue to encourage and coordinate needed research on other sources of mortality. For this analysis, we determined the quality of data did not allow for reasonable extrapolations about other sources of mortality to the local area population.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-11	The DEA and the ECP should analyze the impacts of this mortality on the populations of Golden Eagles in their home territories if they are migrating or floaters. The ECP should focus on all eagles not just resident eagles or eagle nests.	The DEA analyzes the potential impacts of the project on golden eagles, including adults, juveniles and floaters. The cumulative effects analysis is intended to address potential effects on the larger local area population. No additional analysis is proposed.
	3-12	Establish a fully transparent and defined process for implementing an adaptive management framework that includes a clear strategy for monitoring the effectiveness of specific strategies in reducing eagle mortality. This framework should also include a clear process for formal review of the TAC, public input and permit revisions where warranted-and shall be incorporated into the permit terms and all decision documents.	Because this authorization will be issued and overseen by the Service, we have determined that the term "TAC" was misused in the DEA. That language has been rectified in the FEA (see Section 2.2.5.4). Instead, our National Eagle Programmatic Permit Implementation Team (EPPIT) team will be involved in permit oversight and decision-making as appropriate. The EPPIT is composed of eagle permit coordinators and raptor biologists from each of our nine Service Regions. This team includes topical experts and scientists from the Service and the USGS as needed. The Service's Pacific Southwest Region will consider recommendations from the EPPIT, although we retain all decision-making authority over this permit and its adaptive management process. Therefore, a defined process cannot be established at this time because new information and data influences our decisions on an annual basis. We have provided a framework for the initial steps and have a team in place to ensure they will be effective. Updates will be provided to the public via the CA-NV Golden Eagle Working Group, the Solano County TAC for the Montezuma Hills WRA, and our Pacific Southwest Region's website. CA/NV Golden Eagle Working Group *http://www.dfg.ca.gov/wildlife/nongame/GEWG/* Solano County Wind Turbine Projects Avian Reports *http://www.solanocounty.com/depts/rm/planning/commercial_wind_turbine_avian_behavior_n_mortality_reports.asp* Pacific Southwest Region's Website Eagle Page *http://www.fws.gov/cno/conservation/MigratoryBirds/EaglePermits.html*

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-13	Require the applicant to reconfigure the project layout by removing and/or relocating turbines in high avian use areas, near known eagle nests and breeding areas. Additionally, require removal of hazardous turbines in a specified timeframe triggered by mortality above permit allowance.	The project has been constructed and is currently operating. Consequently, there are not options to reconfigure the project layout. Based on available data, recommending relocation of existing turbines is not warranted. Recommending the removal of turbines deemed hazardous could be considered in the future under the adaptive management process if data indicate a significant problem and ACPs prove to be ineffective.
	3-14	Step 1 in the ACPs should also include observer-triggered or radar triggered temporary wind turbine shutdowns.	We developed an experimental ACP stepwise approach to adaptive management (see EA Table 2-2). This process requires implementation of additional measures as collision incidents increase. These measures could include additional monitors, radar systems, or—in the event of a high number of fatalities—seasonal curtailment. Curtailment would not be warranted until the applicant approached or exceeded the level of eagle take authorized.
	3-15	Include in the ACPs as one of the first steps to require seasonal curtailment based on results from monitoring both seasonal avian use and trends in mortalities throughout the year. Seasonal curtailment of turbines should be based on a percentage of the total annual operating hours of the facility and should be of sufficient time to result in actual minimization of eagle mortality. Increases in seasonal curtailment should be considered as an ACP if mortalities continue to occur in seasonal patterns.	Please see response to 3.14 above.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-16	The TAC should be tasked with specific goals and timelines outlined in the ECP, and include third party scientists and members of the public with expertise regarding issues related to eagles in California. Proceedings from the TAC should be available for public review and comment.	Please see response to 3.12 above.
	3-17	Develop a full suite of mitigation options that will fully offset take before it has occurred and ensure ongoing incorporation into the permit terms and conditions.	The applicant has proposed to compensate by ensuring power pole retrofits will be completed on high-risk poles. This remains the best, most assured way to reduce eagle fatalities. Further, ACPs are intended as another means to avoid and minimize mortality to eagles should it occur at or above the frequency estimated. With enough reliable information, any compensatory mitigation that directly leads to a measureable increased number of eagles (e.g., habitat restoration) or the avoided loss of these eagles (e.g., reducing vehicle/eagle collisions, lead ammunition abatement, etc.) could be considered for compensation for future permits. If issued, the permit would contain conditions requiring implementation of compensatory mitigation within 1 year of permit issuance.
	3-18	Incorporate additional terms to help provide mitigation assurances, such as the utility electrocution risk assessment used to identify the specific power poles to be retrofitted, an implementing agreement to ensure that power pole retrofits will not be redundant, and bonds to ensure that funds will be available. Clarify a standard and criteria for identifying power pole retrofits suitable for future mitigation.	The Service worked with PG&E to select an appropriate mitigation site. This site was selected because of higher fatality rates and known nearby nest locations. The retrofits are not duplicative of PG&E's other obligations to retrofit poles. We updated the Compensatory Mitigation Section under Section 2.2.5.3 of the FEA to better describe our methodology used to select power poles to be retrofitted for this permit's compensatory mitigation package. A copy of the contract or implementation agreement will be provided to the Service prior to our potential permit issuance. Creating a retrofit standard is beyond the scope of this specific action.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-19	Intensity and frequency of monitoring should remain at the first year level until the TAC determines adjustments should be made.	This comment is noted and will be retained in our administrative record. The Service will require monitoring as outlined in the FEA. Additional monitoring is proposed based on increasing fatalities. Monitoring will continue through the duration of the permit, although the level of monitoring may decrease after initial detailed surveys have been conducted.
	3-20	The FWS should provide specific guidelines in the eagle permit for designing BACI studies before and after a certain conservation practice is implemented.	Detailed BACI studies are not proposed at this time but may be developed based on documented fatalities and efforts to validate the effectiveness of the ACPs.
	3-21	The eagle permit and the ECP should include more specifics regarding the post-construction effectiveness monitoring protocols and the process by which the results will be used to determine the effectiveness of mitigation measures.	Shiloh IV's ECP (EA Appendix A, Section 5.1) and BBCS (EA Appendix B, Section 4.1.2) both describe the protocol currently being implemented for the project's post-construction monitoring study. Annual post construction monitoring is being conducted for 3 years from the initiation of power delivery, with the possibility of extending the monitoring period if results warrant such an extension. Under the selected Alternative 3, additional mortality monitoring consists of monitoring all turbines monthly for at least the first year to provide assurances that any potential eagle take is detected. Subsequent annual monitoring will be determined by the Service in coordination with the applicant based on the results of the first year's intensive mortality monitoring. We will use the post-construction monitoring data to (1) assess whether compensatory mitigation is adequate, excessive, or deficient to offset observed mortality, and make adjustments accordingly, and (2) explore adaptive management implementation or operational changes that might be warranted at a project after permitting to reduce observed mortality and meet permit requirements.
	3-22	FWS should establish a system whereby post-construction monitoring is conducted by a third-party qualified biologists and observers who report information directly to the FWS.	This comment is noted and will be retained in our administrative record. The Service is satisfied with the applicant hiring qualified biologists to survey and report on fatalities. The permit will include a requirement to report findings to the Service; false or inaccurate data could trigger permit revocation.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-23	FWS should establish a reporting system that tracks the entire Montezuma Hills WRA and shares it with the public.	This comment is noted and will be retained in our administrative record. This request is beyond the scope of this analysis. In addition, Solano County already requires each new wind facility under its jurisdiction to conduct mortality monitoring for a minimum of 3 years. Those reports are publically available through the county. Solano County Wind Turbine Projects Avian Reports *http://www.solanocounty.com/depts/rm/planning/commercial_wind_turbine_avian_behavior_n_mortality_reports.asp*
	3-24	FWS should actively enforce federal laws regarding the Eagle Act.	The Service is working to ensure compliance with the Eagle Act through encouraging wind companies to seek permits and through enforcement investigations and actions where appropriate.
	3-25	Detail the process to revise or potentially terminate permits.	If the Service were to consider a permit revision, we would evaluate if effects were within the context of this EA and our Finding of No Significant Impact. If so, we would issue the revised permit. If we determine that a proposed permit revision needed further analysis, we would prepare a supplemental EA or EIS as appropriate prior to issuing a revised permit. Our permit regulations contain a provisions for permit revocation. Under 50 CFR §13.28 Parts (a) and (b) contain Criteria for Permit Revocation and Procedures for Revocation, respectively. Procedures for revocation are as follows. When the issuing officer believes there are valid grounds for revoking a permit, the permittee shall be notified in writing of the proposed revocation by certified or registered mail. This notice shall identify the permit to be revoked, the reason(s) for such revocation, the proposed disposition of the wildlife, if any, and inform the permittee of the right to object to the proposed revocation. The issuing officer may amend any notice of revocation at any time.
	3-26	Issue a permit that protects the population.	We agree that eagle populations must be protected. The Eagle Act requires us to provide for stable or increasing breeding populations of eagles. We believe that issuance of thoughtfully developed permits can help ensure that populations are maintained.
California Wind Energy Association and American Wind Energy Association	4-1	Clarify that operation of the wind project is not the basis for the federal action.	The DEA does describe the project as existing and operating. We made a minor clarification to the FEA purpose and need (FEA Section 1.3) to indicate that the analysis is for issuance of a permit to the *operational* Shiloh IV Wind Project.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	4-2	Correct misstatements related to "lost" territories.	The Service stands by its assessment that the viability of these nesting areas has been degraded primarily by wind production. While there remain some nesting features, this area will likely remain a population sink if young eagles fledge and are killed in the WRA. The Service did not presume each nest was a territory but does believe there were multiple territories in this area historically.
	4-3	Include all sources of eagle mortality.	This comment is noted and will be retained in our administrative record. We provided a detailed and thorough cumulative impact analysis. For this analysis, we determined the quality of data did not allow for reasonable extrapolations about other sources of mortality in the local-area population.
	4-4	Use consistent methodology for cumulative impacts.	This comment is noted and will be retained in our administrative record. We provided a detailed and thorough cumulative impact analysis with a consistent methodology (see FEA Section 4.2.1.2.2). As stated in the above response, we determined the quality of data did not allow for reasonable extrapolations about other sources of mortality in the local-area population.
	4-5	ACPs in stepwise table (Table 2-2) don't contribute to reducing net loss per se.	The Service disagrees. The stepwise table is needed to ensure effects are avoided and minimized, and retrofit mitigation is needed to ensure that any residual impacts are offset. It will be the combination of these measures that ensures that the no net loss standard is met.
	4-6	Alternative 4 is not practicable and should be removed from consideration.	We are required to evaluate a range of alternatives that would allow us to achieve our purpose and need. This comment is noted and will be retained in our administrative record.
	4-7	Include more information on climate change and eagles.	We revised Section 3.2.2 to expand our analysis on climate change and eagles.
	4-8	Correct terminology related to fatalities.	We have reviewed the use of the word "take" in the EA and determined it is applied appropriately based on context. Only unintentional take may be authorized under the regulation in which the permit was requested. No changes were made.
	4-9	Information regarding enforcement should be removed from the EA.	The Service will retain language regarding enforcement, as without a permit, take of eagles would be unpermitted and in violation of the Bald and Golden Eagle Protection Act.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	4-10	Monitoring should be limited to eagles.	The 3-year monitoring study currently being implemented is consistent with the California Energy Commission Guidelines (California Energy Commission and California Department of Fish and Game 2007), which are generally consistent with the Service's Land-Based Wind Energy Guidelines (U.S. Fish and Wildlife Service 2012. If issued, the permit would contain eagle monitoring requirements to ensure compliance with permit conditions. Our NEPA analysis made the determination that this project would not have significant impacts on birds. Mortality monitoring of all birds and bats will allow us to evaluate our determination and make recommendations to further minimize impacts on birds should data indicate a problem.
	4-11	Retrofits will more than mitigate effects.	We provided a worst-case estimate of potential fatalities and also conducted a REA that shows the number of retrofits required to mitigate these effects. Even so, there remains some uncertainty regarding the overall benefit achieved by such mitigation. Therefore, we will not make any changes to Alternative 3.
Napa-Solano Audubon Society	5-1	One permit needed for all projects in the area. Financial obligations should be the same for all applicants.	This comment is beyond the scope of this analysis, although we will continue to encourage other wind project owners in the Montezuma Hills WRA to apply for programmatic eagle permits.
	5-2	Consider 10 miles from edge of WRA.	Our guidelines ask applicants to evaluate eagle use and local breeding populations within 10 miles of the project site, and this was done. Expanding the radius by several miles to include other properties in the WRA is not requested and is not expected to change the findings in this analysis as it would primarily add agricultural lands to the east of the site. Furthermore, in the cumulative effects analysis, we included available information from the Altamont Pass WRA.
	5-3	Loss of breeding population at this location.	Historically, the Montezuma Hills area likely supported more breeding territories than it does today. As discussed in FEA Section 3.2.3, we believe some breeding territories have been lost due to operational impacts of facilities within the Montezuma Hills WRA. The Service does not expect the entire breeding population within 10 miles of this project to be lost due to operations of this project. Nesting within the WRA appears to have been impacted by the numerous wind projects in the area, but eagles still are nesting outside the Montezuma Hills WRA and in its vicinity. The Service has already addressed potential mitigation needs for eagles in the vicinity and local area population. Further, utility retrofits are expected to help the Service make sure operations of Shiloh IV will not impede our management goal of providing for stable or increasing breeding populations of eagles.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	5-4	Mitigation should be at the site, and not just within the regional population.	The Service disagrees that mitigation at a distance will not provide value for the local population. The Service is focused on the entire local-area population, and the identified site is within an area of high eagle use and has repeated eagle fatalities. Further, there have been some enhancements onsite including removal of the older turbines and undergrounding of electric collection lines. Poles could be retrofit in Solano County; however, there are far fewer nests in that area, and the benefits to eagles are expected to be lower. We will continue to work with the owners of the Solano County utility poles, encouraging them to retrofit those poles.
	5-5	Number of poles appears arbitrary.	The DEA indicated that the number of poles is based on the Service's REA. The REA is based on the methods outlined in the 2013 ECP Guidance (Service 2013). We have made available the REA spreadsheet used to calculate the compensatory mitigation owed; see Appendix D of the FEA.
	5-6	PG&E should be providing mitigation at the impact sites.	PG&E has been retrofitting poles in this area consistent with its Avian Protection Plan (i.e., replacing the incident pole and the five adjacent poles). However, the area presents a high risk to eagles, and the Service supports additional retrofits in this area. We have revised FEA Section 2.2.5.3 to more fully explain how this utility is already retrofitting poles, and this work will be above and beyond the level of retrofit work currently recommended to protect eagles.
	5-7	Look at other options including protecting existing nests and adding new nesting platforms.	The Service will continue to explore other eagle mitigation options; however, retrofits currently appear to the most successful way to reduce fatalities of eagles in this local population area. We would not want additional nests or platforms in the WRA as this will continue to result in exposing eagles to a mortality factor; however, the Service may explore additional nest protection options as part of the ACPs required for projects.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	5-8	Monitoring should be expanded to include all producers and include a larger area and scope.	The first part of this comment suggests that monitoring should be expanded to include all producers and include a larger area. Expanding the scope of the monitoring program to the entire WRA would be beyond the scope of this analysis. Even so, wind facility operators under Solano County's jurisdiction all, at a minimum, conduct their monitoring in accordance with the California Energy Commission Guidelines (California Energy Commission and California Department of Fish and Game 2007), which are generally consistent with the Service's Land-Based Wind Energy Guidelines (U.S. Fish and Wildlife Service 2012). In addition, we will continue to encourage other windfarm operators in the WRA to seek eagle take permits. The second part of this comment addresses Shiloh IV's project-specific monitoring. The Service is satisfied with the monitoring program that is proposed, although the EA considers expanding the current monitoring of 50% of the turbines up to 100% of turbines for a minimum of 1 year. This approach will provide documentation of eagle take incidents during the first year at a minimum. Additional mortality monitoring to evaluate the effectiveness of experimental ACPs may be required if fatalities are as high as the Service estimates (see EA Table 2-2).
Center for Biological Diversity	6-1	Micro-site turbines.	The project has been constructed and is currently operating. Consequently, there are not options to reconfigure the project layout. Removal of turbines deemed "hazardous" could be considered in the future under the existing ACP adaptive management process (see EA Table 2-2).
	6-2	Agree that permit should be no longer than 5 years.	Comment noted.
	6-3	Consider fewer turbines, onsite monitor, radar system, and seasonal curtailment.	We developed an experimental ACP stepwise approach to adaptive management (see EA Table 2-2). This process requires implementation of additional measures as collision incidents increase. These measures could include additional monitors, radar systems, or—in the event of a high number of fatalities—seasonal curtailment. Reducing the number of turbines is not proposed at this time as there is no evidence that certain turbines are more risky than others. The Service analyzed seasonal curtailment under Alternative 4.
	6-4	Consistent timeframes and methodologies are needed.	Expanding the scope of the monitoring program to the entire WRA would be beyond the scope of this action. This comment is noted and will be retained in our administrative record. Please also see response to comment 5-7.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	6-5	Extend membership to those outside the Service.	Several other organizations have requested clarity on the TAC. The process to make changes to minimization measures required under the permit is primarily an agency function as part of our permit oversight responsibilities. Our agency's our National Eagle Programmatic Permit Implementation Team (EPPIT) team will be involved in permit oversight and decision making as appropriate. The EPPIT is composed of eagle permit coordinators and raptor biologists from each of our nine Service Regions. This team includes topical experts and scientists from the Service and the USGS as needed. This team seeks outside expertise on an as-needed basis. The Service's Pacific Southwest Region will consider recommendations from the EPPIT, although we retain all decisionmaking authority over this permit and its adaptive management process. Therefore, a defined process cannot be established at this time because new information and data influences our decisions on an annual basis. We have provided a framework for the initial steps and have a team in place to ensure they will be effective. Updates will be provided to the public via the CA-NV Golden Eagle Working Group, the Solano County TAC for the Montezuma Hills WRA, and our Pacific Southwest Region's website. CA/NV Golden Eagle Working Group *http://www.dfg.ca.gov/wildlife/nongame/GEWG/* Solano County Wind Turbine Projects Avian Reports *http://www.solanocounty.com/depts/rm/planning/commercial_wind_turbine_avian_behavior_n_mortality_reports.asp* Pacific Southwest Region's Website Eagle Page *http://www.fws.gov/cno/conservation/MigratoryBirds/EaglePermits.html*
	6-6	Pole owner responsibility.	Eagle take is a known problem on utility power lines, and we agree that utility companies have their own responsibilities to rectify eagle take caused by electrocution and line collision. Therefore, prior to proposing a mitigation package for Shiloh IV, we evaluated multiple candidate utility companies' avian protection policies and retrofitting schedules. We revised FEA Section 2.2.5.3 to more thoroughly describe our process.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	6-7	Decommission problem turbines and acquire habitat off-site.	Shiloh IV's BBCS (EA Appendix B) summarizes conservations measure commitments made as part of its permitting and environmental compliance process prior to construction. The project provided offsite mitigation habitat suitable to support raptors, including golden eagles as required under their Solano County Conditional Use Permit. We have retained some flexibility with respect to implementation of ACPs. However, we currently believe the mitigation proposed will be the most effective to manage for no net loss to eagle populations and mitigating the effects of the project.
Public	**Public**		
Meyers, Frederick	1	Capture and relocate birds.	We do not believe this is an effective approach to avoiding and minimizing impacts on golden eagles. We are aware of the work of researchers at UC Davis, and they have helped with injured birds.
Mahan, Ron	2	Use other technology to protect birds.	The Service acknowledges the technology is evolving to protect birds. However, this project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act.
Ambriz, Kelly	3	Opposes permit.	The commenter expressed concerns about bald eagle, which is not expected to be impacted. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. Impacts on bald eagles are not expected; see FEA Section 2.2.5.1 and 3.2.3 for more information. This comment is noted and will be included in the administrative record.
Wilson, Mark D.	4	Opposes more wind turbines.	This project is currently constructed and operational, and the Service is evaluated its ability to comply with the Eagle Act's permit issuance criteria. This comment is noted and will be included in the administrative record.
Cook, Adrianne	5	Opposes permit.	This project is currently constructed and operational, and the Service is evaluated its ability to comply with the Eagle Act's permit issuance criteria. This comment is noted and will be included in the administrative record.
Richardson, Karen	6	Opposes giving wind companies an exemption to federal law.	This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. We are not proposing to provide any applicant a variance under existing law. See FEA Chapter 1 for more information about the proposed action and our regulatory authority. This comment noted and will be retained in our administrative record.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
Komadina, James	7	Opposes killing raptors.	This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. We are not proposing to provide any applicant a variance under existing law. See FEA Chapter 1 for more information about the proposed action and our regulatory authority. This comment noted and will be retained in our administrative record.
Jojola, Sam	8-1	Better technology is needed prior to issuing 5-year permit.	This comment is noted and will be retained in our administrative record. We believe 5-year durations are appropriate and protective of eagles. The analysis is based on the current facility, and additional technological modifications may be implemented if ACPs are needed as described in FEA Section 2.2.5.4.
	8-2	Oppose 5-year permit.	This comment is noted and will be retained in our administrative record.
	8-3	Modify technology and shut off turbines.	The analysis is based on the current facility, and additional technological modifications and/or curtailment (shutdown) may be implemented if ACPs are needed as described in FEA Section 2.2.5.4. In addition, under EA Alternative 4, we considered permit issuance with an upfront seasonal curtailment of turbines. This comment is noted and will be retained in our administrative record.
	8-4	Recommends 1-year permit.	Issuance of a programmatic take permit for a 5-year duration will be implemented consistently with federal law. The Service finalized the eagle permit Final Rule in 2009 to allow permit issuance on a limited basis. This comment is noted and will be retained in our administrative record.
	8-5	Concerned about monitoring.	Monitoring and reporting eagle and bird deaths will inform our adaptive management process. See FEA Section 2.2.5.4 for a complete description of the adaptive management process and how it is triggered by mortality monitoring and reporting. This comment is noted and will be retained in our administrative record.
	8-6	Concerned Service is too quick to mitigate.	Comment noted.
	8-7	Concerned about subsidies to wind industry.	Comment noted
	8-8	Other laws.	Comment noted.
	8-9	Migratory bird impacts.	Impacts on migratory birds are discussed and analyzed in FEA Sections 3.2.4 and 4.2.3.4.4. The Solano County TAC meets regularly to evaluate mortality studies. The Service and state wildlife agencies participate in this process.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
Keenan, James	9	Opposes permit issuance, wants fines.	This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. This comment is noted and will be retained in our administrative record.
Vanderbrink, William	10	Opposes permit issuance, wants fines.	Commenter expressed concerns about the American bald eagle, which is not expected to be impacted. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. Impacts on bald eagles are not expected; see FEA Sections 2.2.5.1 and 3.2.3 for more information. This comment is noted and will be included in the administrative record.
Cummins, Melissa	11	Opposed to permit.	This comment is noted and will be included in the administrative record.
Consiglio, Lois	12	Opposed to permit.	Commenter expressed concerns about the American bald eagle, which is not expected to be impacted. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act's permit issuance criteria. Impacts on bald eagles are not expected; see FEA Sections 2.2.5.1 and 3.2.3 for more information. This comment is noted and will be included in the administrative record.
Alexander, Larry	13	Technology and curtailment.	The analysis is based on the current facility, and additional technological modifications and/or curtailment (shutdown) may be implemented if ACPs are needed as described in FEA Section 2.2.5.4. In addition, under EA Alternative 4, we considered permit issuance with an upfront seasonal curtailment of turbines. This comment is noted and will be retained in our administrative record.
Dopler, Jana	14	Opposed to permit.	Comment noted.
White, John	15	Opposed to permit.	This project is currently constructed and operational, and our EA analyzed Shiloh IV's ability to comply with the Eagle Act permitting regulations. This comment is noted and will be retained in our administrative record.
Thompson, Virginia	16	Recommends Alternative 3.	Alternative 3 was identified in the DEA as our Preferred Alternative. This comment is noted and will be retained in our administrative record.
Nygaard, Rochelle	17	Opposed to permit.	The commenter clearly did not read the DEA. This comment is noted and will be retained in our administrative record. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
Schroder, Lucinda	18	Opposed to permit.	This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act. Refer to the FEA Sections 1.3, 1.4.1, and 1.4.2. for further explanation the Eagle Act take regulations, permit issuance criteria, and our position on MBTA take. This comment is noted and will be retained in our administrative record.
Brown, Patrick W.	19	Opposed to permit.	This comment is noted. We only considered issuance of a permit to take golden eagles; impacts on bald eagles are not expected (Section 2.2.5.2). Section 1.5.2 1.1 and 1.3 of the FEA describe that permits may only be issued if doing so is compatible with our goal of maintaining stable or increasing populations of eagles.
Frost, Ed	20	Opposed to permit.	This comment is noted. Section 2.2.5.4 discusses the adaptive management process and what would happen should eagle take exceed the authorized amount of five eagles over 5 years. Shiloh IV has committed to substantial measures to avoid population level impacts on golden eagles. Adaptive management, monitoring, and reporting is required as described in FEA Table 2-2.
Valdez, Roberto	21-1	Opposed to permit.	This comment is noted and will be retained in our administrative record. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act permit issuance criteria and NEPA.
	21-2	Large regional impacts.	We considered regional impacts when conducting our analysis in FEA Sections 4.2.1.2.2 and 4.2.3.4. We used the best available science and the analytical tools as described in our National ECP Guidance (Service 2013) to assess local and regional impacts. Our assessment indicates that permit issuance will offset eagle population impacts caused by the operations of Shiloh IV, helping us to manage for stable or increasing eagle populations. We will continue to factor in regional information when individual eagles are killed and adaptively manage this permit as described in the FEA. Prior to considering re-issuance of this permit once it expires after 5 years, new data would be considered in our permit evaluation. A broader analysis and review of sustainable harvest rates is beyond the scope of this project and EA.
	21-3	Concerned about reporting and preservation of local eagles.	We will require ongoing monitoring to detect and require reporting of eagle fatalities. If fatalities increase, ACPs will help avoid further impacts. We will continue to encourage measures to reduce mortality from the sources identified in the FEA, including the Shiloh IV project and at neighboring wind facilities. The ACPs and mitigation described in the applicant's ECP are intended to minimize ongoing take at Shiloh IV and ensure the project results in no-net-loss to eagles at the population level.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
McNamara, Bruce and Marie	22-1	Opposes permit and wants mandatory reporting.	This comment is noted. This project is currently constructed and operational, and the Service is evaluating its ability to comply with the Eagle Act. Mortality monitoring and incidental reporting is required under a permit.
	22-2	Survey adequacy.	The Service is requiring robust survey methodologies to validate fatality assumptions.
	22-3	Other projects.	These comments are noted and will be retained in our administrative record. The commenter provided approximately 55 full pages of transcripts, figures, and exhibits for a wind project in Minnesota. These are available for public review from the Service, but are not reproduced here because we find that they are not responsive to the analysis for the Shiloh IV DEA.
Tribal	**Tribal**		
Buena Vista Rancheria (Lwenya, Roselynn)	1-1	Include more information on tribal considerations.	The DEA did not analyze tribal protocols related to obtaining and using eagle feathers, but rather analyzed the impacts of the project and described what would happen if dead eagles were found. Because of the limited number of fatalities anticipated, the Service believes that issuance of the permit is not anticipated to interfere with tribal practices. Regarding the questions posed by the tribe, the Service is willing to discuss the specifics with the tribe.
	1-2	Tribal involvement in surveys, training, etc.	Please see response above. The Service will work to make the process as culturally sensitive as possible, although we do not agree that the tribes need to be involved in every step of the survey, training, and AMM process.
	1-3	Consider cultural landscape.	Under the National Historic Preservation Act (1966) as amended in 1992, we do not find any grounds where the Shiloh IV project location is subject to Tribal Consultation 106 process with regard to American Indian Cultural Landscape. There is not a federally recognized tribe with a designated connection to this area for cultural or beneficial use, nor has a tribe established a historical connection to the property in question.
	1-4	Prefer Alternative 4.	Comment noted.
Washoe Tribe of Nevada (Cruz, Darrel)	2-1	No eagles should not be killed as it is contrary to the mission of the Service.	The Service finalized regulations in 2009 to allow the legal unintentional take of eagles when it is unavoidable and mitigation will result in no net loss to the population.
	2-2	The take is likely to be more than one eagle per year.	The Service has utilized the best available statistical methods, using the data available, to estimate the potential take from the project. We believe this statistical model is conservative, and therefore believe that the actual impact will be less than one eagle per year.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	2-3	Measures should be included to 1) reduce prey, 2) manage vegetation, 3) breed replacement eagles, and 3) install devices on turbines to avoid eagles.	The Service has worked with the applicant to develop an ECP, consistent with our Guidance, which includes feasible avoidance and minimization measures that we believe will further reduce the potential for take of golden eagles. Our evaluation determined the prey base is relatively low within the Montezuma Hills WRA due to the current rotational dry land farming practices. At this time, we do not believe that captive rearing of eagles is a feasible option to meet our management goals for eagles. As outlined in the adaptive management implementation process (EA Table 2-2), experimental audio visual deterrent devices may be required if specified eagle take thresholds are reached.
Kashia Band of Pomo Indians (Valencia, Emilio)	3-1	How long has Shiloh IV been operational?	Shiloh IV commenced operations in December 2012.
	3-2	Did permit process begin before the operations of the turbines? If so, why was it not received and the company allowed to initiate business?	The permit application was submitted for Shiloh IV on August 3, 2012. We were unable to process the permit request and complete the required NEPA analysis prior to the project commencing operations.
	3-3	Did Shiloh IV consider flight paths of eagles, bald and golden, before construction?	The eagle use data were collected prior to the release of our draft ECP Guidance (Service 2013) and was consistent with the available guidance at the time (California Energy Commission Guidelines [CEC 2007]). The data did not record flight paths, but it included flight height estimates and behaviors (i.e., flying, perched, etc.). Recent mortality monitoring studies from neighboring wind facilities gave us an indication of risk for this project, and we concluded the use data to be adequate for our analysis in this case.
	3-4	Were the power pole retrofits put in place before the July 2013 ECP or DEA were created?	We had not yet conducted our NEPA evaluation of the permit or its mitigation requirements at the time the ECP was drafted in July 2012. The 133 power pole retrofits (compensatory mitigation) will be required to be implemented within 1 year of permit issuance.
	3-5	Have there been any deaths of golden eagles since the inception of the wind project?	There have not been any eagle take incidents at Shiloh IV to date.
	3-6	The project should not have been in operation before the take permit was finalized.	There was no legal requirement for Shiloh IV to obtain an eagle permit prior to operations. Should take occur without a permit, an entity is then considered in violation of the Eagle Act.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-7	How can the Service issue a "take" permit for a bird of prey, that isn't listed, but protected, when we do not know the current population status?	Under the terms of the 2009 permit regulation and associated EA, eagle take permits that exceed take thresholds for the affected eagle management units, either singly or in combination with other analyzed forms of take, must require that the eagle take be offset so that there is no net loss to the breeding population. The Service is working with USGS to refine and improve population models for eagles that will better enable us to model and predict effects of authorized take on eagle populations. The permittee may be able to undertake additional conservation measures in the form of operational changes or compensatory mitigation if determined necessary.
	3-8	To take 5 birds within a 5 year period could decimate the population in this area, considering they typically don't pair up until 4 or 5 years of age.	This comment is noted. We do not anticipate being able to directly detect population-level responses to individual projects because it is not currently feasible to monitor eagle populations at such a fine scale. However, with monitoring and assessment of cumulative impacts, we may be able to better predict the effects of authorized take. The applicant may be able to undertake additional conservation measures in the form of operational changes or compensatory mitigation if determined necessary.
	3-9	Take of an adult breeding eagle can be much greater than take of a subadult.	We agree although the age classes of eagles killed in the Montezuma Hills, as in most WRAs, is not known well enough to make predictions of impacts on age classes. However, the Service's REA does include assumptions about various age class impacts and benefits associated with mitigation actions. The REA assumes that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% subadult, 45% adult). These estimates come from information contained in the 2009 Environmental Assessment for the Eagle Rule. In the REA, this age distribution is used in both the debit and credit sides of the calculations. Through the adaptive management process, we will learn more about the actual age distribution of eagles that are taken at wind facilities, and we will use this information to improve the models.

Organization Type/ Commenter Name	Comment #	Summary of Comment	Response
	3-10	An adult eagle, in predation mode could run in to turbines and be killed. If the eagles killed are mainly adults, this will severely harm the current population of eagles, certainly for golden eagles since the number of breeding pairs seems to be unknown.	Juveniles and sub-adults outnumber adults in the population, so some bias toward younger age classes would be expected if removal by electrocution were random. Moreover, mortality rates overall are higher for younger eagles, especially juveniles, than for adults, and this fact is taken into account in our REA. The REA and fatality estimates both consider the age of the eagle in their calculations. They assume that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% subadult, 45% adult). These estimates come from information contained in the 2009 Environmental Assessment for the Eagle Rule. In the REA, this age distribution is used in both the debit and credit sides of the calculations. Through the adaptive management process, we will learn more about the actual age distribution of eagles that are taken at wind facilities, and we will use this information to improve the models.
	3-11	It is imperative that the number of breeding pairs be determined, at least in California.	Under the terms of the 2009 permit regulation and associated EA, eagle populations were estimated using the best available information available. The Service is working with USGS to refine and improve population models for eagles that will better enable us to model and predict effects of authorized take on eagle populations. The permittee may be able to undertake additional conservation measures in the form of operational changes or compensatory mitigation if determined necessary.
	3-12	The allowance to take up to five golden eagles over a 5-year period is too many.	The Service has conservatively estimated the impact of up to five eagles. We will authorize take of up to five eagles, likely an over estimate to be protective of eagles. We are taking this approach to avoid underestimating eagle take and secure commitments for adequate mitigations. The stepwise ACP adaptive management approach includes measures to address additional avoidance measures to be implemented as eagle incidents occur. Please see our response to comment 6-3. This comment is noted and will be retained in our administrative record.
Abbreviations: ACP = Advanced Conservation Practice; BACI = Before/After Control/Impact Study; BBCS = Bird and Bat Conservation Strategy; DEA = Draft Environmental Assessment; ECP = Eagle Conservation Plan; EPPIT = Eagle Programmatic Permit Implementation Team; FEA = Final Environmental Assessment; MBTA = Migratory Bird Treaty Act; REA = Resource Equivalency Analysis; USGS = U.S. Geological Survey			

Comment Letters

FED 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

NOV 27 2013

Heather Beeler, Eagle Permit Specialist
United States Fish and Wildlife Service
Division of Migratory Bird Management
2800 Cottage Way, W-2650
Sacramento, CA 95825

Subject: Draft Environmental Assessment for Shiloh IV Wind Project Eagle Conservation Plan

Dear Ms. Beeler:

The U.S. Environmental Protection Agency has reviewed the above document pursuant to the National Environmental Policy Act, the Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

EPA continues to support increasing the development of renewable energy resources in an expeditious and well planned manner. Using renewable energy resources such as wind power can help the nation and California meet energy requirements while reducing greenhouse gas emissions. We encourage the United States Fish and Wildlife Service to apply its regulatory authorities in a manner that will promote a long-term sustainable balance between available energy supplies, energy demand, and protection of ecosystems and wildlife populations.

We appreciate the opportunity to review the DEA and commend the USFWS on its effort in developing a comprehensive plan and recognize the importance of the issuance of an Eagle Take Permit. Based on our review of the DEA we have the following suggestions for your consideration.

The DEA has identified a 5 percent rate of take for the total estimated local-area eagle population and extrapolated an acceptable level of no more than 25 golden eagles be removed (pg.31). However, it is unclear whether the age of the eagle was considered in this analysis. Given the importance of breeding adults and floaters, as indicated on pg. 28, we recommend that USFWS consider expanding the analysis in the FEA to include the impact of removing adult versus juvenile birds. In addition, should this additional analysis result in altered take adjustments and subsequent mitigation, we suggest that the new information be included in the FEA. 1-1

The DEA indicates that mitigation for take of eagles involves power pole retrofits which are anticipated to prevent eagles from electrocution. The document further acknowledges that it is difficult to predict whether the birds saved will be breeding adults, juveniles, or floaters; however, the Resource Equivalency Analysis assumes that the losses to electrocution are proportional to the demographic distribution of the population (pg. 29). However, according to a recent study, most Golden Eagles electrocuted on power lines in North America (>90% in some studies) are immature or subadult birds (Boeker and Nickerson, 1975and Benson, 1981). Susceptibility of immature Golden Eagles to electrocution involves several factors, but none is more important than flying and hunting experience. Inexperienced birds are less adept at landings and take-offs, and thus are at greater risk (section 5.2.5). [1] 1-2

[1] Lehman, Kenndey, Savidge, The state of the art in raptor electrocution research: A global review, 2007: http://www.sciencedirect.com/science/article/pii/S0006320706004150#bib26

Recommendations:

- Consider expanding on the methodology used to determine acceptable level of take and whether age of the eagle was considered. 1-1
- Consider discussing the impact of removing adult versus juvenile birds on the local population and whether the allowable take or increased mitigation should be adjusted if post-construction monitoring indicates a higher level breeding adult mortalities. 1-1
- Since studies have indicated that the majority of Golden Eagle electrocutions are juvenile birds, consider describing the methodology used to determine the recommended number of utility pole retrofits and whether this number will offset the anticipated take of adult birds. 1-2
- For post-construction studies, identify the age and sex of carcasses when possible to better understand the population dynamics of the local population.

As described in the DEA, PG&E established inspection cycles and record-keeping protocols for their utility distribution equipment includes inspection of the systems once a year (in urban areas) or once every 2 years (in rural areas) and detailed inspections every 3-5 years. The Service finds this inspection schedule to be acceptable for the purposes of the project's compensatory mitigation effectiveness monitoring (pg. 12). However, the DEA does not include a mitigation and monitoring plan to assess the effectiveness of this approach. EPA is concerned that the time between inspections may be too long to adequately monitor the effectiveness of retrofitting the utility poles since scavenger removal by predators may bias mortality estimates. Wind energy studies have indicated that scavenger removal between searches often causes underestimation of the actual avian mortalities. Electrocution studies have also shown that long sampling intervals prevents determination of the cause of death because of advanced decay. 1-3

Recommendations:

- Consider developing a mitigation and monitoring plan for the utility poles retrofits to facilitate assessment of the effectiveness of mitigation measures and ensure that the offset will adequately compensate for eagle take. Include the plan in the FEA.
- Consider shorter interval monitoring times to account for scavenger removal of carcasses. Include an adaptive management approach once mitigation effectiveness is determined.

We are available to discuss our comments. When the Final EA is released for public review, please send one hard copy and one electronic copy to the address above (mail code: CED-2). If you have any questions, please contact me at 415-972-3521, or Anne Ardillo, the lead reviewer for this project. Anne can be reached at (415) 947-4257 or ardillo.anne@epa.gov.

Sincerely,

Connell Dunning

FOR

Kathleen Martin Goforth, Manager
Environmental Review Office
Communities and Ecosystems division

ORG 1

November 10, 2013

Attention: Heather Beeler, Migratory Bird Program
US Fish and Wildlife Service Pacific Southwest Region
2800 Cottage Way, W–2605
Sacramento, CA 95825.

RE: Shiloh IV Wind Project DEA Comments

At this time the FWS really has no business giving out or even considering any "take permits" for Shiloh IV Wind or any other wind industry projects. With no reliable mortality data and no accurate mortality impact analysis from the habitats located in and around wind projects, the FWS service can not possibly have accurate knowledge to access any endangered species or any species of concern. 1-1

Serious flaws with Existing Wind Industry Mortality Data and Assessments
The wind industry has been hiding behind fraudulent studies and mortality monitoring for several decades. Voluntary regulations have created an environment with mortality impacts not being reported, or not properly studied. When mortality is studied the wind industry methodology is rigged with search areas far too small, improper search intervals, and the use of many other methods that are not scientific.

Also hidden has been the fact that these turbines are such prolific killers that in years to come these turbines will be the reason for the extinction of many species.

The blade strike slaughter applies to everything that flies that must share the same habitat with these turbines. This includes bees and other insects as well. For birds and bats the mortality footprint of every single turbine reaches out thousands of miles because of the migration patterns for these species.

My research into the wind industry indicates that the wind industry hides over 90% of their mortality with "their" studies. When taking into consideration methodology rigged to not find carcasses, I have calculated that the birds killed by these turbines are in the many millions each year in across America. 1-2

As the wind industry's turbines have grown larger and larger, mortality search areas for carcasses in studies have been deliberately left unchanged. Today the industry's turbines are 23-45 times larger but the search areas used in wind industry studies have remained about the same size. Along with these undersized search areas most of the carcasses are missed in their studies.

But the deception does not stop there. The industry is also using another trick in their search methodology. They are now not even searching for carcasses in their entire grossly undersized search areas. I call this the "percentage searched trick". With this trick searches are conducted on just a portion of the 50-60 meter diameter search areas. Some studies factor this in with contrived numbers some do not. In doing so they can

further avoid turbine carcasses thrown in a particular direction by the turbine blades, can have personnel flip the bodies a few feet out of designated search areas, and give false (high) searcher detection rates with studies conducted on bare soil or gravel left over from the turbine construction.

The wind industry uses the carcasses found in "their" designated undersized search areas for estimating mortality. For the industry carcasses found outside these areas are declared "incidental". This includes eagles and these fatalities do not count in the industry calculations and they pretend they do not even exist. Even birds seen killed by turbines during studies are not counted because they landed outside the tiny designated search areas (Lewes Turbine Delaware). Similar accounts of dismissed carcasses and undersize search areas also exist in past mortality studies conducted on the Shiloh and High Winds turbines.

The recent U.S. Fish and Wildlife Service finding that 85 eagles **were reported** killed at wind facilities in the entire United States over the last 15 years is grossly understated. This figure actually covers only the small percentage of eagles that were killed outside of the Altamont Pass Wind Resource Area (APWRA) by other wind energy facilities. The undercounting of actual eagle fatalities is due primarily to the lack of monitoring and reporting of eagle mortalities by wind farm facilities.

From the list of 85 eagle fatalities, it can be seen that blade-strike mortality of eagles is geographically widespread at wind energy facilities in the United States. The combination of food sources for eagles, soaring winds and wind turbines all occupying the same habitat will always produce eagle fatalities. This holds true for both Golden Eagles and Bald Eagles.

1-2
cont'd

At least half of America's wind projects are located in eagle habitat, and yet the numbers of eagle fatalities actually reported for these facilities are so low and inconsistent that many believe that a deliberate cover-up is taking place.

Examples of this flawed system exist throughout the West. The eagle habitat in Idaho and Montana is among the highest quality habitat available to Golden Eagles anywhere in North America, and yet neither state has **voluntarily reported** any golden eagle fatalities. Texas probably has the highest population of eagles and by far the most installed wind energy capacity in the contiguous 48 states, and yet it has **voluntarily reported just one eagle fatality** for the thousands of turbines that have been operating for decades. At one time, New Mexico reported some wind turbine related eagle deaths, but they **stopped reporting mortalities in 2008,** even though its installed wind energy has nearly quadrupled since the state first reported eagle mortality in 2004.

Today, the wind industry insists that the high eagle mortality at Altamont Pass is an aberration. While expecting the public to believe this claim, it is voluntarily concealing most eagle mortality at other wind farms by employing inept studies, simply not reporting eagle deaths, and even by conducting no studies at all.

All the turbines at Altamont pass have been shown to be prolific killers of eagles, including the industry's newest turbines. These are the same turbines installed at most

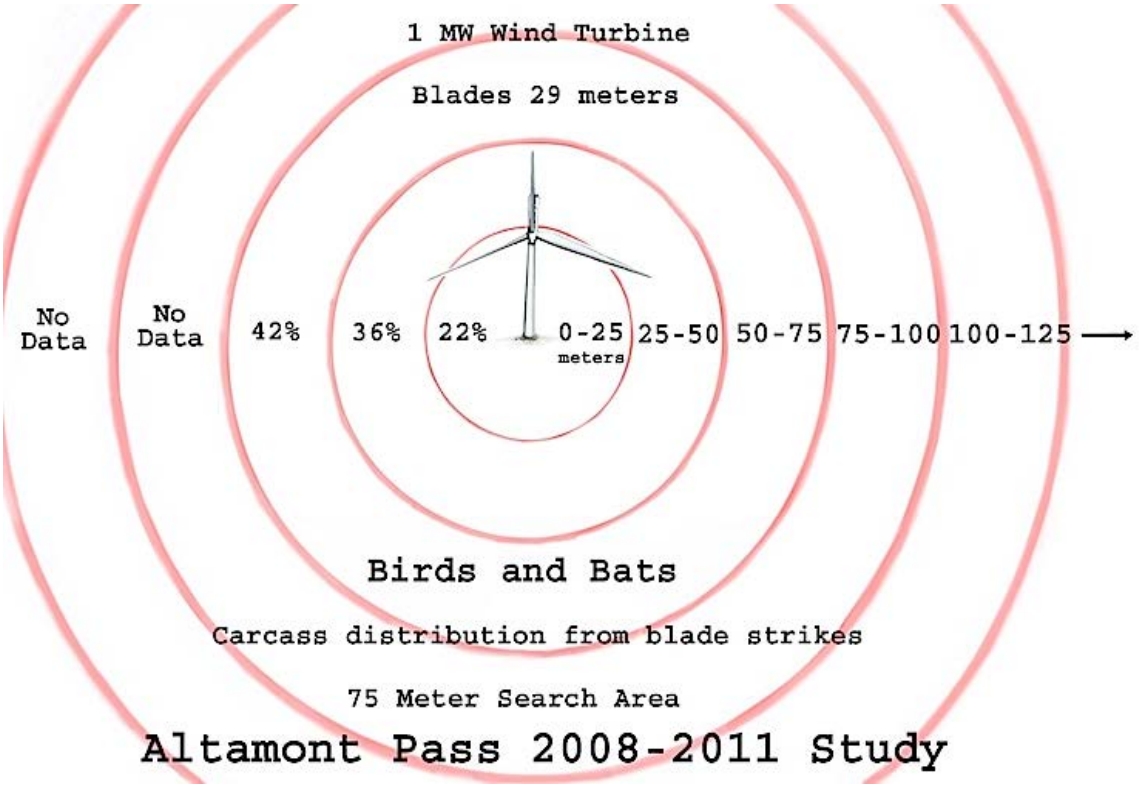
other wind farms. Fortunately the Altamont Pass Wind Resource Area happens to be one of the only wind energy facilities required to annually report and monitor eagle fatalities. Because of this, comparisons and projections can be made for eagle mortality at other wind projects located in eagle habitat, to contrast the number of deaths that would be expected with the number actually reported.

What is known from the last 15 years of studies in the eagle habitat at Altamont Pass is that approximately 1,200 Golden Eagles were killed by about 500 MW of installed capacity, for an annual death toll of 80 eagles. This is a death rate of 0.16 per MW/per year. In the Western States of California, Idaho, Colorado, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Wyoming and Washington, most of the industry's 32,000 MW of installed wind energy capacity is located in eagle habitat.

This is 64 times more installed capacity than found at Altamont. At a mortality rate of 0.16 per MW/per year, this represents the possibility that 4,800 Golden Eagles are being killed each every year, based on the installed capacity in these states.

Another important fact known about eagle/turbine mortality came from 2008 mortality study conducted at Altamont on 38 1-MW wind turbines. This wind farm is located not far from the proposed Shiloh IV Wind Project. From a one-year study, three golden eagles were reported killed by these turbines, even though mortality search intervals were excessive (a month apart) and search areas were three times too small – which means carcasses being carried off by scavengers in between searches, many landing outside the search areas, and other birds wandered off to die beyond the search perimeters (See image below). However, even at this mortality rate (0.08 per MW/per year), based on actual carcasses found, it is very possible that 2,560 golden eagles are killed annually in these 11 states.

1-2 cont'd



This image showing the pattern of wind turbine carcasses distribution can also be found in the studies conducted on the turbines located in the Montezuma hills. Using undersized search areas, searches still found about 75% of fatalities beyond the length of the turbine blades with search areas far too small. Most studies across America look primarily under the turbine blades.

But even if the actual eagle mortality is only a fraction of these two previous estimates, this still represents a devastating and unsustainable impact for Golden Eagle populations. Moreover, the wind industry plans to install at least 10-15 times their current installed capacity in the coming years. A large portion of this expansion will be taking place in the Golden Eagle habitat of these states. The Golden Eagle population in the lower 48 states cannot possibly survive this coming carnage.

The golden eagle population is in very serious trouble and most likely in a rapid state of decline in every Western State. A severe decline has already been shown to exist in Southern California. It came from evidence I found showing an 80-90 percent abandonment of Golden Eagle habitat. However – because of an absence of cumulative impact studies, rigorous monitoring, and accurate reporting of eagle mortalities by wind farm facilities – the public has still has no clue how devastating the wind industry's turbines have been to Golden Eagle populations.

1-2 cont'd

Of the 85 fatalities reported by the industry, Bald Eagles represented 7% of the total. This too is considerable and alarming, since most of today's wind projects are not located in Bald Eagle habitat. In the future, Bald Eagle mortality can be expected to rise dramatically, because the wind industry is rapidly expanding into Bald Eagle wetland habitats across North America. In a few short years, wind projects will most likely be killing hundreds of Bald Eagles annually.

It is vital that Federal law require competent, honest and accurate studies at every wind project located in eagle habitat, so that total mortality and the cumulative impacts from wind turbines on eagle populations can be better understood, and proper constraints are put in place, to keep these vital and magnificent birds from disappearing in numerous regions. Golden Eagles and Bald Eagles are protected species – with severe penalties imposed on any other persons or industries – and yet the wind industry is currently not required to disclose or even look for eagle mortality. Under these conditions wind turbine impacts will never be understood and eagle populations cannot possibly be managed or protected.

Important Facts Omitted from the Shiloh IV Draft Environmental Assessment

The Shiloh IV Draft Environmental Assessment discusses four golden eagle nest sites being located within the Montezuma Hills WRA boundary**. These four golden eagle nest sites or nesting territories are all abandoned;** this clearly shows the consequences of placing wind turbines in golden eagle habitat; adults are killed off, sub-adults are killed off, juveniles are killed off and territories are abandoned. Examples of this pattern of abandonment exist elsewhere in California but none were given.

1-3

Though not clearly stated in the Environmental Assessment this pattern of turbine related golden eagle mortality and territory abandonment is described on page 2-6 Appendix B ..... "Based on the data presented in reports for the High Winds and Shiloh I, II, and III projects, **there were seven known nesting attempts in five years (2001, 2004, 2005, 2006, 2007) in the vicinity of the Montezuma Hills WRA.** Three of those attempts produced at least one fledgling. One of the failed attempts involved two subadults. All three successful nests were at site 2, the Callahan Property. Based on these data, there have been no more than two pairs of golden eagles nesting in the Montezuma Hills WRA in any given breeding season**. Significantly, Curry & Kerlinger surveys of these nests since 2007 have indicated no further nesting activity within the Montezuma Hills WRA (ICF International 2011:Appendix B).** Consequently, with the possible exception of the two occupied territories GANDA (2011) located across the river south of the Montezuma Hills WRA, **the only recently active golden eagle nesting territory) in the vicinity of the Montezuma Hills WRA is the nest discovered in 2011 at Meins Landing, the outcome of which was not determined".**

1-3 cont'd

This statement above fails to note if the last golden eagle territory discovered in 2011 was actually occupied by two adults and if they produced eggs or offspring. I will also note that the Meins Landing territory, if occupied by golden eagles they would have probably been found dead (with proper monitoring and search methodology) somewhere around the turbines located in the Montezuma hills.

Considerations for issuing take permits include the health of the local and regional eagle populations, availability of suitable nesting and foraging habitat. So how will any of this territory abandonment factor into the FWS EAGLE CONSERVATION PLAN with their "no net loss" criteria? Will the FWS determine that since the turbines in the Montezuma hills have already wiped out the local golden eagle population so there will be not be any "no- net- loss" for the species? If so it does not work this way because the golden eagle habitat located in the Montezuma hills will always attract and kill golden eagles from great distances far outside the project boundaries as long as there is a food source. And how will the FWS access this mortality impact when they have no reliable regional population surveys or reliable wind turbine related mortality data?

The Environmental Assessment also mentions two recently active nests representing two eagle territories west and northwest of the proposed Shiloh IV project area, and two others to the southwest. The assessment fails to state which species are currently using these "recently active nests". This is very important because many different species use abandoned eagle nests which would make them "recently active". What is recent, 1 year, 5 years, or maybe 10 years? Were these recently active nests occupied by adult golden eagles and did they produce golden eagle offspring? Are these nest sites still occupied by eagles or are they also now abandoned? As I have see from misleading wind industry related studies, a proclaimed "nesting territory" is far too vague and is in no way an accurate measure for California's golden eagle population.

As discussed in the FWS Eagle Take Policy, the FWS's objective is to manage the species by authorizing take at a level that is **less that 5 percent** of the local area population. Despite the low estimated eagle mortality derived from wind industry studies, the local/regional wind turbine fatality of eagles is not even close to 5% and **is likely to**

1-4

be in the range of 25%-50% per year. With proper studies and analysis it would also be found that the golden eagle mortality from the Montezuma and Altamont Pass Wind Resource areas, already easily exceeds 5% percent of the total golden eagle population for all of California. This far exceeds any reasonable or ethical meaning for the term "regional population".

1-4 cont'd

The Shiloh IV Environmental Assessment fails to disclose any currently occupied and productive eagle territories or nest sites in the region that could be impacted. The Assessment does state "Consequently, the local project area currently supports four or possibly five pairs of breeding eagles".

The important fact missed in the Environmental Assessment is that there actually may not even be a single occupied and productive eagle territory anywhere near this project site. What is the current regional population of adult golden eagles with occupied territories and productive nest sites? Getting clear data is very important because the wind industry and their hired biologists have history of using deceptive, evasive, or misleading language that can leave false impressions. I have seen where golden eagle habitat in Southern California was claimed to have had hundreds of eagle territories yet this region was found to have only a few pairs of adult golden eagles in occupied territories actually producing offspring.

The information regarding golden eagle territory abandonment is available in the 2010 surveys conducted for solar energy projects.

1-3 cont'd

The abandonment of habitat by golden eagles in Montezuma Hills is a very predictable pattern that can be found elsewhere around wind farms in California. Golden eagle population surveys conducted in Southern California show the abandonment of eagle territory extents thousands of square miles beyond the boundaries of wind farms. Adding more rotor sweep will only extend the wind turbine mortality footprint for this species, a species already in a state of serious decline in California.

Currently the Montezuma hills do not support any eagle populations but a golden eagle population would exist if it were not for the wind projects that have been placed in their habitat. A bald eagle population would also likely exist and should be concern because there is bald eagle habitat close by. This is a resource conflict that exists not only in the Montezuma hills but it extends far beyond the boundaries of these wind projects. The alternatives listed for the proposed action are supposed to help resolve resource conflicts. None of them do. The FWS has no reliable data , no reliable research, and no reasonable alternatives were given to approve any take permits for a species in a rapid state of decline. Therefore the only alternative is to deny the project and to deny any golden eagle "take permits" at this time.

Alternative 3 for the project involves "retrofitting a total of 133 power poles in year 1 of permit issuance. The additional mortality monitoring consists of monitoring all turbines monthly for at least the first year to provide assurances that any potential eagle take is detected; subsequent annual monitoring will be determined in coordination between the Service and the applicant based on the results of the first year’s intensive mortality monitoring".

I will remind the FWS that monitoring all turbines **monthly and using undersized search areas** for at least the first year is of little use and will allow most of the wind turbine mortality to be missed. As for the retrofitting of 133 power poles in year, this is something that the FWS should automatically make sure is taken care of because good management is good management. If golden eagles can benefit from retrofitting these towers then it should be done immediately and not because the Shiloh IV wind project is going to kill more golden eagles.

1-2 cont'd

1-5

The FWS has supposedly put in place measures to ensure that local eagle populations are not depleted, yet the death of one eagle from a "take permit" in the Montezuma Hills could actually be 50-100 percent of the current population located within 10-15 miles of the project. It makes no sense that a "take permit" would even be considered. This is especially true since the FWS has no idea how many golden eagle have really been killed over the years by the wind turbines located Montezuma Hills because of flawed studies and unreliable data.

1-3 cont'd

I will conclude by saying that it is all too obvious that the golden eagle data and analysis presented in the Shiloh IV assessment **can not be considered reliable and there is no justification for adding more deadly rotor sweep for the golden eagle with the Shiloh IV wind project.** In addition any "no-net-loss" assessments by the FWS are completely meaningless due to the lack of reporting, accountability, flawed mortality monitoring by the wind industry and no accurate current status of the golden eagle in the region . Under the present system with little oversight, any species "take permit" could actually result in the death of a hundred of any species for which a “take” permit" is issued.

Until reliable data has been obtained, the issuing of any "take permits" for any species to the wind industry and the mitigation based upon the wind industry's undisclosed impacts should be considered illegal. This is especially holds true for the Shiloh IV wind project.

Jim Wiegand
Vice President USA, Save the Eagles International
Phone 530 2225338
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ORG 2

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Sacramento, Ca. 95814
916-447-4956
www.swainsonshawk.org

Heather Beeler
Migratory Bird Program
U.S. Fish and Wildlife Service,
Pacific Southwest Regional Office
2800 Cottage Way, W-2605
Sacramento CA 95825

November 12, 2013

Dear Mrs. Beeler;

Thank you for the opportunity to review the DEA for the Shiloh IV Wind Project Eagle Conservation Plan. The American Bird Conservancy and the Friends of the Swainson's Hawk organizations submit these joint comments on the DEA.

Friends of the Swainson's Hawk, a 501(c)(3) is a local grassroots conservation organization whose mission is to see Swainson's hawks flourish for future generations. Our target species is Swainson's hawks, but we work on regional issues to protect open space and habitat for all species within the California range of the Swainson's hawk.

ABC is a 501(c)(3), not-for profit organization whose mission is to conserve native birds and their habitats throughout the Americas. ABC is the only U.S.-based group with a major focus on bird habitat conservation throughout the entire Americas. ABC acts across the full spectrum of threats to birds to safeguard the rarest bird species, restore habitats, and reduce threats, unifying and strengthening the bird conservation movement. We advance bird conservation through direct action and by finding and engaging the people and groups needed to succeed, regardless of their political, economic, or social point of view. ABC seeks innovative, fair solutions to difficult issues and aspires to lead bird conservation by analyzing issues using the best available science; facilitating networks and partnerships; sharing information; developing and implementing collaborative strategies; and establishing measurable outputs.

We understand that the USFWS is responding to a request by the applicant for a permit to take 3 eagles in 5 years, for the project to comply with the Bald and Golden Eagle Protection Act, and the USFWS goal of maintaining a stable or increasing breeding

population of eagles. In the document the USFWS states that different conditions and mitigation measures can be combined to implement a new alternative. We think that is appropriate, as long as certain conditions are met. There are several measures in the different alternatives, when combined with some additional mitigation that could result in a more complete reduction of impacts.

General Comment 1: If the applicant is only requesting take of 3 eagles over a 5 year period why do alternatives 2, 3 and 4 all have a higher take? We would like to see the permit have the lowest take feasible, thereby allowing the applicant to come back to the USFWS if the take limit was reached or exceeded and discuss additional mitigation measures. We understand that the USFWS determined the take using a model, but if the applicant is asking for a lower take limit we think the lower take should be used. 2-1

General Comment 2: To the degree that the USFWS will use a Technical Advisory Committee to review monitoring results, the retrofitting plan, compliance with mitigation measures and adaptive management we do not believe the existing County Technical Advisory Committee should be used as it is now comprised. That committee has met less frequently then once a year and is usually a forum for presenting annual monitoring reports with limited time for discussion. Its expertise consists primarily of industry contracted biologists and it lacks independent biological expertise. We encourage the USFWS to set up its own committee and meet on the schedule that the USFWS needs to implement the plan. 2-2

General Comment 3: Although only alternatives 3 and 4 have 100% of the turbines searched, we would like 100% of the turbines searched every year for 3 years in any final alternative developed by the USFWS. Because golden eagle fatalities are reportedly an infrequent event, the more comprehensive searches are more likely to detect them. 2-3

General Comment 4: There have been Swainson's hawk mortalities in the Montezuma Wind Resource Area. Although they have not been connected with a post-construction monitoring plan and therefore not included in much of the wind area fatality analyses they have occurred and the species should be included in the Bird and Bat Conservation Plan and any fatalities reported.

Page 28: The analysis focuses on golden eagles, BCC and red-tailed hawks and American kestrel which were identified as species of special interest for the project analysis. We would like Swainson's hawks included in the species of special interest for the project. Although Swainson's hawks are not killed in the same numbers as red-tailed hawks and American kestrels, they are a California state-listed threatened species and their abundance is lower than red-tailed hawks and American kestrels. When Swainson's hawk fatalities occur they should be identified because Swainson's hawk mortalities can impact the populations' prospects for recovery and violates state law. 2-4

Alternatives discussion:

While there is a long analysis and discussion about how the take of 5 eagles in 5 years was determined, there is limited discussion about how the number of power poles to retrofit was derived. Retrofitting power poles to offset avian mortality should not be considered a mitigation measure, but rather something that should be done as a matter of course when developing wind power sites. 2-5

We support the additional three years of monitoring to determine whether the project has any golden eagle fatalities. If the USFWS agrees to alternative 2 or 3 then we think seasonal shutdowns should be included as part of the adaptive management mitigation measures that gets implemented if fatalities occur. Mitigation should occur at the site, and not just within the regional population. 2-6 2-7 2-8

Additional off-site habitat compensation should be part of the adaptive management plan mitigation measures. Habitat compensation for the rotor swept area was already purchased but that is to off-set the general impacts of on-going mortalities. More land conservation mitigation is needed to provide permanent conservation benefits for any sensitive species that are killed. The habitat conservation should be adjusted to provide habitat particular to the species that has been killed. 2-9

Appendix A, Eagle Conservation Plan:

It is noted that no golden eagles have tried to nest in the Montezuma Wind Area since 2007. There may be many factors that have contributed to this lack of nesting attempts, but we would like the USFWS to consider whether the newer, larger wind turbines have had the indirect impact of making the area a less desirable place to nest. 2-10

The Plan states that one of the mortalities at the wind resource area was due to power lines. We would like feasible retrofits to bird safe lines to be done within the Montezuma Wind Resource Area first and then other power poles within the regional population upgraded. 2-11

We support the measures in Table 4-1. Summary of Advanced Conservation Measures Using a Step-wise Approach that is found in the Eagle Conservation Plan. The applicant and the USFWS have set up a reasonable chain of events in the event that golden eagle fatalities occur at an elevated rate. We want to ensure that golden eagle carcasses are found and documented. This makes it essential that additional monitoring to determine compliance with the mitigation measures is an instrumental part of the conservation plan. 2-12

Bird and Bat Conservation Plan:

CM-10 should include mitigation for Swainson's hawks with its red-tail hawk and American kestrel mitigation. 2-13

Biological Triggers: The substantial take argument for adaptive management is fine for most common species, but take of any state or federally-listed threatened, endangered, or special status species should result in adaptive management when even one fatality is reported.

2-14

Sincerely,

Melinda Dorin Bradbury
Biological Consultant to
Friends of the Swainson's Hawk

Michael Hutchins, Ph.D.
Coordinator, National Bird Smart Wind Energy Campaign
American Bird Conservancy

Audubon California * Defenders of Wildlife * Natural Resources Defense Council * Sierra Club * Santa Clara Valley Audubon Society * Golden Gate Audubon Society

November 29, 2013

Heather Beeler, Migratory Bird Program
U.S. Fish and Wildlife Service
Pacific Southwest Regional Office
2800 Cottage Way, W–2605
Sacramento, CA 95825

Re: Golden Eagles; Programmatic Take Permit Application; Draft Environmental Assessment; Shiloh IV Wind Project, Solano County, California (Docket No. FWS–R8–MB–2013–N138)

Submitted electronically to: ShilohIV_comments@fws.gov

On behalf of Audubon California, Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, Santa Clara Valley Audubon Society, Golden Gate Audubon Society and our millions of members and supporters, please accept and fully consider these comments on the Draft Environmental Assessment (DEA) and programmatic eagle take permit application for the Shiloh IV Wind Project (Docket No. FWS–R8–MB–2013–N138). We appreciate the opportunity to comment on this docket and the important issues it raises concerning the obligations imposed by the Bald and Golden Eagle Protection Act (BGEPA).

For many years, our organizations have been deeply engaged in efforts to protect the publicly-owned resources under the jurisdiction of the Department of the Interior and animals and plants, such as bald and golden eagles, protected by federal law. Our organizations also strongly support responsibly sited, developed, operated and effectively mitigated renewable energy projects, including wind generation projects, to meet the challenge of climate change by reducing greenhouse gas emissions. However, renewable energy development is not appropriate everywhere and must be managed in such a way that, to the maximum extent possible, protects wildlife, wild lands and other natural resources and ensures full compliance with all applicable laws.

Pursuant to its statutory authority, the U.S. Fish and Wildlife Service (FWS) has a vital role to play on private and public lands in ensuring that wind projects are sited and operated responsibly and properly mitigated. FWS must also safeguard against what are potentially unmitigable impacts, especially in the face of noted scientific uncertainty. Consideration of the first permit for programmatic take of golden eagles under BGEPA, requested in conjunction with the continued operation of the Shiloh IV Wind Project, represents a significant and positive prospective step forward in this regard. The response to this application will likely set a standard for all permits to follow and we therefore believe that the FWS must approach development of and issuance of this permit with extreme caution and with due regard to the unprecedented nature, acknowledged uncertainty and wide potential reach of the proposed action.

Our groups have a strong history of coming together to provide joint comments on eagle conservation concerns, and particularly as related to renewable energy development. We would like to incorporate by reference our joint comments on the Draft Eagle Conservation Plan Guidance, the proposed revisions and changes in the regulations governing eagle permitting, and on wind energy in the Desert Renewable

3-1

Energy Conservation Plan (DRECP).[1] From the onset, we must reiterate the urgent need for a more comprehensive and fully transparent approach to eagle permitting—this includes meaningful analysis and management on a regional population scale, as well as guaranteed opportunities for the public to understand and engage on monitoring, mitigation and adaptive management prescriptions throughout the life of the permit.

3-1 cont'd

Our concerns and recommendations continue to center on the need for a legally sound and scientifically credible framework for authorizing programmatic take of eagles at wind facilities. We believe the following issues are fundamental to a successful permit,[2] and they can be summarized with respect to this particular Eagle Conservation Plan (ECP) and permit as:

- Revise the "Purpose and Need" section to reflect the statute's principal goal of conserving eagles
- Utilize a regional framework for permit issuance
    - Complete a regional analysis to determine if and how the estimated 12.3% annual take of the local area population is compatible with meeting the preservation standard.
    - Encourage an application for one programmatic permit for the entire wind resource area and outline a strategy for how this will be accomplished
- Incorporate a net conservation benefit into the DEA analysis and permit terms
- Remedy inadequacies in DEA data by analyzing
    - Direct and indirect effects of "take" on different types of eagles (i.e., adult breeders, sub-adults, juveniles, migrators, floaters, etc.) in order to properly calculate take thresholds and mitigation requirements for the project's impacts
    - Cumulative impacts of eagle fatalities from all sources to properly determine this project's population level impacts and ensure that impacts from estimated eagle fatalities account for all potential sources of take
    - A sensitivity analysis to document that the Bayesian mortality model used in this DEA is, in fact, insensitive to prior distributions for eagle exposure and collision probability
- Establish a fully transparent and defined process in the permit and in the ECP for implementing an adaptive management framework that includes a clear strategy for monitoring the effectiveness of specific strategies in reducing eagle mortality, including:
    - Address reconfiguring the project layout to relocate or remove hazardous turbines
    - Require that Step 1 of the Advanced Conservation Practices (ACPs) include observer-triggered or mechanically-triggered temporary wind turbine shutdown
    - Add an ACP requiring seasonal curtailment based on results from monitoring both seasonal avian use and trends in mortalities throughout the year
- Develop a full suite of mitigation options that will fully offset take
- Ensure that compensatory mitigation is both additive and effective
- Assign the Technical Advisory Committee (TAC) with specific goals and timelines outlined in the ECP and expand TAC membership to include third party scientists and members of the public with expertise in issues related to eagles in California

see detailed numbering below

[1] Audubon, et al., Joint Comments on the Draft Eagle Conservation Plan Guidance (May 19, 2011); Audubon, et al., Joint Comments on Advance Notice of Proposed Rulemaking, Docket No. FWS-R9-MB-2011-0094 (July 12, 2012); Defender of Wildlife, et al., Joint Recommendations on Wind Energy Development in DRECP (August 24, 2012, available online at: http://www.drecp.org/documents/docs/comments-general/2012-08-24_Environmental_NGO_Wind_Energy_Recommendations.pdf).

[2] We note that many of these comments are specific to repowering of wind projects and to facilities that are currently in operation, and reserve specific comments on new projects which would clearly have different opportunities for avoidance etc.

- Incorporate detailed monitoring prescriptions and protocols in the permit and the ECP, including reporting requirements to ensure effectiveness of ACPs, mitigation measures and adaptive management. These prescriptions and protocols should include:
    - Intensive monitoring during the first year of operation, as described under Alternative 3
    - Detailed post-construction monitoring protocols and the process by which the results will be used to determine the effectiveness of mitigation measures in an adaptive management framework
    - Specific guidelines in the eagle permit for designing Before-After-Control-Impact (BACI) studies to ensure that the effectiveness of monitoring, mitigation and ACPs is documented
    - Post-construction monitoring undertaken by qualified biologists not in a contractual relationship with the project proponent and raw data to be provided directly to the FWS
    - A reporting system to track information on eagle fatalities and avian use for the entire Montezuma Hills Wind Resource Area (WRA) and regular data review to ensure that cumulative take of eagles is not exceeding the anticipated level
    - Publicly available monitoring results
- Take an active enforcement and oversight role in authorizations for programmatic eagle take, including other separate but related actions and a commitment to require and revise permit conditions as new information becomes available

see detailed numbering below

Conservation of Eagles is the Overarching Priority

In 1940, confronted with the potential extinction of our national symbol, Congress acted to avert this threat and singled out preservation of the bald eagle as a "ward of the National Government" by enacting the Eagle Act.[3] In 1962, Congress extended the protections of the Eagle Act to golden eagles, both because the golden eagle population was in decline and to afford greater protection for the bald eagle.[4] It is against this backdrop, of a singular statutory purpose to conserve eagles, that we must examine any authorizations that affect these iconic, culturally and biologically significant species.

We appreciate and recognize the significant effort that FWS and the applicant have made by moving forward with a programmatic eagle take permit application. Our recommendations for improving the ECP, DEA and action alternatives in these comments are made with a goal of addressing our most immediate conservation concerns and creating a means to move forward despite serious data gaps and uncertainty. The overarching purpose and frame for this action, however, must not be lost. Conserving eagles is the top priority for any authorization under BGEPA and absent this outcome, any "take" authorization is inappropriate. This goal must be clearly articulated and accounted for throughout all decision documents and the analysis that follows.

As an immediate matter the DEA's "Purpose and Need" statement should be revised to reflect that conservation of eagles, first and foremost, drives the permitting process. As it is now, the DEA states that the purpose of the federal action is to consider issuing a permit to Shiloh IV, which is driven by a need to make a permitting decision that may enable Shiloh IV to continue to generate renewable energy consistent with BGEPA.[5] We suggest that the purpose and need statement be revised to state, "the purpose of the federal action is to facilitate the preservation of eagles through issuance of a permit that

3-2

[3] H.R. Rep. No. 2104, 76th Cong., 3d Sess. 1 (1940).
[4] Pub. L. No. 87-884, 76 Stat. 1246.
[5] DEA pg.3.

ensures consistency with our Eagle Act regulations, and in this particular case, may enable Shiloh IV to continue to generate renewable energy in compliance with the Eagle Act."

Recommendation: *The DEA and all associated decision documents and analyses should reflect, guarantee and explain how permit issuance prioritizes the conservation of eagles above all else. Thus, the "Purpose and Need" section should be revised to reflect the statute's principal goal of conserving eagles.*

3-2 cont'd

Fundamental Need for a Regional Framework

BGEPA's preservation standard ensures the continued protection of the species while allowing some impacts to individual eagles. In its 2009 regulations on the take of eagles under BGEPA, FWS stated that it would not issue permits for take within a regional eagle population without sufficient data indicating that the take would not result in a population decline.[6] The issuance criteria for individual programmatic eagle take permits further includes identifying the project-level effects together with cumulative effects of other permitted take and additional factors affecting eagle populations, as well as identifying whether the permit issuance will preclude higher priority permit issuance.[7] FWS cannot reasonably make these determinations without first examining the authorization and affected eagle population within a regional context, including up-to-date baseline regional population information, threats to eagles from all sources, efficacy of avoidance, minimization and compensatory mitigation measures, appropriateness of regional take caps, and conservation goals and objectives that ensure the stability of local and regional eagle populations. As stated in previous comments,[8] establishing a regional framework is a prerequisite to sound mitigation regimes and proper estimation of cumulative impacts.

This type of regional analysis ultimately informs whether take is compatible with the preservation of eagles and whether take may be approaching levels that are unsustainable or which cannot reasonably be offset through compensatory mitigation. In this particular case, the DEA acknowledges that the current local area eagle population estimated annual take is 12.3%, well above FWS' previously identified sustainable take rate between 1% and 5%.[9]. This is an unacceptable level of take. A regional framework is needed to set forth a clear explanation of what will be done to reduce take and account for all sources of threats to the local area population. Without going one step further to demonstrate that the level of take is at least compatible with the preservation of the regional population, it seems clear that a take rate two and a half times the sustainable harvest rate would not meet the preservation standard and therefore permit issuance would necessarily be precluded

3-3

Lack of a regional framework is a fatal flaw in the fundamental basis for programmatic permit issuance, without which we will continue to hit significant biological and legal barriers in the piecemeal project-by-project approach. Relying on a regional framework for eagle permit issuance would not only provide

[6] 74 FR 46841

[7] 50 CFR 22.26(f)(1–6)

[8] Eagle Conservation Plan Guidance Comments, submitted to FWS May 19, 2011, by National Audubon Society, Defenders of Wildlife, Natural Resources Defense Council, National Wildlife Federation, The Wilderness Society, Sierra Club, and numerous Audubon Chapters and Friends

[9] The recently published Eagle Conservation Plan Guidance states, "The Service considered several alternatives for benchmark harvest rates at the local-area population scale, and after comparative evaluation identified take rates of between 1% and 5% of the estimated total eagle population size at this scale as significant, with 5% being at the upper end of what might be appropriate under the BGEPA preservation standard, *whether offset by compensatory mitigation or not*." (italics added for emphasis)

requisite conservation assurances for issuing individual permits, as mandated by BGEPA, but it would also afford an essential bridge as we work together to fill the critical gaps in knowledge surrounding overall impacts to eagle populations. In this specific context, a regional framework appears necessary to demonstrate that the 12.3% annual take rate for the local area population will meet the preservation standard. 3-3 cont'd

Recommendation: *Set forth a specified timeline for completing and incorporating regional information, and/or demonstrate how new information justifies that this is a sustainable harvest rate for the local area population.*

An ECP prepared for one project located in the middle of multiple wind projects fails to be more than an operating plan for the project. Because this ECP does not address threats from all sources to eagles in the Bird Conservation Region (BCR) or eco-region, it cannot be truly "programmatic" and the conservation actions and mitigation measures cannot be effective. We recommend a broader framework for conservation of eagles rather than this "piecemeal" approach. 3-4

Recommendation: *FWS should encourage an application for one permit for the entire wind resource area through cooperation of each developer and outline a strategy for how this will be accomplished.*

Incorporation of a Net Benefit Standard

FWS is bound by the preservation standard set forth in BGEPA,[10] which endeavors to achieve and maintain stable or increasing breeding populations of bald and golden eagles and thus ensure the conservation of the species. With respect to programmatic permits in particular, the 2009 final rule states that, "programmatic permits are designed to provide a net benefit to eagles by reducing ongoing unauthorized take."[11] Yet, there is little discussion of this concept in the DEA. We believe that in issuing programmatic permits for the lethal take of eagles, FWS must address and provide assurances that permit issuance will produce a net conservation benefit to affected eagle populations. Because population data and impacts to eagle populations are extremely uncertain, requiring a net conservation benefit and/or setting take limits at rates that at least allow for population growth, is the only way to ensure that there is no net loss to eagle populations. 3-5

FWS must provide greater clarity on expectations for reaching a net benefit and ongoing management actions to ensure that a sustained reduction[12] in eagle take is occurring throughout the life of the project, especially considering the current uncertainty surrounding fatality models, baseline data, ACPs and mitigation measures. As part of this net benefit calculation, we recommend established requirements and procedures for engaging in applied research activities to leverage permit issuance and help us fill priority data gaps, identify more effective mitigation measures, and generally inform our

[10] 16 U.S.C. § 668a. In compliance with the preservation standard, unless permitted, BGEPA prohibits the "take" of any eagle—part, nest, or egg thereof—where "take" also includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. 16 U.S.C. § 668c.

[11] Eagle Permits; Take Necessary To Protect Interests in Particular Localities; Final Rules, 74 Fed. Reg. at 46842.

[12] FWS assumes that permit issuance will equate to a reduction in take and thereby increase the likelihood of a stable or increasing population; however, especially considering the possibility of declining populations, FWS must clearly articulate a regulatory plan and specific assurances to guarantee that the project is meeting "no net loss" for permit issuance, at a minimum, and ensuring zero net take of eagles over the life of the project. This statutory requirement is in addition to incorporating a net benefit.

limited tool-box for addressing eagle interactions at wind farms. This is particularly important given the role this DEA and associated analysis and decision document may have in informing subsequent permits.

3-5 cont'd

Recommendation: *Clearly incorporate a net conservation benefit into the DEA analysis and permit terms, including adequate mechanisms for ensuring a sustained reduction in take throughout the life of the project as well as procedures for engaging in applied research activities to fill priority data gaps.*

Inadequacies in the DEA Data and Analyses

a. Direct and Indirect Effects

The DEA states rightly that "The biological impact of killing an eagle within the WRA on the overall population depends on the type of eagle killed: a breeding adult, a juvenile, or a floater." Yet the calculation of the threshold or cap of allowable take presumes that any one eagle killed can be offset by compensatory mitigation by preventing the death of one other eagle through a power pole retrofit. Like many long-lived raptors, the Golden Eagle shows deferred maturity and does not usually breed until the fourth or fifth year."[13] The DEA also reports that "A sizable number of floaters are needed for healthy, stable populations of raptors in general (Hunt 1998). Floaters function as replacement breeders for territory-holding birds that die."

3-6

Recommendation*: The DEA should analyze the direct and indirect effects of "take" on different types of eagles in order to calculate thresholds for these different types, and assign them values and mitigation requirements and analyze the relationship of the loss of each type of eagle to the overall population.*

b. Cumulative Impacts of "take" for Golden Eagles at the Project

In *A Citizen's Guide to the NEPA,* "cumulative impact" is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions **regardless of what agency (Federal or non-federal) or person undertakes such other actions**. **Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.**"[14]

The DEA states "For this analysis, past, present, and reasonably foreseeable projects comprise the Montezuma Hills WRA, the Altamont Pass WRA, the Pacheco Pass WRA, the Tehachapi WRA and ongoing utility operations. We did not include other sources of fatalities, such as vehicle strikes, illegal hunting, and poisoning, because too few quantitative data were available for these sources."[15]

3-7

NEPA does not allow an analysis to dismiss an impact because data is not "quantitative" in analyzing cumulative impacts. The impacts of the project on Golden Eagle are additional stressors to a population that is considered to be in decline from wind projects as well as collisions with utility power poles and lines, lead poisoning, collisions with automobiles, disturbance by humans, loss of habitat and other sources.

[13] Sanchez-Zapata et al, Age and breeding success of a Golden Eagle (*Aquila chrysaetos)* population in southeastern Spain

[14] Council on Environmental Quality, Executive Office of the President, December 2007.

[15] Appendix E, p. 41

FWS must use the "best available science on each of these impacts," whether it is "quantitative" or not, to calculate the cumulative impacts of other sources of impact than energy generation and transmission in determining cumulative impacts, amount of "allowable" take for a regional or local population, the compensatory mitigation ratio for that cumulative impact—if in fact it can be mitigated at all—for meeting the regulatory standard of BGEPA and the permit criteria set out. And importantly, the cumulative impacts analysis from all sources must inform and meet the Permit Issuance Criteria as required in 50 CFR 22.26(f)(1-6), especially criterion 1, "[t]he direct and indirect effects of the take and required mitigation, together with the cumulative effects of other permitted take and additional factors affecting eagle populations, are compatible with the preservation of bald eagles and golden eagles."

3-7 cont'd

Recommendation: *In the same way that FWS uses a Bayesian model to calculate risk to eagles at a wind project with many unknowns, FWS could use a similar model to calculate cumulative impacts from all sources using best available data in order to analyze population level impacts in the DEA.*

c. Mortality Model

The mortality model developed by FWS and used in the DEA to estimate project-level take is based on Bayesian statistical methods that require initial values for model inputs. By drawing these values from "prior distributions," conclusions can be made using very sparse data, such as the 48 minutes of total eagle use that were recorded during the single year of surveys at Shiloh IV. However, Bayesian model predictions are known to be sensitive to how prior distributions are defined.[16,17] As a result, various methods have been developed to test the sensitivity of model predictions to these prior distributions.[18,19,20] No information is presented regarding any such analysis in the DEA. While the ECP Guidance Module 1 asserts that "with adequate sampling, the data will determine the posterior distribution, not the prior,"[21] it is by no means clear that this is the case given the single year of surveys used to estimate exposure probability. Below, we address some of the concerns regarding the inputs into the Bayesian model:

3-8

- ECP Guidance recommends 800 meter (~0.5 mile) point counts, but surveys used to provide eagle exposure data for the mortality models were performed prior to the ECP Guidance and used a 1 mile radius. Using these data would be expected to overestimate eagle use and inflate mortality estimates to an unknown degree, but the specific effects of using these data are unknown.
- Post-construction data gathered during operation of the previous Shiloh project were used as "preconstruction" data for the Shiloh IV eagle exposure analysis. This not truly preconstruction data since turbines might have reduced eagle use, decreasing estimates of exposure rate. In addition, these data were not stratified across time and space and,

[16] Sinharay, S., and H. S. Stern. 2002. On the Sensitivity of Bayes Factors to the Prior Distributions. The American Statistician 56(3):196-201.

[17] Hill, S.D., and J.C. Spall. 1994. Sensitivity of a Bayesian analysis to the prior distribution. IEEE Systems, Man and Cybernetics Society 24(2):216-221.

[18] Hamra, G.B., R.F. MacLehose RF, and S.R. Cole. 2013. Sensitivity analyses for sparse-data problems-using weakly informative Bayesian priors. Epidemiology. 2013 Mar;24(2):233-9.

[19] Oakley, J.E., A.O'Hagan. 2004. Probabilistic sensitivity analysis of complex models: a Bayesian approach. J. R. Statist. Soc. B (2004) 66(3):751–769.

[20] Bornn, L., A. Doucet, and R. Gottardo. 2010. An efficient computational approach for prior sensitivity analysis and cross-validation. Canadian Journal of Statistics 38(1):47-64.

[21] USFWS. 2013. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2. Available: http://www.fws.gov/windenergy/PDF/Eagle Conservation Plan Guidance-Module 1.pdf

as a result, exposure rates across the project in space and time were assumed to be uniform.

- The input for collision probability is based on an analysis of golden eagle wind turbine avoidance rates from four U.S. wind facilities: Altamont Pass, Tehachapi Pass, San Gorgonio, and Foote Creek Rim. The three former sites are all located in California, but contain some of the smallest, oldest lattice tower turbines, many of which were non-operational during surveys. The latter site, located in Wyoming, was built in the late 90's and contains medium size turbines. With the possible exception of Altamont, all of these areas are considerably different in terms of habitat compared to Shiloh IV. Due to all of the above factors, the avoidance rates for these turbines could bear little relationship to those within a more modern facility and a different geographic setting.

3-8 cont'd

The sensitivity of the Bayesian fatality estimation model to the inconsistent and incomplete data inputs described above is unknown and has been insufficiently explored in the DEA. Unless this has already been done or it can be transparently documented that it's unnecessary, we suggest that a sensitivity analysis be performed to demonstrate how variations in Bayesian model data inputs affects predicted mortality. If mortality predictions are highly sensitive to inaccurately specified data inputs, FWS should initiate their own effort to define model data inputs with the degree of precision needed.

Recommendation: *Perform a sensitivity analysis to document that the Bayesian mortality model is insensitive to the data inputs used for eagle exposure and collision probability, these inputs were constructed using data incompatible and/or inconsistent with the ECP Guidelines, and insufficient evidence has been presented that this is not affecting the mortality estimates produced by the model. If data inputs strongly affect results, FWS should perform the studies needed to obtain more precise mortality model inputs*.

d. Uncertainty in Population Estimates

Most recently, golden eagle population trends in the Western U.S. were analyzed by Millsap et al (2013)[22]. This study used two data sources: western U.S. golden eagle survey (WGES) data for BCRs 9 (Great Basin), 10 (Northern Rockies), 16 (Colorado Plateau), and 17 (Badlands and Prairies), and Breeding Bird Survey (BBS) data taken across the golden eagle range in the western U.S. WGES data have been collected using consistent aerial transect-based methods every summer since 2006, but only for the four inland BCRs listed above. Even for these BCRs, the most recent WGES report states they cannot yet be used to reliably indicate population trend: "***the trend analysis was based on only 6 years (2006 – 2011) of survey data, so our conclusion should be viewed with caution***."[23]

3-9

Nonetheless, the WGES survey is a viable survey that must be continued and expanded. On the other hand, BBS data has long been controversial for avian population assessment due to the opportunistic roadside sampling and failure to account for species detectability, as well as the use of citizen scientists and many other issues. It is particularly unsuited to golden eagle population assessment since the species exhibits an avoidance of human activity and

[22] Millsap, B. A., Zimmerman, G. S., Sauer, J. R., Nielson, R. M., Otto, M., Bjerre, E. and Murphy, R. (2013), Golden eagle population trends in the western United States: 1968–2010. The Journal of Wildlife Management, 77: 1436–1448. doi: 10.1002/jwmg.588

[23] Nielson, R. M., L. McManus, T. Rintz, and L. L. McDonald. 2012. A survey of golden eagles (Aquila chrysaetos) in the western U.S.: 2012 Annual Report. A report for the U.S. Fish & Wildlife Service. WEST, Inc., Laramie, Wyoming.

roadsides. BBS data, which were used in the 2009 FEA to estimate BCR level populations as well, do not provide adequate insight into eagle populations.

3-9 cont'd

The analysis of Millsap et al., however, hinges on calibrating BBS data with the more accurate WGES data in the four overlapping BCRs, then using the scaling factor from that analysis to predict population status and trend for all other BCRs. Part of the Millsap et al. analysis attempts to deal with the fact that WGES and BBS are fundamentally incompatible since BBS data is performed around breeding season for the huge set of species recorded whereas WGES is always after breeding and fledging have occurred. Overall, the Millsap et al. analysis is an attempt to generate insight from existing data that fall short of providing any certainty regarding the actual status and trend of golden eagles in the western U.S. This is particularly true in California, where a better understanding of population status is urgently needed given threats to the species from habitat loss and development and other stressors.

Prior to the Millsap et al. study, golden eagle population assessments have been less optimistic. In fact, analysis of data from the 2006 through 2009 WGES surveys suggested a population decline across the four BCRs covered by the surveys.[24] Significant Golden Eagle breeding failures have also been reported in some areas of the southwestern United States,[25] and declines in counts of migrating Golden Eagles have been reported in most areas in the western United States.[26] It is unclear if the latter is linked to the general decrease in the number of eagles.[27] Lastly, Kochert et al., the most widely cited synthesis of western U.S. golden eagle population data, asserts that breeding golden eagle populations are in decline across the western U.S. based on migration counts, but the authors also warn that existing sources of data based on migration counts and nest surveys are inadequate to fully evaluate golden eagle population status and trend. [28]

Given the conflicting results regarding the status and trend of golden eagles across the west, as well our lack of confidence in the methods in Millsap et al. 2013, we see no firm basis to say that golden eagle populations, particularly in California, are not in decline. As Millsap et al (2013) caution, "occupied breeding areas may be declining locally or regionally," and note that their findings, "do not address the question of whether golden eagles have the demographic resiliency to absorb additional mortality and maintain their stable population trajectory." The approach used in the DEA, however, is to take the Millsap et al. (2013) conclusion of stable populations to justify permit evaluation. This approach fails to address the need for a cohesive system to evaluate the actual status and trend of golden eagles at different scales, and further underscores the importance ensuring a sustained reduction in and zero net take of eagles over the life of the project. The FWS should set a precedent for a rational approach to estimating golden eagle population and trend that is based on sound data, which accumulates certainty over time.

[24] Neilson et al. 2010, USFWS 2009, Appendix C
[25] *WRI 2009*
[26] Farmer et al. 2008, Smith et al.2008
[27] Pagel et al, Interim Golden Eagle Technical Guidance, U.S.Fish & Wildlife Service, February 2010
[28] Kochert, M. N., K. Steenhof, C. L. Mcintyre, and E. H. Craig. 2002. Golden eagle (Aquila chrysaetos). In A. Poole (ed.), The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, NY. Available: <http://bna.birds.cornell.edu/bna/species/684doi:10.2173/bna.684>.

Recommendation: *Areas where wind development and eagle use coincide must be prioritized for golden eagle population surveys that follow the WGES protocol and provide sufficient sampling to provide usable population estimates, and do so within a shorter time frame so as to provide a robust foundation for eagle take permits*.

3-9 cont'd

e. Estimation of golden eagle fatalities within the local area population

Estimates of the local area population, defined as the population within a 140 mile radius of the project footprint, are used to set the allowable take for the project. Golden eagle fatality estimates must be as accurate as possible to provide mitigation that is commensurate with impacts. The DEA's approach to estimate fatalities in this population used a Bayesian analysis of mortality data from Montezuma Hills WRA, results from a previous study to estimate Altamont Pass WRA mortality, re-analysis of Tehachapi WRA data, and an estimated 2 eagles at Pacheco Pass WRA, which lacked mortality monitoring data. This fatality data was combined with take estimates for eagle electrocution and collision for BCR 32, which covers a completely different area than the local area population definition above, to arrive at an estimated annual local area population take of 64.5 eagles. Understanding that this estimate takes a precautionary approach, based on available data, and is the approach that the FWS has chosen to take, we again must point out that it does not provide sufficient certainty. Similarly, the failure to add any mortality estimates for vehicle strikes, illegal hunting, and poisoning is unacceptable considering the known impact these fatalities have on the population. Given this permit will likely be a precedent for future permits, we recommend the FWS determine more accurate estimations of golden eagle fatalities.

3-10

Recommendations: *Estimates of fatalities within the local area population must be improved through mandatory eagle mortality monitoring and reporting for all WRAs, as well as a comprehensive estimation process that includes all sources of mortality, including vehicle collisions, illegal hunting, and poisoning*.

The ECP states in a population analysis that, "a core segment of the BCR 32 population, encompassing Alameda and Contra Costa Counties near the Altamont Pass WRA, appears to be stable, suggesting that mortality associated with wind turbines is not resulting in a net decline of the population or the species in this region" (Hunt and Hunt 2006; ICF International 2011: Appendix B). However, with a population of only 800 or more birds within the BCR (Rocky Mountain Bird Observatory 2012), there does not appear to be a surplus of individuals or breeding pairs. Accordingly, additional conservation measures are necessary to ensure no net loss of the species and to offset the potential for an effect on the regional population.

3-11

The mortality of an estimated 47 Golden Eagles per year at Altamont suggest that if the above analysis is true, then the 470 Eagles killed over the last ten years must be primarily non-resident or migratory or floaters.

Recommendation: *The DEA and the ECP should analyze the impacts of this mortality on the populations of Golden Eagles in their home territories if they are migrating or floaters. The ECP should focus on all eagles not just resident eagles or eagle nests.*

Adaptive Management and Advanced Conservation Practices (ACPs)

The DEA acknowledges the need for implementation of an adaptive management framework to guide conservation practices during operation of the Shiloh IV wind facility. The DEA defines adaptive management as "a decision process promoting flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood."[29] While the FWS recognizes that the Shiloh IV wind facility requires an adaptive management approach, the framework provided in the DEA relies solely on implementation of ACPs without providing a fully transparent and defined process for monitoring the effectiveness of the ACPs that includes public input and future revisions of the ACPs where warranted. While the concept of ACPs is a key element of an adaptive management framework, it needs to be developed more fully to include a clear process for effectiveness monitoring of measures. These revisions, as well as all other recommendation herein, must further be clearly incorporated throughout all decision documents, including within the permit terms and ECP—which should be incorporated by reference into the permit after amended as required to support permit issuance. 3-12

Recommendation: *Establish a fully transparent and defined process for implementing an adaptive management framework that includes a clear strategy for monitoring the effectiveness of specific strategies in reducing eagle mortality. This framework should also include a clear process for formal review of the TAC, public input and permit revisions where warranted—and shall be incorporated into the permit terms and all decision documents.*

The ACPs are the key element of the adaptive management framework included in the DEA and under all action alternatives the applicant is required to implement ACPs "as appropriate." Our organizations have some significant concerns with major elements of the proposed framework for implementing ACPs. First, our organizations strongly support implementation of the mitigation hierarchy: avoidance, minimization and then compensatory mitigation. Therefore, we believe that every effort should be made to avoid impacts to golden eagles first and foremost. Avoidance strategies include reconfiguring wind turbines to avoid high avian use areas and buffers around known eagle nests and breeding areas and removing especially hazardous turbines that cause repeated mortality or overlap with high avian use areas. 3-13

Recommendation: *Require the applicant to reconfigure the project layout by removing and/or relocating turbines in high avian use areas, near known eagle nests and breeding areas. Additionally, require removal of hazardous turbines in a specified time frame triggered by mortality above permit allowance.*

Minimization strategies include seasonal curtailment during known periods of high avian use, as well as observation-based or mechanically -triggered temporary shutdown of turbines when a golden eagle is within a specified distance of a wind turbine. Observer-triggered or mechanically-triggered temporary turbine shutdown measures have already shown promise in reducing eagle mortality at other wind project facilities and should be implemented as an upfront conservation measure. Considering the historic mortality at this project site, implementing temporary shutdown measures is clearly warranted. 3-14

Recommendation: *Step 1 in the ACPs should also include observer-triggered or radar-triggered temporary wind turbine shutdown.*

Seasonal curtailment of turbines, such as recommended in Alternative 4 of the DEA is another minimization measure that could potentially reduce eagle mortality. This practice has been 3-15

[29] DEA p 6, Section 1.4.5.

implemented at Altamont and results from effectiveness analysis suggesting that this practice reduces overall mortality.[30] Considering the number of hours that a wind turbine is operating throughout the year, our organizations do not think that a cap of 780 hours of curtailment is necessarily sufficient to reduce mortality and believe a detailed analysis should accompany this curtailment measure. 3-15 cont'd

Recommendation: *Include in the ACPs as one of the first steps to require seasonal curtailment based on results from monitoring both seasonal avian use and trends in mortalities throughout the year. Seasonal curtailment of turbines should be based on a percentage of the total annual operating hours of the facility and should be of sufficient time to result in actual minimization of eagle mortality. Increases in seasonal curtailment should be considered as an ACP if mortalities continue to occur in seasonal patterns.*

The DEA, in its description of the ACPs states that: "The stepwise approach outlines the thresholds at which Shiloh IV will implement ACPs and relies on a technical advisory committee (TAC) of FWS staff." We fully support the concept of a TAC to oversee the adaptive management framework and implementation of the ACPs. This strategy has been used at other wind facilities and WRAs to guide implementation of management actions to minimize mortality. However, the TAC composed would benefit greatly by including third party scientists and members of the public. 3-16

Recommendation: *The TAC should be tasked with specific goals and timelines outlined in the ECP, and include third party scientists and members of the public with expertise regarding issues related to eagles in California. Proceedings from the TAC should be available for public review and comment.*

Expanding the Mitigation Menu

As the FWS seeks to identify new mitigation options for eagle conservation, emphasis should be given to incorporation of additional operational mitigation and site avoidance measures. The preservation benefits of avoidance and operational mitigation are more assuredly matched to the take threats at a site than are compensatory mitigation measures. Hence, the FWS's preservation obligations are more conclusively achieved when the best available avoidance and operational mitigation are employed. We must underscore this primary emphasis on measures to avoid and minimize take, as such a requirement is cornerstone to the well-accepted mitigation hierarchy[31] and is necessary to meet the regulatory standard of "unavoidable" take. We place extreme importance on continuing to incorporate sound, smart from the start planning and siting, which include avoidance measures and the best available minimization measures, prior to addressing the standard for and requirements stemming from the actual "take" of the species.

That being said, we also believe that FWS must take the lead in developing appropriate new compensatory mitigation measures. Other options are urgently needed, as power pole retrofits currently represent the only quantified and verifiable form of golden eagle mortality mitigation. Power pole retrofits are an inappropriate long-term mitigation strategy for wind projects because they are not additive—they are preventing electrocutions at power poles but not directly addressing take from wind projects, and it should be noted that FWS already has the authority to compel owners of power poles to

[30] Leslie et al, ICF, Altamont Pass Wind Resource Area Bird Fatality Study, Bird Years 2005-2009

[31] Outlined in FWS' official mitigation policy as a tiered approach for first incorporating avoidance, then minimization measures and finally requiring compensatory mitigation for large-scale impacts with greater, unavoidable impacts. U.S. Fish and Wildlife Service Manual (501 FW 2). *See also* 74 Fed. Reg. at 46852 and 46 Fed. Reg. 7656 (Feb. 24, 1993).

retrofit them if eagle mortality has occurred. FWS must clearly articulate additional mitigation options that would not only attempt to offset eagle mortality at wind projects but also provide a net conservation benefit to the species. FWS should examine the viability of habitat improvements or protective measures for foraging and nesting habitat, carcass removal, additional wind project operational controls or curtailment, funding for habitat restoration or minimizing activities with a demonstrated negative effect on golden eagle populations or lead abatement programs if accompanied by a scientifically defensible analysis of the population benefits to eagle populations in the local or regional area of the mortality. 3-17

Recommendation: *Develop a full suite of mitigation options that will fully offset take before it has occurred and ensure ongoing incorporation into the permit terms and conditions.*

Treatment of Compensatory Mitigation in the DEA

As noted in the DEA, upfront mitigation through distribution pole retrofits has been committed to by the applicant. Upfront mitigation is a positive step that paves the way for net conservation benefit; mitigation for mortality should provide benefits in advance of any mortality they compensate for, and increases in mitigation should be automatically triggered as needed. However, it must also be made clear in the permit terms that the applicant is also required to incorporate any new mitigation measures that are recommended by FWS or the TAC to address mortality associated with the permit based on the latest science.

The DEA mentions, but does not provide, the utility electrocution risk assessment used to choose the highest priority area to mitigate for Shiloh IV eagle mortality, located almost 140 miles to the south of the project. This area, at the periphery of the project-level local population as defined by juvenile eagle dispersal distance, was presumably chosen because there is no area closer to the project where retrofitting is justified. Convenience should not be the basis for mitigation. One concern is that the eagles in the locality where retrofits prevent mortality are only connected to those that would be taken by Shiloh IV by an ad-hoc, rule of thumb radius with no basis in local, field based data. A second concern is that, as more projects in the Montezuma WRA, Altamont Pass WRA, Pacheco Pass WRA, and other nearby areas apply for permits, it is unclear whether there will be sufficient power pole retrofit options within the local area population. For this area in particular, it seems clear that FWS must expand the range of compensatory mitigation options available or harvest levels will be unsustainable. 3-18

We also request that FWS makes public the utility electrocution risk assessment used to identify the specific power poles to be retrofitted. We have concerns regarding the criteria, or lack thereof, for choosing poles to retrofit that may be "high risk" to Golden Eagles. FWS must justify this decision with data and a standard for poles to qualify as compensatory mitigation. That standard must include presence of eagles that are at risk, and also demonstrate why this action is not otherwise occurring or likely to occur in the immediate future

Overall, the exclusive use of retrofits for compensatory mitigation and continued lack of a true basis for defining equivalency for those retrofits[32] provides little certainty that impacts are truly being

[32] As discussed in the DEA, retrofits are the form of mitigation for which equivalency is most clear cut; in the case of lead abatement, habitat enhancement, or reducing other sources of collision mortality (e.g. roadside carcass removal), the population benefit is more ambiguous than retrofits, which remove risk at a point location where an eagle could otherwise, eventually, get killed. However, estimates of retrofit equivalency presented in the DEA are also speculative. The relative productivity of mitigating risk at a single pole recommended in ECP guidance (FWS, Migratory Birds; Eagle Conservation Plan

compensated for. However, recognizing that this is one of few methods for moving forward, we recommend that an implementing agreement between the utility and the applicant must be in place as a condition of this permit to ensure that retrofits can and will be done in a timely manner and that these efforts to retrofit will be complementary and not redundant. FWS should also consider whether a bond by the developer, or similar mechanism, should be required to make certain funds are available. 3-18 cont'd

Recommendation: *Incorporate additional terms to help provide mitigation assurances - such as the utility electrocution risk assessment used to identify the specific power poles to be retrofitted, an implementing agreement to ensure that power pole retrofits will not be redundant and bonds to ensure that funds will be available. Clarify a standard and criteria for identifying power pole retrofits suitable for future mitigation.*

Monitoring and Reporting

The FWS's preferred alternative, Alternative 3, includes additional monitoring during the first year of operation: "monitoring all turbines monthly for at least the first year to provide assurances that any potential eagle take is detected; subsequent annual monitoring will be determined in coordination between the FWS and the applicant based on the results of the first year's intensive mortality monitoring."[33] We fully support this level of intensive monitoring during the first year of operation. The results of this monitoring should be shared with the TAC and the public.

Recommendation: *The eagle permit should include a measure to conduct intensive monitoring during the first year of operation as described under Alternative 3 in the DEA. The intensity and frequency protocol of monitoring should remain at this level until the TAC determines based on findings that appropriate adjustments should be made—at no time, though, shall there be no monitoring throughout the duration of this permit.* 3-19

One of the main reasons why many of the ACPs are still experimental is due to the lack of before-after-control-impact studies (BACI) that are designed to specifically look at conservation practices and their effect on eagle mortalities. The DEA lacks specific information on how these studies will be conducted at the Shiloh IV wind facility. 3-20

Recommendation: *The FWS should provide specific guidelines in the eagle permit for designing BACI studies before and after a certain conservation practice is implemented.*

The details of the post-construction monitoring protocols were not well defined in the DEA. The three main components included in the DEA were: 1) avian use surveys; 2) carcass surveys; and 3) carcass detection probability and removal monitoring. The DEA states that, "results will be used to determine the effectiveness of mitigation measures."[34] However, it does not specify how the results will be used in 3-21

Guidance: Module 1—Land-Based Wind Energy, Version 2. http://www.fws.gov/windenergy/PDF/Eagle%20Conservation%20Plan%20Guidance-Module%201.pdf, 2013) defined as 0.0036 electrocutions/pole/year, was taken from a 2001-2003 golden eagle study in the service area of a single Rural Electric Utility in Northeast Utah and Northwestern Colorado. This study, which searched randomly selected distribution segments, was hampered by the inability to conclusively verify that the cause of death on decomposed carcasses; even when search intervals were shortened, cause of death could only be determined in 40% of cases. In addition, there were variations in sampling and analysis between the three regions sampled and other inconsistencies in the study that make it an insufficient basis for establishing retrofit equivalency for golden eagles across their range in the western U.S.

[33] DEA, p 9, Section 2.2.3

[34] DEA, p 11, Section 2.2.5.

a transparent process to determine the effectiveness of the mitigation measures. The protocols for the avian use surveys were also not well defined. The DEA does not specify if an incidental reporting system or disturbance monitoring of nearby nests and breeding areas will be implemented.

3-21 cont'd

Recommendation: *The eagle permit and the ECP should include more specifics regarding the post-construction monitoring protocols and the process by which the results will be used to determine the effectiveness of mitigation measures.*

We recommend the eagle permit include the following post-construction monitoring:

1) Intensive monitoring, as described in Alternatives 3 and 4 in the DEA, until the TAC determines based on findings that appropriate adjustments should be made;
2) Three years of post-construction mortality monitoring of 50% of turbines, with continuation for additional years based on a review of the results and TAC consultation;
3) Avian use surveys to determine where potentially hazardous turbines are located;
4) Disturbance monitoring of nearby nest sites and breeding areas;
5) A wildlife incidental reporting system that would include incidental reporting of eagle mortalities on the project site.

Golden eagles, other avian species and wildlife, in general, all belong to the public trust. Impacts to wildlife at wind facilities should be documented and reported in the most accurate, honest and transparent manner to agencies and the public. Currently, wind facility developers hire biological consultants to collect data, monitor the facility and report directly to the company, with the resulting information the property of the company. This can lead to situations in which a full suite of data is not reported to agencies nor shared with the public. Given the paucity of data about eagles and the interaction between eagles and wind development, is in the public's best interest to ensure that all the data at wind facilities is collected correctly and reported accurately. This information can be used to inform future permitting decisions. The best way to ensure this information is available is to establish a system whereby wind facility monitoring is conducted by an independent third party of qualified observers, or in the alternative, that the FWS or other non-private party enters into the contractual relationship with the qualified biologist. Permit terms should also require the full submission of any raw data collected on-site. Considering that this DEA is precedent-setting as potentially the first eagle take permit issued for a wind facility, the FWS has an opportunity to establish a system whereby accurate information is reported directly to the agency and the public.

3-22

Recommendation: *FWS should establish a system whereby post-construction monitoring is conducted by third-party qualified biologists and observers that report information directly to the FWS*.

Considering that the Shiloh IV project is one of many in the Montezuma Hills WRA, there is a need for all data on avian use and fatalities to be reported and consolidated into a standardized database. In this way, the FWS and the public can better understand and track eagle fatalities at the landscape-scale instead of just on a project-scale.

3-23

Recommendation: *FWS should establish a reporting system whereby information on eagle fatalities and avian use is tracked for the entire Montezuma Hills WRA and shared with the public. At periodic, standardized intervals, this data should be reviewed to ensure that cumulative take of eagles is not exceeding the anticipated level and resulting in a net loss of golden eagles.*

Active Enforcement and Oversight

Finally, given the unprecedented nature of this action and continued lack of comprehensive framework for programmatic permit issuance, as well as the significant biological uncertainty described above, it cannot be stressed enough that FWS must commit to take an active enforcement and oversight role in the issuance of authorizations for programmatic eagle take. This includes full accommodation for the robust and unimpaired enforcement capability of FWS—which would include clear articulation of the manner in which it will exercise its statutory authority, as well as how it will ensure the continuing validity of all actions stemming from the proposed authorization and any actions that may affect it. 3-24

We urge FWS to acknowledge that eagle conservation actions cannot be considered in isolation, on an arbitrary project-by-project basis. Enforcement and oversight must begin to address similar activities within the local and regional population boundary. It should also be noted that the eagle take permit regulations include specific authorization for FWS to: "amend, suspend, or revoke a programmatic permit issued under this section if new information indicates that revised permit conditions are necessary, or that suspension or revocation is necessary, to safeguard local or regional eagle populations."[35] Processes for such action should be delineated within the final environmental assessment, consistent with the aforementioned principles. FWS should further consider and ensure increased agency capacity to administer eagle take permits, through program and enforcement staff as well as dedicated resources targeted for golden eagle conservation; this would be a prospective step to address a foreseeable area of much expected need. 3-25

Recommendation: *FWS must take an active enforcement and oversight role in authorizations for programmatic eagle take, including other separate but related actions and a commitment to require and revise permit conditions as new information becomes available and dictates needed action to preserve golden eagle populations.*

Conclusion

Our acknowledgement that an effective eagle permitting program is required is counterbalanced by the recognition that we lack the information to forecast eagle mortality from the project, evaluate impacts on local or regional populations, and define meaningful mitigation. We suggest significant revisions to the action alternative in accordance with the recommendations detailed above. We agree choosing the no action alternative while allowing the project to operate would forgo opportunities to facilitate and further promote the conservation of golden eagle populations. We acknowledge the cooperative effort of the applicant in attempts to address potential impacts to golden eagles. Equally importantly, we recognize the shared urgency in finding a resolution to this issue to create a path forward for the rapid and responsible deployment of renewable energy. Promoting the no action alternative would significantly set back the clock on promising solutions that could potentially benefit wind development and golden eagles alike. 3-26

Thank you for your consideration of these comments.

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Audubon California

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[35] 50 C.F.R. § 22.26(c)(7).

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November 27, 2013

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Re: Comments of the California Wind Energy Association on the Draft Environmental Assessment of the Shiloh IV Wind Project Eagle Conservation Plan

In October 2013, the United States Fish and Wildlife Service ("FWS") announced the availability for public comment of the Draft Environmental Assessment ("DEA") for the Shiloh IV Wind Project Eagle Conservation Plan ("Shiloh IV ECP"). The DEA evaluates the issuance of a programmatic eagle take permit for the activities described in the Shiloh IV ECP. The California Wind Energy Association ("CalWEA") and American Wind Energy Association ("AWEA") appreciate the opportunity to provide the following comments on the DEA and look forward to continuing to work with the FWS to minimize the effects of wind energy development and operations on golden eagles (*Aquila chrysaetos*).

CalWEA is a non-profit corporation supported by members of the wind energy industry including turbine manufacturers, project developers and owners, component suppliers, support contractors, and others. CalWEA represents its members in California's policy forums, seeking to encourage and support the production of electricity through the use of wind turbines.

AWEA is the national trade association representing a broad range of entities with a common interest in encouraging the deployment and expansion of wind energy resources in the United States. AWEA members include wind turbine manufacturers, component suppliers, project developers, project owners and operators, financiers, researchers, renewable energy supporters, utilities, marketers, customers, and their advocates.

As noted by FWS, the United Nation's Intergovernmental Panel on Climate Change (IPCC) has predicted that, if unchecked, global climate change will cause great extinctions of wildlife. Specifically, the IPCC has found: "Globally about 20% to 30% of species ... will be at increasingly high risk of extinction, possibly by 2100, as global mean temperatures exceed 2 to 3° C above pre-industrial levels."[1] FWS

[1] Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland. 104 pp. As cited at p.7 in FWS, *Rising to the Urgent Challenge; Strategic Plan for Responding to Accelerating Climate Change*, *available at http://www.fws.gov/home/climatechange/pdf/CCStrategicPlan.pdf.*

agrees that "[c]limate change is the transformational conservation challenge of our time" carrying "the potential to cause abrupt ecosystem changes and increased species extinctions."[2] The number of bird deaths from wind energy projects is very small in comparison to other anthropogenic sources (e.g., buildings, transmission towers, vehicle collisions, distribution lines, domestic cats),[3] as well as the threats posed by climate change.

Issuance of the first eagle take permit since the 2009 Final Eagle Permit Rule will be an important step forward for the wind energy industry and an acknowledgement of the continuing collaborative partnership between FWS and wind energy industry for the protection of golden eagles. Ensuring that golden eagle take authorization is practicable for the wind industry while recognizing the shared goal of eagle preservation is of critical importance to the wind energy industry and its ability to continue to reduce climate pollution.

CalWEA and AWEA offer several specific comments on the DEA below, including requested corrections and clarifications. Assuming these shortcomings will be addressed in the final document, CalWEA and AWEA support the DEA and Alternative 2 (based on the applicant's proposed ECP), as retrofitting 75 power poles is sufficient to offset the conservative Bayesian model mortality of five eagles in five years. The Shiloh IV ECP is an example of the wind energy industry meeting a very high standard for mitigating relatively low impacts to golden eagles, with benefits that more than offset impacts.

The Cumulative Effects Analysis Should Clarify Impacts of the Federal Action

The National Environmental Policy Act (NEPA) applies to major federal actions. The underlying purpose and need (the federal action) to which the DEA is responding, as required by NEPA regulations, is for FWS to ensure that granting a programmatic eagle take permit to Shiloh IV is consistent with Eagle Act regulations. As FWS must ensure compliance with the Eagle Act and its goal to maintain stable or increasing breeding populations of bald and golden eagles, the proposed alternatives must be explained with reference to meeting that objective.

While the DEA generally characterizes the federal "action" and "action alternatives" appropriately, a few parts of the cumulative impacts assessment[4] need to be clarified to make clear that "operation" of the wind project is not the basis of federal action.[5] The NEPA regulations clearly state that the effects "caused by the action" are to be evaluated,[6] and the operation of the wind project has already been fully authorized and is beyond the scope of the DEA. This is an important distinction because the effect of issuing the permit is to *reduce* environmental impacts by offsetting potential eagle mortality through mitigation and compensation that would not otherwise occur.[7] 4-1

[2] *See* FWS *supra* note 1.

[3] For further discussion on this point, see comments of AWEA submitted to FWS on the Draft Land-Based Wind Energy Guidelines.

[4] DEA p. 28-31.

[5] See, e.g., DEA p. 29. The third paragraph suggests that "the wind project will have adverse effects." The operating wind project is an existing condition, and only consequences of the federal action (issuing the permit) should be considered environmental impacts. The phrase "both adversely by the wind project and" should be stricken because operation of the wind project is not the federal action under consideration. In the second sentence under "Cultural Effects," and again under "Other Priority Uses" "Operation of the project, including the take of eagles" should be replaced with "issuance of the permit" because operation of the project is not the federal action.

[6] 40 Code of Federal Regulation (C.F.R.) Section (§) 1508.8.

[7] The NEPA regulations also specify that environmental benefits should be discussed as an effect of the action. 40 C.F.R. § 1508.8.

The DEA Requires Corrections of Biological Information

The DEA should correct misstatements related to "lost" eagle territories. The DEA concludes that three golden eagle territories "have likely been lost due to hazards presented by wind energy development in the Montezuma Hills over the past 10 years."[8] However, the DEA acknowledges elsewhere that the data does not support a causal connection.[9] It may be that the territories have not been lost, but are merely periodically occupied. For example, despite numerous surveys, the noted Masson nest has not been documented to be active in the past 12 years,[10] so if it was part of a "lost territory," the loss occurred before the Shiloh I, II, and III projects became operational. The Currie nest was last active in 2004,[11] and the Callahan nest was last active in 2010,[12] during the 10-year period when the DEA asserts the territory was lost. The Draft Eagle Conservation Plan for the Shiloh IV Wind Project demonstrates that there is golden eagle activity as recently as 2010 and that the territory is not lost. 4-2

Further, we request that FWS acknowledge that eagles are well-known to have supernumeral nests within a single territory. Each nest should not be presumed to be its own territory. The Masson, Currie, and Callahan nests may even be part of the same territory, or part of the Meins Landing territory. Similarly, the Concord and Kirker Creek nests could be considered to be part of the same territory.

The DEA should consistently extrapolate data to account for all known sources of eagle mortality. The DEA recognizes that quantification of mortality can be difficult (e.g., when sources of mortality are unknown and fatalities are undocumented). In some cases, the DEA addresses this difficulty by using a proxy or making other assumptions.[13] In another case, by contrast, the DEA excludes most sources of golden eagle fatalities from consideration because of the difficulty of quantifying the other acknowledged sources of mortality: vehicle strikes, illegal hunting, poisoning, etc.[14] Instead of assuming that these sources do not exist for purposes of the analysis, the DEA should use a proxy by extrapolating from existing available data to account for other sources of mortality. Consideration of other sources of mortality is required per the 2009 Eagle Permit Rule.[15] Wind turbine collisions, for example, have been found to account for less than two percent of the documented human-caused fatalities of golden eagles outside of Altamont Pass.[16] 4-3

[8] DEA p. 22.
[9] DEA p. 24.
[10] Draft Eagle Conservation Plan for the Shiloh IV Wind Project, p. 2-6 (August 2012).
[11] Draft Eagle Conservation Plan for the Shiloh IV Wind Project, p. 2-7 (August 2012).
[12] Draft Eagle Conservation Plan for the Shiloh IV Wind Project, p. 2-7 (August 2012).
[13] See, e.g., DEA p. 29 (using proportion of demographic distribution as a proxy); and p. 36 (using a conservative estimating approach).
[14] DEA p. 31.
[15] 74 FR 46839 states, "We will use modeling to evaluate the level of take we can permit that is compatible with this statutory threshold, taking into consideration the cumulative effects of all permitted take, including other forms of lethal take permitted under this section and other causes of mortality and nest loss."
[16] AWEA Report on Eagle Citations, Nest locations, and Fatalities, Tetra Tech EC, Inc., prepared for AWEA, p. ES-1, January 2011; updated May 2011 (copy attached) included an analysis of all public records for eagle fatalities that have occurred since the 1950s, which showed that golden eagle fatalities caused by collisions with wind turbines accounted for "less than one percent" of all human-caused sources of mortality. In recognition of the additional documented fatalities noted in the Pagel et al. (2013) study, over the course of the last year, AWEA increased their estimation of wind energy's impacts on golden eagles to "less than two percent."

Use a consistent methodology to estimate cumulative impacts. The DEA should also use a consistent methodology to estimate cumulative impacts. With respect to the Pacheco Pass Wind Resource Area (WRA), the DEA fills a data gap by applying an estimate from other wind energy facilities in similar habitat types.[17] However, it is unclear whether similar data gaps were addressed in a similar fashion. Specifically, it is unclear whether data gaps for utility-caused mortality were similarly estimated (e.g., for utilities other than PG&E, for the full geographic extent of the WRA, and for distribution as well as transmission lines). Additionally, the DEA's cumulative impacts assessment does not estimate other sources of fatalities at all, even though these other sources have been shown to be significant causes of eagle fatalities. The DEA should be clarified to apply reasonable assumptions for estimating fatalities from all known sources, in addition to the two select sources discussed in the DEA. Attached to these comments is a source evaluating other sources of eagle fatalities.[18] 4-4

The DEA should clarify its description of Table 2-2.[19] The DEA explains the rationale for meeting the "no net loss" standard with compensatory power pole retrofits using the FWS Resource Equivalency Analysis (REA).[20] Those compensatory actions, rather than the actions contained in Table 2-2, are "necessary" to maintain "no net loss" of eagles[21] because the "no net loss" standard is being met through power pole retrofits in quantities conservatively estimated to sufficiently compensate for the authorized take. The implementation of experimental measures in Table 2-2, if proven effective, *could potentially* contribute to meeting the standard, but should be recognized as being in excess of what is needed for meeting the standard and thus providing a net conservation benefit.[22] Retrofitting 75 power poles is sufficient to offset the conservative Bayesian model mortality of five eagles in five years, as described in Alternative 2, while the other measures in Table 2-2 (i.e., additional monitoring and testing) do not contribute to reducing net loss *per se.* 4-5

Alternative 4 Fails to Meet the BGEPA Practicability Standard

Selection of Alternative 4 would not be practicable and should be removed from consideration. For an operating facility that has followed the best siting practices currently available under federal, state, and local regulation, particularly for an industry with large capital requirements and narrow margins, it seems highly unlikely that Alternative 4 could meet the "practicable" criteria. Curtailment is not a viable avoidance and minimization measure in this instance because it is not "capable of being done after taking into consideration, relative to the magnitude of the impacts to eagles, the following three things: the cost of remedy compared to proponent resources; existing technology; and logistics in light of overall project purposes"[23] and should never be used in a blanket fashion but rather as a limited measure, at times of high risk, when appropriate and when no other means for reducing risk are available. It is our strong opinion that Alternative 4, and its proposed remedy for avoiding take, should be eliminated from further consideration in the final EA. It is also our opinion that curtailment is unnecessary to meet the "no net loss" standard and would go above and beyond that which is needed to meet this relevant standard. 4-6

[17] DEA p. 31.
[18] *See supra* note 16.
[19] DEA p. 12.
[20] DEA p. 12.
[21] DEA p. 12.
[22] See also DEA p. 35 (ACPs "may reduce the amount of actual take") and p. 37 (ACPs "could result in decreased eagle fatalities").
[23] 50 C.F.R. § 22.26(f) and 50 C.F.R. § 22.3.

The DEA Appropriately Accounts for the Negative Consequences of Climate Change on Eagles and Recognizes Wind Energy's Mitigation of This Environmental Problem, But This Factor Should Be More Fully Integrated into the NEPA Analysis

The DEA's Cumulative Effects section notes: "[G]enerating electricity using wind energy rather than fossil fuels, operation of the project could offset production of 93,423–116,779 metric tons of CO2 equivalent per year (citation omitted). Over the life of the project, this would equate to approximately 3.3–4.0 million metric tons of CO2 equivalent. This offset would constitute an indirect beneficial effect."[24] It is our opinion that the relationship among wind energy development, climate change, and golden eagle preservation should be more fully explored and given additional weight when assessing the alternative actions and the totality of the permit application. Beyond simply evaluating the direct effects of a federal action, NEPA also requires an evaluation of the "[i]ndirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable ... [including] related effects on air and water and other natural systems."[25] While the relationship between an overly restrictive alternative action, such as Alternative 4, may inhibit wind energy's mitigation of climate change and the adverse impacts of climate change on the golden eagle population may be difficult to determine with precision, the NEPA framework requires that it be analyzed and inform federal decision making. At its core, "NEPA ensures that an agency's approval of a project is a fully informed and well-considered decision."[26] Courts have acknowledged the appropriateness of an EA addressing climate change and its associated impact on wildlife.[27] In sum, any NEPA review addressing a wind energy application for an eagle take permit should rigorously consider the relationship among golden eagles, climate change, and wind energy's mitigation of this environmental challenge in all the alternatives considered, and the ability of wind energy to mitigate that outcome should be considered in those alternatives as a net benefit. 4-7

Other Issues Requiring Correction or Clarification

Correct use of terminology. The term "take" used throughout the document implies a legal conclusion. In the context of an incidental take permit, it would be more accurate to use the term "unintended take." Further, "collision" is another proper term, as in "In efforts to reduce ~~take of~~ collisions with the four key species, many turbines have been removed."[28] The statement quoted in the previous sentence is referring only generally to "take" because it discusses species regulated by two different statutes (the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act), each having different standards and different definitions of "take." It should therefore be clarified as suggested above. 4-8

[24] DEA p. 36.
[25] 40 C.F.R. § 1508.8(b).
[26] *Center for Biological Diversity v. United States Department of the Interior*, 563 F.3d 466 (2009)
[27] See, e.g., *In Center for Biological Diversity v. Kempthorne*, the court upheld the sufficiency of an EA partially on the basis that it "acknowledge[d] climate change and enumerated its long-term effects on polar bears, including 'increased use of coastal environments, increased bear/human encounters, changes in polar bear body condition, decline in cub survival, and increased potential for stress and mortality, and energetic needs in hunting for seals, as well as traveling and swimming to denning sites and feeding areas.'" 588 F.3d 701, 711 (9th Cir. 2009). The depth of this analysis on climate change and wildlife demonstrates that the DEA in the case at hand should more fully integrate this factor into its evaluation of the alternatives considered.
[28] DEA p. 33.

The discussion of enforcement actions and speculation about investigations and prosecution goes beyond the scope of the DEA; it does not inform the environmental analysis and we request that it be removed from the document.[29] 4-9

An eagle take permit should not require project operators to survey for birds, other than eagles, or bats.[30] The permit only authorizes take of golden eagles. Large bird detection can be done more effectively and efficiently than is possible for bats and small birds. 4-10

Clarify that Alternative 3 is not expected to result in significant adverse effects. Because of the conservative modeling approach discussed in the DEA,[31] the statement regarding Alternative 3 should be revised to state: "Our REA shows that 133 retrofits will more than mitigate the loss of five eagles."[32] This clarification helps to support the conclusion that Alternative 3 is not expected to result in significant adverse effects on golden eagle populations. 4-11

CalWEA and AWEA appreciate the opportunity to provide comments on the Shiloh IV ECP and can support the DEA contingent upon the aforementioned clarifications and corrections being sufficiently addressed.

Sincerely,

Nancy Rader

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[29] DEA p. 36-37. The material addressing enforcement issues should be stricken from the final EA.
[30] DEA p. 11 (third bullet under Mortality Monitoring).
[31] See, e.g., DEA p. 53.
[32] DEA p. 37.

Attachment

AWEA Report on Eagle Citations, Nest Locations, and Fatalities

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Prepared for:

The American Wind Energy Association

January 2011
Updated May 2011

Executive Summary

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. Changes in the permit structure in 2010 now allow for permits for incidental take of eagles; however, at this time, implementing guidelines have not been released and the Final Rule states that permits available for golden eagles will be limited due to U.S. Fish and Wildlife concerns about declining golden eagle populations. This report was designed to address three requests from the American Wind Energy Association (AWEA). First, Tetra Tech summarized the information that is known about bald and golden eagle fatalities based on the information that is available in the public domain. Second, Tetra Tech requested data from natural heritage databases and used the data to create a map book depicting buffers of different sizes. Third, Tetra Tech reviewed the citations used in USFWS eagle guidance and protocol-level documents to determine if the relevant scientific literature was used correctly.

Our review of literature and databases concerning eagle fatalities found documentation of 6,956 bald eagle and 3,715 golden eagle fatalities recorded in the contiguous United States since 1960. For bald eagles, of the known causes of fatality, human- and non-human-caused fatality totals were approximately equal. The most common human causes of bald eagle fatalities were poisoning (37%), shooting (22%), electrocution (10%), and vehicle strikes (6%). Fatalities of golden eagle were dominated by human causes, primarily electrocution (50%), collisions with wind turbines at the Altamont Pass Wind Resource Area (21%), and poisonings (13%). Collisions with wind turbines at wind resource areas outside of the Altamont Pass accounted for <1 percent of the total human-caused fatalities of golden eagles.

We obtained bald and golden eagle nest location data from 17 states, which included data for both species (7 states) and bald eagle only (10 states); no state had only golden eagle nest data. Of states without data, 12 states had a data license agreement that would not allow them to release the data and 11 were evaluating if they could release the data. We applied buffers of various distances around the known eagle nests and calculated the percentage of land in each state that overlapped with the nest buffer. The percentage of overlap and the resultant percentage that could be off limits does not take into account the other numerous siting constraints such as wind speed, other sensitive species, cultural resources, military and civilian flight paths, and other development constraints, which would likely further reduce the amount of developable land. Of the 7 states with golden eagle nest data, the percentage of land that overlapped the USFWS recommended 4-mile buffer (as stated in the Interim golden eagle inventory and monitoring protocols: and other recommendations, released February 2010) around nests ranged from <1 percent in Kansas to 19 percent in Wyoming, with 4 of 7 states having less than 5 percent overlap. Of the 10 states with bald eagle nest data, the percentage of land that overlapped the USFWS recommended 2-mile buffer ranged from <1 percent in Texas and South Carolina to 39 percent in Delaware, with 8 of 10 states having less than 5 percent overlap. When the bald and golden eagle nests were similarly buffered by 4 miles in states where nest data was obtained for both species, the percentage of land that overlapped the combined bald and golden eagle buffer ranged from 4 percent in Arizona to 34 percent in Washington. Because many of the eagle nest summarized in the state databases represent incidentally found nest locations, these values will likely increase dramatically as the number of eagle surveys increase and additional nest locations are found.

We reviewed all accessible literature cited in five key USFWS documents: (1) Draft Bald and Golden Eagle Protection Act standards for review of wind energy projects, released September 2010 ; (2) Interim golden eagle inventory and monitoring protocols: and other recommendations, released February 2010; (3) Service white paper providing guidelines for the development of project-specific avian and bat protection plans for renewable energy facilities, released August 2010; (4) Interim guidelines for the development of a project specific avian and bat protection plan for wind energy facilities, released June 2010; and (5) Letter from USFWS in Oregon to wind developments regarding eagles, released September 20, 2010, and found that the correct use of the citations ranged from 45 to 86 percent. We found important discrepancies in the use of citations that pertained to buffer distances that could result in the reconsideration of the proposed buffers. We also found discrepancies with regard to the value of mitigation measures such as turbine feathering and cut-in speeds that could result in the application such measures without any testing of their effectiveness for avian species. Another major area of discrepancies in the use of citations occurred in documentation of golden eagle population declines, which have been shown in some but not all of the areas claimed in the USFWS documents. Small errors in citing the contents of references also had major ramifications in some instances, including the definition of local populations for projects and in describing the scale of eagle movements outside the breeding season. In many cases, these discrepancies, if not corrected, could cause wind energy developers to undertake inappropriate and possibly ineffective mitigation actions (Table ES-1).

Table ES-1. Summary of key discrepancies between USFWS documents and original source documents.

Source Document	Information Presented	Assessment of Technical Correctness	Implications	References (source document)
1. BGEPA Standards (p6) 2. BGEPA Standards (p5) 3.USFWS Letter (p3)	References home range sizes of eagles and appropriate buffers for development, generally recommends protection of a fixed area or a core area based on space use of eagles. Home range radii of 1.75 to 4 miles listed for golden eagle and winter home ranges described in both area and linear measurement units.	Improper use of these references includes the use of buffer recommendations designed for different input data than those to which USFWS applied them and use of inter-nest distances as estimates of home range size. Average home range sizes were overestimated either by miscalculation or use of a maximum annual value to estimate a minimum breeding value. Winter home range estimates included errors in units, errors in cited values, and representation of a home range of a single breeding pair as a population average. **Sections Where Further Addressed:** 3.3.1 3.3.5 4.3.1 4.3.5 Appendix 6	The use of inappropriate or inaccurate estimates of home range sizes to prescribe buffer distances and other forms of management may result in restrictions on wind energy facilities that do not achieve the USFWS desired result of conserving eagle populations. Such restrictions may include inappropriate buffer distances, setbacks, timing, or micrositing restrictions.	Blumstein and Fernandez-Juricic 2010 (1) Garrett et al. 1993 (2) Kochert et al. 2002 (3) McGrady et al. 2002 (2) Grubb et al. 1994 (2) McClelland et al. 1996 (2) Platt 1984 (2)
1.BGEPA Standards (p7)	Reference to a 4 - mile buffer from the nest for golden eagles, which captures 87.5% of adult eagle activity.	The distance cited was calculated for resident, breeding adults, and is not applicable to migrant adults, juveniles or subadults. **Sections Where Further Addressed:** 3.3.1 4.3.1 Appendix 6	Different buffer distances might be relevant for birds during winter or migration and for different age classes. Use of data inappropriate to the age class or status (breeding, migrant, vagrant) of eagles present at a project site may result in buffers or other restrictions that do not achieve the desired USFWS goal of conserving eagle populations.	Watson and Davies 2009 (1)

Source Document	Information Presented	Assessment of Technical Correctness	Implications	References (source document)
1.ABPP White Paper, Interim Guidelines for ABPP (p3)	All developers of renewable energy facilities are encouraged to coordinate with Service field offices and State fish and wildlife agencies when developing an ABPP, and if eagles occur on or near the project site, to consult the Service's 2010 eagle permitting implementation guidance (USFWS 2010) if they intend to seek programmatic permits under 50 CFR 22.26.	The eagle permitting implementation guidance has not been released yet. **Sections Where Further Addressed:** 3.3.3 4.3.3 Appendix 6	Until implementation guidance is publicly available, project proponents do not have a means to obtain permits.	USFWS 2010 (1)
1.ABPP White Paper, Interim Guidelines for ABPP (p10, Section 2) 2.ABPP White Paper, Interim Guidelines for ABPP (p10, Section 3)	Recommendations to increase cut-in speed, feather turbines, and lock rotors during peak migration to reduce avian fatalities.	All suggestions about turbine feathering in this statement should refer to bats only and not birds. Kunz et al. 2007 summarized Arnett's observations that the majority of bat fatalities occur on low wind nights. This paper is a methods paper, not a research paper. Manville 2009 makes reference to a similar statement in relation to "birds/bats" but doesn't cite any sources. **Sections Where Further Addressed:** 3.3.3 4.3.3 Appendix 6	These recommendations have not been tested for effectiveness in reducing avian fatalities, thus their effectiveness is unknown for reducing bird fatalities.	Kunz et al. 2007 (1) Manville 2009 (1, 2)

Source Document	Information Presented	Assessment of Technical Correctness	Implications	References (source document)
1.ABPP White Paper, Interim Guidelines for ABPP (p8, Section 3d) 2.ABPP White Paper Interim Guidelines for ABPP (p13, Section C4)	Recommendation to avoid use of guy wires on meteorological towers, and to mark any necessary guy wires with bird deterrent devices.	The USFWS 2000 document specifies these markers only for towers in known raptor or waterbird concentration areas, daily movement routes, or in major diurnal bird migratory movement routes or stopover sites. **Sections Where Further Addressed:** 3.3.3 4.3.3 Appendix 6	Adherence to this guidance may result in the use of unnecessary markers on guy wires in areas lacking the characteristics listed in the reference.	USFWS 2000 (1, 2)
1.Interim GOEA monitoring protocol (p 9)	Statement that golden eagle populations are believed to be declining throughout their range in the contiguous United States.	The references cited for the statement provide equivocal support for the existence of large-scale declines; some references show increases in some areas, some are based on time series too short to establish population trends, and some do not present population trends at all. **Sections Where Further Addressed:** 3.3.2 4.3.2 Appendix 6	There is less support for range-wide declines than USFWS asserts, which could result in restrictions on wind energy development that are not warranted in all regions (e.g., eastern U.S.) based on population trend.	Harlow and Bloom 1989 (1) Good et al. 2007 (1) Kochert and Steenhof 2002 (1) Kochert et al. 2002 (1) Smith et al. 2008 (1) USFWS 2009b (1)
1.Interim GOEA monitoring protocol (p9)	Significant golden eagle breeding failures have been reported in some areas of the southwestern United States.	The WRI report pertains to only one area of the southwest, and documents low productivity, rather than breeding failure in three survey years. **Sections Where Further Addressed:** 3.3.2 4.3.2 Appendix 6	Management on a large geographic scale based on low productivity in one region may lead to inappropriate and overly restrictive strategies that do not achieve the desired USFWS goal of conserving eagle populations.	WRI 2009 (1)

Source Document	Information Presented	Assessment of Technical Correctness	Implications	References (source document)
1. USFWS Letter (p2)	The Project's local-area eagle population of concern is the area encompassed by a circle 140 miles from the Project boundary, by definition.	This definition of a local population appears only on page 46845 of USFWS (2009a) and pertains to permits for take of nests under 50 CFR 22.27. It does not appear intended to apply to BGEPA incidental take permits under 50 CFR 22.26. The final rule clearly states "…it would be too burdensome to ask the proponent to provide data on that large a scale… data within a 10-mile radius of the nest provides us with adequate information …". **Sections Where Further Addressed:** 3.3.5 4.3.5 Appendix 6	Further clarification is needed regarding the 140-mile circle around the local eagle population as it might not be applicable to incidental take of eagles. Additionally, if it is applied to incidental take, the cost of assessing impacts at such a scale would be much greater than the 10-mile radius suggested as the proponent's data responsibility.	USFWS 2009a (1)

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1 Introduction

Bald and golden eagles have been protected under the Bald and Golden Eagle Protection Act (BGEPA) since 1940 (amended in 1959, 1962, 1972, and 1978). The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg (16 U.S.C. 668(a); 50 CFR 22). "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle (16 U.S.C. 668c; 50 CFR 22.3). "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. The U.S. Fish and Wildlife Service (USFWS) is responsible for enforcing the BGEPA.

Historically, permits for incidental take associated with development have not been available under the BGEPA. This changed in November of 2010, after the USFWS final rule went into effect allowing for incidental take permits under BGEPA. Of the two types of permits available, wind energy development was specifically called out as needing a programmatic permit because take is not limited to a specific time or location. At this time, implementing guidelines for the programmatic permits have not been released to the public and no programmatic permits have been authorized. In addition, the final rule states that for golden eagles west of 100 degrees West longitude, they will only issue take permits based on "levels of historically authorized take, safety emergencies, and take permits designed to reduce ongoing mortalities and/or disturbance", pg 46840. The final rule goes on to state that for golden eagles east of 100 degrees West longitude, permits will only be issued for safety emergencies. Thus, even after implementation guidelines are drafted, the final rule does not allow for the issuance of permits due to their concerns about declining golden eagle populations.

In response to the inability of wind energy developers to get permits, USFWS has recommended that developers prepare project-specific Avian and Bat Projection Plans (ABPPs), which outline the potential project-related risk to birds and bats; advanced conversation measures (e.g., avoidance, minimization, and mitigation) that would be implemented to reduce risk; and provide for adaptive management based on post-construction monitoring results.

As a result of continued developments regarding eagles and the potential effects on wind energy development in the United States, the American Wind Energy Association (AWEA) contracted Tetra Tech to evaluate the following concerns. First, information on eagle fatalities associated with wind has not been summarized, either alone or in the context of other sources of eagle fatalities. To address this gap, Tetra Tech summarized the information that is known about bald and golden eagle fatalities based on the information that is available in the public domain. Second, AWEA requested that Tetra Tech address whether buffers suggested by USFWS around all eagle nests have adequate biological justification. Overly restrictive policies with respect to this issue will remove a significant percentage of the western United States from wind. In order to understand the implications of different sized buffers from eagle nests, Tetra Tech requested data from natural heritage databases and used the data to create a map book depicting buffers of different sizes. Third, AWEA requested that Tetra Tech review the citations used in USFWS eagle guidance and protocol-level documents to determine if the relevant

scientific literature was used correctly and supported the policy decisions being made by the USFWS with regards to the wind industry, and to determine if additional unreferenced information would affect these policies. To address AWEA's concerns, Tetra Tech reviewed the literature cited within five documents released by the USFWS.

2 Methods

2.1 Fatality Assessment

2.1.1 Search Engines, Search Terms Used, and Data Limitations

Database searches were conducted to identify peer-reviewed literature and technical reports that provided information on eagle fatalities. Key search terms, listed below, were used to generate an initial list of reports and papers, which was refined to include papers that provided data on eagle fatalities within the continental United States. We obtained all papers and reports that could be easily acquired; however, the papers review should not be considered comprehensive because some sources could not be obtained, and although the databases we search are used academically, not all appropriate papers will be identified during the search because they often do not capture gray literature. Cause of death was assumed to be correctly attributed by the source.

Database searches were conducted in Web of Science, Wildlife Ecology Worldwide, and Google Scholar. Search strings included the following:

Bald eagle and collide	Golden eagle and collide
Bald eagle and collision	Golden eagle and collision
Bald eagle and dead	Golden eagle and dead
Bald eagle and electrocution	Golden eagle and electrocution
Bald eagle and fatalit	Golden eagle and fatalit
Bald eagle and kill	Golden eagle and kill
Bald eagle and mortalit	Golden eagle and mortalit
Bald eagle and poison	Golden eagle and poison
Bald eagle and power line	Golden eagle and power line
Bald eagle and powerline	Golden eagle and powerline
Bald eagle and shoot	Golden eagle and shoot
Bald eagle and transmission	Golden eagle and transmission
Bald eagle and wind energy	Golden eagle and wind energy
Bald eagle and turbine	Golden eagle and turbine

Additional effort was directed towards acquiring information about eagle fatalities associated with wind farms. These efforts included personal communications and review of materials not identified through the database searches.

2.1.2 Databases Reviewed

Bird Banding Laboratory Band Returns:

The USGS Bird Banding Laboratory maintains a database of banded birds, including those that were banded and subsequently found dead (recoveries). These data are incidentally reported to the banding labs as birds are found. We requested and received (December 20, 2010) band encounters for bald and golden eagles from the Bird Banding Laboratory from 1960 to 2010.

We summarized these data based on their data field "encounter how obtained description", focusing on recovered bands. We recorded causes of death for all cases in which it was known, and assigned the death to the "unknown cause" category for the following Bird Banding Lab Categories: found dead – unknown cause known, injury – unknown cause, building enclosure, caught by hand, died in nest, dead on highway – unknown cause, dead as skeleton, unknown cause, obtained – unknown cause, miscellaneous, band number obtained – unknown cause, fall from nest, banding mortality, and mortality beacon from transmitter.

Avian Incidental Monitoring System:

We reviewed records from the Avian Incident Monitoring System (AIMS), which is a cooperative program between American Bird Conservancy and the U.S. Environmental Protection Agency (ABC 2010). The AIMS dataset is designed to provide a centralized source for both lethal and sub lethal impacts of pesticides on birds. The data were collected by the American Bird Conservancy with input from a working group of scientists and industry representatives. Data presented in this report were collected by running an advanced search, selecting United States only, and using eagle in the field "any part of a birds name". We queried the full data range of the database from 1968-2005. AIMS data are available online at: http://www.abcbirds.org/abcprograms/policy/toxins/aims/aims/index.cfm.

FAA Wildlife Strike Database:

We reviewed records from the Wildlife Strike Database, which is maintained by the Federal Aviation Administration (FAA). The database contains records of wildlife strikes by civilian and U.S. Air Force aircraft occurring since 1990. Reports of wildlife strikes are provided voluntarily to the database, which is searchable online or may be downloaded in its entirety from http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx. Data presented in this report were collected by running a state by state search on the web page, and searching for records of "bald eagle", "golden eagle", "eagle", or "eagles" by sorting based on the species column of the database.

USGS National Wildlife Health Center:

The USGS National Wildlife Health Center provides quarterly reports of wildlife fatalities. We reviewed all quarterly reports from 1995 to 2010 (USGS 2010b). All four quarterly reports per year were reviewed except for 2010, for which only quarters 1 and 2 were posted as of December 2010. Not all data from this database were included in the summary because some multi-species fatality incidents were summarized as the estimated total number of birds impacted and did not provide the number of eagles impacted. In order to refine our understanding, we submitted a data request to the USGS National Wildlife Health Center, but have not received a response to date. Quarterly mortality reports are available online at http://www.nwhc.usgs.gov/publications/quarterly_reports/index.jsp

USFWS National Forensics Laboratory:

Tetra Tech contacted the USFWS National Forensics Laboratory and requested information on eagle fatalities. Tabitha Viner, Forensic Scientist, stated in an email on December 27, 2010 that because the information on fatality evaluated by the Laboratory are used in legal cases, they cannot provide information on eagle fatalities, even in an abstract form.

USFWS Law Enforcement Database

Tetra Tech contacted the USFWS Law Enforcement and requested information on eagle fatalities. Sandy Clevea of USFWS stated that the information on the cause of eagle fatalities could only be retrieved under a Freedom of Information Act request. A request was faxed to the USFWS on December 28, 2010. We had not received a response at the time of writing this report.

2.1.3 Data Summary

Human-caused mortality was divided into the following categories: vehicle strike, aircraft strike, train strike, wire collision, collision/electrocution, electrocution, wind turbine blade collision, unknown collision, gunshot, trap, and poisoning. The category 'poisoning' included the following descriptors for databases and reports: aldicarb, botulism, brodifacoum, carbofuran, coumaphos, DDT, diazinon, famphur, fenthion, lead, parathion, pentobarbitol, phorate, secondary anti-coagulant, secondary pesticide, strychnine, terbufos, thallium, toxicosis, unspecific poisoning, and warfarin. Natural mortality was divided into the following categories: west nile virus, peritonitis, avian vacuolar myelinopathy, avian pox, avian cholera, avian tuberculosis, bacterial infection, weather, unknown disease, other bird/animal, and unknown.

The Altamont Pass Wind Resource is collection of wind energy facilities owned by several companies that provide electrical power to California. Due to concerns about raptor fatalities, a number of studies were conducted to evaluate the potential bird mortality risks (Howell and DiDonato 1990; Orloff and Flannery 1992, 1996; Hunt 2002; Smallwood and Thelander 2004, 2005, 2008; ICF Jones & Stokes 2008a; WEST 2008, Smallwood and Karas 2009). In the course of our review, we found that the same fatality data appeared in many of these studies. We therefore compared major references for Altamont Pass Wind Resource (Howell and DiDonato 1990, Orloff and Flannery 1992, Howell 1997, Hunt et al. 1997, Erickson et al 2001, Hunt 2002, Smallwood and Thelander 2002, Dorin et al. 2005, Smallwood and Thelander 2008, Smallwood and Karas 2009), and totaled eagle fatalities that represented distinct events. This left a reduced set of references that covered all reported eagle fatalities at Altamont Pass Wind Resource (Howell and DiDonato 1990, Erickson et al. 2001, Hunt 2002, Smallwood and Karas 2009). Portions of the Altamont Pass Wind Resource have been repowered to utilize next-generation modern turbines by the owners of individual wind farms.

2.2 Nest Mapping

To obtain data on nest locations for bald and golden eagles, a Tetra Tech biologist identified the state agency responsible for maintaining nest data. Once the appropriate agency was identified, an inquiry was sent to all states in the continental U.S. via email and/or standard mail to request nest information for the entire state. Due to the sensitivity of eagle nest data, several states required a data license agreement or had additional questions regarding the use of the data. A license agreement would restrict use of the data, and in most cases prohibit Tetra Tech from sending the data to AWEA. For these instances, Tetra Tech issued responses that identified how the data would be used, but stated that a data license agreement could not be signed as Tetra Tech intends to distribute the data to the AWEA, and the data could be sent to AWEA members. Thus, when a data license was required, Tetra Tech requested nest data at a spatial scale that could be transmitted without a data license. As Tetra Tech received responses from

each state, the responses were saved electronically and entered into a tracking spreadsheet. Spatial data were entered into a GIS, and nest locations were mapped. Nests were buffered by 2, 4, 5, and 10 miles and mapped by state and calculated the percentage of land that overlapped with the nest buffer. The percent of overlap is the percent of the state that could be made off limits to wind energy development due to the location and spacing of nests. We did not restrict our analysis to land only suitable for wind energy development. The percentage of overlap and the resultant percentage that could be off limit does not take into account the other numerous siting constraints such as wind speed, other sensitive species, cultural resources, military and civilian flight paths, and other development constraints, which would likely further reduce the amount of developable land. The percentage of each state encompassed by buffered bald eagle nests, golden eagle nests, and combined nests was calculated for 2-, 4-, 5-, and 10-mile buffers by state.

2.3 Review of Key Eagle Documents

We conducted a review of all accessible literature cited in five key USFWS documents that communicate to wind energy developers the permitting and monitoring guidelines pertinent to bald and golden eagles. The USFWS documents we reviewed were: (1) Draft Bald and Golden Eagle Protection Act standards for review of wind energy projects, released September 2010 (Appendix 1); (2) Interim golden eagle inventory and monitoring protocols: and other recommendations, released February 2010 (Appendix 2); (3) Service white paper providing guidelines for the development of project-specific avian and bat protection plans for renewable energy facilities, released August 2010 (Appendix 3); (4) Interim guidelines for the development of a project specific avian and bat protection plan for wind energy facilities, released June 2010 (Appendix 4); and (5) Letter from USFWS in Oregon to wind developments regarding eagles, released September 20, 2010 (Appendix 5).

We generated a list of all references cited in the five USFWS documents. For each reference, we included all citations of the reference, organized by USFWS document, and included context from the paragraph in which the citation occurred. Senior-level biologists examined the context of the citation in the USFWS document and assigned the citation one of the following four categories of accuracy:

1) Accurate as cited (Accurate)
2) Accurate, but with additional context (Context)

   Additional context occurred when the USFWS document used part of the information presented in the reference; however, there was also additional information from the reference that would slightly alter the statement in the USFWS document.

3) Inaccurate due to minor discrepancies (Minor)

   A minor discrepancy occurred when the USFWS document used a citation in a way that was not completely consistent with the original reference, but the correct use would not result in major changes to the statement in the USFWS document (e.g., an incorrect reference to a county, an incorrect reference to a date, an incorrect use of a term, etc).

4) Inaccurate due to major discrepancies (Major)

   A major discrepancy occurred when the USFWS document used a citation in a way that was not consistent with the original reference, and the correct use would result in major

changes to the statement in the USFWS document (e.g., incorrect use of results related to home range size, incorrect interpretation of results such as a declining population trend, incorrect statement about analysis used, etc).

We subjected all citations identified as inaccurate due to major discrepancies to peer review by an additional reviewer to obtain concurrence on the assessment. Results of the review were recorded in an annotated bibliography (Appendix 6).

To locate papers or reports that were not cited in the USFWS documents that might be important to understanding bald and golden eagle ecology, we used Google Scholar and the search terms “golden eagle home range” and “bald eagle home range” on December 28, 2010. We used these terms because we felt that papers or reports on home range size would include basic data on breeding biology as well as papers examining changes in home range size due to disturbance. We reviewed the abstracts of the first 70 citations returned for each species and obtained papers or reports that provided data collected in the lower 48 states on home range size. We also reviewed the abstracts of papers or reports that cited Garrett et al. (1993) and Marzluff et al. (1997). Further, we examined the Birds of North America species accounts for bald and golden eagles (Buehler 2000, Kochert et al. 2002) and examined papers or reports on home range that were not included in the USFWS documents.

3 Results

3.1 Fatality Assessment

Our review of literature and databases concerning eagle mortalities found documentation of 6,956 bald eagle and 3,715 golden eagle fatalities recorded in the contiguous United States since 1960.

For bald eagles, 3,491 (50 percent) of fatalities were due to unknown trauma or other unknown causes (Tables 1 & 2). Among documented human-caused fatalities (Table 1), the leading causes of death were poisoning (36 percent, mostly due to pesticides or predator poisons), shooting (21 percent), electrocution (10 percent), vehicle strikes (6 percent), and traps (6 percent, including entanglements in fishing nets and oil slicks) (Table 1). Ninety-one percent (2,950 of 3,259) of natural bald eagle fatalities were due to unknown causes (Table 2). Among documented natural fatalities, the leading causes were avian vacuolar myelinopathy (6 percent of total), West Nile virus (1 percent), and other animals (1 percent; Table 2).

Table 1. Human-related causes of fatalities in bald eagles.

Author	Years	Vehicle strike	Aircraft strike	Train strike	Wire collision	Collision / electro-cution	Electro-cution	Wind turbine blade collision	Unknown collision	Gun shot	Trap	Poisoning	Illegally taken	Unknown trauma
ABC 2010	1968-2005											409		
Allen et al. 1996	1992-1993											3		
Boeker and Nickerson 1975	1972-1973						7							
Bortolotti 1984	not reported									8	3	4		4
Buehler 2000	1995-1997											55		
Buehler et al. 1991	1984-1990						1							1
Coon et al. 1970	1960 -1965						1		7	45	3	2		
Craig et al. 1990	1977-1987											5		
Cromartie et al. 1975	1971-1972						1			13		14		1
Deem et al. 1998	1988-1994											1		
Dellasala et al. 1989	1986-1987									6				
Driscoll et al. 1999	1951-1993									5				1
Ellis et al. 1969	1967-1968									2				
FAA 2010	1994-2010		74											
Fleischli et al. 2004	1980-2000											158		
Frenzel 1984	1979-1983					6				7				2
Frenzel and Anthony 1989	1979-1982						1					1		1
Garcelon and Thomas 1997	1993											1		
Harmata and Stahlecker 1993	1977-1990									1		1		
Harmata et al. 1999	1979-1997	4				10				7	2	8		
Harness and Wilson 2001	1986-1996						118							
Harris et al. 2007	1993-2003	6							2	10		13		46
Henny et al. 1987	1984-85											8		
Kaiser et al. 1980	1975-1977						17			33	6	19		24
Kanaan et al. 2005	2000													5
Kocan and Locke 1974	1963-1971								5	17		1	2	
Kozie and Anderson 1991	1984-1988						1							
Kumar et al. 2002	2000	2								1		1		2
Littrell 1990	not reported											1		
Mabie et al. 1994	1985-1993									1				
Manville 2010	not reported							1						
Martell et al. 1991	1987-1989										1			
Millsap et al. 2004	1997-2002	4					2					1		
Mineau et al. 1999	1985-1994											243		
Mineau et al. 1999	1985-1990											14		
Mojica et al. 2009	1985-2007				21	17	27							

Author	Years	Vehicle strike	Aircraft strike	Train strike	Wire collision	Collision / electro-cution	Electro-cution	Wind turbine blade collision	Unknown collision	Gun shot	Trap	Poisoning	Illegally taken	Unknown trauma
Neumann 2009	2004-2008											38		
Olson 2001	1997-1999									1				
Piatt et al. 1990	1989										32			
Platt 1976	prior to 1969; 1971-1972									4				
Reichel et al. 1984	1978-1981	16					43			57	18	24		59
Richards et al. 2005	1993-2002									9				
Russell et al 2009	1990 -2008											2		
Smith and Murphy 1972	not reported						4							
Sprunt and Cunningham 1962	~ 1962									91	8			
Stone et al. 1999	1971-1997											1		
Stone et al. 2001	1986- 2000			10										
Thomas et al. 1998	1994-1997											4		1
Trail 2006	1950 - 2000										1			
USFWS 2009b	1990- 2007		10											
USFWS 2009b	2000-2001				1		4							
USGS 2010a[1]	1960-2010	167	1	16					4	90	52	20	16	
USGS 2010b[1]	1995-2010								18			43		
Watson 1989	1988										1			
Wendell et al. 2002	1995-1998													4
Wiemeyer et al. 1989	1979-1983											1		
Wood et al. 1988	1963-1984						130			329	68	158		301
	TOTALS	199	85	28	22	33	357	1	36	737	195	1257	18	452
	PERCENTAGE	6	2	1	1	1	10	0	1	22	6	37	1	13

Notes:
[1] Data from these sources may be redundant with other sources, but the data do not permit estimation of that proportion

Table 2. Natural causes of fatalities in bald eagles.

Author	Years	West Nile	Peritonitis	Avian vacuolar myelinopathy (AVM)	Avian pox	Avian cholera	Avian tuberculosis	Bacterial infection	Weather	Unknown disease	Kill by another bird/ animal	Unknown
Bortolotti 1984	not reported									2		151
Botzler 1991	1974-1975					8						
Coon et al. 1970	1960 -1965									4		13
Cromartie et al. 1975	1971-1972									2		4
Driscoll et al. 1999	1951-1993										4	49
Fischer et al. 2002	1994-2002			90								
Fischer et al. 2006	1998-2004			28								
Frenzel 1984	1979-1983											19
Frenzel and Anthony 1989	1979-1982											2
Harmata and Stahlecker 1993	1977-1990											1
Harmata et al. 1999	1979-1997										3	15
Harris et al. 2007	1993-2003	3			2						3	9
Hoenerhoff et al. 2004	2002						1					
Jagoe et al. 2002	1998-1999											3
Kaiser et al. 1980	1975-1977		3							17		46
Kanaan et al. 2005	2000		1					1				
Kocan and Locke 1974	1963-1971											8
Kozie and Anderson 1991	1984-1988											2
Kumar et al. 2002	2000		2									
Locke et al. 1972	1960-1969					3						
Mabie et al. 1994	1985-1993											1
Martell et al. 1991	1987-1989											1
Millsap et al. 2004	1997-2002				1				1	1		8
Mojica et al. 2009	1985-2007									2	3	5
Morishita et al. 1998	1983-1994											6
Nemeth et al. 2006	1999-2004	23										
Reichel et al. 1984	1978-1981									19		18
Rosen 1972	1970-1971					1						
Russell et al. 2009	1990 – 2008				1							1
Sprunt and Cunningham 1962	~ 1962											11
Thomas et al. 1998	1994-1997			26								
USGS 2010a[1]	1960-2010								2	5	6	2513
USGS 2010b[1]	1995-2010			41								63
Wendell et al. 2002	1995-1998											1
	TOTALS	26	6	185	4	12	1	1	3	52	19	2950
	PERCENTAGE	1	<1	6	<1	<1	<1	<1	<1	2	1	91

[1] Data from these sources may be redundant with other sources, but the data do not permit estimation of that proportion

For golden eagles, 1,291 (35 percent) of fatalities were due to unknown trauma or other unknown causes (Tables 3 & 4). Among documented human-caused fatalities of golden eagles, the leading causes were electrocution (50 percent), collision with wind turbines at the Altamont Pass (21 percent, see additional context below), poisoning (13 percent), vehicle strikes (5 percent), and shooting (5 percent; Table 3). Golden eagle fatalities due to collisions with wind turbines outside of the Altamont Pass (12 fatalities) represented <1 percent of the known fatalities in our dataset. We found that a total of 662 golden eagle fatalities caused by turbine collisions were recorded at Altamont Pass from 1984 to 2008. Eighty-five of these fatality records are reported by more than one source, and those that are redundant with the most comprehensive listing (Smallwood and Karas 2009) are footnoted in Table 2. Ninety-four percent (1,240 of 1,310) of natural golden eagle fatalities were due to unknown disease, and an additional 2 percent (30) were classified as other unknown causes (Table 4). Documented non-human causes of fatalities were avian pox (2 percent), other animals (1 percent), and West Nile virus (<1 percent).

We found that very few data have been published regarding rates of mortality of golden eagles. Rates of eagle fatalities have only been systematically recorded for wind energy projects (5 rates reported from the Altamont Pass Wind Resource Area and 4 from other wind farms) and transmission lines (2 rates reported: Table 5). Most wind energy-related fatalities have occurred at the Altamont Pass Wind Resource Area; therefore, most of the rate estimates for wind energy refer to Altamont Pass. Fatality rates at Altamont Pass range from 0.00 to 0.173 fatalities/MW/year, depending on source. The other fatality rates reported for all other wind energy facilities located outside the Altamont wind resource area are lower than those reported for Altamont. The two rates of golden eagle fatalities presented for transmission lines not associated with wind development range from 4 to 22 golden eagle fatalities per year and only a single estimate is provided on an eagle fatality per pole basis (0.0036-0.0068 golden eagle fatalities per pole; Table 5).

Most estimates of fatality rates of golden eagles were available for non-wind-energy projects only on a per-year basis. Golden eagle take permitted by the USFWS or fatalities due to illegal trafficking resulted in an average of 232 deaths/year between 2002 and 2007 (USFWS 2009). Estimates of electrocution mortality rates ranged from 4-19 deaths/year and from 0.0038-0.0068 deaths/pole on transmission lines (Table 5). We also found records of an additional 5,074 eagle fatalities that were not described to species (Table 6). Of these incidents, human-caused fatalities comprised 47 percent and natural, unknown, or unspecified causes comprised 53% (Table 6). Some of the fatality records we found likely overlap, but the degree to which this occurred cannot be ascertained due to a lack of documentation of the source of eagles analyzed in many of the references. Overlap is most likely between the records of central pathology laboratories (e.g., USGS National Wildlife Health Center) and short-term field projects. Wherever overlap was suspected, we denoted this with footnotes on tables.

Table 3. Human-related causes of fatalities in golden eagles.

Author	Years	Vehicle strike	Aircraft strike	Train strike	Wire collision	Collision / electro-cution	Electro-cution	Wind turbine blade collision		Unknown collision	Gun shot	Trap	Poisoning	Illegally taken	Unknown trauma
								Altamont	All others						
ABC 2010	1968-2005												173		
Anderson et al. 2005	1997-2000								1						
Beecham 1975	1968 -1971						12			6	3				
Benson 1981	1977-1979						342				1				
Boeker and Nickerson 1975	1972-1973						250								
Bortolotti 1984	not reported										8	17	11		2
Craig and Craig 1998	1991-1997	1					2						1		
Craig et al. 1990	1977-1987												5		
Ellis et al. 1969	1967-1968										26				
Erickson et al 2001	1984-1988							26							
FAA 2010	1994-2010		8												
Harmata 2002	1977-1999	1			1						2				
Harness and Wilson 2001	1986-1996						272								
Henny et al. 1984	1977-1980												3		
Howell and DiDonato 1991	1988-1989							2							
Hunt 2002[2]	1998-2001	4		1	4		12	42			1		5		
Insignia Environmental 2009	2008-2009								3						
Jeffrey et al. 2009	2008								3						
Johnson et al. 2010	1999-2007								1						
Kerlinger et al. 2006	2003-2005								2						
Lehman et al. 2010	2001-2004						36								
Littrell 1990	not reported												1		
Martell et al. 1991	1985-1994												144		
O' Neil 1988	1980-1985						32								
Orloff and Flannery 1992	1989-1991							16[2]							
Phillips 1986	1981-1985	100					300				75	12			
Richards et al. 2005	1993-2002										1				
Russell et al 2009	1990 - 2008	13			1		6			1		1			4

Author	Years	Vehicle strike	Aircraft strike	Train strike	Wire collision	Collision / electro-	Electro-cution	Wind turbine blade collision		Unknown collision	Gun shot	Trap	Poisoning	Illegally taken	Unknown trauma
Smallwood and Karas 2009	1989-2007							495							
Smallwood and Thelander 2008	1998-2003							54[2]							
Smith and Murphy 1972	not reported						52								
Stone et al. 1999	1971-1997												1		
Thelander and Rugge 2000[2]	1998-1999							4[2]							
Thelander et al. 2003	1998-2000							11[2]							
USFWS 2009b	not reported		28												
USFWS 2009b	2000-2001				21		219								
USGS 2010a[1]	1960-2010	23					5			2	20	12	2	4	
Wendell et al. 2002	1995-1998									1	1		3		5
Woods, C. 2010 (pers com)	2009-2010								2						
	TOTALS	119	36	1	27	0	1316	565	12	10	138	42	349	4	11
	PERCENTAGE	5	1	<1	1	0	50	21	<1	<1	5	2	13	<1	<1

Notes:
[1] Data from these sources may be redundant with other sources, but the data do not permit estimation of that proportion
[2] Fatalities from these sources are redundant with Smallwood and Karas and therefore are not included in the totals.

Table 4. Natural causes of fatalities in golden eagles.

Author	Years	West Nile	Peritonitis	Avian vacuolar myelinopathy (AVM)	Avian pox	Weather	Unknown disease	Kill by another bird/animal	Unknown
Beecham 1975	1968 -1971						12	6	
Benson 1981	1977-1979						342		
Boeker and Nickerson 1975	1972-1973						250		
Bortolotti 1984	not reported								17
Craig and Craig 1998	1991-1997						2		
FAA 2010	1994-2010								
Harmata 2002	1977-1999				1				
Harness and Wilson 2001	1986-1996						272		
Hunt 2002	1998-2001				4		12		
Lehman et al. 2010	2001-2004						36		
Nemeth et al. 2006	2002-2004	2							
O'Neil 1988	1980-1985						32		
Russell et al. 2009	1990 - 2008	1			1		6	1	1
Smith and Murphy 1972	not reported						52		
USFWS 2009b	2000-2001				21		219		
USGS 2010a[1]	1960-2010						5	2	12
Wendell et al. 2002	1995-1998							1	
	TOTALS	3	0	0	27	0	1240	10	30
	PERCENTAGE	<1	0	0	2	0	94	1	2

Notes:
[1] Data from these sources may be redundant with other sources, but the data do not permit estimation of that proportion

Table 5. Rates of fatalities in golden eagles.

Authors	Years	Activity	Eagle fatalities per year	Eagle fatalities per turbine per year	Eagle fatalities per MW per year	Eagle fatalities per pole per year	Eagle fatalities per 40 turbines per year	Eagle fatalities per year due to illegal trafficking	22.21 - Scientific Collection Permits - eagle fatalities per year	22.22 - Religious take permits - eagle fatalities per year	22.23 - Depredation permits - eagle fatalities per year
USFWS 2009b	Unstated	Variable						180	3	24	25
Howell and DiDonato 1991	1988-1989	Wind Farm (Altamont)	2								
ICF Jones & Stokes 2008[1]	2005-2007	Wind farm (Altamont)			0.173						
Kerlinger et al. 2006	2003-2005	Wind farm		0.00569	0.0032						
Lehman et al. 2010	2001-2004	Transmission line	10.68-19.24			0.0036-0.0068					
Orloff and Flannery 1992[1]	1989-1991	Wind farm (Altamont)	39								
Smallwood and Karas 2009	1989-2007	Wind farm (Altamont)	55.3 (1998-2003) 64.7 (2005-2007)								
Smallwood and Thelander 2008[1]	1998-2003	Wind farm (Altamont)	66.7 (80% CI: 24.7-108.7)		0.115						
Sweanor 2010	not reported	Wind Farm					1				
West 2008[1]	2005-2007	Wind farm			0.00-0.04						
Woodbridge and Garrett 1993	1986-1992	Transmission line	4-22								
Woods, C. 2010 (pers com)	2009-2010	Wind farm	2	0.025	0.0167						

[1] Fatalities from these sources are redundant with Smallwood and Karas

Table 6. Causes of fatalities in unknown eagles.

Author	Years	Trauma (unknown)	Unknown	Electrocution	Aircraft Strike	Poisoning	Gun shot
ABC 2010	1968-2005					85	
Boeker and Nickerson 1975	1969-1971			>300			
FAA 2010	1990-2010				7		
Franson et al. 1995	1960-1995	1075		796		477	645
Harness and Wilson 2001	1986-1996			358			
Kramer and Redig 1997	1980-1995						
Morishita et al. 1998	1983-1994		6				
Phillips 1986	1941-1985					25	
	TOTALS	1075	6	1454	7	587	645
	PERCENTAGE	28	<1	39	<1	16	17

3.2 Nest Mapping

We received data from 26 states, but data from 9 states was at too coarse a scale to map (Appendix 8, Figure 1). For example, some states only provided the county where eagles were known to nest; other states provided township data where eagles were known to nest. We received nest data from 17 states, which included data for both species (7 states) and bald eagle only (10 states; Tables 7-9). Wind class varies from poor (class 1) to outstanding (class 6; Figure 2) for states from which we received nest data. Fifteen states are either working internally to determine what level of data they can send or they have forwarded the request within their organization. Eleven states have not responded to requests (Appendix 8).

We found a distinct pattern of the distribution of nests by species within the United States. All of the states with only bald eagle nests occurred east of the Mississippi River, and golden eagle nests occurred within or west of the Rocky Mountains with the exception of Kansas where a golden eagle nest was located on the Kansas-Colorado boarder (Figures 3 – 16). Bald eagle nests were found in every state, but golden eagles nests were not reported east of the Mississippi River.

We obtained bald and golden eagle nest location data from 17 states, which included data for both species (7 states) and bald eagle only (10 states); no state had only golden eagle nest data. Of the 7 states with golden eagle nest data, the percentage of land that overlapped the USFWS recommended 4-mile buffer (as stated in the Interim golden eagle inventory and monitoring protocols: and other recommendations, released February 2010) around nests range from <1 percent in Kansas to 19 percent in Wyoming with 4 of 7 states having less than 5 percent overlap. Of the 10 states with bald eagle nest data, the percentage of land that overlapped the USFWS recommended 2-mile buffer ranged from <1 percent in Texas, and South Carolina to 39 percent in Delaware with 8 of 10 states having less than 5 percent overlap. When the bald and golden eagle nests were similarly buffered by 4-miles in states where nest data was obtained for both species, the percentage of land that overlapped the combined bald and golden eagle buffer ranged from 4 percent in Arizona to 34 percent in Washington.

Table 7. Percent of state that overlaps with buffered bald eagle nests.

State	Percent of land in state encompassed by			
	2-mile buffer	4-mile buffer	5-mile buffer	10-mile buffer
Alabama	2	4	6	17
Arizona	<1	2	3	9
Delaware	39	82	93	99
Florida	23	27	56	79
Idaho	4	12	16	36
Illinois	4	14	19	46
Indiana	4	14	20	47
Kansas	<1	2	3	8
Kentucky	1	5	7	26
Montana	3	10	14	36
North Carolina	3	10	14	36
South Carolina	<1	<1	<1	<1
Tennessee	2	6	7	22
Texas	<1	<1	<1	<1
Utah	<1	1	1	3
Washington	12	27	33	51
Wyoming	2	6	9	23

Table 8. Percent of state that overlaps with buffered golden eagle nests.

State	Percent of land in state encompassed by			
	2-mile buffer	4-mile buffer	5-mile buffer	10-mile buffer
Alabama[a]				
Arizona	<1	2	2	8
Delaware[a]				
Florida[a]				
Idaho	1	2	3	9
Illinois[a]				
Indiana[a]				
Kansas	<1	<1	<1	<1
Kentucky[a]				
Montana	1	2	3	9
North Carolina[a]				
South Carolina[a]				
Tennessee[a]				
Texas[a]				
Utah	7	16	20	36
Washington	3	10	13	31
Wyoming	6	19	26	57

[a]No golden eagle data available.

Table 9. Percent of state that overlaps with buffered bald and golden eagle nests.

State	Percent of land in state encompassed by			
	2-mile buffer	4-mile buffer	5-mile buffer	10-mile buffer
Alabama	2	4	6	17
Arizona	<1	4	5	14
Delaware	39	82	93	99
Florida	23	27	56	79
Idaho	5	14	19	42

Illinois	4	14	19	46
Indiana	4	14	20	47
Kansas	1	2	3	8
Kentucky	1	5	7	26
Montana	4	12	17	38
North Carolina	3	10	14	36
South Carolina	<1	<1	<1	<1
Tennessee	2	6	7	22
Texas	<1	<1	<1	<1
Utah	7	17	21	38
Washington	15	34	41	69
Wyoming	8	22	29	61

3.3 Review of Key Eagle Documents

3.3.1 Draft Bald and Golden Eagle Protection Act Standards for Review of Wind Energy Projects, released September 2010

Citations with major discrepancies

We found major discrepancies in 7 of 20 citations (35 percent) reviewed for this document (Table 10). These discrepancies were generally related to efforts to develop estimates of home range size for both species.

In citing Blumstein and Fernández-Juricic (2010), the authors applied the concept of a corrected individual landscape buffer based upon a behavioral characteristic of the individual (minimum approaching distance) to data derived from individual movements (50% core home range). Neither the USFWS document nor the original reference establishes a relationship between the two data types and, to date, no relationship has been established in the literature, nor is there biological justification why there should be a relationship. This discrepancy will result dramatically different buffer sizes from the two approaches

The document cited Garrett et al. (1993) as the source of a 2 mile (~3.2 km) minimum extent of bald eagle home ranges from nest sites. Garrett et al. (1993) is a secondary source for this information, which actually appears to refer to the mean distance between nearest-neighbor nests in a study conducted in south-central Oregon by Frenzel (1984). The mean nearest-neighbor distance is simply the average distance between nests and is not a measure of how far eagles will travel from the nest.

The document cited Grubb et al. (1994) as the source for an estimated 63 mi^2 winter home range for an immature bald eagle in Arizona. The actual winter home range reported in the paper was far larger (40,387 km^2 or 15,539 mi^2).

The document cited McClelland et al. (1996) as the source of winter home range sizes throughout the intermountain west of eagles radio-tagged on migration. In fact, the cited study reported only on eagles tagged in the nest, and reported linear measures of distance traveled, not home range areas.

The document cited McGrady et al. (2002) as an example of the application of kernel-based home range estimators to eagle home ranges. Kernel-based methods use probabilities to estimate home ranges and the concentration of animal use within a home ranges. McGrady et

al. (2002) did not use a kernel-based method to estimate the size of eagle home ranges. Instead, they used the non-kernel-based minimum convex polygon to estimate home range sizes, which essentially connects the outermost animal locations with lines to generate an estimate of home range boundary. Therefore, this was mis-cited because the method used (minimium convex polygons) are not kernel-based methods, as stated in the document. In addition, the document cited McGrady et al. (2002) as support for the concept that golden eagle breeding home ranges extend a minimum of 6.4 km from the nest site, but the paper actually reports that the maximum home range size during all seasons was 12,835 ha, which has a radius of 6.4 km.

The document cited McLeod et al. (2002) as an example of the application of kernel-based home range estimators to eagle home ranges. The citation was inappropriate because McLeod et al (2002) did not use a kernel-based home range analysis method. Rather, they developed a model to predict ranging behavior and used observed ranging behavior, a central point, and elevation.

Citations with minor discrepancies

We found minor discrepancies in 4 of 20 citations (20 percent) reviewed for this document (Table 10). Further, McGrady et al. (2002) was also cited as the source of the concept of 50% core home ranges as "high-sensitivity areas", but McGrady only used the term "core", and did not refer to sensitivity.

The document cited Moorcroft et al. (1999) as an example of a kernel-based home range analysis, but this paper used a mechanistic home range model based on a random walk, which is not the same as a kernel-based analysis. The document cited Platt (1984) as the source for an average golden eagle home-range size of 8.5 mi^2 in Wyoming, but the paper actually reported a home range area of 9.3 mi^2 for one breeding pair in southwest Wyoming. The document cited Smallwood and Karas (2009) as a source of information on eagle electrocutions, but the paper does not address electrocution.

Citations used in context

We found that 9 of 20 (45 percent) citations reviewed for this document were accurate or had only minor additional context associated with them (Table 10).

3.3.2 Interim Golden Eagle Inventory and Monitoring Protocols and Other Recommendations, Released February 2010

Citations with major discrepancies

We found major discrepancies in 3 of 57 (5 percent) citations reviewed for this document (Table 10).

The document cites Dixon (1937) as a source for information that hatching in golden eagles is asynchronous and can begin as early as late January in California. The paper does not state that the eggs hatch asynchronously and does not mention hatching in early January. Rather, it states "Eggs are deposited, in this area, as early as the first week in February and as late as the first week in March" (Dixon 1937).

The document cites Farmer et al. (2008) as a source for the statement that golden eagle populations are believed to be declining throughout their range in the contiguous United States. The paper actually supports this statement for the western U.S., but refutes the statement overall, by demonstrating significant increases in migration counts and Christmas Bird Counts in the eastern U.S. Figure 17 of this paper shows significant ($P \leq 0.05$) increases at 3 of 5 eastern watch sites (1994-2004) and significant decreases at 3 of 9 western watch sites (1995-2005) (Farmer et al. 2008).

The document cites Good et al. (2007) as evidence that golden eagle populations are declining throughout their range in the U.S., but this study provides a population estimate, it does not provide data regarding trends in populations. The introduction discusses potential declines, but the paper does not provide evidence of a decline, nor do the authors state that they suspect a decline.

Citations with minor discrepancies

We found minor discrepancies in 14 of 57 (25 percent) citations reviewed for this document (Table 10).

The document cites Bleich et al. (1990) in describing the sensitivity of bighorn sheep to disturbance by helicopters. Although the paper does describe reactions to disturbance by sheep, it does not establish that golden eagles frequent the same habitat as bighorn sheep.

The document cites Boeker and Ray (1971) as the source for a list of ways human disturbance has negatively impacted golden eagle nests. Boeker and Ray (1971) only makes the unsubstantiated statement that human disturbance accounted for at least 85% of all known nest losses; the authors of the paper provide no data on the effects of human intrusion on golden eagle nests.

The document cites Hoechlin (1976) as a source for techniques to survey nests from a helicopter, but the paper provides a photographic guide to aging nestlings and does not describe methods used to photograph or view eagles in the nest.

The document cites Kochert and Steenhof (2002) as support for the statement that golden eagles are declining throughout their range in the U.S. The paper actually says that migration counts in the eastern U.S. suggest a decline from the 1900s to the early 1970s with a stable or increasing trend since the early 1970s, and that no significant trends are apparent in migration counts in the western U.S. since the 1980s. The document also cites Kochert et al. (2002) as support for a mid-April to late-May hatch window in southwest Idaho; however, these data were only a portion of the entries in Appendix 2 of the paper, which calculated and overall hatch window of 10 March-25 June for western North America.

Palmer (1988) was cited as a source of information on the timing of courtship at territories, but although Palmer discusses various behavioral patterns that may be associated with courtship or territorial displays, it does not explicitly address courtship timing. The document also cites Palmer (1988) as the source of information that, at upper latitudes and higher elevation sites in northern states, golden eagle eggs may be laid as early as February and March, but the paper describes only one nest that fits these criteria, and clearly points out that this nest was unusual. Other February dates in Palmer are for general California-Texas breeding with no elevations or

latitudes denoted. The document also cites Palmer (1988) as the source for information that golden eagles may roost with bald eagles where there are concentrations of waterfowl or carrion, but Palmer does not mention waterfowl.

The document cites Smith et al. (2008) as evidence that golden eagles are declining throughout their range in the contiguous U.S., but Smith et al. (2008) only discusses the western U.S., where he found a marginally significant decline in the Rocky Mountains ($P<0.10$) and significant decline in the Intermountain Region ($P<0.05$).

The document cites USFWS (2009b) as evidence of population declines in golden eagles in the western U.S. from 2006 to 2009, but the cited study only contains data from 2006 to 2008.

The document cites WRI (2009) as evidence of breeding failures in more than one area of the southwestern U.S., but the paper only deals with one area of the southwest and actually documents low overall productivity, not necessarily breeding failures.

The document cites Young et al. (1995) as evidence that hatching of eggs in Alaska occurs from late March to early May. Young et al. (1995) gives estimated laying dates in this range (23 March-11 May), but hatching dates given in this paper range from 20 May to 12 June.

Citations Used in Context

We found that 40 of 57 (70 percent) citations reviewed for this document were accurate or had only minor additional context associated with them (Table 10).

3.3.3 Service White Paper Providing Guidelines for the Development of Project-Specific Avian and Bat Protection Plans for Renewable Energy Facilities, Released August 2010

Citations with major discrepancies

We found major discrepancies in none of 29 citations reviewed for this document (Table 10).

Citations with minor discrepancies

We found minor discrepancies in 4 of 29 (14 percent) citations reviewed for this document (Table 10).

The document cited Arnett et al. (2009) as a source indicating that reductions in blade cut-in speed and hours of operation could substantially reduce bat mortality. The paper evaluated three operating speeds: fully operational, a cut-in speed of 5.0 mps and a cut-in speed of 6.5 mps. However, the effect of reducing hours of operation without changing cut-in speed was not examined. Reductions in average nightly bat fatality ranged from 56% to 92% with “minimal” annual power loss, where minimal is defined by Arnett (Arnett et al. 2009).

The document cited Environment Canada (2006a) as a source of methods for counting small birds, but the paper addresses point counts in general rather than specific counts for small birds. The same methodological guidance is attributed to Environment Canada (2006b), but that paper also treats only point counts in general.

The document cited Manville (2009) as support for locking turbine rotors during peak migration or peak use of an area. Manville (2009) discussed that turbine feathering was being explored as an option to reduce risk, but did not recommend locking turbines to reduce risk.

Citations used in context

We found that 25 of 29 (86 percent) citations reviewed for this document were accurate or had only minor additional context associated with them (Table 10).

3.3.4 Interim Guidelines for the Development of a Project Specific Avian and Bat Protection Plan for Wind Energy Facilities, Released June 2010

Citations with major discrepancies

We found major discrepancies in 2 of 35 (6 percent) citations reviewed for this document (Table 10). The document cited Pagel et al. (2010) for guidance about the duration of eagle surveys. Pagel et al. (2010) says only this about the duration of monitoring, "Specific recommendations for the number of years needed for baseline data and measures to avoid take should be developed in coordination with the Service, and, to reduce redundancy between management and permitting requirements, consistent with permit requirements outlined in the Draft Implementation Guidelines for the new rules (expected fall 2010)". The document cites Kunz et al. (2007) as a source of information that reducing turbine cut-in speed reduces bird fatalities. Kunz et al. (2007) summarizes data from Arnett that the majority of bat fatalities occur on nights with low wind speeds, and does not relate avian fatalities to turbine-speed data..

Citations with minor discrepancies

We found minor discrepancies in 6 of 35 (17 percent) citations reviewed for this document (Table 10).

The document cited Arnett et al. (2009) as a source indicating that reductions in blade cut-in speed and hours of operation could substantially reduce bat mortality. However, the effect of reducing hours of operation without changing cut-in speed was not examined. The paper evaluated three operating speeds: fully operational, a cut-in speed of 5.0 mps and a cut-in speed of 6.5 mps. Reductions in average nightly bat fatality ranged from 56% to 92% with "minimal" annual power loss, where minimal is defined by Arnett (Arnett et al. 2009).

The document cited Environment Canada (2006a) as a source of methods for counting small birds, but the paper addresses point counts in general rather than specific counts for small birds. The same methodological guidance is attributed to Environment Canada (2006b), but that paper also treats only point counts in general.

The document cited Kunz et al. (2007) as a source of discussion concerning barotraumas, but the paper does not mention barotrauma. The document cited Manville (2005) as the source of an estimate that between 58,000 and 440,000 birds are killed each year by wind turbines in the U.S. Manville (2005) only provides an estimate of 40,000/year, and the numbers provided appear instead in Manville (2009).

The document cited Manville (2009) as the source of the USFWS's estimate that between 58,000 and 440,000 birds are killed each year by wind turbines in the U.S. According to Manville (2009) the estimate is actually the range between the wind industry's estimate of

58,000 and the USFWS's estimate of 440,000. The document also cited Manville (2009) as support for turning off turbines to protect birds and bats in high-risk areas, but although it discussed the increased risk of such areas, the paper did not recommend these measures to avoid or reduce impacts.

Citations used in context

We found that 28 of 35 citations reviewed for this document were accurate or had only minor additional context associated with them (Table 10).

3.3.5 Letter from USFWS in Oregon to Wind Developments Regarding Eagles

Citations with major discrepancies

We found major discrepancies in 4 of 13 (31 percent) citations reviewed for this document (Table 10).

The document cited Ferrer et al. (2003) as evidence that golden eagle populations appear to be declining in the western U.S. However, Ferrer et al. (2003) describes a symptom of a decline in eagle populations, but does not present any data indicating a decline of golden eagles in the western U.S.

The document cited Good et al. (2007) as a source for concern about population trends in the golden eagle, but this study provides a population estimate; it does not provide data regarding trends in populations.

The document cited Kochert et al. (2002) as a source of guidelines to avoid disturbing golden eagle nests, but the paper does not suggest any conditions to avoid disturbance. There is a passing mention in Kochert et al. (2002) that abandoned nests in one study had more human dwellings within 1.6 km (1 mi) than active nests.

The document cited USFWS (2009a) as a source for the concept that a project's local population of concern is encompassed by a circle 140 miles from the project boundary. This definition of a local population appears only in the section on page 46845 pertaining to permits for eagle nest take under 50 CFR 22.27. This does not appear intended to apply to BGEPA take permits under 50 CFR 22.26. Further, the final rule clearly states "However, we believe it would be too burdensome to ask the proponent to provide data on that large a scale… data within a 10-mile radius of the nest provides us with adequate information to evaluate many of the factors noted above". The final EA (USFWS 2009b) does mention a 140-mile dispersal distance in the context of permit administration units, and states "We will consider the natal dispersal distance of golden eagles when evaluating effects to local area populations".

Citations with minor discrepancies

We found minor discrepancies in 1 of 13 (7.5 percent) citations reviewed for this document (Table 10).

The document cited Kochert et al. (2002) as a source of golden eagle courtship and nesting dates between January 1 and July 15 in the intermountain west. Kochert et al. (2002) indicates late January as earliest dates of aerial displays, stick-carrying, and nest building in Idaho; December – January for pair formation and courtship in the Diablo Range of California.

Citations used in context

We found that 8 of 13 (62 percent) citations reviewed for this document were accurate or had only minor additional context associated with them (Table 10).

Table 10. Use of citation in U.S. Fish and Wildlife Service documents.

Reference	U.S. Fish and Wildlife Service Document[1]				
	Interim Guidelines for ABPP	USFWS ABPP White Paper	Letter from USFWS Oregon	Interim Golden Eagle Monitoring Protocol	BGEPA Standards
Anderson et al. 1999		Accurate (1)			
Arnett et al. 2007	Accurate (1)				
Arnett et al. 2009	Minor (1)	Minor (1)			
APLIC 1994	Accurate (3)	Accurate (3)			
APLIC 2006	Accurate (3)	Accurate (2)	Accurate (1)		
Beebe 1974			Not reviewed		
Beecham 1970	Not cited	Not cited	Not cited	Not cited	Not cited
Beecham and Kochert 1975				Not reviewed	
Bleich et al. 1990				Minor (1)	
Bloom and Hawks 1982				Accurate (1)	
Bloom and Clark 2001	Not cited	Not cited	Not cited	Not cited	Not cited
Blumstein et al. 2010					Major (1)
Boeker 1974	Not cited	Not cited	Not cited	Not cited	Not cited
Boeker and Ray 1971				Minor (1) Context (1)	
Buehler 2000					Context (1)
CEC and CDFG 2007	Accurate (1)	Accurate (1)			
Collopy et al. 1989				Accurate (1)	
Dixon 1937				Major (1)	
Dubois 1984				Accurate (1)	
Dunford et al. 2004	Accurate (1)				
Dunstan et al. 1978					Not cited
Ellis 1979				Accurate (1)	
Ellis et al. 2009				Context (1)	
Environment Canada 2006a	Minor (1) Accurate (1)	Minor (1) Accurate (1)			
Environment Canada 2006b	Minor (1) Accurate (1)	Minor (1) Accurate(1)			
Erickson et al. 2004	Accurate (2)				
Farmer et al. 2008			Accurate (1)	Major (1) Accurate (1)	
Federal Aviation Administration 2007	Context (1)	Context (1)			
Fenton 1997	Accurate (1)	Accurate (1)			
Ferrer et al. 2003			Major (1)		
Fyfe and Olendorff 1976[2]					
Garrett et al. 1993					Major (1)
Gehring et al. 2009	Context (1)				
Good et al. 2007			Major (1)	Major (1)	
Grubb et al. 1994					Major (1) Accurate (1)
Harlow and Bloom 1989[2]					
Harmata 1982				Accurate (1)	
Hickman 1968[2]					
Hodos 2003	Context (1)				
Hoechlin 1976				Minor (1)	
Hunt 1998				Accurate (1)	

Reference	U.S. Fish and Wildlife Service Document[1]				
	Interim Guidelines for ABPP	USFWS ABPP White Paper	Letter from USFWS Oregon	Interim Golden Eagle Monitoring Protocol	BGEPA Standards
Hunt et al. 1992	Not cited	Not cited	Not cited	Not cited	Not cited
Hunt et al. 1997				Context (1)	
Kochert and Steenhof 2002				Minor (1)	
Kochert et al. 2002			Major (1) Minor (1) Context (1) Accurate (1)	Minor (2) Context (3) Accurate (11)	Context (1) Accurate (2)
Kunz et al. 2007	Major (1) Minor (1) Accurate (6)	Accurate (2)			
Kuvlesky et al. 2007	Accurate (1)				
Lee and Spofford 1990				Accurate (1)	
Manville 2004	Context (1)				
Manville 2005	Minor (1) Accurate (1)	Accurate (1)			
Manville 2009	Minor (2) Accurate (3)	Minor (1) Accurate (2)			
McClelland et al. 1996					Major (1)
McGrady et al. 2002				Accurate (1)	Major (2) Minor (1) Accurate (1)
McIntyre 1995				Accurate (2)	
McLeod 2002					Major (1)
Menkens and Anderson 1987				Context (1)	
Millsap and Allen 2006				Accurate (2)	
Moorcroft et al. 1999					Minor (1)
National Oceanic and Atmospheric Administration 2009	Accurate (1)				
National Oceanic and Atmospheric Administration 2006	Accurate (1)				
National Research Council 2004		Accurate (1)			
Newton 1979				Accurate (1)	Accurate (1)
Nielson et al. 2010					Not cited
Oberholser and Kincaid 1974	Minor (1)				
Olendorff 1971[2]					
Olsen and Olsen 1978[2]					
Ontario Ministry of Natural Resources 2006	Accurate (2)	Accurate (1)			
Pagel et al. 2010	Major (1) Accurate (2)	Accurate (1)	Accurate (3)		
Palmer 1988				Minor (3) Context (1) Accurate (6)	
Phillips and Beske 1990[2]					
Platt 1984					Minor (1)
Richardson et al. 1997	Context (2)	Context (2)			
Smallwood and Karas 2009					Minor (1)
Smith et al. 2008			Accurate (1)	Minor (1) Context (1)	
Steenhof amd Newton 2007				Accurate (1)	
Steidl et al. 1993[2]					
Stewart et al. 2007	Context (1) Accurate (1)				
USFWS 2010	Not reviewed				

Reference	U.S. Fish and Wildlife Service Document[1]				
	Interim Guidelines for ABPP	USFWS ABPP White Paper	Letter from USFWS Oregon	Interim Golden Eagle Monitoring Protocol	BGEPA Standards
USFWS 2009a			Major (1) Accurate (1)		
USFWS 2009b				Minor (1) Context (1)	
USFWS 2008	Accurate (1)	Accurate (1)			
USFWS 2007					Accurate (1)
USFWS 2003	Accurate (3)				
USFWS 2000	Context (1)	Context (1)			
USFWS (in prep)	Not reviewed				
Watson 1997d					
Watson and Davies 2009					Context (1)
Watson and Whalen 2003			Context (1)		
Watts et al. 2007					Context (1)
Wehausen 1980[2]					
Wheeler 2003[2]					
Wheeler 2007[2]					
WRI 2009				Minor (1)	
Williams et al. 2009	Accurate (2)	Accurate (1)			
Wind Turbine Guidelines Advisory Committee 2010		Context (1)			
Young et al. 1995				Minor (1)	

[1] Number in parenthesis represents the number of times the citation was used in that context, not reviewed indicates that the paper not reviewed because it was not available or not in public domain, not cited indicates that the paper appears in the reference section of a document, but was not cited in the text.

[2] Reference requested from author or interlibrary loan, but not received at the time of this report.

3.3.6 Additional Papers and Reports

Of the 70 additional abstracts that were reviewed for golden eagles, 4 that were not used in the USFWS documents had data relevant to the USFWS documents. The Birds or North America species account for golden eagle included 1 citation that had data relevant to the USFWS documents. Of the 70 abstracts that were reviewed for bald eagles, 1 had data relevant to the USFWS documents. The Birds of North America species account for bald eagle included 2 citations that had data relevant to the USFWS documents.

Kochert et al. (1999) found that success of golden eagles (percentage of pairs that raised young) was lower at burned territories after fires. Success was lowest 4 – 6 years after extensive burning of a territory, but increased 8 – 11 years post-burn. Anderson et al. (1990) found that 1 golden eagle exposed to military training did not move completely out of its home range. Home range size was not reported, and the sample size was too small to test for changes in the geometric center of the home range. Steenhof et al. (1983) studied adults and subadults nesting in southwest Idaho from 1970 to 1981 in the Snake River Canyon. Distance from nest to nearest human habitation was 2,272 m (1.41 mi) for adult territories and 1,172 m (0.72 mi) for subadult territories. Distance to nearest road was 523 m (0.32 mi) for adult territories and 452 m (0.28 mi) for subadult territories. Holmes et al. (1993) found that disturbance distances for golden eagles to pedestrians and vehicles in northern Colorado during winter ranged from 106 – 390 m and 14 – 190 m, respectively. Marzluff et al. (1997) studied the spatial use of 8 to 9 golden eagle territories from 1992 to 1994 in the Snake River Birds of Prey National Conservation Area in Idaho. Eagles traveled 1046 ± 366.6 SE meters (0.64 ± 0.22 mi)

(*n* = 8) from the nest during the breeding season. Using a 100% concave polygon estimate, breeding home ranges varied from 194 ha to 8,331 ha and averaged 2,280 ± 2,625 SD ha (n = 8), and home ranges varied from 1,370 to 170,000 ha outside of the breeding season. Marzluff et al. (1997) reported behavior-specific distances and found that golden eagles traveled furthest from the nest during hunting forays and to kills (between 3,500 – 4,000 m or 2.17 – 2.48 mi).

Griffin and Baskett (1985) reported winter home range sizes of juvenile and adult bald eagles in Missouri to be 18.3 km^2 ± 14.6 SD (7.06 mi^2 ± 5.6 mi^2) and 18.8 km^2 ± 9.0 SD (7.26 mi^2 ± 3.48 SD), respectively. Schirato and Parsons (2006) studied 30 bald eagle nests with management plans and 332 without management plans in the Puget Sound of Washington. The nests with management plans had similar occupancy compared to nests without plans, productivity was not different between nests with plan and those without plans, and the number of young per occupied nest was slightly higher for sites with plans. Mahaffy and Frenzel (1987) found the response distance of nesting bald eagles to live and mounted decoy eagles in Minnesota was 0.56 ± 0.18 (n = 4), 0.55 ± 0.17 (N = 4), and 0.72 ± 0.21 SE km (n = 2) for incubation, early brooding, and late brooding, respectively. The distance an eagle travels from the nest for defense is assumed to be the territory size.

4 Discussion

4.1 Fatality Assessment

The fatality data presented here provide a useful overview of causes of fatality in eagles; however, these results should be interpreted with caution. First, most of the data presented were collected incidentally; therefore, they do not represent a random sample and should not be interpreted as though the percentages reported here are representative of the population percentages. Wind energy-related fatalities are better documented than other types, because most (10 of 13) studies we found that reported eagle fatalities used systematically collected data. In general, fatality data are more likely to come from high use areas and human-related fatality data may be more commonly reported. Second, 50 percent of all bald eagle fatalities and 33 percent of all golden eagle fatalities were attributed to either an unknown cause, unknown disease or unknown trauma; highlighting that we have limited understanding of relative contributions of different types of risks to eagles. Third, the data were collected over different lengths of time and cover multiple decades. For some fatality causes, such as electrocutions, poisonings, aircraft strikes, the date when data were collected is unlikely to alter the data interpretation and fatality because these causes are likely to be independent of year unless a specific action was taken to correct the issue such as the elimination of bounties on golden eagles in western states. Other forms of development like wind energy are relatively new and have only been in place since the 1980's; however, these data have been collected more systematically than other types of energy development (Kerlinger et al. 2011). Fourth, the data presented here are not comprehensive. State fish and game departments vary in the level of detail recorded (e.g., species of eagle, cause of fatality, etc.) and even if eagle fatality records are maintained. These data were not compiled here. Other data that exist, such as those collected by USFWS law enforcement, are only available under a FOIA request and those data have not yet been made available. Thus, although the data we have compiled provide useful context to identify causes of eagle fatalities, without systematic data collection they are biased and must be interpreted with caution to avoid erroneous conclusions.

For the data analyzed as part of this assessment, bald and golden eagles showed divergent patterns of fatality. For bald eagles, of the known causes of fatality, human- and non-human-caused fatality totals were approximately equal. The specific sources of human-caused fatalities also differed between the species, with bald eagles succumbing mostly to poisoning and shooting, followed by electrocution and vehicle strikes. The distribution of bald eagles overlaps large areas of human development in the Midwest and East coast, and the sources of human caused fatalities could be due to the more frequent encounters between humans and bald eagles. Electrocution, shooting, and poisoning were also common causes documented in reports that did not identify eagles to species, which suggests that these are the major human-caused threats to eagles in general. Natural fatalities were primarily documented as a result of avian vacuolar myelinopathy, a neurological disease.

In contrast to bald eagles, fatalities of golden eagle were dominated by human causes, primarily electrocution, poisonings, and collisions with wind turbines at the Altamont Pass Wind Resource Area. Golden eagles inhabit vast areas of the western U.S. with low human populations. However, long segments of power lines in these regions have been documented to cause golden eagle fatalities. Although human populations tend to be lower in the western U.S. than in the eastern U.S., power line development can still result in fatalities even in uninhabited areas.

The relative contribution of collisions with wind turbines to the fatality dataset was small (<1 percent) except for the Altamont Pass Wind Resource Area. Ninety-eight percent (565 of 577) of golden eagle fatalities due to wind turbines occurred at the Altamont Pass Wind Resource Area (see Methods section for a description of how redundant data from Altamont Pass were managed). The Altamont Pass Wind Resource Area is a collection of wind energy facilities owned by several companies that provide electrical power in California. The type and number of operating turbines varies over the site and range in output from 40 kilowatts (kW) to 1 megawatt (MW) per turbine with a total turbine count changing from approximately 5,400 units in 1998 to approximately 4,200 in 2009 (Smallwood and Karas 2009). Portions of the Altamont Pass Wind Resource Area have been and are being repowered to utilize next-generation modern turbines by the owners of individual wind farms. The old generation turbines range from 40 kW to 250 kW and have smaller, faster turning blades; are shorter; and use lattice towers compared to the modern turbines which range from 667 kW to 2.5 MW and have larger slower turning blades, are taller and have tubular towers lacking perch sites. Thus, risk could be reduced by reducing the number of turbines to achieve the same power production (one modern turbine can replace several old generation turbines), reducing perches for raptors, and elevating the blade from the ground where prey items are located. An additional factor contributing to golden eagle fatalities at Altamont is that the vegetative cover is largely grassland with surrounding urban development and much of it contains high densities of California ground squirrels (Hunt 2002). Potential components that may affect high fatality rates at the Altamont Pass Wind Resource Area are year-round food availability, strong winds in steep terrain, urbanization in the surrounding areas, and a high density of small turbines with high blade rotor rotational speed (Hunt 2002). It is important to note these variables are unique to this particular wind resource area and after 30 + years of development (and 30,000 + MW installed) this level of mortality has not been replicated at other wind farms.

Unknown cause or unknown disease was the predominant cause of natural fatalities in bald and golden eagles (Tables 2 and 4). Both eagle species had fatalities related to conflicts with

another bird/animal (often another eagle, West Nile virus, and avian pox. Additional diseases were identified for bald eagles including avian vacuolar myelinopathy, which was the predominant cause of identified natural fatalities. Differences in natural fatalities may be a result of differences in the ecology of the species, different levels of interest in the cause of death (e.g., cause of death may have been a higher priority in bald eagles due to their earlier listed status under the ESA), or variation in how and where data were collected.

Estimating golden eagle fatality rates under various conditions (e.g., miles of transmission line, number of turbines, numbers of power poles) is challenging because few data are reported as a scalable rates; therefore, it is hard to directly compare the number of fatalities from two different sources (e.g., golden eagle fatalities due to 100 miles of transmission line versus a 50 MW wind farm). Nine of the 12 fatality rates compiled were from wind farms, 5 of which were from the Altamont Wind Resource Area (Table 5). Rates varied in their presentation from eagle fatalities per year, per turbine, per 40 turbines, or per megawatt. Per year golden eagle fatalities at Altamont ranged from 2 to 66.7 golden eagles per year. Power line development was the only other development type where rates were presented, and one single report presented a scalable estimate using eagle fatalities per pole per year (Table 5). Golden eagle fatalities per year were also reported as the number of take permits issued by the USFWS, which totaled 52 golden eagles per year for scientific collection, religious take, and depredation permits.

The eagle fatality data summarized here provides information about known causes of fatalities under both natural and anthropogenic situations. However, the data in their current form are limited for the reasons outlined above. Two types of key constraints exist. First, additional data outside of those compiled in this report are scattered and time consuming to locate. A centralized eagle database including metadata, such as the AIMS database (ABC 2010) would offset this problem, particularly if data collected by the state fish and wildlife department and USFWS were included. Second, systematic fatality data should be collected for anthropogenic causes where these types of surveys are possible, such as collision and electrocutions; vehicle, aircraft, and train strikes; and wind development. These systematic data should be translated into rates so that the values are scalable and can be applied to other circumstances. Currently, systematic data are being collected primarily by the wind energy industry (e.g., 10 of 13 studies we found documenting golden eagle fatalities presented systematically collected data), so more is known about this source of fatalities than most others. In addition, many other post-construction mortality studies at wind project have been conducted where no eagle fatalities were documented (e.g., Vansycle, OR (Erickson et al. 2000); Foote Creek Rim, WY (Young et al. 2002, 2003); Nine Canyon, WA (Erickson et al. 2003a); Wildhorse, WA (Erickson et al. 2003b, 2008); Stateline, OR/WA (Erickson et al. 2004); Klondike III, OR (Gritski et al. 2009); Biglow Canyon, OR (Jeffery et al. 2009, Enk et al. 2010) .

The scope of this report was limited to those materials outlined in the methods and, because of that limitation, the values presented here should not be considered a comprehensive list. Additional materials of interest that were not part of the scope include fatalities associated with law suits (e.g., Yakima tribe (116 eagles), PacifiCorp (232), U.S. vs. Moon Lake Electrical Association (12 golden eagles), the Exxon Valdez oil spill (32 bald eagles reported by Piatt et al. 1990, ~900 bald eagles reported by Bowman 1993).

4.2 Nest Mapping

We received data from 22 states, but data from 9 states was at too coarse a scale to map. The data from the remaining states do not represent a comprehensive data set or exact locations of nests due to variations in the quality and methods of data collection. Most data represent incidental observations rather than systematic data collection, a distinction that may or may not be identified within the metadata for each state. In addition, nest location data are collected in a variety of ways (e.g., digitized off of hard-copy maps, GPS locations) and the error associated with the nest locations is unknown. In addition, the years spanned by the each state's dataset are highly variable.

Of the states where data are available, nest abundance and distribution constraints that limit wind energy development will be greatest in Wyoming and Utah. In these states, at least 15 percent of the land would be excluded from wind development by a 4-mile buffer, which has been recommended by the USFWS (Appendix 1). This constraint, which would be greater through the use of larger buffers of up to 10-miles as recommended by some in the Service and conservation community, estimate likely represents a significant underestimate of the actual impacts because, as discussed above, the data in the natural heritage databases generally represents incidental sightings. Therefore, the data are likely to be more complete in areas with obvious nests and with regular human activity, whereas data in remote areas with limited access may be non-existent or grossly under represented. The order of magnitude of these differences is not known, but could be large. Other states with high wind classes such as Idaho and Washington, constraints that limit wind energy development may be larger than estimated based on existing heritage data.

Buffered bald eagle nests occupy large percentages of land in Florida and Washington, and at least approximately 15 percent of the land in these states would be encompassed by a 2-mile buffer, which was posed as an avoidance area for bald eagle nests (Appendix 1), The impact of this on wind development will be greatest in states like Washington, which has higher class winds and numerous bald eagle nests; however, the large number of bald eagle nests in many states may place constraints on other forms of development. Overall, data for bald eagles appear to be more comprehensive than for golden eagles. This discrepancy likely occurs because of the bald eagle's previous listing under the Endangered Species Act and the associated survey required as part of state recovery plans.

4.3 Review of key eagle documents

4.3.1 Draft Bald and Golden Eagle Protection Act Standards for Review of Wind Energy Projects, released September 2010

The draft BGEPA standards for review of wind energy projects are intended to guide USFWS staff in making determinations about when it is appropriate to use avian protection plans to reduce the risks posed by wind energy projects to eagles. Because of this intent, any discrepancies in use of the supporting literature can have important ramifications for the siting and operation of wind energy facilities. We found major discrepancies in 30% and minor discrepancies in 25% of the citations used in the document, with only 45% of the citations used in the correct context.

Most of the major citation discrepancies we found were related to estimation of eagle home range sizes and conservation buffers. These discrepancies can have ramifications such as

mitigating for impacts that are unlikely to materialize (e.g., including more nests in the impact analysis that might be affected) for wind energy developments because permit and mitigation decisions will be based on the potential for significant impacts to local populations. Further, if the potential impacts of development are assessed within the home range of an eagle, then overestimation of the home range will result in the overestimation of impacts. It is therefore essential that developers have access to accurate home range modeling and that conservation buffers be constructed in a biologically meaningful way. Many of the discrepancies relating to home range estimation were the result of inaccurate attribution of information to primary sources. In the cases of Grubb et al. (1994) and McClelland et al. (1996), the document cited incorrect numerical estimates of winter home range size. The home range size estimates in these references also are of limited relevance to wind energy facility siting, because they describe the nomadic movements of immature eagles. Nomadic individuals cannot be reliably assigned to local populations, and the movement patterns of breeding birds that can be assigned to such populations are therefore more relevant to siting decisions. McGrady et al. (2002) was cited as the source of breeding home range size to develop the 4-mile buffer; however, McGrady et al. (2002) report annual home range size. In most animal species, the breeding home range is a subset of the annual home range, so the two are not directly comparable. The misapplication of the annual home range size, which was calculated over all seasons, could result in buffer that is larger than the breeding season home range size. Overall, the use of metrics that are assumed to be home range sizes or home range sizes that are based on small sample sizes may result in broad restrictions on wind energy development that may not achieve the goal of conserving eagles because they may cause managers to focus conservation efforts on areas or habitat types that do not effectively support breeding eagles. For example, Marzluff et al. (1997) concluded that the key to golden eagle conservation in shrub steppe habitats was the preservation of shrub patches sufficient to support jackrabbit populations. In areas dominated by shrub steppe, land preservation efforts emphasizing large open areas simply because they were traversed by golden eagles would therefore provide less conservation effect than an approach focused on preservation of shrub habitats. Other studies, such as Marzluff et al. (1997), have calculated breeding season home range size, which would be more applicable (see Section 4.3.6.).

Additional incorrect use of citations to support the development of a buffer occurred in the use of Garrett et al. (1993). The document cited a secondary source as the authority for the size of bald eagle breeding season home range size. The citation used as a minimum buffer size what was reported in the primary reference (Frenzel 1984) as the mean nearest-neighbor distance between nests; this distance does not clearly relate to minimum movement distances away from the nest. Thus, the buffer provided in the USFWS document is based on the assumption that eagles move a minimum of 2-miles from the nest, but the data used to develop the buffer is based on nest spacing and not breeding home range size. Further, in citing Blumstein and Fernández-Juricic (2010), the authors applied the concept of a corrected individual landscape buffer based upon a behavioral characteristic of the individual (minimum approaching distance – the distance at which an animal responds to a disturbance) to data derived from individual movements (50 percent core home range). Neither the USFWS document nor the original reference establishes a relationship between the minimum approaching distance and 50 percent core home range, and it is likely that different buffer sizes would result from the use of the different methods. Although the buffers as stated in the USFWS document may be applicable in the broader sense of golden eagle breeding biology or ecology, they are not justified by the use of citations presented in this document.

The other major discrepancies consisted of mistaken citations for methods (McGrady et al. 2002 and McLeod et al. 2002) used to generate kernel-based home range estimates. However, there are other available citations for the kernel-based method that could be cited, and overall, the incorrect reference for kernel-based estimators does not change the context of the statement.

Minor discrepancies we noted in this document included one inaccurate citation (Smallwood and Karas 2009) of a source for primary information regarding electrocution mortality of eagles. Although this reference mentions electrocution as a cause of eagle fatalities, it does not provide primary data regarding the degree of hazard posed by electrocution, and does not support the statement as written in the document ("Research and observations have shown that golden eagles are vulnerable to collisions with wind turbines and to electrocutions from transmission line"). The remaining minor discrepancies in this document pertain to home range and buffer sizes. One citation of McGrady et al. (2002) mischaracterize the conclusions of that reference, but do not substantially change the USFWS document. The home range size attributed to Platt (1984) contained a numerical error (the actual number was larger), and was misleadingly described as an average, when it in fact described only one home range. Similarly, although Moorcroft et al (1999) developed a home range model, it was not an example of a kernel-based home range estimator, and does not provide guidance on how to generate one.

4.3.2 Interim golden eagle inventory and monitoring protocols and other recommendations, released February 2010

The USFWS released the interim golden eagle inventory and monitoring protocols to identify the minimum effort that should be devoted to inventory and monitoring of potential golden eagle use of development areas. Although the protocols describe field efforts that are the mutual responsibility of agencies and their permittees, it is important to note they are intended to collect data concerning baseline circumstances for evaluating permit applications. As such, any discrepancies in use of the supporting literature in this document can have important ramifications for potential permittees. Most (70%) of the citations were used appropriately, but we found major discrepancies in 5% and minor discrepancies in 25% of the citations used in the document.

Major discrepancies in this document included four citations (Good et al. 2007, Farmer et al. 2008) in support of the statement that golden eagle populations were in decline throughout their range in the continental U.S. Neither citation fully supported this statement, and the use of such an overly broad statement could lead to more severe restrictions on permits than are actually necessary to conserve eagle populations. Similarly, the third major discrepancy involved an inaccurate citation in support of an overly-broad seasonal window for timing of breeding, which could negatively impact the timing of operations by proponents.

The majority of minor discrepancies we noted with citations in this document consisted of either attributing information to an incorrect source, as with Hoechlin (1976) and Palmer (1988), or attributing greater detail of information to a source than it actually contained, as was the case for citations of Boeker and Ray (1971), Palmer (1988), USFWS (2009b), and WRI (2009). In three cases, Kochert and Steenhof (2002), Kochert et al. 2002, and Smith et al. (2008), minor discrepancies arose because the document cited papers as support for broader statements regarding population trends than they actually supported. Citations of Bleich et al. (1990), Kochert et al. (2002), and Young et al. (1995) were similarly used to support incomplete or incorrect statements regarding the timing of breeding. These discrepancies with regard to the

timing of breeding and population trend can have ramifications for potential permittees by making permit conditions (timing or siting) more restrictive than necessary to conserve golden eagle populations. We determined these discrepancies were relatively minor despite being related to breeding and population status because correction of the context would not significantly alter the statement in the USFWS document. In the case of Bleich et al. (1990), the recommendations in the cited paper related strictly to bighorn sheep, but the context of the citation implied that it also established that golden eagles occurred in the same habitats as bighorn sheep. This may be the case, but the literature cited does not provide data to support the statement.

4.3.3 Service white paper providing guidelines for the development of project-specific avian and bat protection plans for renewable energy facilities, released August 2010

The USFWS released the white paper for the development of project specific avian and bat protection plans for renewable energy facilities with the objective of providing guidance to avoid and minimize impacts to bird and bats. The majority of citations (86 percent) in this document were used correctly. We found one major discrepancy under item #2 of the Operational Phase Measures section of the white paper, which cited Kunz et al. (2007) to the effect that "most bird fatalities at wind projects occurred at times of low wind speeds…" The Kunz paper was referring to bat fatalities, not bird fatalities. We found minor discrepancies in the use of 4 citations. Arnett et al. (2009) was cited in the Operation Phase Conservation Measure section and was used in to support the statement that increasing cut-in speed and reducing hours of operation could reduce bat fatalities. The study by Arnett et al. (2009) did not experimentally test changes in operation hours independent of changes to cut-in speed. Although increasing cut-in speed could result in reduced operating time, the effects of reduced operation were not tested. The minor discrepancy in the use of the citation does not change the overall context of the paragraph in that increased cut-in speed has been shown to reduce bat fatalities.

Of the remaining three citations with minor discrepancies, 2 involved the incorrect reference to a survey method. The document cited Environment Canada (2006 a,b) as source of methods for small bird counts. However, the Environment Canada documents describe point counts in general. The minor discrepancy in the use of the citation does not change the overall context of the paragraph in that bird point counts are an appropriate survey method. The final citation used with a minor discrepancy occurred in the Operation Phase Conservation Measure section. The document cited Manville (2009) as support for locking turbine rotors during peak bird migration or peak use of an area. Manville (2009) discussed that turbine feathering was being explored as an option to reduce risk, but did not recommend locking turbines to reduce risk. The incorrect use of the citation would alter the context of the statement because the statement would need to identify studies that have shown that shutting off turbines has reduced fatalities of birds and bats. These recommendations have not been tested for effectiveness in reducing bird fatalities in general and for eagles to be specific, thus the recommendation is not supported by the literature and might not be effective for reducing bird fatalities.

4.3.4 Interim guidelines for the development of a project specific avian and bat protection plan for wind energy facilities, released June 2010

The USFWS released the interim guidelines for the development of project specific avian and bat protection plans for renewable energy facilities with the objective of providing guidance to

avoid and minimize impacts to bird and bats. We found that the majority of the citations were used correctly (80 percent), and we found two major discrepancies in the use of a citation. The document cited Pagel et al. (2010) for guidance about the duration of eagle surveys. However, Pagel et al. (2010) did not provide specific guidance regarding survey duration; rather it suggested that the duration of surveys should be developed in coordination with the USFWS. This major discrepancy would change the context of the statement as the document recommends 3 years of post-construction monitoring and references Pagel et al. (2010) for survey duration. Given Pagel et al. (2010) does not provide a specific duration, the statement would need to be changed to state that the duration of post-construction monitoring can vary, and the surveys should be developed in coordination with the USFWS. The document cites Kunz et al. (2007) as a source of information that reducing turbine cut-in speed reduces bird fatalities. Kunz et al. (2007) only provide data on bat fatalities, thus the discrepancy affects the context of the document, because reducing cut-in speed has not been shown to reduce bird fatalities.

We found minor discrepancies in the use of 6 (17 percent) of the citations primarily involving incorrect citation of numbers or inappropriate citation for methods. Arnett et al. (2009) was cited in the Operation Phase Conservation Measure section and was used in to support the statement that increasing cut-in speed and reducing hours of operation could reduce bat fatalities. The study by Arnett et al. (2009) did not experimentally test changes in operation hours independent of changes to cut-in speed. Although increasing cut-in speed could result in reduced operating time, the effects of reduced operation were not tested. The minor discrepancy in the use of the citation does not change the overall context of the paragraph in that increased cut-in speed has been shown to reduce bat fatalities. The document cited Environment Canada (2006 a,b) as source of methods for small bird counts. However, the Environment Canada documents describe point counts in general. The minor discrepancy in the use of the citation does not change the overall context of the paragraph in that bird point counts are an appropriate survey method. The document cites Kunz et al. (2007) when referencing barotrauma, but Kunz et al. (2007) does not discuss barotrauma. The minor discrepancy does not affect the context of the statement as the other citation (Manville 2009) correctly references barotrauma; however, there are other studies that could be referenced that demonstrate that barotrauma is a source of bat mortality. The document cited Manville (2005) as the source of an estimate that between 58,000 and 440,000 birds are killed each year by wind turbines in the U.S. Manville (2005) only provides an estimate of 40,000/year, and the numbers cited appear instead in Manville (2009). The document cited Manville (2009) as the source of the USFWS's estimate that between 58,000 and 440,000 birds are killed each year by wind turbines in the U.S. According to Manville (2009) the estimate is actually the range between the wind industry's estimate of 58,000 and the USFWS's estimate of 440,000, although a justification for how the number was calculated is not presented. The minor discrepancy does not change the context of the statement as both numbers are correct estimates and appear in Manville (2009). The document cited Manville (2009) as support for locking turbine rotors during peak migration or peak use of an area. Manville (2009) discussed that turbine feathering was being explored as an option to reduce risk, but did not recommend locking turbines to reduce risk. The incorrect use of the citation would alter the context of the statement because the statement would need to identify studies that have shown that shutting off turbines has reduced fatalities of birds and bats. These recommendations have not been tested for effectiveness in reducing bird fatalities in general and for eagles to be specific, thus their recommendation is not supported by the literature and might not be effective for reducing bird fatalities.

4.3.5 Letter from USFWS in Oregon to wind developments regarding eagles

The USFWS issued the letter to a wind energy developer in response to communication regarding proposed golden eagle protection measures at the proposed project in Oregon. We found that the majority of the citations were used correctly (62 percent), and we found major discrepancies in 4 (31 percent) of the citations. The letter cited Ferrer et al. (2003) as evidence of golden eagle population declines. Ferrer et al. (2003) describes symptoms of population declines in the western U.S., but does not present data demonstrating a decline. The letter cited Good et al. (2007) as an indication for cause to be concerned about population trends in this species. Good et al. (2007) provides a population estimate for the western US and does not present evidence of a decline in the western U.S. These discrepancies do not change the context of the paragraph as there are additional citations that are used correctly. The letter appears to cite Kochert et al. (2002) as a source of guidelines to avoid disturbing golden eagle nests, but the paper does not suggest any conditions to observe to avoid disturbance. However, Kochert et al. (2002) would be an appropriate citation for the statement that eagles vary in sensitivity to unusual activities in the vicinity of the nest, which appears earlier in the sentence.

We noted a major discrepancy in the citation of USFWS (2009a), which set forth the final rule for the issuance of eagle disturbance permits. The document attempts to apply the definition of a local golden eagle population (within 140 miles of the project) developed for nest take under 50 CFR 22.27 to take under 50 CFR 22.26. Even if one assumes that the USFWS intended the 140-mile boundary to apply to both permits, the burden of surveying such a large area is clearly taken on by the agency with the statement (in 50 CFR 22.27) that "…we believe it would be too burdensome to ask the proponent to provide data on that large a scale… data within a 10-mile radius of the nest provides us with adequate information to evaluate many of the factors noted above". The impact of this discrepancy could be to force a much larger survey effort and cost onto a potential permittee than intended in the regulation. This is particularly true if a survey intended to apply only to nest take is mistakenly applied to take under 50 CFR 22.26. Because of the potential ramifications of this discrepancy, be believe that clarification is needed from the USFWS regarding its interpretation of the local population as defined in 50 CFR 22.27, and its intent in applying this definition to wind energy developments

We found 1 minor discrepancy (7.5 percent) in the use of the citations. The letter incorrectly cited the dates of golden eagle courtship and nesting in the intermountain west as Kochert et al. (2002) provide breeding initiation dates only for this region.

4.3.6 Additional Papers and Reports

The papers reviewed below were not cited in the USFWS documents, but they could provide additional context and information about golden eagle breeding biology.

Three of the papers not included in USFWS documents address issues related to disturbance, which is important given that disturbance is highlighted as a form of take under the BGEPA. The study by Anderson et al. (1990) could have been referenced to show that at least one eagle pair was tolerant of military training within the territory and that eagles could be tolerant of other types of disturbances. The data in Steenhof et al. (1983) provides information on potential tolerance of breeding adult and subadult golden eagles to human habitations and roads. These results could be used to assess the potential effects of project facilities such as operations and

maintenance buildings and service roads when these types of facilities are located away from turbines. The study by Holmes et al. (1993) provides information on the flushing distance of golden eagles to pedestrians and vehicles in winter and could be referenced when discussing non-breeding season impacts.

Territory size of eagles is being used as one of the criteria to evaluate potential buffer distances in nests; therefore, additional papers addressing territory size may change requested/required buffer distances. Marzluff et al. (1997) presented several estimates of home range size using core areas and polygons for golden eagles in Idaho using a convex polygon similar to that of McGrady et al. (2002), Marzluff et al. (1997) found breeding season home range size in Idaho varied from 336 ha to 9,759 ha making the minimum home range radius from a nest 0.64 mi and the maximum 3.46 mi. The convex polygon method includes all observations, and Marzluff et al. (1997) states that concave polygons best describe the area used by eagles as do core areas (clusters) that remove extreme travelers and define high use areas. Using the maximum concave breeding season home range estimate of 8331 ha, the radius from a nest is 3.2 mi. This is an important finding because the BGEPA guidelines rely on the 4-mile buffer concept for categorizing projects, and the distance reported by Marzluff et al. (1997) for Idaho could be used develop additional buffer distances for breeding golden eagles.

When discussing declines in golden eagle populations, it could have been noted that Kochert et al. (1999) found that the percentage of pairs that raised young was lower at burned territories, and that wildfire could lead to local population declines due to low recruitment given the duration of low productivity post-fire. The USFWS documents stated golden eagle populations were declining but did not provide potential causes of declines.

The papers reviewed below were not cited in the USFWS documents, but could provide additional context and information about bald eagle breeding biology.

The data in Griffin and Baskett (1985) could be used to provide support for bald eagle non-breeding home range size. Schirato and Parsons (2006) demonstrated that the management plans developed for eagles in Puget Sound provided short term protection and enhanced some measures of reproductive success. The distance traveled from the nest reported by Mahaffy and Frenzel (1987) should be discussed when presenting buffer distances as the eagles in the study did not travel as far as those referenced in the USFWS document.

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ORG 5

November 29, 2013

Heather Beeler, Migratory Bird Program,
U.S. Fish and Wildlife Service, Pacific Southwest Region,
2800 Cottage Way, W–2605,
Sacramento, CA 95825

Re: Golden Eagles; Programmatic Take Permit Application; Draft Environmental Assessment; Shiloh IV Wind Project, Solano County, California (Docket No. FWS–R8–MB–2013–N138]

Submitted electronically to: ShilohIV_comments@fws.gov

Dear Ms. Beeler,

I am writing you to comment on the US Fish and Wildlife's ***Draft Environmental Assessment (DEA) on Application for Eagle Permit for Shiloh IV Wind Energy Project in Northern California*** in behalf of the 909 members of the Napa-Solano Audubon Society (NSAS) as a member of it's conservation committee. Even though the law allows anyone to comment, NSAS thanks you for extending the time to comment as downloading the above document was not possible due to the shutdown of the U.S. Fish and Wildlife Service (FWS) website. NSAS appreciates the chance to express our concerns and hope our comments are considered seriously for this historic DEA

NSAS commends Shiloh IV Wind Project, LLC for applying for this programmatic eagle take permit. Since this is the first permit that would allow a take of Golden Eagles, NSAS is a bit more critical of some of the science that is in this document especially because of the precedent that it would set. NSAS believes the FWS's piecemeal process for the permit issuance is flawed and will not provide the net conservation benefit for local or regional eagle populations as required under the Eagle Protection Act. NSAS also believes the required monitoring and compensatory mitigation is inadequate especially for where the golden eagles may be taken in Solano County. These are NSAS's comments to the DEA:

1. NSAS recommends the FWS expand the take analysis and permit to be applicable to the entire Montezuma Hills Wind Resource Area (WRA) at a minimum, if not all the WRAs within Bird Conservation Region (BCR) 32 (Coastal California). Until all wind resource mortality is addressed, the FWS cannot achieve its obligations under the Eagle Protection Act to conserve eagle populations or eagle take permit issuance criteria 1, as stated in Section 1.5.2 of the DEA. Additionally, without the permit and associated financial obligations applied equally to all

5-1

projects (based on production and risk), this process places the Shiloh IV applicants at a competitive disadvantage, especially if mortality is documented. 5-1 cont'd

2. The assessment of the local golden eagle population is too narrow and is focused on just the 10 mile radius surrounding the Shiloh IV project area. Consistent with comment 1, the analysis should take into account a minimum 10 mile radius of the entire WRA. NSAS recommends drawing 10 mile radius circles from the four “corners” of the WRA. 5-2

3. The Draft EA predicts a take of 0.86 golden eagles per year, rounded to 5 eagles for the 5 year permit for the Shiloh IV project. However, the projected mean annual take for the Montezuma Hills WRA is 6.16 eagles (up to 8.23 eagles). This potentially represents the loss of entire adult breeding population in the 10-mile radius of the Shiloh IV project as described in the DEA. The Draft Permit alternatives do not provide any mitigation for this projected larger cumulative take of golden eagles. 5-3

4. The DEA does not provide any real documentation for the selection process, other than "worked with PG&E," to determine a compensatory mitigation site or any demonstration that the proposed retrofits 140 miles away at the southern edge of the BRA would provide any meaningful conservation value for the local golden eagle population or the BRA golden eagle population. NSAS understanding is Lake San Antonio where the mitigation is proposed is primarily a major wintering area for bald eagles. The DEA states that Bald Eagles unlikely to be affected by the Shiloh IV project in the Montezuma Hills WRA. So why is the pole retrofit mitigation proposed for this area? NSAS feels that any mitigation on poles should happen in Solano County unless PG & E has no poles in the County that need to be retrofitted. The DEA needs to provide a better analysis and justification for mitigation benefit in order to demonstrate the compliance with required permit issuance criteria and as mitigation for take of golden eagles. 5-4

5. The basis for the adequacy of the compensatory mitigation proposal to retrofit between 75 and 133 electrical power poles, depending on alternative, is not discussed in the DEA. The number of poles appears arbitrary. The applicant's Draft Eagle Conservation Plan (pages 4-8 and 4-9) provides a purported calculation of a net benefit to the eagle population; however, the basis for the benefit is stated as an assumption and no documentation is provided to support the assumed benefit. 5-5

6. Even if there is demonstrated golden eagle mortality at the proposed compensatory mitigation area, it would seem to be FWS's authority under the Act to compel PG&E to mitigate their take of eagles as their obligation and not some third party. This seems unfair to Shiloh IV applicant and gets PG & E off the obligation to do their due diligence under the Act. If pole retrofits are part of the compensatory mitigation package for the project, NSAS recommends that the FWS provide better documentation on benefits and conduct additional analysis to locate pole retrofits in a location that provides benefit for the local golden eagle population. 5-6

7. NSAS recommends that the FWS expand the suite of compensatory mitigation. One option that would benefit the local golden eagle population is to provide protection for and reduce disturbance to existing active nests. With three historic or current golden eagle nests in the 5-7

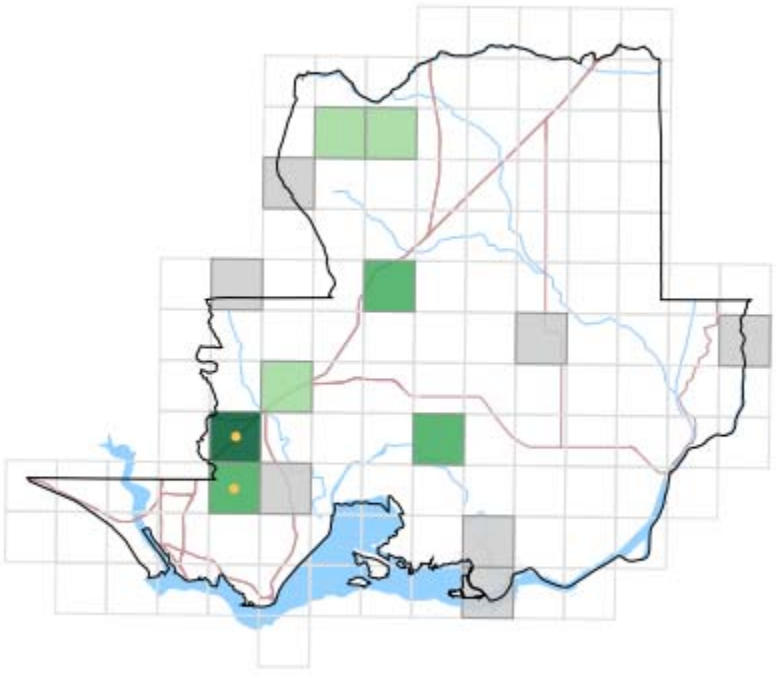
WRA and one adjacent, it would seem there is significant financial incentive for landowners to remove golden eagle nest trees in order to minimize golden eagle populations and avoid expensive penalties from implementation of Advanced Conservation Practices (ACP)s. NSAS is aware of one instance in the City of Vallejo where a landowner removed a eucalyptus tree after the breeding season in 1991 that supported a nesting pair of golden eagles from 1979-1991 in anticipation of future development of the parcel. NSAS does not know if this pair abandoned nesting in this area altogether or successfully relocated to another location. The Solano Habitat Conservation Plan (HCP), of which the FWS is an active participant in developing, contains a program for protecting known nest sites for the State-listed Swainson's hawk. A similar program for golden eagle nest protection could provide significant benefit for the local golden eagle population. If not currently a limiting factor, the availability of nest sites would also appear to be potentially limiting in and around the WRA, particularly as older large eucalyptus trees die and are not replaced. Construction of artificial nest structures has been successfully employed as a conservation strategy for golden eagles in other locations and should be considered as an alternative or additive compensatory measure for issuance of the permits. During the period between 2004-2010 NSAS conducted a Solano County Breeding Bird Atlas. However, NSAS atlasers were not allowed to go into the WRA to survey for nesting activity. In Dec 2007 there was a sighting from a consultant that saw a pair of golden eagle courting and copulating and trying to rearranging sticks in the old nest of a common raven on power pole within the WRA. In light of this mitigation recommendation, please see the for the map of Golden Eagle nesting activity in Solano County. This map can also be gotten by going to http://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ProjectHome&BBA_ID=CA-Sol2004 and going to results by species on that page and scrolling down to Golden Eagle.

5-7
cont'd

Draft Golden Eagle Results for entire Atlas Area

All results DRAFT until final review / publication.

This map was last updated 29 Nov 2013.



Block List | How to read this map

SUMMARYhttp://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ResultsBySpecies*(These results last updated 29 Nov 2013)*:

Golden Eagle	Blocks All
Confirmed	1
Probable	3
Possible	3
Observed	7
Blocks with evidence [1]	7
Blocks with data [2]	114
Total blocks	124

[1] 'Blocks with evidence' does not include Observed records.

[2] 'Blocks with data' refers to blocks with any species submitted.

8. The proposed monitoring program under any of the alternatives is too limited in time and narrow in scope. The monitoring program should be expanded to require participation and funding by all wind power producers in the WRA and include monitoring of golden eagle populations. This monitoring should include monitoring of golden eagle nests and wintering populations to better document production, use, and population trends within at least 10 miles of the entire WRA. The monitoring program should run for the entire permit duration. If run for a shorter period, how will mortality be determined and additional ACPs triggered? 5-8

NSAS recommends that, at a minimum, the take permit be expanded to the all producers in the WRA and that all entities provide applicable funding to provide for independent, third party monitoring under the direction of a technical advisory committee.

Thank you for allowing us to comment on this Draft Environmental Assessment on Application for Eagle Permit for Shiloh IV Wind Energy Project in Northern California.

Sincerely,

Robin L. C. Leong

Robin Leong,
Member of the Napa-Solano Audubon Society

CENTER for BIOLOGICAL DIVERSITY Because life is good.

protecting and restoring natural ecosystems and imperiled species through science, education, policy, and environmental law

Via email

11/29/2013

Heather Beeler, Migratory Bird Program,
U.S. Fish and Wildlife Service,
Pacific Southwest Regional Office,
2800 Cottage Way, W–2605,
Sacramento, CA 95825.
ShilohIV_comments@fws.gov

RE: Shiloh IV Wind Project DEA Comments

Dear Ms. Beehler,

On behalf of the staff, members and supporters of the Center for Biological Diversity, we submit the following comments on the Draft Environmental Assessment (DEA) for the Shiloh Wind Project and the first programmatic permit for the take of golden eagles proposed to be issued by USFWS.

The Center strongly supports the development of renewable energy as a critical component of efforts to reduce greenhouse gas emissions, avoid the worst consequences of global warming, and to assist in achieving needed emission reductions. The development of renewable energy production and the generation of electricity from wind power in an important part of those efforts. However, like all projects, wind power projects including repowering projects such this one should be thoughtfully planned to minimize impacts to the environment. In particular, renewable energy projects should avoid impacts to sensitive species such as golden eagles and their habitat, and should be sited in proximity to the areas of electricity end-use when possible in order to reduce the need for extensive new transmission corridors and the efficiency loss associated with extended energy transmission. Only by maintaining the highest environmental standards with regard to local impacts, and effects on species and habitat at the local and regional scale, can renewable energy production be truly sustainable.

The Center supports wind projects applying for golden eagle permits as required under the Bald and Golden Eagle Protection Act, because of the overall benefits to eagle conservation that the Act provides by providing permit conditions that limit mortality, require consistent mortality monitoring, and require application of avoidance measures. Because this permit would be the first one issued for "take" of golden eagles, it is precedential.

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The Center is concerned over the decline in golden eagles in the southwest[1] and the regionally high impact of wind energy on golden eagles in California[2] compared to other regions. From that perspective we offer the following comments.

Avoidance

Because the Montezuma Hills Wind Resource Area (MHWRA) has been in operation for years, and monitoring for eagles and other avian species has occurred in the area, some data are available on golden eagle use of the site. We believe that a key component to the re-powering effort should be careful micro-siting of new turbines. If additional data is needed on how golden eagles use the air space, now is the time to collect it prior to engineering the repowering. Clearly avoidance of injury and mortality to golden eagles needs to be the highest priority of any eagle permit. 6-1

Alternatives

We agree that eagle permits should be given for no longer than 5 years. The DEA proposes to permit the "take" of approximately one eagle per year for the all of the action alternatives (at pgs. 19-20 of the PDF), with Alternatives 2 and 3 proposed take of five eagles over five years and Alternative 4 proposed take of four eagles over five years. This proposed number reflects the current reported golden eagle fatalities based on monitoring of projects within the MHWRA. The DEA estimates that "The local area population (i.e., those birds within 140 miles of the project area) is estimated at 527 individuals", (at pg. 35 of the PDF). In light of this information, we agree with the DEA's conclusion that "the project would contribute to local and possibly regional adverse effects on the species" (at pg. 47 of the PDF). 6-2

In order to provide better protection for this eagle population, in addition to the careful siting of "re-power" turbines, other avoidance and minimization measures need to be included in the permit that could reduce potential impacts to golden eagles and should be considered as part of the alternatives analysis. These measures include:

- Reducing the number of turbines in the re-power effort;

- As an initial matter, having a biologist onsite to monitor eagles who has the ability to turn-off (curtail or "feather") turbines when eagles are approaching turbines and rotor-swept area. Other projects (Ocotillo Wind in Imperial County) [3] are implementing such an avoidance measure. We recognize that this avoidance measures is Step III of the Advanced Conservation Practices (ACPs) which would only be implemented *after* three eagle fatalities in a single year or four fatalities in any 5 years are documented, however, we believe that this is a reasonable avoidance measure that could be implemented initially, as it has been elsewhere, potentially saving three or four eagles or more. 6-3

1 Millsap et al. 2013
2 Pagel et al. 2013
3 http://www.icpds.com/?pid=2843

- As above, radar systems to detect incoming birds is proposed to be put in place as Step IV of the ACPs but only after four eagle fatalities have occurred in a 12 month period or five eagles in five years. While we recognize that this technology is not currently accurate enough to detect even large birds like golden eagles, we believe that over the course off the permit term, great improvement in the technology will be made, making it a viable alternative that could be incorporated into a SCADA system to turn off turbines when eagles are approaching and should be implemented as early as possible. Implementation of this measure should be required as early as technologically feasible, whether or not 4 or 5 eagles have already been killed.

- Seasonal curtailment during eagle high use periods and especially after local nests fledge should be required annually.

6-3 cont'd

Mortality Monitoring

Mortality monitoring really needs to be over the life of the re-powered project, and certainly must be required over the life of the eagle permit. As exemplified in the DEA, mortality monitoring has been inconsistent both in timeframes, methodologies and across the MHWRA, complicating the capacity of the U.S. Fish and Wildlife Service (FWS) to estimate eagle mortality and model future mortalities. Consistent monitoring going forward will improve the ability of FWS and the companies to better implement conservation measures in the future.

6-4

Technical Advisory Committee

As part of the ACPs, a Technical Advisory Committee (TAC) is proposed be formed, made up of FWS staff (DEA at pg. 22 of the PDF). While we support the establishment of a TAC basically to review monitoring data, advise on new/updated avoidance and monitoring methods and adaptive management strategies, we believe that extending the membership of the TAC to golden eagle experts outside of the FWS staff would be beneficial. In addition, the TAC meetings should be publicly noticed, open to the public, and detailed minutes of TAC meetings should be provided to the public within 2 weeks of any meeting including any recommendations from the TAC.

6-5

Compensatory Mitigation Falls Short

While we support the reduction of avian mortalities from power poles in general, if power poles are causing golden eagle (or other sensitive species) mortality, then it is incumbent on the power pole owner(s) to retrofit the power poles, not this project proponent.

6-6

Additional mitigation for impacts should be included in the permit. For example, decommissioning of problem turbines or groups of turbines needs to be included. The DEA should also consider off-site acquisition of habitat or conservation easements specifically in support of golden eagle conservation in perpetuity to off set the impacts from this project. Mitigation acreage should include more than just the rotor swept area acreage, it should include the landscape as a whole, because effectively the whole MHWRA will continue to pose an

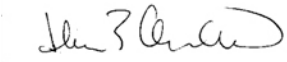
6-7

ongoing threat to golden eagles as long as turbines of the current technology are present. Mitigation lands should be acquired to secure lands outside of WRAs to provide safe movement corridors for eagles and other birds, for example, lands adjacent to East Bay Regional Park lands or other open spaces in the region; or provide additional habitat and restoration well away from any of the WRAs and in areas with high eagle densities, such as areas adjacent to Lake San Antonio California State Recreation Area and Fort Hunter Liggett (DEA at pg. 22 of the PDF). 6-7 cont'd

Conclusion

We appreciate the effort that went into this analysis for the first golden eagle take permit for a wind project, and we appreciate the opportunity to comment on the DEA. By incorporating our suggestions, we believe the FWS will be able to craft an adequate permit. Please feel free to contact me with any questions.

Sincerely,



Ileene Anderson
Senior Scientist

References:

Millsap, B.A., G.S. Zimmerman, J.R. Sauer, R.M. Nielson, M. Otto, E. Bjerre and R. Murphy 2013. Golden Eagle Population Trends in the Western United States: 1968-2010. Journal of Wildlife Management 77(7): 1436–1448

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The Journal of Wildlife Management; DOI: 10.1002/jwmg.588

Research Article

Golden Eagle Population Trends in the Western United States: 1968–2010

ORG 6
part 2

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ABSTRACT In 2009, the United States Fish and Wildlife Service promulgated permit regulations for the unintentional lethal take (anthropogenic mortality) and disturbance of golden eagles (*Aquila chrysaetos*). Accurate population trend and size information for golden eagles are needed so agency biologists can make informed decisions when eagle take permits are requested. To address this need with available data, we used a log-linear hierarchical model to average data from a late-summer aerial-line-transect distance-sampling survey (WGES) of golden eagles in the United States portions of Bird Conservation Region (BCR) 9 (Great Basin), BCR 10 (Northern Rockies), BCR 16 (Southern Rockies/Colorado Plateau), and BCR 17 (Badlands and Prairies) from 2006 to 2010 with late-spring, early summer Breeding Bird Survey (BBS) data for the same BCRs and years to estimate summer golden eagle population size and trends in these BCRs. We used the ratio of the density estimates from the WGES to the BBS index to calculate a BCR-specific adjustment factor that scaled the BBS index (i.e., birds per route) to a density estimate. Our results indicated golden eagle populations were generally stable from 2006 to 2010 in the 4 BCRs, with an estimated average rate of population change of −0.41% (95% credible interval [CI]: −4.17% to 3.40%) per year. For the 4 BCRs and years, we estimated annual golden eagle population size to range from 28,220 (95% CI: 23,250–35,110) in 2007 to 26,490 (95% CI: 21,760–32,680) in 2008. We found a general correspondence in trends between WGES and BBS data for these 4 BCRs, which suggested BBS data were providing useful trend information. We used the overall adjustment factor calculated from the 4 BCRs and years to scale BBS golden eagle counts from 1968 to 2005 for the 4 BCRs and for 1968 to 2010 for the 8 other BCRs (without WGES data) to estimate golden eagle population size and trends across the western United States for the period 1968 to 2010. In general, we noted slightly declining trends in southern BCRs and slightly increasing trends in northern BCRs. However, we estimated the average rate of golden eagle population change across all 12 BCRs for the period 1968–2010 as +0.40% per year (95% CI = −0.27% to 1.00%), suggesting a stable population. We also estimated the average rate of population change for the period 1990–2010 was +0.5% per year (95% CI = −0.33% to 1.3%). Our annual estimates of population size for the most recent decade range from 31,370 (95% CI: 25,450–39,310) in 2004 to 33,460 (95% CI: 27,380–41,710) in 2007. Our results clarify that golden eagles are not declining widely in the western United States. © 2013 The Wildlife Society.

KEY WORDS *Aquila chrysaetos*, Breeding Bird Survey, golden eagle, hierarchical model, populations, trend, United States.

In 2009, the United States Fish and Wildlife Service (Service) published regulations under the Bald and Golden Eagle Protection Act (16 United States Code 668–668d; hereafter Act) that established conditions under which the Service could permit lethal take and disturbance of bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). The Act delegates to the Secretary of the Interior the ability to permit take of the eagles "necessary for the protection of other interests in any particular locality" after determining the take is "compatible with the preservation of the bald eagle or golden eagle." The regulations define take to mean pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. In the 2009

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regulations, the Service established that compatibility with mandates of the Act are accomplished if permitting activities do not result in a net decrease in the number of breeding pairs of either species of eagle (using 2009 as the baseline) within regional geographic management units, which in the case of the golden eagle are Bird Conservation Regions (BCR; U.S. North American Bird Conservation Initiative Monitoring Subcommittee 2007, U.S. Fish and Wildlife Service 2009). Direct counts of the number of golden eagle breeding pairs are not available and the number varies annually with environmental conditions (Kochert et al. 2002); therefore, the Service relies on trends in estimates of total golden eagle population size and demographic models that use those population estimates to assess whether the management objective of a stable breeding population is being achieved (U.S. Fish and Wildlife Service 2009).

This permitting threshold created a need for accurate population trend and size data for both species of eagle so Service and other agency biologists could make informed decisions when eagle take permits were requested. This had been problematic in the case of the golden eagle because available data had been sufficient for only coarse estimates of population size with no measure of uncertainty. The lack of robust population data was 1 factor that led the Service to conclude it could not authorize additional take above that existing at the time the eagle take regulations were published without potentially violating the preservation standard in the Act (U.S. Fish and Wildlife Service 2009). This decision has been controversial, particularly in the western United States where permits to unintentionally take golden eagles in association with renewable energy development are needed.

We integrated data from golden eagle population surveys conducted by Western Ecosystems Technology (WEST) and the Service (hereafter the western United States summer golden eagle survey, or WGES; Good et al. 2007, Nielson et al. 2012) and the North American Breeding Bird Survey (hereafter BBS) using a log-linear hierarchical model (Sauer and Link 2011, Zimmerman et al. 2012). Our broad objectives were to help clarify our understanding of the status of the golden eagle in the conterminous western United States. We studied the summer golden eagle population in the conterminous western United States roughly west of the 100th meridian; we stratified this population by BCR for analyses (Fig. 1). The BBS is a well-known survey intended to provide early-summer population change information for over 420 species of birds from the late 1960s to the present over much of North America (Sauer and Link 2011). Given its timing, the BBS provides information on golden eagles before young have fledged from nests over most of the western United States, hence it is a pre-recruitment survey. Population estimates from the BBS are controversial because they lack estimates of detection (Thogmartin et al. 2006), and the BBS is considered to have deficiencies because of low precision and low abundances with respect to assessing trends of golden eagle populations (http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa10.pl?03490&1&10, accessed 4 Nov 2012). The WGES was initiated in 2003 as a pilot study, and was designed to estimate population size of golden eagles. Adjustments were made following the pilot study and the survey has been conducted annually using a consistent protocol and sample of survey transects since 2006 by WEST with funding from the Service (Good et al. 2007, Nielson et al. 2012). This aerial transect-based survey focuses on late summer, post-breeding golden eagles in the Great Basin (BCR 9), Northern Rockies (BCR 10), Southern Rockies/Colorado Plateau (BCR 16), and Badlands and Prairies (BCR 17) BCRs, which collectively cover about 80% of the golden eagle's range in the conterminous western United States (U.S. Fish and Wildlife Service 2009).

Both WGES and BBS counts of golden eagles exist for BCRs 9, 10, 16, and 17 for the years 2006–2010; we refer to these BCRs as the overlap BCRs. The WGES has produced estimates of golden eagle density for the overlap BCRS for the years 2006–2010 (Nielson et al. 2012), and the BBS has generated estimates of golden eagle population trends for the period 1968–2008 (Sauer and Link 2011). Our specific objectives in integrating data from the WGES and BBS were to 1) collectively apply all available survey data to inform regional trend estimates; 2) assess whether the BBS and WGES were providing similar golden eagle population trend estimates for the time periods and BCRs of overlap; and if so, 3) develop an adjustment factor to scale the BBS counts of birds per route in the spring to density estimates post-breeding, which would allow us to estimate golden eagle population size and trend over the time series of the BBS (1968–2010) or for parts of that interval for both the overlap BCRs and other BCRs in the conterminous United States west of the 100th meridian.

We present the methods and results from the composite analysis of WGES and BBS golden eagle population data, and compare those findings with those from other recent golden eagle population analyses and assessments. In that context we also consider recent published estimates of golden eagle population trends from regression analyses of autumn western United States golden eagle migration counts (Bildstein et al. 2008). The original analysis of those data suggested migratory populations of golden eagles over much of the western United States have declined since the mid-1980s, and in particular from 1995 to 2005 (Farmer et al. 2008). However, recent analyses suggest migratory behavior of some North American raptors may be changing in response to climate change (Rosenfield et al. 2011, Buskirk 2012), and we wanted to assess whether this might be a factor in the golden eagle trends reported by Farmer et al. (2008). In addition to providing insights into golden eagle population change over the analysis period, our results also extend the utility of the hierarchical model developed by Sauer and Link (2011) in generating estimates of population numbers through the incorporation of estimated detection probabilities from the WGES.

STUDY AREA

The WGES was conducted in the United States portions of BCRs 9, 10, 16, and 17, which collectively cover the majority of the interior conterminous western United States (Fig. 1). Military lands, elevations >3,048 m, water bodies

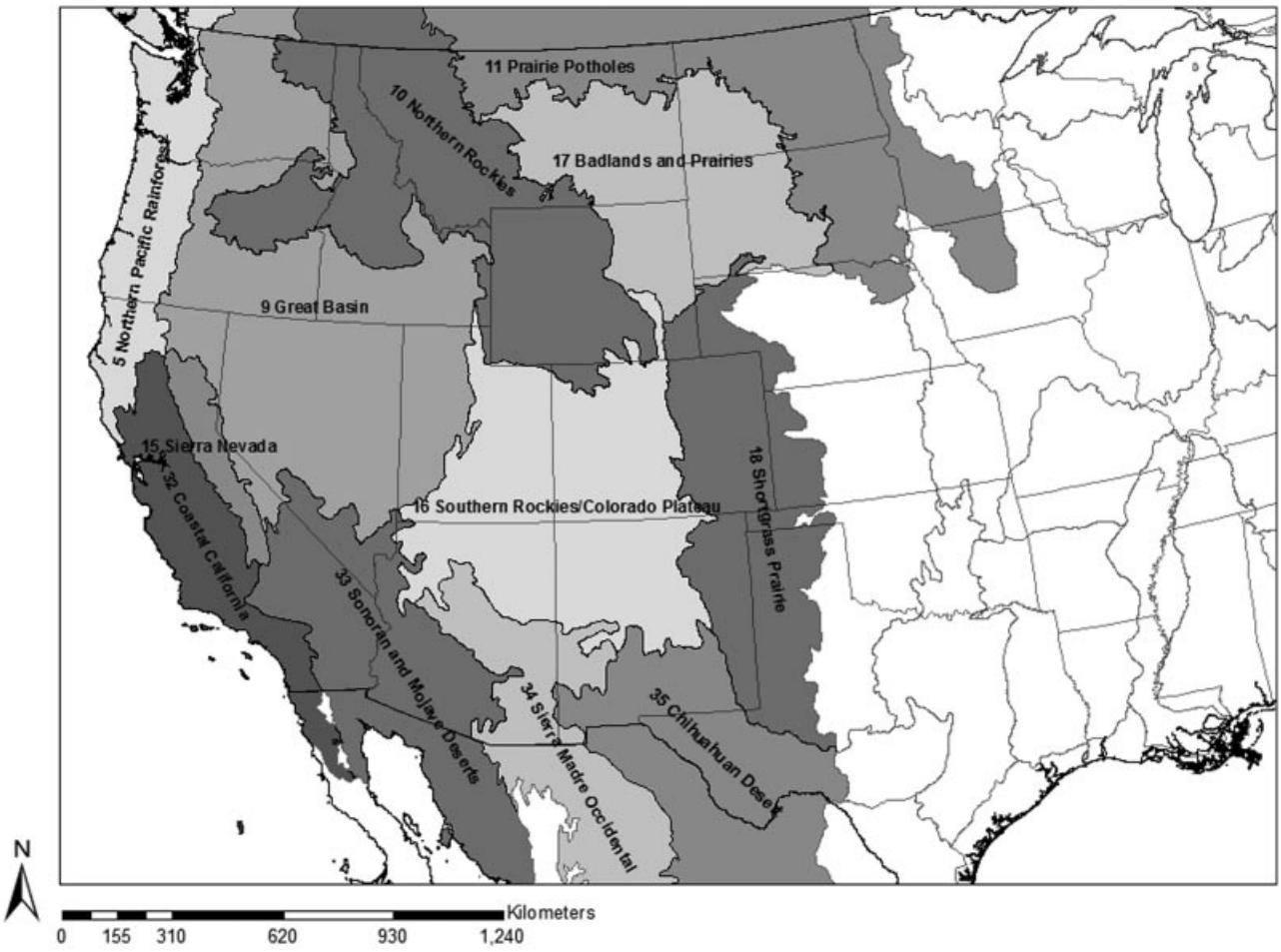

Figure 1. Map of our study area showing Bird Conservation Regions (BCRs), the geographic regions by which we stratified our analyses of golden eagle surveys. Shaded BCRs were included in our study.

>30,000 ha, and large urban areas accounting for 6.03% of these BCRs were not sampled in the WGES. The BBS provides information for the entire western United States; we used BBS data for each BCR west of the 100th meridian in the conterminous United States (Table 1). Thus, we used both WGES and BBS data from overlap BCRs 9, 10, 16, and 17, and BBS data only from the non-overlap BCR 5 (Northern Pacific Rainforest), BCR 11 (Prairie Potholes), BCR 15 (Sierra Nevada), BCR 18 (Shortgrass Prairie), BCR 32 (Coastal California), BCR 33 (Sonoran and Mojave deserts), BCR 34 (Sierra Madre Occidental), and BCR 35 (Chihuahuan Desert).

Table 1. Bird Conservation Region (BCRs) areas used in our analysis of golden eagle surveys, 2006–2010.

BCR[a]	Area (km^2)[b]
9—Great Basin	671,710
10—Northern Rockies	504,133
16—Southern Rockies/Colorado Plateau	477,753
17—Badlands and Prairies	360,113
5—Northern Pacific Rainforest	175,866
11—Prairie Potholes	414,819
33—Sonoran and Mojave Deserts	216,255
34—Sierra Madre Occidental	123,571
32—Coastal California	155,169
15—Sierra Nevada	48,340
18—Shortgrass Prairie	381,839
35—Chihuahuan Desert	176,139

[a] Analysis used only United States portions of BCRs.
[b] We filtered BCR areas to exclude military lands, elevations >3,048 m, water bodies >30,000 ha, and large urban areas to be compatible with the areas used by Nielson et al. (2012). Overall, this resulted in a 6.03% reduction in area compared to the unfiltered BCR areas.

METHODS

We used a log-linear hierarchical model (Sauer and Link 2011) to estimate population sizes and trends, and to integrate data from the WGES and the BBS. The WGES was conducted by WEST, flying fixed-wing aircraft along transects at a speed of about 161 km/hr. For complete details on the design of the WGES, see Good et al. (2007) and Nielson et al. (2012). We used WGES data from 2006 through 2010 in these analyses; we did not use data from the pilot year of 2003 as it may not be comparable, following the recommendation of Nielson et al. (2012). In each year, WEST flew between 203 and 216 standardized transects (Table 2). Transect length was typically 100 km, but differences in the number and length of transects occurred for various reasons (e.g., in some years forest fires precluded flying all or portions of some transects). These variations

Table 2. Length (km) of transects flown by year on the western United States summer golden eagle survey (WGES) in Bird Conservation Regions (BCRs) 9, 10, 16, and 17.

BCR	2006	2007	2008	2009	2010	Total
9	6,016	5,857	5,770	5,915	5,911	29,469
10	4,606	4,570	4,546	4,728	4,557	23,007
16	3,966	3,998	3,975	3,807	3,939	19,685
17	3,143	3,245	3,129	3,147	3,201	15,865
Total	17,731	17,670	17,420	17,597	17,608	88,026

were accommodated by treating transects as sampling units in the log-linear hierarchical models. These surveys were conducted from 15 August to 15 September, after juvenile golden eagles had fledged but before autumn migration (Fuller et al. 2001).

Surveys were flown at different altitudes because of topography. Specifically, rugged portions of transects were flown at a higher altitude (150 m above-ground level; AGL) compared to relatively level portions (107 m AGL). During 2006, 2007, 2009, and 2010, 2 observers were situated on the right side of the aircraft (1 in the front seat and 1 in the rear) and 1 observer in the rear left side of the aircraft. During 2008, only 1 observer occupied the right side of the aircraft (in the front) on 68 of 213 transects. Observers counted all golden eagles, attempted to place each eagle in an age class, estimated the perpendicular distance of observed eagles from the transect, and recorded whether eagles were perched or flying. Using these data and a combination of distance sampling (Buckland et al. 2001) and mark-recapture methods (Borchers et al. 2006), Nielson et al. (2012) estimated population sizes and detection functions for golden eagles in each of the 4 BCRs covered by the WGES. Considering the various combinations of observer position (back-left, front and back-right, and front-right only), flight height (AGL), and eagle behavior (flying vs. perched), we recognized 9 different detection categories for our analysis of WGES data. In our analysis, we used the estimated average probability of detection within 1,000 m of the aircraft for each detection category to relate counts of golden eagle groups during the WGES to density estimates.

The BBS was conducted from the ground at points along road transects (different from WGES transects) from April through June. Each route was 39.4 km long and survey points were placed at 0.8-km intervals. Protocol dictated that observers counted every bird that was not a dependent juvenile heard or seen within 400 m for a 3-minute period at each point. However, we were not confident that observers consistently followed protocol with respect to the distance, so we did not incorporate the area sampled in analysis of the BBS data. We used BBS data from 1968 to 2010 for this analysis, but calculated trend estimates for 2 time periods: 1968–2010 and 1990–2010. We included the former period to present our best estimate of trend for the complete range of years for which we have data. We present the limited trend because early years of the BBS provided relatively small sample sizes for analysis, and these small sample sizes can lead to imprecise results and to an inability to distinguish patterns within the period. The years 1990–2010 had much greater BBS coverage and commensurately larger golden eagle sample sizes, and the estimates of annual change over this period were unaffected by the imprecise estimates from the earlier years. Past analyses of BBS data have assigned routes to strata defined by BCR and state or province. To maintain consistency with the design of the WGES, we defined strata based on BCR only, except that we split out British Columbia and Alberta from BCRs 10 and 11 because the WGES did not survey areas outside the United States.

Many juvenile golden eagles encountered during the WGES in a given year were not available to be sampled during the BBS survey in that year, as the BBS primarily occurred before juvenile golden eagles fledged. Initially we considered analyzing the juvenile and non-juvenile age class data separately, but uncertainty over how to treat golden eagles classified as an unknown age in the WGES precluded this approach. Therefore, we combined all golden eagles observed during the WGES to a single age class.

The hierarchical models we used to derive population indices accommodate the stratification and the repeated sampling (i.e., counts are conducted along the same transects each year for the respective surveys) design of both surveys (Sauer and Link 2011, Nielson et al. 2012). The model used for the BBS was

$$\log(\lambda_{i,j,t}) = S_i + \beta_i T_t^* + \gamma_{i,t} + \omega_j + \eta E_{j,t} + \varepsilon_{i,j,t}$$

where we assumed that counts of eagles from each transect were samples from an overdispersed Poisson distribution with expected value λ that was specific for each BCR (i), route-observer combination (j), and year (t). The S and β represent BCR-specific intercept and slope parameters for underlying trends over the entire time series. Following Sauer and Link (2011), we centered years on the median value (i.e., $T_t^* = t -$ median year). We also included BCR- and year-specific random effects (γ) to model annual indices as offsets from the underlying trends, a random effect for observer and BBS route combinations (ω) to account for repeated sampling along the same routes by the same observers each year, and a fixed effect of first-year observers (η) to account for inexperience and learning by observers during the survey. The $E_{j,t}$ was an indicator variable that was assigned a 1 if an observer conducted a BBS route j for the first time (in year t) and a 0 otherwise (e.g., observer experience). We included an overdispersion parameter (ε) to account for extra Poisson variation. Following Sauer and Link (2011), we weighted BBS indices for each BCR by the

proportion of routes that recorded ≥1 golden eagle since the survey's inception. Because we did not have an estimate of detection probability or area sampled, the model for the BBS data yields an annual index to population size quantified as the number of birds per route (Sauer and Link 2011).

Although the model structure for the WGES was similar to the BBS model, the WGES model statement accommodated differences in survey design. For the WGES, WEST 1) employed observers that were carefully trained and had a year of pilot surveys, which allowed us to ignore the first-year observer effect; 2) estimated detection probability, which allowed us to adjust the counts for undetected individuals; and 3) surveyed a defined area along a systematic sample of transects across the overlap area, which enabled us to estimate an actual density (see Table S1, available online at www.onlinelibrary.wiley.com). Our modeling approach was similar to Zimmerman et al. (2012), except that we included detection rate directly in the main model, whereas they used a visibility correction factor when calculating derived statistics. Specifically, the structure of our model for the WGES data was

$$\log(\lambda_{i,j,a,b,c,t}) = \log(A_{j,a,b,c}) + \log(P_{a,b,c}) + S_{i,c} + \beta_{i,c}T_t^* + \gamma_{i,c,t} + \omega_{j,c} + \varepsilon_{i,j,a,b,c,t}$$

where A represented the area sampled for each detection class along transects and P represented the detection probability. Area sampled was based on the assumption of a 1,000-m buffer on each side of the aircraft minus the area underneath the plane where vision was blocked, which was 25 m over flat terrain and 40 m over rugged terrain for each side of the aircraft (i.e., total buffer width was 1,950 m and 1,920 m over flat and rugged terrain, respectively). The indexing for the WGES data was slightly different than the model for the BBS data. Although i still indexed BCR, j represented individual transects for the WGES data (i.e., our sampling unit). The indices a, b, and c are associated with detection classes. Detection probabilities varied by 1) for perched golden eagles, gentle terrain flown at 107 m versus rugged terrain flown at 150 m, indexed by a above; 2) side of the airplane (left side had 1 observer in the rear, the right side had 2 observers most years, and 1 observer in the front for some transects in 2008) indexed by b above; and 3) behavior (flying vs. perching birds) indexed by c above. Although the detection probability of perched birds varied by altitude flown, we found no effect of altitude on detection of flying birds (Table 3). Separate linear regressions ($S_{i,c} + \beta_{i,c}T_t^* + \gamma_{i,c,t}$) of the trend and separate random transect effects ($\omega_{j,c}$) were estimated for perched and flying birds.

We used Bayesian methods to make inferences about unknown parameters in the models. We used the Markov chain Monte Carlo (MCMC) method implemented in program WinBUGS (Lunn et al. 2000) to estimate posterior distributions of unknown parameters (Table S1, available online at www.onlinelibrary.wiley.com, which also provides prior distributions for each of the unknown parameters). We incorporated uncertainty associated with the detection probabilities by sampling a P (detection probability) from a normal distribution with means and variances estimated by Nielson et al. (2012; see Table 3). We ran 3 chains for 40,000 iterations and used the first 36,000 iterations for a burn-in period and made inferences using the final 4,000 iterations for each of the chains. Therefore, our final summary statistics are based on a total of 12,000 iterations. We inspected history plots and used $\hat{R}$ to estimate convergence. $\hat{R}$ convergence measures <1.1 suggested convergence (Gelman and Hill 2007), and all model results reported here had $\hat{R}$ values ≤1.03.

We used the MCMC procedure to estimate the posterior distributions of several derived parameters. We computed annual indices of golden eagles from each survey in each BCR as functions of the model parameters. For the BBS, we derived annual indices (I) of birds per route from parameters and variance components as

$$I_{i,t} = z_i \exp(S_i + \beta_i T_t^* + \gamma_{i,t} + 0.5\sigma_\omega^2 + 0.5\sigma_\varepsilon^2)$$

where z represented a weighting factor based on the proportion of routes in that strata (Sauer and Link 2011). We estimated annual estimates of birds per km^2 from the WGES as

$$n_{i,t,c} = \exp(S_{i,c} + \beta_{i,c}T_t^* + \gamma_{i,t,c} + 0.5\sigma_{\omega_c}^2 + 0.5\sigma_{\varepsilon_c}^2)$$

Note that perched birds were indexed as $c = 1$ and flying as $c = 2$, and we summed these 2 densities to estimate a total density for eagles in each BCR for each year based on the WGES data ($n_{it.}$).

Similar to Zimmerman et al. (2012), we needed to scale data from 1 survey to the level of the other to integrate results from the 2 surveys. We chose to scale the BBS data to the

Table 3. Detection probabilities and standard errors (SE) for the different observation categories in the western United States summer golden eagle survey (WGES) in Bird Conservation Regions (BCRs) 9, 10, 16, and 17 from 2006 to 2010.

	Detection probability (SE)[a]		
	Eagle flying	Eagle perched	
Observer position in aircraft	All terrain[b]	Gentle[c]	Rugged[c]
Left (rear)	0.437 (0.071)	0.443 (0.033)	0.325 (0.010)
Right (front and rear)	0.511 (0.060)	0.556 (0.033)	0.419 (0.091)
Right (front only; 2008)	0.304 (0.059)	0.426 (0.032)	0.283 (0.090)

[a] Detection probabilities were estimated as the mean of detection functions from distance sampling over a 1-km range.
[b] Terrain and altitude did not influence detection probabilities for flying golden eagles.
[c] Flight altitude was 150 m above-ground level over rugged terrain compared to 107 m above-ground level over gentle terrain.

level of the WGES because the goal of this analysis was to derive a population estimate. To transform the BBS indices of birds per route during the breeding season to estimates of density post-fledging, we adjusted the BBS levels for the overlap BCRs to the WGES for all years using the ratio of the sum of WGES densities over all overlap years (*nDen* in Table S1, available online at www.onlinelibrary.wiley.com) to the sum of the BBS indices over all overlap years (*n* in Table S1, available online at www.onlinelibrary.wiley.com) for each BCR ($i = 9$, 10, 16, and 17):

$$\text{Scale}_i = \frac{n_{i,\ldots}}{I_i}$$

The purpose of the scale factor is to adjust the results of the 2 surveys to a common level to enable results to be combined during years of overlap. In addition to combined inference for overlap years, historical BBS results should be scaled to be consistent with combined results to make inferences regarding population size and trends for years prior to implementation of the WGES. More complicated models for aggregation could be considered, with parameters to control for 1) differences in units (i.e., BBS population index and WGES density) and approach (road counts vs. aerial counts); 2) mortality of birds throughout the summer; and 3) movements of birds to and from the conterminous western United States during the summer. These factors are accounted for implicitly by the scale factor in our analyses, but even with data and a model to directly account for these added features we would still need to estimate a constant scale factor to adjust the BBS index to the density scale of the WGES. We adjusted the BBS indices in the non-overlap BCRs using an overall scaling factor averaging the overlap BCR-specific scaling factors, and based variability in these estimates on the MCMC simulations. These constant scale factors maintained the trend information in the BBS data and were the best available for adjusting BBS indices for the years prior to the WGES.

After scaling the BBS data to represent densities, we calculated composite estimates as the means of scaled BBS and WGES densities for each year and BCR. The WGES did not begin until 2006, so the composite BBS densities for years prior to 2006 were only the BBS estimates scaled by the adjustment for the respective BCR in the overlap regions (i.e., prior to 2006, we had no WGES estimate to average with the scaled BBS index). We then calculated the population estimate by expanding the composite density estimates by the total area in each BCR. We generated area estimates that excluded military lands, elevations >3,048 m, water bodies >30,000 ha, and large urban areas. Overall, we excluded 6.03% of the total area.

We calculated trends by BCR and for all BCRs combined as the average population change from 1968 to 2010 and 1990 to 2010 based on the composite population index as suggested by Sauer and Link (2011):

$$B_i = \left(\frac{N_{i,2010}}{N_{i,\text{year1}}}\right)^{1/(2010-\text{year1})}$$

where i indexes BCR, year1 represents the first year (i.e., 1968 or 1990), and N is the composite population size for each year, reported as a percent relative change.

We compared our results relative to population size and trends for golden eagles in the western United States to prior published assessments, including the previous analyses of the WGES by Nielson et al. (2012). With respect to trends in numbers of autumn migrant golden eagles, we hypothesized that if migration behavior was changing in response to climate change that negative trends in autumn counts of golden eagles would be greater at southern than more northern hawk watch sites. A complete assessment of this hypothesis was not possible as we were unable to obtain raw data from all pertinent hawk watch sites for analysis in this paper. Given this, we were not able to separate the location-specific trends from the overall trend, but we were able to evaluate this hypothesis in a preliminary context by plotting the summary trend results from Smith et al. (2008: 226–227) against latitude, and fitting a locally weighted scatterplot smoothing (LOWESS) line to the trend data and to upper and lower 95% confidence limits for each site. We used the locfit package and scb function (http://CRAN.R-project.org/package=locfit, accessed 18 Jun 2012) in R (version 2.15.0, http://www.r-project.org/, accessed 18 Jun 2012) for this analysis.

RESULTS

From 2006 to 2010, 780 golden eagles were detected on approximately 88,000 km of transects that were surveyed in the 4 BCRs covered by the WGES (Table 2). Golden eagle detection probabilities on the WGES across the 9 detection classes ranged from 0.28 to 0.56 (Table 3). Hierarchical model estimates from the WGES for the total population of golden eagles in all BCRs tended to be slightly larger than distance sampling estimates, but broad overlap occurred in the credible intervals (Fig. 2).

Golden eagles are generally seen at low abundances throughout their range on BBS routes, though our analysis included 3,977 golden eagle detections on BBS routes over all 12 BCRs over the study period (Tables S2 and S3). As BBS data only index trends, the scaling factors derived from the WGES analysis for each BCR allowed us to adjust the scale of BBS estimates from golden eagles per route to golden eagles per km^2 (Table 4). The scaling factors were similar among BCRs 9, 10, and 16. The scaling factor in BCR 17 was approximately 3 times greater than the other BCRs, which resulted from a relatively high density of eagles observed in that BCR by the WGES ($\bar{x} = 0.009$, 0.015, 0.008, 0.027 birds/km^2 in BCRs 9, 10, 16, and 17, respectively) compared to the BBS index of birds per route ($\bar{x} = 0.322$, 0.362, 0.225, 0.253 in BCRs 9, 10, 16, and 17, respectively). In other words, the WGES estimated almost double the density of golden eagles in BCR 17 compared to any of the other BCRs, whereas the BBS survey counted more birds per route in BCRs 9 and 10 than BCR 17. We plotted the scaled BBS data against the densities estimated from the WGES to compare trends between the 2 surveys (Fig. 3). Credible intervals of yearly estimates and patterns of

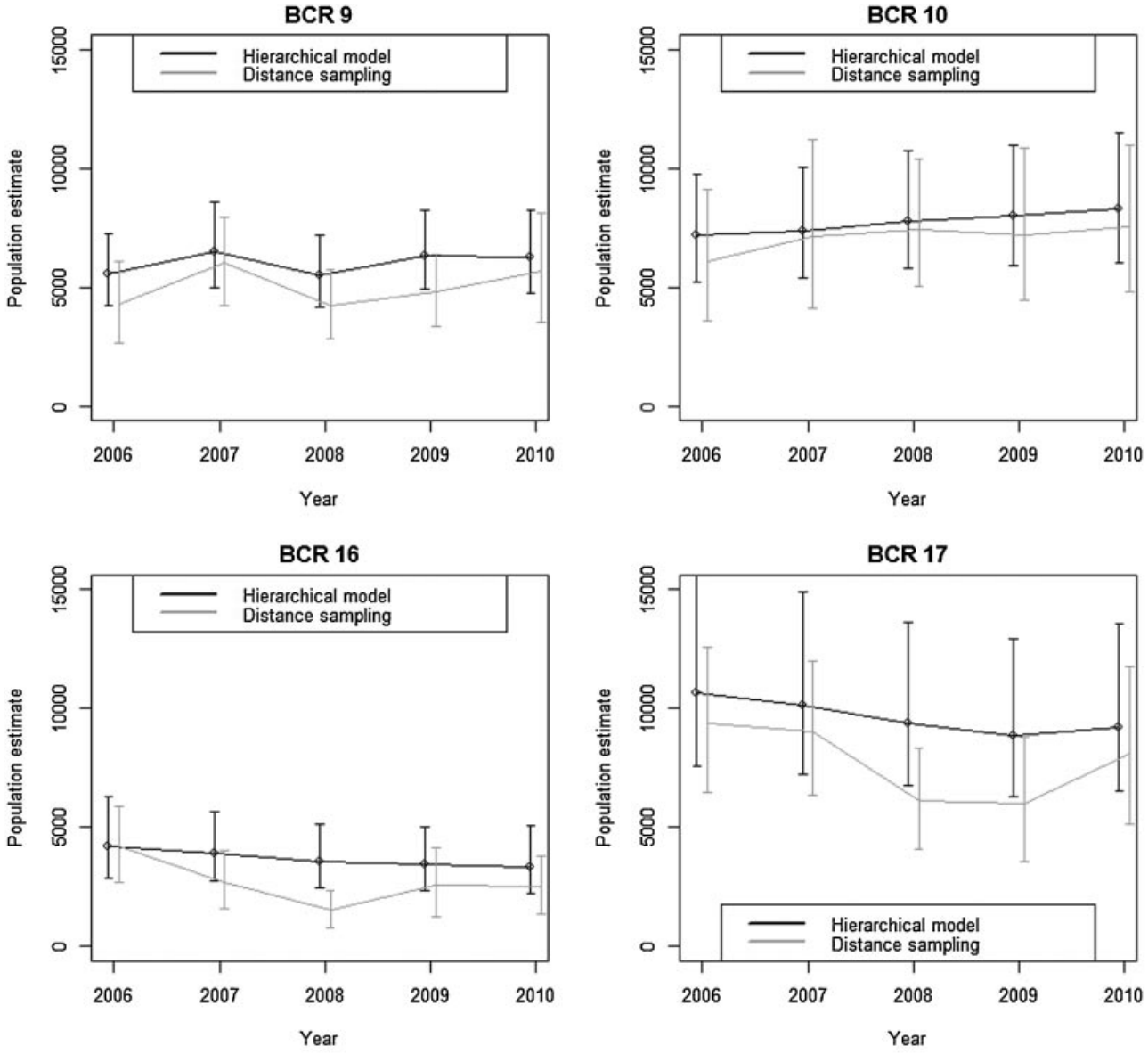

Figure 2. Comparison of population estimates from our hierarchical model to those derived from distance sampling (Nielson et al. 2012) from the western United States summer golden eagle survey in Bird Conservation Regions (BCRs) 9, 10, 16, and 17, 2006–2010. Error bars represent the 90% credible intervals.

population change of overlap BCRs were generally consistent between surveys. Declines in WGES results in BCR 17 over the period 2006–2009 were not significantly different from the no-change indicated by BBS results, and more positive trends from WGES results in BCR 10 were likewise not significantly different from the less positive BBS results.

We expanded the 4 overlap BCR density estimates to provide estimates of composite population size and credible intervals for these BCRs (Fig. 4). As in the non-combined estimates, credible intervals of the composite population index were larger for BCR 17. However, average coefficients of variation for BCRs 9, 10, 16, and 17 were 21%, 21%, 25%, and 25%, respectively, indicating that the variability of BCR 17 scaled with the higher index of golden eagles there (i.e., indices were 2–4 times higher in BCR 17 than in the other 3 BCRs).

Population estimates for BCRs other than 9, 10, 16, and 17 were based solely on BBS data, which were scaled to the level of the WGES using the overall scaling factor (Fig. 5, Table S4). Our analysis indicates some support for population increases in the Northern Rockies and Prairie

Table 4. Factors used to scale the Breeding Bird Survey (BBS) counts of golden eagles per route to the level of golden eagles per km^2 as estimated from the western United States summer golden eagle survey (WGES), for the 4 Bird Conservation Regions (BCRs) and years of overlap (2006–2010) for the 2 surveys.

BCR	Median scaling factor (95% CI)
9	0.028 (0.020, 0.039)
10	0.042 (0.029, 0.062)
16	0.034 (0.023, 0.052)
17	0.106 (0.069, 0.168)
Overall	0.053 (0.041, 0.071)

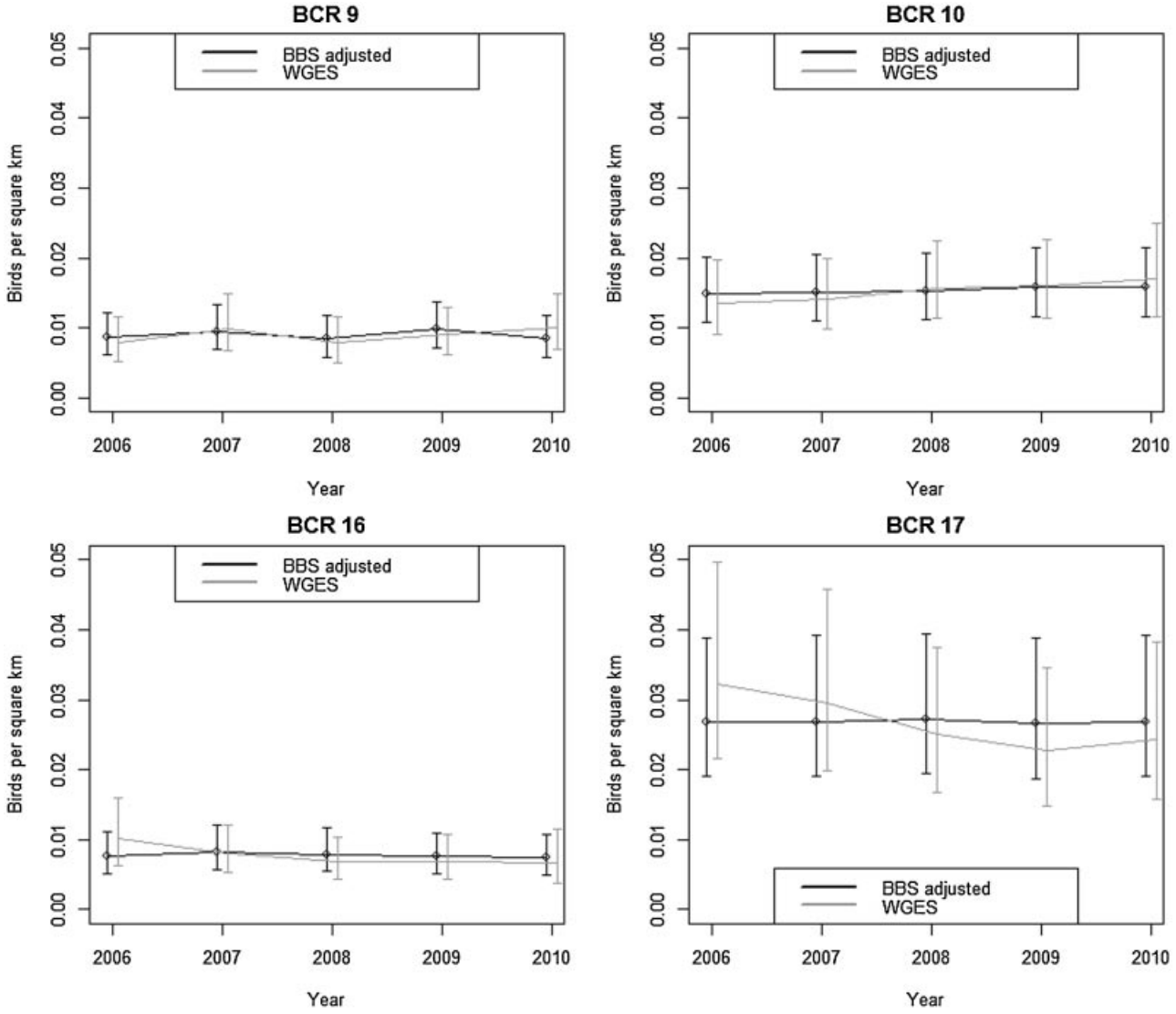

Figure 3. Comparison of trends in golden eagle density for years and Bird Conservation Regions (BCRs) of survey overlap by the Breeding Bird Survey (BBS) and Western Golden Eagle Survey (WGES). Error bars represent the 95% credible intervals.

Pothole BCRs (10 and 11, respectively), and slight declines in some of the southern BCRs (15, 16, 32, 33). However, in nearly all cases credible intervals included 0, indicating limited support for decreasing or increasing populations in these BCRs. The overall trend estimate from 1968 to 2010 for all BCRs combined (including both the combined results from the 4 overlap strata and the BBS-only strata) was +0.4% per year (95% CI = −0.27% to 1.00%), suggesting the population was stable over the period (Figs. 5 and 6). Our estimate of overall trend for the period 1990–2010 was +0.5% per year (95% CI = −0.33% to 1.3%).

Our LOWESS-fit plot of trends in counts of autumn migrant golden eagles by latitude showed stronger negative trends from 1995 to 2008 at hawk watch sites south of 40° north latitude than a sites further north (Fig. 7).

DISCUSSION

These data represent the first comprehensive, integrated analysis of the 2 most appropriate existing datasets to assess the golden eagle's status in the western United States and are therefore of interest for comparison with previous findings. Kochert and Steenhof (2002) provided a broad overview of migration count, BBS, Christmas Bird Count, and local population study data for golden eagles throughout North America. They concluded that golden eagle populations in Alaska and Canada were likely stable, but that some breeding populations in the western United States were evidencing declines. Nielson et al. (2012) analyzed the WGES trend data from 2006 to 2010 and concluded those data showed no evidence of a trend in overall numbers of golden eagles in BCRs 9, 10, 16, and 17. Our findings from the composite analysis of BBS and WGES data for the overlap BCRs parallel those of Nielson et al. (2012) for the period of the WGES, but also suggest the study population has been generally stable in those BCRs since the late 1960s. Moreover, our analysis of BBS data for the other BCRs in western North America suggests golden eagle populations are generally stable there as well. Our overall estimates of

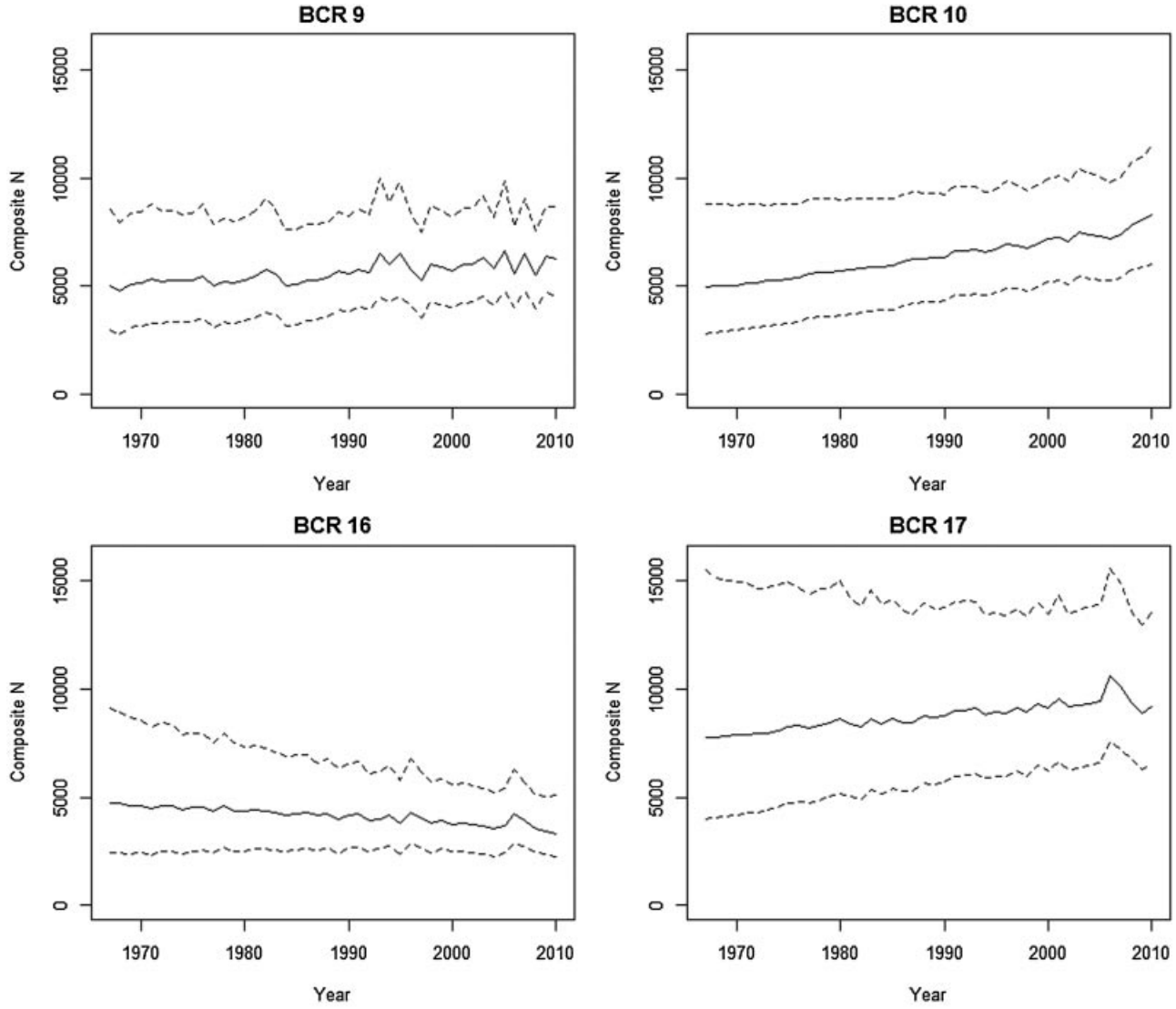

Figure 4. Integrated Breeding Bird Survey and Western Golden Eagle Survey estimates of golden eagle population size in Bird Conservation Regions (BCRs) 9, 10, 16, and 17. Dashed lines represent the 95% credible interval.

golden eagle population trends were similar for the 2 time periods of analysis, so these findings were not an artifact of the relatively imprecise estimates over the early years of the BBS.

The level of imprecision and scale of our estimates certainly leaves room for the local declines described by Kochert and Steenhof (2002), and point estimates of trend for BCRs 15, 16, and 34 were <0 in our analysis. However, point estimates of trend from our analysis were above 0 for BCRs 5, 9, 10, 11, 17, and 18. Thus, although our results overall suggest golden eagle populations are and have been stable for the past 43 years in the western United States, the direction of golden eagle population change may differ at the BCR level. In addition, the amount of annual change estimated in some BCRs is greater than what might be expected from mortality and fecundity alone. This suggests that other factors, such as geographic shifts in the summer distribution of golden eagles from southern to northern BCRs among years, may be contributing to the population change estimates at the BCR level.

Our composite estimates for BCRs 9, 10, 16, and 17, both in terms of golden eagle population trends and size, compare favorably with prior distance sampling analyses of the WGES data (Nielson et al. 2012). We note that our estimates were slightly greater than those based on distance sampling alone because of transformation to the log scale and the addition of variance components for calculating derived parameters for our log-linear model, the inclusion of a sample unit random effect in our repeated measures analysis, and the slightly larger expansion areas used in our analysis. However, credible intervals for the 2 approaches greatly overlapped and inferences were consistent.

Our inferences regarding trend in all cases are based on BCR-specific information. The scaling factor, which we derived from the overlap BCRs only, merely scaled results from 1 survey to the other and had no affect on the trend

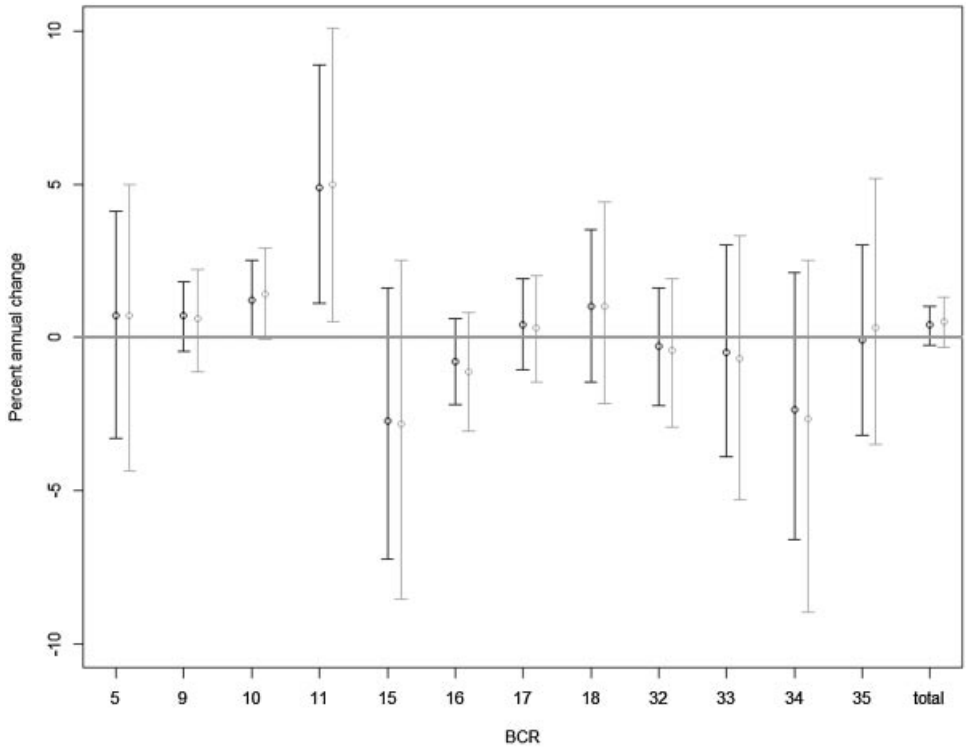

Figure 5. Trend estimates by Bird Conservation Region (BCR) and total survey area for golden eagles based on Breeding Bird Survey indices (BCRs 5, 11, 15, 18, 32, 33, 34, and 35) and integrated population estimates (BCRs 9, 10, 16, and 17). The black lines represent trends for the 1968–2010 period and the gray lines represent the trend from 1990 to 2010. Error bars represent 95% credible intervals.

estimate. Scaling permitted the conversion of golden eagles observed per BBS route to golden eagles per km^2, and controlled for population differences due to timing of surveys (i.e., the BBS survey was largely a pre-fledging survey whereas the WGES was a post-fledging survey). Inclusion of the BBS data allowed us to extend the time series trend beyond the years of the WGES in the overlap BCRs and make predictions about population size in BCRs outside of

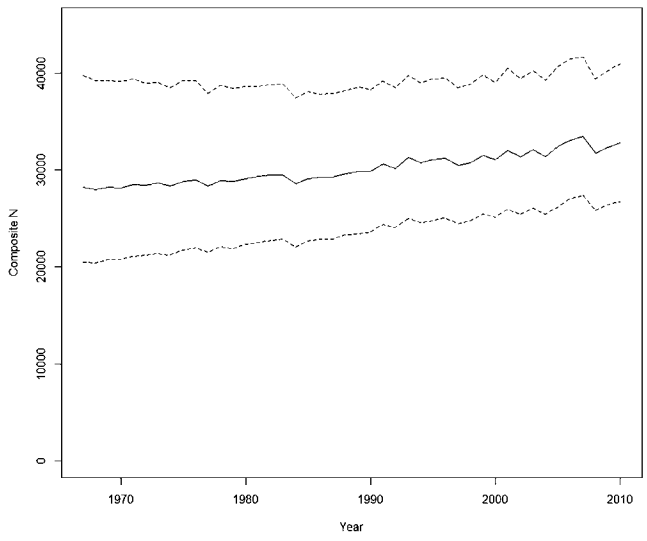

Figure 6. Trend in golden eagle population estimates for all western United States Bird Conservation Regions (BCRs) combined, 1968–2010. Estimates for all BCRs from 1968 to 2005 are from the Breeding Bird Survey (BBS), as are estimates for all BCRs but 9, 10, 16, and 17 from 2006 to 2010. Estimates for BCRs 9, 10, 16, and 17 for 2006–2010 are composite estimates using both BBS and western United States summer golden eagle survey data. The middle line is the median, and upper and lower dotted lines represent the 95% credible intervals.

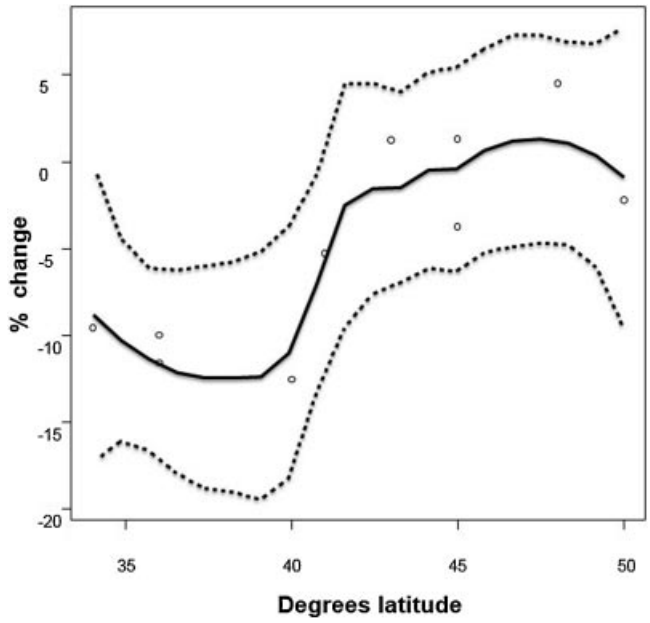

Figure 7. Trends in counts of autumn migrant golden eagles at 10 hawk watch sites in the western United States, as reported in Smith et al. (2008; Table 3). Periods of observation vary by site, but range from 1985 to 2005. The middle line is the mean, and the upper and lower dotted lines represent the 95% confidence intervals reported in Smith et al. (2008).

the overlap area. We have advanced our understanding of golden eagle populations in these BCRs, and implemented a method for incorporating detection rates into the Sauer and Link (2011) hierarchical model. The close correspondence in direction and magnitude between BBS and WGES trends in BCRs 9, 10, 16, and to a lesser degree, 17, for the overlap years of 2006–2010 suggest the BBS may provide more useful information on golden eagle population change than previously thought (Kochert and Steenhof 2002). This also lends support for our use of BBS data to provisionally estimate golden eagle trends in other BCRs in the western United States.

Smith et al. (2008) and Farmer et al. (2008) reviewed migration count data from autumn hawk watch sites in western North America, and reported negative count trends over the most recent decade at many count sites and concluded migratory golden eagle populations in western North America were undergoing recent declines. Our reassessment of their results suggests a latitudinal pattern may exist in the trends in counts of autumn migrant golden eagles in western North America. Such a pattern implies that factors other than, or in addition to, population change may be operating to affect autumn counts of migrant golden eagles. We hypothesize that this pattern may be a consequence of changes in migratory behavior that result in fewer golden eagles arriving at southern hawk watch sites during the time those sites are operating. This could occur if fewer golden eagles left northern breeding areas, if they migrated shorter distances, or if migration were delayed in time, such as has been reported for the sharp-shinned hawk (*Accipiter striatus*; Rosenfield et al. 2011) and other raptors in eastern North America (Buskirk 2012). This hypothesis should be explored further with full data from these hawk watch sites. Counts of migrant golden eagles also represent a larger area than is covered by the WGES or our BBS samples (e.g., golden eagles from breeding areas across all of Canada and Alaska), and population trends in the portion of the migrant population not included in our analyses were possibly different from those of golden eagles summering in the western United States.

Historically, the golden eagle population in the conterminous United States was estimated at between 10,000 and 100,000 individuals (Hamerstrom et al. 1975), but this estimate was not based on actual surveys. Rich et al. (2004) estimated about 30,000 golden eagles occurred in parts of the United States and Canada sampled by BBS routes. Good et al. (2007) estimated 27,392 golden eagles (90% CI: 21,352–35,140) occurred in the WGES area in 2003. Nielson et al. (2012) updated the estimate of Good et al. (2007) for the WGES area for the years 2006–2010; annual estimates of total population size ranged from a low of 19,286 (90% CI: 15,802–23,349) in 2008 to a high of 24,933 (90% CI: 20,296–30,664) in 2007. The Service adopted an estimate of 30,193 golden eagles in the conterminous western United States in its final environmental assessment addressing unintentional take regulations under the Bald and Golden Eagle Protection Act; this estimate was derived from a combination of the WGES results through 2008 for BCRs 9, 10, 16, and 17, and estimates in Rich et al. (2004) for the other western BCRs (U.S. Fish and Wildlife Service 2009). Our population estimates from the composite model for the overlap BCRs for 2006–2010 range from a low of 26,490 (95% CI: 21,760–32,680) in 2008 to a high of 28,220 (95% CI: 23,250–35,110) in 2007, slightly greater than the estimates of Nielson et al. (2012). Our overall golden eagle population estimates for the western United States must be regarded cautiously in light of the underlying assumptions. However, our annual estimates since 2001 (31,370 [95% CI: 25,450–39,310] in 2004 to 33,460 [95% CI: 27,380–41,710] in 2007) compare favorably with the Service's 2009 estimate (U. S. Fish and Wildlife Service 2009) and the Partner's In Flight estimate, though the latter included parts of Canada not covered by our estimate (Rich et al. 2004), and our estimate excludes 6.03% of the area in the western United States.

Two issues with our approach warrant further discussion. First, for the years and BCRs where we had both BBS and WGES data, we were able to directly calculate scaling factors to scale the BBS data to estimate golden eagle density. Factors accounted for by the adjustment in these BCRs and years included 1) differences in units between the BBS and WGES due to a lack of detection probability and lack of a well-defined sampling area associated with BBS counts, 2) possible bias in the BBS estimates given the counts are conducted from roads, 3) addition of fledged young to and mortality of breeding birds from the golden eagle population of each BCR between the time of the BBS and WGES, and 4) immigration and emigration of birds between the 2 surveys. As noted previously, we considered omitting juvenile golden eagles counted on the WGES from the composite estimates, and then estimating trends and density of juveniles separately. However, we were uncertain how to treat unknown-age golden eagles seen on the WGES under that approach. In some years and in some BCRs the number of unknown-aged eagles was at the same level as the number of juveniles; therefore, the treatment of unknowns had influential consequences on estimates of juvenile population size and trend. After comparing various approaches, we decided that pooling age classes and thus incorporating the correction for the addition of juveniles to the population between the BBS and WGES into the scaling factor was the most defensible method.

The second issue involves application of the scaling factor used to scale the BBS counts to golden eagle density. The overall scaling factor was similar for BCRs 9, 10, and 16, but about 3 times greater in BCR 17. We are uncertain why BCR 17 was different, but this demonstrates that the adjustment can vary considerably among BCRs. However, the overall scaling factor reflects the differences among groups, as it has a large credible interval that overlaps the credible intervals of all the BCR estimates except BCR 9. The overall scaling factor allows us to scale BBS data for non-overlap years and BCRs to an abundance estimate, and that abundance estimate reflects the uncertainty in the scaling factor. Even though uncertainty reflected in the composite estimate reduces the precision, the population size estimates we

calculated are based on survey data and have direct management relevance, as estimates of population size are essential for the Service's permitting of eagle take. The golden eagle population size estimates currently being used by the Service for the non-overlap BCRs are based on outdated estimates from biological data for which measures of uncertainty are lacking (Rich et al. 2004, U.S. Fish and Wildlife Service 2009). Accordingly, comparative population estimates using current data, for which explicit assumptions can be described, and which are amenable to testing are desirable for the non-overlap BCRs.

A fundamental assumption underlying our population estimates for the 8 non-overlap BCRs is that the overall adjustment factor for BCRs 9, 10, 16, and 17 is relevant for these BCRs and years. This assumption could be tested by independent surveys in these BCRs and generating additional BCR-specific adjustment factors for comparison. In the meantime, considering the variation in adjustment factors we found for the 4 overlap BCRs, the population estimates presented here for the non-overlap BCRs should be regarded cautiously and with due consideration of the wide confidence intervals surrounding the annual estimates and range in the adjustment factors for the 4 overlap BCRs. Improving population estimates for non-overlap BCRs may also be possible by using information presented in our supplemental tables in conjunction with other information (e.g., BCR-specific landscape-scale habitat information) to better match scaling factors for non-overlap BCRs to the most similar overlap BCR.

Hierarchical models provide a very general framework for modeling survey data, and we chose to use models that conformed as close as possible to present BBS analyses (Sauer and Link 2011) but used the information and results from analysis of WGES data (Nielson et al. 2012). During the development of the model, we considered alternative forms to assess whether we could improve performance. Alternatives we evaluated included approaches where we modeled the trend with a common linear regression or a common random walk (Durbin and Koopman 2001) for both surveys, estimated a single trend with random effects for perched and flying birds, and included a BCR-transect-year random effect and estimated BCR-specific variances. These alternative models resulted in only minor changes to our results and did not influence inferences from our study.

MANAGEMENT IMPLICATIONS

Our findings have potential implications for the issuance of golden eagle take permits under the Act by the Service. In 2009, the Service concluded that golden eagle populations might be declining and were not robust enough to support additional permitted take. Consequently, the Service severely restricted availability of such permits. Our results clarify that golden eagles are not declining, at least widely and at the present time, in the western United States, though we acknowledge occupied breeding areas may be declining locally or regionally as described by Kochert and Steenhof (2002). However, our findings do not address the question of whether golden eagles have the demographic resiliency to absorb additional mortality and maintain their stable population trajectory. Additional demographic research and modeling is needed to address this question. Our results also show promise relative to use of a combination of BBS and aerial surveys in generating credible population size estimates for golden eagles on a landscape scale. Population size estimates and an understanding of the uncertainty in those estimates are necessary to assess the population-level significance of any authorized take of golden eagles. An important next step is to conduct WGES-like aerial counts in 1 or more of the non-overlap BCRs to develop additional BCR-specific adjustment factors for comparison with those presented here for BCRs 9, 10, 16, and 17. Such an analysis would help clarify the applicability of an overall adjustment factor for BBS counts in other BCRs, and provide information useful in deciding whether aerial surveys comparable to the WGES are necessary in every BCR for which population estimates are needed.

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Associate Editor: Marc Bechard.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web-site.

Table S1. WinBUGS code used to integrate information from the Breeding Bird Survey (BBS) and western United States summer golden eagle survey (WGES).

Table S2. Number of golden eagles counted on Breeding Bird Survey (BBS) routes by Bird Conservation Region (BCR) from 1968 to 2010. Data from Canadian potions of BCRs that extend into Canada are excluded.

Table S3. Numbers of Breeding Bird Survey (BBS) routes for Bird Conservation Regions (BCRs) used in this analysis that have been surveyed from 1968 to current. Counts in Canadian portions of BCRs that extend into Canada are omitted.

Table S4. Golden eagle population estimates for all western United States Bird Conservation Regions (BCRs), 1967–2010. For the overlap BCRs (9, 10, 16, and 17) and years (2006–2010) the estimates are composites derived from the BBS and WGES. For other BCRs and years, estimates are derived from the BBS only, using the overall adjustment factor derived for the composite estimates to scale to density.

Bald Eagle and Golden Eagle Mortalities at Wind Energy Facilities in the Contiguous United States

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SHORT COMMUNICATIONS

J. Raptor Res. 47(3):311–315

BALD EAGLE AND GOLDEN EAGLE MORTALITIES AT WIND ENERGY FACILITIES IN THE CONTIGUOUS UNITED STATES

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KEY WORDS: *Bald Eagle*; Haliaeetus leucocephalus; *Golden Eagle*; Aquila chrysaetos; *mortality*; *United States*; *wind energy*.

Eagles are among the bird species that can be injured or killed by collision at wind energy facilities when the birds are flying at the same height above ground as the blades of horizontal-axis wind turbines (Drewitt and Langston 2006). Regions of the United States with wind resources adequate for wind energy development (National Renewable Energy Laboratory 2009) often overlap habitats important to Bald Eagles (*Haliaeetus leucocephalus;* Buehler 2000) and Golden Eagles (*Aquila chrysaetos*; Kochert et al. 2002). Golden Eagles, in particular, use open spaces and wind resources similar to those valuable for wind energy facilities. High levels of collision mortality are well documented for Golden Eagles at the Altamont Pass Wind Resource Area (APWRA) in California (Smallwood and Thelander 2008, Smallwood and Karas 2009), where published estimates of annual mortality ranged as high as 66.7 to 75.0 Golden Eagles per year in 2005–2007 (Smallwood and Thelander 2008; Drewitt and Langston 2006). Elsewhere, assessments of eagle mortality at commercial-scale and/or private wind energy facilities are either seldom conducted or in some cases not made available for public review. Meanwhile, terrestrial-based commercial wind energy (facilities where electrical power is produced for sale to the local or national power grid) installed in the contiguous United States reached an estimated 51 630 megawatts by September 2012, and likely will increase substantially by 2015 (U.S. Department of Energy 2011a, 2011b), suggesting potential for increased interaction between eagles and wind energy facilities.

Concerns over the effects of this trend on North America's Bald Eagles and Golden Eagles exist, but are weakly substantiated due to a lack of published documentation of mortalities. Our objective was to summarize documented cases of eagle mortality at wind energy facilities in the contiguous United States, excluding APWRA, during the last 15 years, as a starting point for future assessments.

METHODS

We retrieved information on eagle mortalities and injuries that occurred from 1997 to 30 June 2012 at wind energy facilities, by using public-domain sources, including documents from wind energy companies released to the U.S. Fish and Wildlife Service. We omitted anecdotal or unsubstantiated accounts and considered only cases with unambiguous physical evidence of mortality or injury. We did not include eagle mortalities from APWRA because of the availability of information reported from that location that has been published elsewhere. Although not all reports of mortality we reviewed included carcass necropsies, we considered collision as the likely cause of mortality for eagles discovered beneath operating wind turbines and/or which exhibited dismemberment or other gross external evidence of blunt force trauma. However, losses of eagles at wind energy facilities reported here included one eagle mortality attributed to electrocution on a power line. Last, we encountered six records of eagles injured by blunt force trauma at wind facilities and, due to the severity of their injuries, three were subsequently euthanized or deemed non-releasable. Of the remaining three, one injured eagle was released after extensive rehabilitation, and we are unaware of the final disposition of the remaining two. We included these as mortalities because the individuals were likely removed from the population. We only reported fatalities with strong and compelling information; we did not include 17 records where eagle mortality was not fully substantiated; i.e., the report lacked physical evidence or a reliable first-person source.

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Table 1. Mortalities of Bald Eagles and Golden Eagles associated with wind energy facilities in the contiguous United States during 1997 through June 2012, excluding Altamont Pass Wind Resource Area in California. These data underrepresent the total number of mortalities of eagles at wind energy facilities in the United States during this period; e.g., most were discovered incidentally during routine activities at facilities.

SPECIES	STATE	NUMBER OF FACILITIES WHERE MORTALITIES WERE REPORTED	NUMBER OF FATALITIES
Bald Eagle	Iowa	3	3
Bald Eagle	Maryland	1	1
Bald Eagle	Wyoming	2	2
Golden Eagle	California	13	27
Golden Eagle	Colorado	1	5
Golden Eagle	New Mexico	1	5
Golden Eagle	Oregon	2	6
Golden Eagle	Texas	1	1
Golden Eagle	Utah	1	1
Golden Eagle	Washington	2	5
Golden Eagle	Wyoming	7	29
Total		32[1]	85

[1] Both species were killed at two Wyoming facilities, yet each of the facilities is represented only once in the column total.

RESULTS AND DISCUSSION

We found a minimum of 85 eagle mortalities at 32 wind energy facilities in 10 states during 1997 through 30 June 2012 (Table 1, Appendix). Sixty-seven (78.8%) of these mortalities occurred during 2008–2012. Six (7.1%) mortalities were of Bald Eagles and 79 (92.9%) were of Golden Eagles. All but one mortality occurred at commercial-scale wind facilities; one dead adult Bald Eagle was discovered under a smaller-scale wind turbine with a blade radius of only 3.5 m. One Wyoming facility accounted for 12 Golden Eagle mortalities, the most for any single facility. Mortality of both species was recorded at two separate facilities in Wyoming. Adults made up 55.5% (20 birds) of the 36 Golden Eagle mortalities for which age class was reported. At APWRA, subadults composed 63.3% of 42 blade-strike mortalities of Golden Eagles (Hunt 2002); however, age class was unknown for more than half (54.4%) of the Golden Eagle mortalities (Appendix), so we could not make a clear comparison.

One possible explanation for limited records of Bald Eagle mortality is that this species may be less vulnerable than Golden Eagles to collisions at wind energy facilities. However, the White-tailed Eagle (*Haliaeetus albicilla*), a congener ecologically similar to the Bald Eagle, incurs substantial collision mortality at wind facilities in coastal Norway (Nygård et al. 2010). There may also be less overlap between the areas most important to Bald Eagles and current wind energy facilities in the contiguous United States than is the case for Golden Eagles. Another explanation is that discovery of carcasses of Bald Eagles, either incidentally or during surveys, at wind energy facilities east of the 100th meridian may be less likely because landscapes there are more heavily vegetated (row crops and forests) and thus carcasses are more likely to be concealed, particularly during spring and summer.

More than one-half (54.1%) of the eagle mortalities at wind energy facilities we report were discovered by a property owner or by facility employees during routine site operations. In contrast, less than one-fourth (18.8%) were found during surveys designed to document avian mortality (Appendix). One mortality (1.2%) was discovered via radiotelemetry, and one (1.2%) blade strike of an eagle from a territory near a turbine field was observed. Means of discovery of other mortalities (24.7%) were not evident from records we reviewed. Other than a sample of known-age individuals, records generally were too incomplete for us to assess biological or ecological factors associated with eagle mortality at wind energy facilities.

Designs of carcass surveys at wind energy facilities were either unknown to us or were such that inferences to total mortality could not be made. This, combined with the facts that most carcasses were discovered incidentally, and that reporting of mortalities was primarily voluntary with little or no effort directed toward finding the total number of eagles killed at a facility, suggest that the mortalities reported here underrepresent the actual number of eagle fatalities that have occurred at non-APWRA wind facilities in recent years.

More Golden Eagle strikes were reported in March–June than in any other months (Fig. 1), although sample sizes were too small for statistical analyses. Whether this reflected a seasonal shift in mortality or just a change in detection was unclear from the data available, but this should be investigated as part of future studies. Nygård et al. (2010) reported a surge in adult White-tailed Eagles killed at wind facilities in Norway during the spring season.

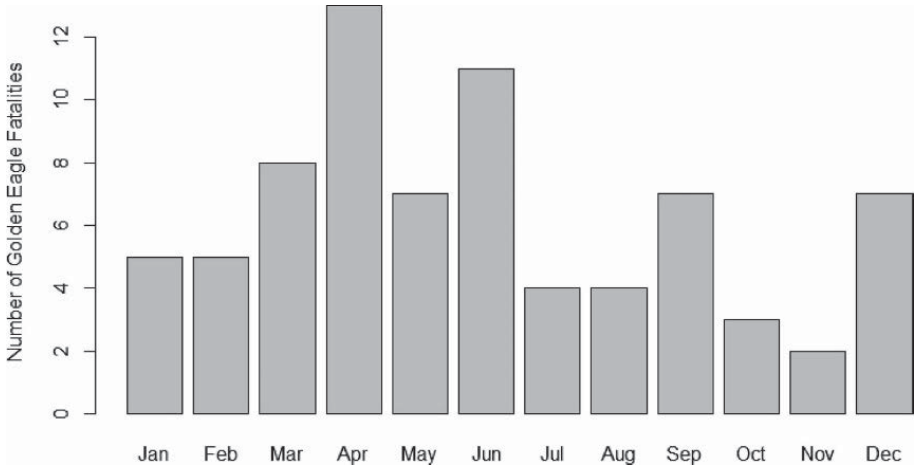

Figure 1. Seasonal distribution of Golden Eagle fatalities at wind facilities reported by month. Three of 79 Golden Eagle mortality records were not included due to lack of specificity of month of incident.

This summary likely conveys only a limited portion of eagles killed at non-APWRA wind energy facilities in the contiguous United States, considering the general lack of rigorous monitoring and reporting of eagle mortalities. Thus, our findings of the reported mortalities likely underestimate, perhaps substantially, the number of eagles killed at wind facilities in the United States. Even with this limitation, we report that blade-strike mortality of eagles is geographically widespread in the United States, and both Bald Eagles and Golden Eagles are killed. Given the projected growth in wind resource development in habitat frequented by Bald Eagles and Golden Eagles, estimation of total mortality and better understanding of factors associated with injury and death at wind facilities through robust and peer-reviewed research and monitoring should be a high priority.

MORTALIDAD DE *HALIAEETUS LEUCOCEPHALUS* Y *AQUILA CHRYSAETOS* EN INSTALACIONES DE ENERGÍA EÓLICA EN LA PARTE CONTINUA DE ESTADOS UNIDOS

RESUMEN.—Han muerto individuos tanto de *Haliaeetus leucocephalus* como de *Aquila chrysaetos* en instalaciones de energía eólica en Estados Unidos. Encontramos un mínimo de 85 águilas muertas, incluyendo 6 individuos de *H. leucocephalus* y 79 de *A. chrysaetos*, en 32 instalaciones de energía eólica en 10 estados desde 1997 hasta el 30 de junio de 2012. Probablemente nuestros resultados sub-representan, quizá substancialmente, los números de águilas muertas en Estados Unidos a causa de la producción de electricidad generada por el viento.

[Traducción del equipo editorial]

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Authors' Note: Between 30 June 2012 and the time of final acceptance of this manuscript, Bald and Golden eagles had been killed by wind-generated electricity production in three additional states: Idaho, Montana, and Nevada.

Appendix. Mortalities of Bald Eagles and Golden Eagles associated with wind energy facilities in the contiguous United States during 1997 through 30 June 2012, excluding Altamont Pass Wind Resource Area in California.

SPECIES	YEAR	STATE/SITE	SEX	AGE	HOW RECOVERED
Golden Eagle	1997	CA - 1	female	subadult	incidental
	1999	CA - 2	unknown	unknown	unknown
		CA - 3	unknown	unknown	unknown
	2000	CA - 3	unknown	unknown	unknown
		CA - 4	unknown	unknown	unknown
	2001	CA - 3	unknown	unknown	unknown
	2002	CA - 3	unknown	unknown	unknown
		CA - 5	unknown	unknown	unknown
		CA - 5	unknown	unknown	unknown
	2004	CA - 6	unknown	unknown	survey
		NM - 1	unknown	unknown	unknown
		NM - 1	unknown	unknown	unknown
	2005	CA - 6	unknown	unknown	incidental
		CA - 7	unknown	unknown	incidental
		NM - 1	unknown	adult	unknown
		NM - 1	unknown	unknown	unknown
	2007	CA - 8	unknown	unknown	unknown
		CA - 9	unknown	unknown	unknown
	2008	NM - 1	unknown	unknown	incidental
	2009	CA - 10	unknown	unknown	incidental
		CO - 1	unknown	unknown	survey
		CO - 1	unknown	unknown	incidental
		OR - 2	unknown	adult	incidental
		WA - 1	unknown	adult	survey
		WY - 3	unknown	unknown	incidental
		WY - 3	unknown	adult	survey
		WY - 3	unknown	unknown	survey
	2010	CA - 10	unknown	unknown	incidental
		CA - 11	unknown	juvenile	telemetry
		CO - 1	unknown	adult	incidental
		OR - 2	unknown	unknown	survey
		OR - 2	unknown	subadult	incidental
		OR - 2	unknown	juvenile	incidental
		WY - 1	unknown	adult	incidental

Appendix. Continued.

SPECIES	YEAR	STATE/SITE	SEX	AGE	HOW RECOVERED
		WY - 2	unknown	adult	incidental
		WY - 3	unknown	adult	incidental
		WY - 3	unknown	unknown	survey
		WY - 3	unknown	unknown	incidental
		WY - 3	unknown	subadult	survey
		WY - 3	unknown	unknown	incidental
		WY - 4	unknown	unknown	incidental
		WY - 5	unknown	unknown	survey
		WY - 5	unknown	unknown	survey
	2011	CA - 10	unknown	unknown	incidental
		CA - 10	unknown	unknown	incidental
		CA - 10	unknown	unknown	incidental
		CA - 10	unknown	adult	incidental
		CA - 12	male	juvenile	incidental
		CA - 12	unknown	adult	incidental
		CO - 1	male	adult	incidental
		CO - 1	unknown	unknown	incidental
		OR - 1	unknown	adult	incidental
		WA - 1	female	adult	incidental
		WA - 2	female	adult	incidental
		WA - 2	male	adult	observed
		WY - 1	unknown	unknown	incidental
		WY - 2	unknown	subadult	incidental
		WY - 3	unknown	subadult	incidental
		WY - 3	unknown	unknown	survey
		WY - 3	unknown	juvenile	survey
		WY - 4	unknown	unknown	incidental
		WY - 5	unknown	unknown	survey
		WY - 6	unknown	subadult	survey
		WY - 6	unknown	juvenile	incidental
		WY - 6	unknown	juvenile	incidental
		WY - 6	unknown	subadult	survey
		WY - 6	unknown	unknown	incidental
	2012	CA -10	unknown	adult	unknown
		CA - 10	unknown	adult	unknown
		CA - 10	unknown	subadult	unknown
		CA - 13	unknown	adult	unknown
		OR - 2	unknown	adult	incidental
		TX - 1	unknown	subadult	unknown
		UT - 1	unknown	adult	incidental
		WA - 2	unknown	unknown	unknown
		WY - 3	unknown	juvenile	incidental
		WY - 7	unknown	unknown	incidental
		WY - 7	unknown	unknown	incidental
		WY - 7	unknown	unknown	incidental
Bald Eagle	2010	WY - 4	unknown	adult	incidental
	2011	IA - 1	unknown	adult	incidental
		WY - 1	unknown	adult	survey
	2012	IA - 2	unknown	unknown	unknown
		IA - 3	male	adult	incidental
		MD - 1	male	adult	incidental

Public 1

Date: Fri, Sep 27, 2013 at 12:28 PM
Subject: Shiloh wind project - possible solution for the eagles?
To: scott_flaherty@fws.gov
Cc: ShilohIV_comments@fws.gov

Dear Mr. Flaherty (CC: public comments email),
My name is Fred Meyers, I am a graduate student at UC Davis studying engineering.
This email is in reference to the Shiloh wind project, and their permit to kill golden eagles.
Here on the UC Davis campus we have a raptor center, dedicated to helping birds of prey all over Northern California. I would like to suggest the possibility of taking advantage of their facilities to capture and relocate the birds, rather than kill them.

Their contact info is found at http://www.vetmed.ucdavis.edu/calraptor/contact/index.cfm
However, I haven't had much luck contacting them via phone or email. If you are interested, I can try and arrange a meeting in person since I live very close to their facility.

Thank you for your time,
-Fred

---------- Forwarded message ----------
From: **Ron Mahan** <rmahanjr@embarqmail.com>

Date: Fri, Oct 11, 2013 at 7:00 AM
Subject: Shiloh IV Wind Project
To: ShilohIV_comments@fws.gov

We have laws protecting Bald & Golden Eagles for a reason, and that reasoning does not go away in order to provide favoritism to any single person or group. The law applies to all, and should so equally.

The Shiloh IV (and ALL wind turbine generating facilities) can use technology and better construction methods to obey the law.

They should NOT be allowed to cut expenses and kill eagles just to improve their bottom line. They can construct fencing and invest in other technology to prevent eagles from being killed by their project.

No group should be granted any such permit to kill eagles.

Ron Mahan

Ft. Myers, Floirda

Fwd: Shiloh IV Wind Project

---------- Forwarded message ----------
From: **Kelly Ambriz** <mktgwizman@gmail.com>
Date: Fri, Oct 11, 2013 at 8:09 AM
Subject: Golden Eagles; Programmatic Take Permit Application; Draft Environmental Assessment; Shiloh IV Wind Project, Solano County, California
To: ShilohIV_comments@fws.gov

Dear Ms. Beeler,

I read with sadness of this impending action as another contradiction in the current Government's efforts to confuse American's about the reality's of alternative energy at the expense of one of our grandest symbols of America, the bald eagle.

In essence, this application if passed would further legitimize what I believe is a serving of untruth from environmentalist from the threat of climate change. I acknowledge our climate conditions have changed, but, I do not accept it is solely the result of carbon usage. Thus, allowing for another wind farm to be authorized while giving a 'get out of jail free card' to kill golden eagles is a bad deal. The argument is that renewable, including wind energy, will reduce, the amount of carbon dioxide in the atmosphere. Less carbon dioxide reduces the threat posed by climate change, which benefits eagles and other wildlife. In other words, we have to kill eagles in order to save them. 3-1

I am aware that wind projects routinely violate the Bald and Golden Eagle Protection Act and the Migratory Bird treaty Act, but no wind farm has ever faced prosecution. However, companies that exist to provide energy by other means, namely, carbon are routinely indicted for violating those same statutes. This smacks of double standards, results in increased costs for Americans to obtain energy, fattens lawyers wallets and provides more fodder for the liberal press in america to carry forth the overly politicized agenda of liberals to force change. 3-2

Change, I realize Ms. Beeler is a way of life. However, wind turbine study's show that ~573,000 birds per year including 83,000 birds of prey are killed (Source: Wildlife Society Bulletin, March 2013). Yet the effect that wind power has on reducing global carbon-dioxide emission is minuscule. The American Wind Energy Association states that in 2012 wind energy production reduced domestic C02 emissions by 80 million tons. It is estimated that last year, global C02 emissions totaled 34.5 billion tons. This is the equivalent of a baby farting in a hurricane if you will. 3-3

The 60,000 megawatts of US wind generation capacity reduced global carbon-dioxide emissions by about two-tenths of 1%. It is estimated that a 1% reduction in global carbon-dioxide emissions, the US would have to install at least 120,000 more turbines (assuming 2MW / ea). For the liberal energy agenda to be achieved, if

only with wind power this equates to something like a need for 285,000 MW of capacity, or roughly, 142,000 turbines a year. This is ridiculous. Not only are wind turbines inefficient in conversion of wind into energy, they're utility is limited to only when the wind is blowing. .

3-3 cont'd

However, my point for contacting you with my thoughts have to do with the "Catch-22" that already exists for this industry. First, wind turbines are killing legally protected eagles in the name of slowing climate change. Two, the wind energy industry is lobbying to extend a production tax-credit (2.2 cent per kilowatt hour) which cost tax-payers $12B.

3-4

It's one thing that Washington, i.e. Government officials including you continues to allow a so-called green industry effort to kill birds and eagles with impunity. I as a taxpayer, do not condone my tax contributions being used to subsidize the slaughter.

Please give this your consideration and stop the permit being granted.

Thank you,

Kelly Ambriz

---------- Forwarded message ----------
From: **Mark Wilson - Law Office of Mark Wilson** <mark@markdwilsonlaw.com>
Date: Fri, Oct 11, 2013 at 7:18 AM
Subject: Wind turbines kills protected birds
To: ShilohIV_comments@fws.gov

Hello,

I strongly oppose allowing additional wind turbines because of the proven fact that they kill protected birds (as well as unprotected ones) in large numbers. But even if not in large numbers, the knowledge that these will kill protected species should be enough to prevent their use. The amount of energy produced is too small to justify such a loss of protected bird life.

Mark D. Wilson

17171 Park Row, Suite 370

Houston, Texas 77084

mark@markdwilsonlaw.com

281-646-9600 (office)

281-646-9601 (fax)

281-703-9808 (cell)

Public 5

---------- Forwarded message ----------
From: **freddie mac** <freddie_mac1@yahoo.com>
Date: Mon, Oct 14, 2013 at 4:29 AM
Subject: Shiloh IV Wind Project, LLC vs Eagles and Migratory Birds
To: "ShilohIV_comments@fws.gov" <ShilohIV_comments@fws.gov>

Why is it that wind projects, which routinely violate the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, have never faced a single prosecution? (RB) Has the federal government decided that these federally-protected birds are less important than so-called "green" projects?

Bald eagles, first protected by the 1918 Migratory Bird Treaty, were declared an endangered species in the US in 1967, and formally removed from the list of endangered and threatened wildlife in 2007. (Wiki) Not even 10 years later, and companies that kill these and other migratory birds are not only NOT penalized, they're seeking federal waivers to kill even more.

Wind projects in 2012 reduced CO2 emissions by two-tenths of 1%; achieving a reduction of 1% would require 120,000 more turbines (RB) and how many dead eagles?

If I have to choose between our national symbol, a bird that symbolizes grace and majesty, and ugly wind turbines, there's no choice: the bird wins every time.

Sincerely,

Adrianne Cook
Maplewood, NJ 07040

Note: stats from Robert Bryce, "Fighting Climate Change by Killing Eagles", WSJ Oct 11, 2013, A13 (RB), and Wikipedia's page on bald eagles (Wiki)

Date: Tue, Oct 15, 2013 at 9:03 AM
Subject: Golden Eagles; Programmatic Take Permit Application
To: ShilohIV_comments@fws.gov

Re: Golden Eagles; Programmatic Take Permit Application; Draft Environmental Assessment; Shiloh IV Wind Project, Solano County, California

We are very much against allowing wind farms an exemption from federal law (Bald and Golden Eagle Protection Act) so that they can continue to kill eagles and other birds. We very much agree with the following op-ed in the Wall Street Journal:

http://online.wsj.com/article/SB10001424052702303342104579099060830782406.html

Karen and Tom Richardson
NJ

Public 7

---------- Forwarded message ----------
From: <jkom1@aol.com>
Date: Tue, Oct 15, 2013 at 12:10 PM
Subject: Shiloh IV Enivronmental Assessment Comments
To: ShilohIV_comments@fws.gov

To Whom It May Concern:

I am submitting comments on captioned item regarding EDF Renewable Development's Permit Application to kill raptors under the Eagle Act.

I strongly disagree with giving preference to any industry to kill raptors as a result of their operations. My personal first hand experience in managing natural resource projects in Nevada was the the repeated deaths of any raptor was sufficient cause for the USFWS to close the operation. The companies I managed went to extraordinary measures to prevent such deaths. When, unfortunately, a death occurred, five figure fines were levied and scaled to the number of repeat occurrences.

Your job is to enforce the existing laws. It is the obligation of Congress to amend law. I do not agree with providing Shiloh IV any variance under existing law in regard to killing raptors at its operations.

Sincerely,

James Komadina
1135 Skylight View
Colorado Springs, Colorado 80906

Heather Beeler
Migratory Bird Program, USFWS
Pacific Southwest Regional Office
2800 Cottage Way, W-2605
Sacramento, California 95825

Public 8

SUBJECT: Shiloh IV Wind Project

The cost of continuing to allow the wind industry to kill Golden Eagles, other raptors and migratory birds for over two (2) decades has been and is too high for the current benefit that wind power provides. The Altamont facility has proven that.

Problems at Altamont with initial lattice designed towers over 20 years ago and ground squirrel and other rodents in the area proved to be a disaster for golden eagles and other raptors, until the re-design of the tower support structure and eliminating the rodents helped curtail the problem. But the eagle deaths have persisted over the years. The theory and practice of wind power is important, but better technology to avoid avian wildlife deaths needs to be explored before a five (5) year permit is issued to this facility and others elsewhere. Wind power is still behind the curve despite recent efforts. 8-1

I am appalled that anyone is considering a five (5) year programmatic take permit for Shiloh IV given the historical track record of the wind industry's impact to avian populations elsewhere. How arrogant to consider a long term permit after untold millions of taxpayer dollars have been spent for decades on eagle conservation in the Western U.S., not to mention the millions expended on the Condor population, which is one of the most expensive species projects in U.S. history. 8-2

A five (5) year take permit is reprehensible and contrary to sound science and conservation until the wind industry ramps up efforts to modify technology or shuts off certain existing wind turbines during times that eagles and other large raptors are most active. The wind industry needs to be more proactive instead of griping that buildings, cars, and cats are killing more migratory birds. They have had over 2 decades to address these eagle mortalities with meaningful solutions. Buildings, cars and cats usually don't kill eagles and don't exploit taxpayer subsidies. 8-3

Because of these impacts, the permit should not be issued until this facility and others can show some substantial progress to address the ongoing deaths of all migratory birds. A one (1) year permit would be more in line, but still questionable, given the unforeseen growth in wind turbine construction that will follow. 8-4

These types of permits would allow the industry to continuously justify and allow untold numbers of golden eagles to be legally taken without fear of prosecution.

It opens the door to add numbers of eagle deaths to the permit in the future. It would also open up the arguments from electrical utility companies, mining, oil and gas exploration and others who have been prosecuted that the wind industry is getting favorable treatment. Something is wrong with that concept.

Why bother with a permit at all? Wind power facilities in California already kill golden eagles and have done so for decades without a permit and no accountability without a single prosecution. Higher up non-law enforcement bureaucrats in U.S. Fish and Wildlife Service have given a whole new meaning to Malfunction Junction (Washington D.C.) with this five (5) year programmatic permit and others that will follow including the thirty (30) year take permit for the Condor at the wind power facility near Tehatchapi.

Who will monitor this and other forthcoming permits for years to come? Certainly not the U.S. Fish and Wildlife Office of Law Enforcement which has been historically neglected for decades with only 218 Special Agents nationwide as of 2013, the same number they had in 1978. The U.S. Fish and Wildlife Service Office of Law Enforcement was once the "Division of Law Enforcement". With dwindling numbers they will soon be able to fit into a room or smaller. Leaders need to hire a reasonable amount of agents that is commensurate with the exponentially expanding world of wildlife crime and ecological impacts to our wildlife. Recent reports of elephant ivory trafficking tied to terrorism, and exponential growth of wildlife trafficking throughout the globe, wildlife impacts by wind, solar, mining and petroleum impacts all support that. There has been accountability for wildlife impacts by electrical utilities, oil and petroleum, and precious metal mining. Wind power has been unaccountable for many years. 8-5

Why are higher up officials so quick to "mitigate" wildlife loses? Where were they and where are they now when more FWS/LE Special Agents are needed. We want other countries to follow CITES and protect their wildlife, but what kind of example do we set here with the exponential threats to wildlife here around the globe that will surely impact our long term livelihood on this planet. 8-6

Why are bureaucrats in Washington D.C. so quick to issue a permit to a project that represents an industry that has several decades of documented violations of the Migratory Bird Treaty Act and Eagle Act and watch the Office of Law Enforcement languish with such low numbers of Special Agents now and historically?

Misguided priorities.

The real issue is the world population has exceeded the earth's carrying capacity and all the wind turbines in the world are not going to make a difference. China's and other emerging nation's exponential growth are severely impacting large mammal populations such as rhino and elephant species around the globe. China consumes half the world's coal supply and has expanded wind power in that country. This year they are reportedly ending their wind subsidy program.

In the really big picture, we are wasting too much money with tax funded subsidies for the current wind turbine technology. The expansion should be slower given the historical impacts to avian wildlife. Our government needs to focus more on what is happening globally with wildlife and the ecosystem. It is all we have.
A recent study reports that U.S. taxpayers are paying 12 billion dollars annually for wind power subsidies. 8-7

What a racket at the expense of wildlife resources and taxpayer money. How beneficial could that be given those figures?

Try putting some wind turbines off the coast of Malibu, Miami Beach, or the Grand Canyon, Yellowstone, etc., and see what happens if it is so beneficial. The public would really scrutinize those subsidies and tax credits then. Long term widespread expansion of wind power should be limited because of ecological impacts to our treasured natural resources. Maybe they should consider building wind power turbines next to Congress. Lots of wind there that would surely make it the most profitable ever.

What about the Migratory Bird Treaty Act? Incidental Take? Congress can amend it, no doubt. Broken is a word often followed by treaty in the government's historical treatment of Native American tribes and with the current state of affairs with a broken divided Congress, there will be some Congressional extremists who would only be too glad to dismantle the MBTA for any reason to appease lobbyists, get votes, and get re-elected. Some tribes like the Hopi and Osage already feel impacted by the growing expansion of wind power. 8-8

The wind power industry has been treated differently since the 1980's in California, particularly the Altamont Pass wind facility which has wreaked havoc on Golden Eagle and other raptor populations since then without a single prosecution when they didn't even have a permit to do so. Oil and gas, including petroleum, electric power corporations, and gold and silver mining operations have all been investigated and prosecuted over decades and these industries have made valiant efforts to curtail migratory bird deaths, much to their credit.

I can't imagine how anyone can justify any wind power company securing an "incidental take" permit for a Golden Eagle or any other migratory bird after the wind industry's record of killing eagles for over 2 decades without a permit or a single prosecution. There is no excuse for the wind industry to get special treatment after they have had many years to find meaningful solutions instead of just reporting bird deaths.

Oil, gas and petroleum, electrical power and mining operations have all been held to a higher standard for decades now with favorable results in curtailing and preventing migratory bird deaths.

You won't find a genuine conservationist who really cares about our wildlife resources say that the wind power industry is not treated differently. To say so would be totally disingenuous, misleading and selling out politically.

The wind power industry has historically had no accountability and no motivation to do anything about the near 30 decade long record of killing golden eagles in California other than reporting the bird deaths. The precious metals industry reported bird deaths voluntarily in the 1980's in Nevada and in many cases did nothing to curtail the migratory bird deaths, until they were investigated in Nevada and other states and prosecuted. These prosecutions resulted in that industry taking a strong initiative to prevent migratory bird mortalities. Likewise for many power companies investigated and prosecuted until they complied with the Migratory Bird Treaty Act (MBTA) and Eagle Act, and have fixed the problem in the majority of cases along with oil, gas and petroleum facilities. Wind power needs to do much more than report bird deaths. Reporting and monitoring bird deaths for years is almost less than doing nothing at all.

The bottom line is it's all about lobbyists corrupting political folks to pressure the political heads of conservation agencies to "sell out" and "modify" these historical Congressional Acts that were meant to protect our avian resources for future generations. How shameful! Those bureaucrats should resign and go to work for the wind power companies.

Bureaucrats should not waste taxpayer and conservation money on subsidies.

What about other migratory birds impacted by this proposal? How will these facility address those migratory bird deaths? Surveys will be conducted by "qualified biologists". Who determines their qualifications and monitors them? There should be oversight to insure biologists with this responsibility maintain integrity and are honest. 8-9

We do need to explore the wind industry and its long term benefits. Doing it right with exploring meaningful technology to address the migratory bird deaths will actually create more jobs for our country. Wind power should continue to expand slowly, find meaningful solutions that are impacting that will create more jobs for ancillary industries working with scientists together to address the issue before long term permits are issued.

Decision makers at the highest levels entrusted with oversight and care of America's heritage natural resources and wildlife should not get into the habit of continuously trading in their professional integrity for political expediency.

Sam Jojola

---------- Forwarded message ----------
From: <jimkeenan@cox.net>
Date: Fri, Nov 8, 2013 at 11:46 AM
Subject: Eagle Take Permit For Shiloh IV
To: ShilohIV_comments@fws.gov

Sir or Madam:

Please allow me to express in the strongest possible terms my disapproval at the request for an eagle take permit for the Shiloh IV windfarm.

Windfarm technology is inherently avian-unfriendly and persons or businesses choosing to employ such technology must not be allowed to avoid fines connected to the killing of protected species – those fines must be levied in full and borne by the violator as a cost of doing business.

Thank you for the opportunity to comment on this matter.

James T. Keenan
jimkeenan@cox.net

---------- Forwarded message ----------
From: **William Vanderbrink** <wdvander@live.com>
Date: Fri, Nov 8, 2013 at 8:20 PM
Subject: Golden Eagles; Programmatic Take Permit Application; Draft Environmental Assessment; Shiloh IV Wind Project, Solano County, California
To: ShilohIV_comments@fws.gov

I am in opposition to the granting of any commercial entity the right to "take" any American Bald Eagle during a 5 year permit. This facility should not be granted any permit to cause the death of any flying species.

I am aware of the requirements to industrial facilities and their treatment of animals. Those facilities are held to a very high level of responsibility in any case that an animal is injured. This electrical generation facility should be held to at least the same level of responsibility as any other.

William Vanderbrink
3110 Eagle Nest Drive
La Porte, TX 77571

---------- Forwarded message ----------
From: **Melissa Cummins** <mcummins191@gmail.com>
Date: Fri, Nov 8, 2013 at 7:35 AM
Subject: Proposal to kill Golden Eagles
To: ShilohIV_comments@fws.gov

I am opposed to granting any permits to wind energy companies to legally kill golden eagles, or any eagles for that matter. While wind energy is supposedly more 'green" than other forms of energy, they do have one significant draw back and that is the very negative effect on birds and bats. Granting this will open the door for more requests, and send the wrong message to energy companies. Since the tax payer is subsidizing these projects through tax credits, we should not be encouraging or allowing the take of protected species. If wind companies end up paying enough fines, perhaps they will find ways to reduce the killing of birds and bats because they have a financial incentive to do so. Fines recovered from take related to wind turbines, should be used for conservation efforts for the affected species.

Melissa Cummins
191 Cummins Road
Touchet, WA 99350
mcummins191@gmail.com

Public 12

---------- Forwarded message ----------
From: **Lois Consiglio** <sig9447@yahoo.com>
Date: Sat, Nov 9, 2013 at 1:29 PM
Subject: Shiloh IV Wind Project, Request for Programmatic Take Permit
To: "ShilohIV_comments@fws.gov" <ShilohIV_comments@fws.gov>

My comment is on the application by this wind farm for permission to slaughter the American Eagle, a federally protected bird, in the pursuit of profit. I say absolutely not. We cannot bow to pressure from industry, green or not, to destroy the quintessential symbol of America. The amount of power generated by these windmills is insignificant when compared to the amount of power generated each day in this country and their loss will not be felt. Windmills are not efficient, reliable or clean producers of power they are basically a "feel good" effort at power production. The turbines constantly frequently leak oil, another pollutant, in addition to killing or maiming not only Eagles but any other bird unlucky enough to fly near the turbine blades. If the country was starved for energy and these windmills were the difference between having power or not this could be considered but they are not. They are ugly and inefficient and most definitely not worth destroying this national treasure for.

Thank you;
Lois Consiglio
Tamarac, Fl.

Public 13

---------- Forwarded message ----------
From: **Larry Alexander** <flipdog1@gmail.com>
Date: Sat, Nov 9, 2013 at 3:29 AM
Subject: Eagle vs Windmill
To: ShilohIV_comments@fws.gov

Use common sense for a change.
Require the wind farm to provide a protective envelope around the offending blades, or shut down if eagles are in the area.
The remedy would be similar to the prior requirements of this nature.
If you put folks in jail,who do you pick for that?
If you fine them, the consumer pays,not the responsible persons.
There have been some really stupid requirements in the past,why stop now?
IMO
Larry Alexander

Public 14

---------- Forwarded message ----------
From: **J D** <janadopler@msn.com>
Date: Sat, Nov 9, 2013 at 9:14 AM
Subject: Golden Eagles
To: "ShilohIV_comments@fws.gov" <shilohiv_comments@fws.gov>

Who in their right mind would allow the murder of members of a protected species; and by a "Green Energy" company?
I am appalled that this is even being considered.
Please do not allow this travesty to occur with government approval. It is after all by government hands that this species has been protected from extinction.. Will you now withdraw that protection?

Public 15

---------- Forwarded message ----------
From: **John White** <carondolet@hotmail.com>
Date: Sat, Nov 9, 2013 at 7:36 AM
Subject:
To: "ShilohIV_comments@fws.gov" <shilohiv_comments@fws.gov>

I am staunchly opposed to any effort by the Fish and Wildlife Service that would grant EDF Renewable Energy a permit to "take" golden eagles. Approval of such a request would legally sanction the killing of hundreds of golden eagles annually and is entirely contrary to the Bald and Golden Eagle Protection Act. Any move to grant this permit is indeed worthy of the immense national opprobrium that such an action will surely provoke.

Sincerely,

J. White, PhD
Oshtemo, MI 49077

Public 16

---------- Forwarded message ----------
From: **Thompson, Virginia** <vthompson14@law.du.edu>
Date: Sun, Nov 10, 2013 at 11:36 PM
Subject: Comment on Shiloh IV permit for programmatic take of eagles
To: "shilohIV_comments@fws.gov" <shilohIV_comments@fws.gov>

Dear Sir or Madam:

I suggest that the U.S. Fish and Wildlife Service consider implementing "Alternative 3" as described in DEA - to issue a 5-year permit based on applicant's proposed eagle conservation plan with additional mitigation and monitoring measures. The monthly monitoring of turbines for eagle mortalities would be informative as to the effects of the project, and would reveal the actual impact of the turbines on the eagle population in the area on a continual basis. This option seems to be the best designed to protect the eagles as it calls for close monitoring and responsive measures.

Public 17

November 12, 2013

Attention: Heather Beeler, Migratory Bird Program
US Fish and Wildlife Service Pacific Southwest Region
2800 Cottage Way, W–2605
Sacramento, CA 95825.

RE:Shiloh IV Wind Project DEA Comments

The Fish and Wildlife Service should reject the request for an ITP for the Shiloh IV Wind Project.
The Service has no accurate or reliable data from any wind project to base a decision on.
The wind industry has been allowed to be self regulating and is allowed to use methods that insure a favorable report for its projects. No other industry in America is allowed this luxury.
I have personally witnessed how the wind industry used deceptive language and used unverifiable information to create "Perception Deception" here in Goodhue MN with the AWA Goodhue/New Era Wind Project.
The oil industry has been heavily fined for the death of a few ducks but never has the wind industry been fined for any of the known deaths of protected species. California Condors, Golden Eagle, Bald Eagles and other raptors along with whooping cranes and song birds have been killed by wind turbines throughout the US yet the USFWS has failed to prosecute.
California is well on it's way to wiping out the California Condor. Granting this ITP would assure the same fate to the Golden Eagle of California as well.
This is unacceptable!
Industrial Wind Energy benefits few at the expense of many at great environmental cost.
The request for an ITP for the Shiloh IV Wind Project should be rejected.

Thank You,
Rochelle Nygaard
12110 355th St
Goodhue MN 55027

SHILOH IV WIND PROJECT DEA COMMENTS

These comments are based on my 30-career as a special agent with the USFWS Office of Law Enforcement. In 1979, I was the first agent to take a power company (Utah Power and Light) to court for violating the MBTA and the BEPA for what the company claimed was the "incidental take" of eagles and other migratory birds. Fortunately, the U.S. Attorney's Office in Salt Lake City agreed that there was nothing in our nation's conservations laws that allowed "incidental take" and opined that the whole-sale slaughter of birds by power companies was illegal.

Since then, the majority of power companies have come into compliance with preventing the loss of protected bird species on power lines. Everywhere you look you can see modified power poles and lines designed to protect migratory birds. The Service went on to enforce bird conservation laws on trona concentration ponds, gold mines, oil pits, and anywhere where birds were being killed indiscriminately. The Service has historically maintained a hard line in enforcing the conservation laws already in place—so-called "incidental take" was not tolerated.

Wind power has presented a 21st Century conservation challenge that the Service seems to be ready to fold on. A five-year pass (permit) will only serve as precedence for other wind power companies to follow. If the Service shows a weakness at the first light, it will never be able to go back and maintain its presence as a solid constituent for migratory birds. Arguing over whether wind power is economically justified is not the point. But killing wildlife indiscriminately has no justification and the Service is the only agency that can make this point in a meaningful way.

If the Service allows Shiloh IV permission to kill protected birds, this will open the doors for all power companies, including traditional ones, to argue that their mishaps with bird fatalities are also "justified" as "incidental take." This will happen no matter whatever good intentions these companies implore. Don't let them take you out to lunch and tell you what to do. Hold the hard line!

Look into the future, way into the future, and into the past, and where we have been. Those of us who worked in the Service during the past forty years vigorously enforced the conservation laws protecting all migratory birds. We had no idea that we'd be turning our efforts over to a new generation of overseers who are apparently willing sit by and allow giant blades chop up birds the Service is charged to protect.

I completely understand that the situation is complex and should have been dealt with a long time ago—when wind power was in its infancy. I actually saw this coming. But it's here and now it the time to DEAL with it, and not give in. A permit is the first act of giving in. Please don't this. Please consider all other options.

Sincerely,

Lucinda Schroeder (FWS Special Agent, retired)

Public 19

---------- Forwarded message ----------
From: **Patrick W Brown** <Patrick_W_Brown@progressive.com>
Date: Tue, Nov 12, 2013 at 9:01 AM
Subject: Killing Eagles
To: "ShilohIV_comments@fws.gov" <ShilohIV_comments@fws.gov>

Just a few years ago eagles were almost extinct and our goal was to save them. Now, because of the fraud of global warming it's ok to kill them? Are you guys nuts?

Don't do it!!!!!

Patrick W. Brown

Pbrown150@tampabay.rr.com

Public 20

---------- Forwarded message ----------
From: **Ed Frost** <edofchesapeake@gmail.com>
Date: Tue, Nov 12, 2013 at 8:08 AM
Subject: Permit to legally kill up to five golden eagles over the next five years.
To: ShilohIV_comments@fws.gov

I am adamantly opposed to the ShilohIV's request for a kill permit for golden eagles. While I do not believe that animal life should take precedence over human life, the killing of as many as 315 birds and 258 bats PER TURBINE seems to be quite excessive to test/develop an unproven (at least on a large scale) source of energy. And, I remain unconvinced that wind energy will provide much of a plus to human life. Wouldn't it make more sense for California to get its collective head out of the sand and consider opening a nuclear power plant (perhaps out in the desert???) to create energy? It is far and away the least intrusive of energy options. Yes, there is an issue with spent nuclear fuel but there are options available.

Also, just out of curiosity, what if they kill MORE than the allotted 5 golden eagles? Who is going to keep track? Will the fines exceed the expected ROI for the company? Just curious.

Ed Frost
432 Warhawks Rd.
Chesapeake, VA 23322

---------- Forwarded message ----------
From: **Roberto Valdez** <roberto58valdez@hotmail.com>
Date: Fri, Nov 29, 2013 at 4:58 PM
Subject: Individual Comments re: DEAAEP for Shiloh IV WEP(2013).
To: "ShilohIV_Comments@fws.gov" <shilohiv_comments@fws.gov>

November 27, 2013
November 29, 2013
Heather Beeler
Migratory Bird Program
U.S. Fish and Wildlife Service
Pacific Southwest Region
2800 Cottage Way, W-2605
Sacramento, CA 95825

Subject: Individual Comments re: Draft Environmental Assessment on Application for Eagle Permit for Shiloh IV Wind (Turbine) Energy Project in Northern California (Solano County).

Dear Ms. Beeler:

As a long-time Solano County resident Markamalaka Friendship Alliance (MFA) stakeholder for the proposed Multi-Species Habitat of Solano County, I am urging you that the USFWS deny this permit request for the Shiloh IV WEP. In my opinion, the 5--year monitoring/mitigation plan is inadequate to minimize the "take" permitting of both the golden and bald eagles as well as associated species such as Swainson's Hawks, Burrowing, Bats known to nest,fly within the project site. Because, during the day/night times, these species are not able to avoid inevitably crashing into the moving blades for the wind turbines. By the way, last year several bald eagles were spotted and photographed by local residents in the English Hills north of the city of Vacaville. 21-1

Also, the pending DEA application will not make "a least than significant" difference to protect the eagles migrating through the secondary "buffer" area which this project site is already adversely impacting on a daily basis in the Montezuma Hills near the Suisun Marsh. Thus, the eagle "take" permitting for this 50-plus wind turbines within the project site will not significantly off-set the wildlife fatalities from the 700-plus wind turbines surrounding this latest project. 21-2

In addition, based on my involvement with this approved project in Solano County, I am not convince that this applicant will make genuine efforts to report, preserve the eagles and associate species within the project site. While, I doubt that both the USFWS and Solano County Department of Resource Management will have 21-3

enough staff & time to monitor the annual/5-year monitoring/mitigation requirements for this DEA plan. If the USFWS approves this permit request, I am certain that Solano County will continue to allow more building of wind turbines which will lead inevitably to more unnecessary deaths for both eagles as well as associated species in the 8th open corridor which Solano County does not recognize, treasure at all.

Thank you for giving me the opportunity to respond to this important matter, but I must say that there has been very little publicity about this permit request in Solano County. By the way, I only saw a small caption about this permit request re: Solano County moratorium on alternative energy-saving projects. Please refer to Daily Republic newspaper article on Nov. 6th.

Yours Truly.

“Wildlife Consultants: Narrowing the Gap between Wildlife Agencies and Wind Developers”

(see pg. 5)

Rob Bouta, of Westwood:

“How Much Does Science Matter?

*

Permitting decisions are based on politics rather than science.

*

Perception is reality.

*

Null hypothesis of agencies: Presumed risk.

*

Influence the perception **of decision makers.”**

Tribal 1

November 26, 2013

United States Department of the Interior
Fish and Wildlife Service
Pacific Southwest Region
Regional Director
Attn: Heather Beeler, Eagle Permit Specialist
2800 Cottage Way, Suite W-2606
Sacramento, CA 95825
Heather_Beeler@fws.gov

Subject: FWS/R8/MB&SP-MB/Shiloh IV

Dear Regional Director:

Thank you for the opportunity to review and comment on the Shiloh IV Wind Project Eagle Conservation Plan Draft Environmental Assessment. Comments are provided below pursuant to the National Environmental Protection Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act.

4.2.1 Impact Analysis - Cultural Effects:
The sacred value of the eagle to the American Indian appears to be taken out of cultural context and does not consider tribal protocols related to obtaining and using eagle feathers and other parts of the eagle for cultural and ceremonial purposes.

Who will decide if a fatality is in "good condition"? How will tribal people be advised that there has been a fatality and it is available to the tribe? Which tribes will be contacted? How is it decided which tribe collects the fatality? Is there a protocol in place? If so, the protocol should be attached as a condition to the permit. If no protocol is in place, a protocol should be developed in consultation with the Tribes and attached as a condition to the permit.

4. 2.3 Other Environmental Analysis -Biological Resources: The Biological Resources analysis is incomplete because it fails to consider cultural value of biological resources to the American Indian community.

Concerning proposed studies, training, and mitigations, Tribal communities should be involved in the surveys, training, development of avoidance, minimization, and monitoring measures to protect biological resources.

4.2.3 Other Environmental Analysis- Cultural Resources: Consideration of cultural resources is incomplete because it is restricted to a single category of resources, that is archeological sites, and does not consider the American Indian traditional cultural landscape as a

P.O. BOX 162283 Sacramento, CA 95816
TEL 916.491.0011 FAX 916.491.0012
www.buenavistatribe.com

potential historic property eligible for listing on the National Register (see attachment Advisory Council on Historic Preservation Native *American Traditional Cultural Landscape Action Plan*).

The Buena Vista Rancheria of Me-Wuk Indians prefers Alternative 4: Issue 5-Year Permit based on applicants proposed Eagle Conservation Plan with Seasonal Restrictions, which is the environmentally preferred alternative, with a modification to include 133 retrofits instead of 101 retrofits.

If you have questions or wish to arrange a face to face consultation please contact me at (916)491-0011, by email at roselynn@buenavistatribe.com, or by mail at the address above. Again, thank you for the opportunity to comment.

Respectfully,

Roselynn Lwenya, Ph.D
Tribal Historic Preservation Officer/Environmental Resource Director

Preserving America's Heritage

Native American Traditional Cultural Landscapes and the Section 106 Review Process: Questions and Answers

The consideration of Native American traditional cultural landscapes in Section 106 reviews has challenged federal agencies, Indian tribes, and Native Hawaiian organizations for some time. There has been confusion regarding what makes a place a traditional cultural landscape, whether they can be considered historic properties, and whether the size of such places influences their consideration under the National Historic Preservation Act. While these are all critical issues worthy of much thought and deliberation among federal agencies, Indian tribes, and Native Hawaiian organizations, the Advisory Council on Historic Preservation (ACHP) wishes to advance this dialogue by first addressing common questions about how such historic properties should be considered in the Section 106 process. While we anticipate that further dialogue will be necessary to resolve these and other issues, this Q and A is offered to move the dialogue forward and improve the consideration of these places in the Section 106 process.

This guidance assumes that readers have a basic understanding of the Section 106 review process. For more information, go to www.achp.gov.

Since this is not an exhaustive list of the issues related to Native American traditional cultural landscapes that one might encounter in a Section 106 review process, we would welcome suggestions for additional questions the ACHP should consider addressing. Further, please send us additional information or sources regarding Native American traditional cultural landscapes that you believe would be helpful for others.

1) What is a traditional cultural landscape?

The term "traditional cultural landscape" has not yet been formally defined by the National Park Service, the agency responsible for defining historic properties and maintaining the National Register of Historic Places (NRHP). While there is currently no formal NRHP definition of a traditional cultural landscape, the recent interest in these places has led the National Park Service to launch an initiative regarding updating National Register (NR) Program guidance for identifying, evaluating, and documenting properties that are historically significant as Traditional Cultural Properties (TCPs) and/or Native American landscapes. NPS will be soliciting written comments and suggestions through October 31, 2012, and may be submitted to **nr_info@nps.gov**. Respondents should identify their submission(s) as a "TCP/NAL Comment" in their e-mail "subject" box. Responses submitted via email will be posted on an ongoing basis beginning the first week of June 2012 on the NR website located at: **http://www.nps.gov/history/nr/publications/guidance/TCP comments.htm**. Respondents who do not want their names and/or e-mail addresses posted on the NR website along with their comments, or do not want their comments published at all, should clearly indicate that preference in their e-mail.

2) Can traditional cultural landscapes be considered historic properties under Section 106 of the National Historic Preservation Act?

Traditional cultural landscapes are considered by the NRHP to be a type of significance rather than a property type. Property types are limited to those specified in the NHPA and the NRHP regulations and include districts, buildings, structures, sites, and objects. Traditional cultural landscapes can and often do embrace one or more of these property types. It is important to note that the size of such properties or the potential challenges in the management of them should not be considerations in the evaluation of their significance. Any questions regarding eligibility for listing in the National Register of Historic Places should be referred to the National Register of Historic Places. Information about the National Register can be found at www.nps.gov/nr. See question 8 for additional resources.

3) How are traditional cultural landscapes identified in the Section 106 review process?

Traditional cultural landscapes, because they are often a property type such as a district or site, are identified in the same manner in the Section 106 process as other types of historic properties of religious and cultural significance to Indian tribes or Native Hawaiian organizations. The regulations at 36 CFR Section 800.4 outline several steps a federal agency must take to identify historic properties. In summary, to determine the scope of identification efforts, a federal agency, in consultation with the State Historic Preservation Officers (SHPO)/Tribal Historic Preservation Officer (THPO), must:

1. Determine and document the area of potential effect for its undertaking;
2. Review existing information; and,
3. Seek information from consulting parties including Indian tribes or Native Hawaiian organizations.

Based on the information gathered through these efforts, the federal agency, in consultation with the SHPO and any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to historic properties that may be affected by the undertaking, develops and implements a strategy to identify historic properties within the area of potential effects. Identification efforts may include background research, oral history interviews, scientific analysis, and field investigations.

A federal agency's consultation with Indian tribes or Native Hawaiian organizations is intended to ensure historic properties that may be of religious and cultural significance to them are both identified and appropriately considered in the Section 106 review process. In fact, the Section 106 regulations at Section 800.4(c)(1) require federal agencies to acknowledge the special expertise of Indian tribes and Native Hawaiian organizations in assessing the eligibility of historic properties that may be of religious and cultural significance to them.

4) Why is it important for federal agencies to consult with Indian tribes or Native Hawaiian organizations regarding traditional cultural landscapes?

Many assume that archaeologists can identify, through archaeological surveys, those properties that are of significance to Indian tribes or Native Hawaiian organizations. However, unless an archaeologist has been specifically authorized or permitted by an Indian tribe or Native Hawaiian organization to speak on its behalf, or has been determined by that entity to be qualified to conduct such surveys, it should not be assumed that the archaeologist possesses the appropriate expertise to determine what properties are or are not of religious and cultural significance to an Indian tribe or Native Hawaiian organization. The appropriate individual to make such a determination is the representative designated by the tribe or Native Hawaiian organization for this purpose. Efforts to identify these types of properties may include site visits and interviews with tribal elders or cultural experts.

Additionally, unless such traditional cultural landscapes have already been publicly identified, frequently the only entities aware of these landscapes are either an Indian tribe or a Native Hawaiian organization. Since such places are often comprised of related locations across some distance and for which the connections may not be obvious to those outside of the culture that holds them significant, it stands to reason that the most appropriate entity to inform such identifications and evaluations are either Indian tribes or Native Hawaiian organizations.

5) How can issues of confidentiality be addressed when traditional cultural landscapes may be affected by an undertaking?

Many Indian tribes or Native Hawaiian organizations have belief systems that require the location and even the existence of properties of traditional religious and cultural significance, including traditional cultural landscapes, not be divulged. Therefore, it is vital that the federal agency work with tribes or Native Hawaiian organizations to identify sensitive locations while respecting desires to withhold specific information about such sites. The Section 106 regulations at 36 CFR Section 800.4(b)(1) state, in part, that "[t]he agency official shall take into account any confidentiality concerns raised by Indian tribes or Native Hawaiian organizations during the identification process."

The NHPA and the Section 106 regulations also provide a vehicle for protecting information that an Indian tribe or Native Hawaiian organization has disclosed for the purpose of identification and evaluation of historic properties in the Section 106 process. Section 304 of the NHPA (16 U.S.C. 470w-3(a)) and the regulations at 36 CFR Section 800.11(c)(1) provide that the head of an agency, after consultation with the Secretary of the Interior, "shall withhold from disclosure to the public" information about the location, character, or ownership of a historic property when the agency head determines that the disclosure of such information may cause a significant invasion of privacy; risk harm to the historic property; or, impede the use of a traditional religious site by practitioners. After such a determination, the Secretary of the Interior, in consultation with the relevant agency, will determine who, if anyone, may have access to the information for purposes of the NHPA. When the information in question has been developed in the course of an agency's compliance with Section 106, the Secretary shall consult with the ACHP in reaching determinations on the withholding and release of information.

One important caveat: the Section 304 confidentiality provisions only apply to properties that are listed or eligible for listing in the NRHP. Thus, it is possible that information disclosed prior to an eligibility determination may not be protected. Therefore, the ACHP suggests that agencies and Indian tribes or Native Hawaiian organizations contact NR staff for guidance regarding the amount of information and detail needed to make a determination of eligibility when such information may be at risk of disclosure. It may be possible for a tribe or Native Hawaiian organization to share just enough information for the agency to identify the existence of a site and make a determination of eligibility without compromising the site or the beliefs associated with it. Such information might include general aspects of the historic property's attributes, i.e., that an important yearly ceremony takes place in a certain general location, that quiet is required in the area, that visual impacts will impede the ability to properly perform a required ritual, or that important ceremonial harvesting activities must occur at a particular place, time, or under certain conditions, as well as basic information about the relationship of the property to the project area. However, if there are questions about the adequacy of such information in making determinations of eligibility, the NR staff should be consulted.

Issues of confidentiality and sensitivity of information require flexibility and cooperation among the consulting parties. There may be situations where a tribe or Native Hawaiian organization is only willing to share information with the federal agency and not with the other non-federal consulting parties. This can challenge the traditional Section 106 process where the federal agency also consults with the SHPO to

determine eligibility of properties. In such cases, it is recommended that the agency promptly talk with the ACHP or the NR staff about how to resolve such a situation.

6) What types of features may be part of a traditional cultural landscape?

There is no single defining feature or set of features that comprise a traditional cultural landscape. Such places could be comprised of natural features such as mountains, caves, plateaus, and outcroppings; water courses and bodies such as rivers, streams, lakes, bays, and inlets; views and view sheds from them, including the overlook or similar locations ; vegetation that contributes to its significance; and, manmade features including archaeological sites; buildings and structures; circulation features such as trails; land use patterns; evidence of cultural traditions, such as petroglyphs and evidence of burial practices; and markers or monuments, such as cairns, sleeping circles, and geoglyphs.

7) What is the role of the Advisory Council on Historic Preservation in the consideration and protection of traditional cultural landscapes in the Section 106 process?

A federal agency must afford the ACHP an opportunity to participate in consultation regarding the resolution of adverse effects to any historic property, including a traditional cultural landscape, if the property is listed or determined eligible for listing on the NRHP. The ACHP can also offer its advisory opinion on the substance of any finding, determination, or decision regarding the adequacy of an agency's compliance with the Section 106 regulations at any time at the request of any individual, agency, or organization. The ACHP cannot, however, comment on the eligibility of a property for listing on the NRHP. Therefore, an Indian tribe or Native Hawaiian organization can request that the ACHP review an agency's finding, determination, or decision regarding the potential effects of its undertaking and the resolution of effects to historic properties of significance to them.

8) Where can I get more information on cultural landscapes in general?

The U.S. National Park Service (NPS) provides additional information on cultural landscapes at:

http://www.nps.gov/history/hps/hli/landscape_guidelines/index.htm
http://www.nps.gov/history/hps/hli/landscape_guidelines/using.htm

NPS also provides additional information on traditional cultural properties, which can also be landscapes at:

http://www.nps.gov/nr/publications/bulletins/pdfs/nrb38.pdf

International sources of information:

http://unesdoc.unesco.org/images/0013/001331/133121e.pdf
http://www.international.icomos.org/centre_documentation/bib/culturallandscapes.pdf
http://whc.unesco.org/en/news/588

Issued on July 11, 2012

Preserving America's Heritage

NATIVE AMERICAN TRADITIONAL CULTURAL LANDSCAPES ACTION PLAN

The Advisory Council on Historic Preservation (ACHP) has seen an increasing number of Section 106 reviews involving large scale historic properties of religious and cultural significance to Indian tribes or Native Hawaiian organizations (NHOs). Improvements in federal agency consultation with Indian tribes and NHOs and greater recognition of their expertise in identifying historic properties of significance to them have likely contributed to this increase. It is equally likely that there have also been increasing development pressures in places not previously developed.

These large scale properties are often comprised of multiple, linked features that form a cohesive "landscape." The recognition, understanding, and treatment of such places can be a struggle for the non-tribal or non-Native Hawaiian participants in the Section 106 process, partly due to the lack of experience in addressing such places and partly due to the lack of guidance regarding these traditional cultural landscapes.

In response to growing concerns about the impacts to these properties of religious and cultural significance to Indian tribes and Native Hawaiian organizations, in 2009, the ACHP began an informal dialogue with tribal representatives primarily via teleconferences and e-mail exchanges. During the Tribal Summit on Renewable Energy in January 2011 (go to www.achp.gov/renewable_energy.html for more information), participants recognized the importance of identifying and considering historic properties at the landscape level and avoiding inappropriately breaking these larger properties into smaller units that are managed separately and out of context. As a result of these discussions as well as the ACHP's experience in individual Section 106 reviews, it is evident that the issues are complex and warrant the attention of the larger preservation community. To that end, the ACHP held a forum in August 2011, to introduce the ACHP members to the challenges of recognizing and protecting Native American traditional cultural landscapes and to elevate the issues to policy levels within the federal preservation program (go to www.achp.gov for more information).

This proposed plan is based on the suggestions the ACHP has received and the discussions with its preservation partners since 2009. It sets forth actions designed to affirmatively address the challenges the ACHP believes are most critical for both protecting these important historic properties as well as addressing identified hurdles in the Section 106 and National Environmental Policy Act (NEPA) processes when proposed projects may impact Native American traditional cultural landscapes. The appropriate and early involvement of those parties for whom these places are so important, Indian tribes and NHOs, and the clarification of how these landscapes are to be recognized and treated in Section 106 and NEPA reviews are key elements to accomplishing these goals.

The first set of action items focuses on raising awareness both within the preservation community and among our partners about the existence of traditional cultural landscapes and their importance to Indian tribes and Native Hawaiian organizations. This purpose of this outreach is to ensure that Native American traditional cultural landscapes are considered early in land management and project planning decisions.

Early consultation with Indian tribes and Native Hawaiian organizations to identify areas of religious and cultural significance prior to project siting decisions is not only the most effective means to avoid impacts to these places but is also the best way to minimize project delays.

The second set of action items focuses on the Section 106 process and the development of tools to assist all participants in the recognition and consideration of Native American traditional cultural landscapes. Given the increasing threats to these places from large-scale developments, the ACHP will focus its attention on this action items in FY 2012 and early FY 2013.

In order to ensure the success of these proposed measures, the ACHP and the Department of Interior (DOI) must formally commit to work together to address the broad issues surrounding Native American traditional cultural landscapes. The ACHP, as the agency with responsibility for overseeing the Section 106 review process, and DOI, through the National Park Service (NPS), as the agency with responsibility for overseeing the National Register of Historic places, should provide leadership in addressing Native American cultural landscapes in the national historic preservation program. Together, the ACHP and NPS should:

- Promote the recognition and protection of Native American traditional cultural landscapes both within the federal government and the historic preservation community as well as at the state and local levels, and,

- Address the challenges of the consideration of these historic properties in the Section 106 review process as well as in NEPA reviews.

To meet these goals, the ACHP and NPS should, in consultation with key partners including Indian tribes, Tribal Historic Preservation Officers (THPOs), Native Hawaiian organizations, State Historic Preservation Officers (SHPOs), federal agencies, preservation organizations, cultural landscape experts, and industry representatives, carry out the following actions:

1. Promote the recognition and protection of Native American traditional cultural landscapes both within the federal government and the historic preservation community as well as at the state and local levels.

- NPS and the ACHP should work with the National Association of Tribal Historic Preservation Officers (NATHPO) and other intertribal organizations to advance the recognition of Native American traditional cultural landscapes in the broader national preservation program through their interaction with preservation partners including the National Conference of State Historic Preservation Officers, the National Trust for Historic Preservation, federal agencies, and others.

- DOI, the ACHP, the Council on Environmental Quality (CEQ), and other federal agencies should work with Indian tribes, THPOs, and NHOs to reach out to applicants and trade associations to promote the early consideration of, and consultation with Indian tribes, THPOs, and NHOs about sacred sites and Native American traditional cultural landscapes in project planning and scoping.

- Federal agencies should develop long-term, meaningful relationships with Indian tribes, THPOs, and NHOs to ensure effective and early consultation that leads to better planning and, where appropriate, identifying areas of cultural sensitivity.

- The ACHP and CEQ should encourage federal agencies to integrate consultation and coordination with Indian tribes, THPOs, and NHOs as early as possible in their planning processes to identify and address potential cultural resource concerns.

- The Administration should include the protection of Native American landscapes and historic properties in its agenda for the annual Tribal Nations Meeting at the White House to engage and hear from tribal leaders on this issue.

- The Administration should promote training for federal officials on working more effectively with tribal governments and developing greater cultural sensitivity.

2. Address the challenges of the consideration of Native American traditional cultural landscapes in the Section 106 review process as well as in NEPA reviews.

- NPS should issue additional guidance on how to apply the National Register criteria to these historic properties. The guidance should define "traditional cultural landscapes" as they relate to Indian tribes or Native Hawaiian organizations. It should also address what constitutes adequate documentation; how to protect sensitive and confidential Native American cultural knowledge and information; and, the role of traditional cultural knowledge in making determinations of eligibility.

- NPS should update National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties* to clarify how this guidance applies to historic properties of religious and cultural significance to Indian tribes and Native Hawaiian organizations. NPS should also explore how guidance regarding Native American traditional cultural landscapes might inform the treatment of large historic properties or landscapes of significance to non-Native communities.

- The ACHP should develop a policy statement and issue formal guidance on the need for early tribal and Native Hawaiian consultation and the consideration of Native American traditional cultural landscapes in the Section 106 review process to include the role of Indian tribes, THPOs, and Native Hawaiian organizations and how to determine effects on such historic properties.

- The ACHP should work with NATHPO to develop a special case digest of Section 106 cases, best practices, and examples where federal agencies effectively managed such places, consulted tribes, developed innovative mitigation approaches, etc.

- The ACHP and DOI should work with their preservation partners to address the perceived conflicts regarding confidentiality of sensitive information and the transparency of agency decision making in the Section 106 process.

- The ACHP should promote the consideration of Native American traditional cultural landscapes through its leadership role in the Interagency Working Group on Indian Affairs as a means to reach a broader federal audience and to explore the potential intersections with other federal programs and initiatives including climate change and sacred sites protection.

With the formal adoption of this action plan by the ACHP members on November 10, 2011, the ACHP is committed to carrying out its responsibilities under this plan.

November 23, 2011

Washoe Tribe of Nevada and California

Cultural Resources Department/Tribal Historic Preservation Office

Protect, Preserve and Promote Washoe Heritage and Culture

December 2, 2013

Heather Beeler, Eagle Permit Specialist
Fish and Wildlife Service
2800 Cottage Way, Suite W-2606
Sacramento, CA. 95825

Subject: Eagle Take Permit, Shiloh IV Wind Project

Dear Ms. Beeler,

Thank you for consulting with the Washoe Tribe of Nevada and California on the proposed Programmatic Eagle Take Permit for the Shiloh IV Wind Project.

We do not agree with the concept of sacrificing a wildlife species for human development. It is contrary to our beliefs as a Native American Tribe of people, who believe all terrestrial live hold equal rights to live.

It is contrary to the Mission of the Fish and Wildlife Service; to protect and preserve the fish and wildlife. It is in direct conflict with the Migratory Bird Act. It took years of national attention and efforts to bring the eagle back from a threatened and endangered species to a protected species and now the eagle allowed to parish as a result of development. No eagle should be allowed to be killed by a source known to kill eagles. 2-1

The eagle needs seventy square miles to live and as you know, when an eagle disappears from an area a new eagle will move in to occupy and fill the void. Therefore I foresee an eagle perhaps more would die every year as a result of the project facility. 2-2

As a Native American Tribe the eagle (patalni) is important to the continuation of our culture and heritage.

- It is revered as a sacred source of power
- A symbol of power
- Eagle feathers are used for ceremonial uses
- Eagle feathers are used in healing and cleansing rituals
- Eagle parts are used in other parts of our culture
- Eagle is a messenger and conduit to the creator

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We would like to see what measures are proposed to safeguard the species for example;

- Fences that keep small animals out, reducing the need for eagles to fly into the danger zone to catch their prey
- Keep vegetation low, denying small animals from using landscape
- Do not allow food source to entice eagles into harm from propellers
- The facility should be required to develop an eagle breeding program to perpetuate the species
- Install devices on the propellers that keep them away from danger

2-3

Thank you, and please call if you have any questions at (775) 782-0014

D Cruz

Darrel Cruz; Cultural Resource Department/THPO

Kashia Band of Pomo Indians
of the Stewarts Point Rancheria

January 23, 2014

US Fish and Wildlife Service
Pacific Southwest Region
Attn: Heather Beeler, Eagle Permit Specialist
2800 Cottage Way, Suite W-2606
Sacramento CA 95825

Re: Programmatic Eagle Take Permit for Golden Eagles from the Shiloh IV Wind Project, LLC located in the Montezuma Hills Wind Resource Area, Solano County, California

Dear Ms. Beeler:

Thank you for the notification and follow up with the Tribe regarding this subject. Kashaya traditional territory is within this distance even at the furthest location of our traditional area. So that you understand our concerns below, before our main questions of concern on this project, we have provided additional information on why this animal is important to the Kashaya People.

The Eagle Dances

The Eagle is the most sacred bird animal of the Kashaya people and has been since the dawn of time. Eagle, is our protector, our healer, our parent and everything that is sacred. He is the Sacred Maker and Protector.

It is Eagle that creates sacred and protects the sacred for the Kashaya in reality and in spirituality. He is the Bird Animal that all other animals call in our language, "nophonophow" meaning the Leader of all animals.

With everything in our present reality, Creator gathered all of the animals together and said to the animals in the world, "Eagle shall be the leader of all of you."

Well, that didn't go over too well with the rest of the animals so they decided to fight for the honor to be the leader of all the animals. There were many, many animals and they each wanted to have his position.

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So Eagle gave each animal the opportunity to fight him to be the leader. So all of the male animals gathered to take turns to see who could beat Eagle in a fight. The fight began and went on for days. Again and again, those who went to fight him were beaten down by Eagle.

Finally, the last animal thought, "I am going to be Eagle because he must be tired, then I will be the leader." So they began to fight. They fought and fought making the dust fly every which way. Finally Eagle beat his last opponent and stood up in front of all those he beat down, spread his wings and sang his song; as he sang his song, he danced to the song.

His wings were fully spread as he danced and when he finished his singing and dancing, he said, "This song and dance is what the spiritual people will sing when I give them my feathers. It will be that way forever."

We have not danced our Eagle dance since the Eagle was taken from us many, many generations ago. He left us his songs but was not able to leave his sacred feathers for us. Not having the sacred feathers of the Eagle is like being incomplete in our healing, singing and dancing ceremonials that we do for the Eagle.

The Eagle left our old people with one instruction and it is this: You must do a Law of Reciprocity to me. You must sing my song, give me food and dance my dance for when the day I return.

The story was the prophecy that he left our old people and has been related to the later generations after generations to this day and time. It is my sacred belief that the prophecy will be come the truth for the Kashaya people.

Ho:w kilukh...ma?e: mephi
(Oh Eagle – This is the end of the story)

Our specific questions and concerns regarding this take permit application are below:

How long has the Shiloh IV Wind Project been in operation? Did this permit process begin before operation of the turbines? If so, why was it not received and the company allowed initiate business? Did the Shiloh IV Wind Project consider flight paths of eagles, bald and golden, before construction? We know that Shiloh IV Wind Project has a draft Environmental Assessment, Eagle Conservation Plan but it is dated July 2013. Did they put in the pole retrofits before this document was created? Have there been any deaths of golden eagles since the inception of the wind project? This project should not have been in operation before the take permit was finalized. 3-1 3-2 3-3 3-4 3-5 3-6

As we both know, golden eagles can disperse up to 140 miles from their nest areas, and in some cases even further. Within this radius they acquire territory, find mates, nesting areas and produce young. We know that as of 2006 there are approximately 200 breeding pairs of bald

eagles in California but there appears to be a lack of data on the number of breeding pairs of golden eagles. According to the California Department of Fish and Wildlife the abundance of golden eagles appears to be declining. So the question is how can you issue a "take" permit for a bird of prey, that isn't listed, but protected, when you are not aware of the current population? And to take 5 birds within a 5 year period could decimate the population in this area, considering they typically don't pair up until 4 or 5 years of age. A "take" of an adult breeding eagle can be much greater then the "take" of a sub-adult. Adult eagles prefer live prey and are more adept at hunting, where as sub-adults are not as adept hunters and tend to rely on carrion. An adult eagle, in predation mode could run into the turbines and be killed. If the eagles killed are mainly adults, this will severely harm the current population of eagles, certainly for golden eagles since the number of breeding pairs appears to be unknown. It is imperative that this be rectified and the number of breeding pairs determined, at least in the state of California.

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We understand the need and drive for alternative energy for the state. Kashia has begun to incorporate alternative energy features with its projects and appreciates the savings it can provide, but we do not do it with the intent to "take" an important species. The allowance to "take" up to five golden eagles over a five year period is too many. Although the information gathered by the Shiloh IV Wind Project indicates it is unlikely there will be this many "taken" in a five year period, it could happen. And if it happened, the impacts could be devastating for the golden eagle population in the 140 mile radius.

3-12

If you have further questions please contact Nina Hapner, Director of Environmental Planning at either 707.591.0580 x 107 or nina@stewartspoint.org.

With Respect,

Emilio Valencia
Tribal Chairman

CC: File
KDEP
THPO