United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

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In Reply Refer To:
FWS/AFHC-HRC-CPA/045617

Memorandum

To: Service Directorate

From: Acting Deputy Director

Subject: Service White Paper Providing Guidance for the Development of Project-Specific Avian and Bat Protection Plans for Renewable Energy Facilities

Attached is a Service white paper on the development of specific Avian and Bat Protection Plans (ABPPs) or Avian Protection Plans (APPs) for renewable energy facilities. The white paper provides the components that would be incorporated into ABPPs or APPs, and is consistent with previous Service recommendations. This paper is a guide and field offices should apply it to projects as appropriate. Although the concept of ABPPs/APPs is relatively new, the Service has received numerous requests for guidance in ABPP/APP development. The white paper provides considerations for ABPPs and APPs while the national ABPP guidance and template are under development.

The Bureau of Land Management (BLM) has provided an Instructional Memorandum (IM) to their regional and field offices directing staff, when needed, to collaborate with the Service in developing ABPPs or APPs for current and future renewable energy projects. The IM directs BLM staff to acquire written concurrence from the Service that the portions of ABPPs/APPs applicable to federal trust species adequately addresses potential impacts prior to signing a project's Notice to Proceed. We will soon provide suggested language for those concurrence letters.

The development of an ABPP or an APP should begin at the earliest planning stages of a proposed project. However, the white paper may be applied to projects that have progressed into later stages. Suggestions on micrositing turbines, facility operations, wildlife monitoring and adaptive management should be applied to the extent practicable in the development of ABPPs or APPs that are already beyond the site planning stage. As with all projects, Service Field Offices will work with applicants to apply these suggestions to specific projects and acquire the needed information.

While the development and implementation of ABPPs are voluntary, a sound and properly implemented ABPP may represent a "good faith" effort by a company or other project proponents to conserve migratory birds and bats when developing a renewable energy project. However, an ABPP should not be used as a substitute for complying with the provisions of the Endangered Species Act when a renewable energy project is expected to cause take of endangered or threatened wildlife. Furthermore, the preparation of an ABPP does not limit or preclude the Service from exercising its authority under any law, statute, or regulation, nor does it release any individual, company, or agency of its obligations to comply with Federal, State, or local laws, statutes, or regulations.

Attachment

Considerations for Avian and Bat Protection Plans
U.S. Fish and Wildlife Service White Paper
July, 2010

The U.S. Fish and Wildlife Service (Service) is developing national Avian and Bat Protection Plan (ABPP) guidance for wind energy and other renewable energy projects. Until this guidance is approved, the Service has prepared this white paper that provides a template for content and discussion that should be considered for inclusion in ABPPs (or Avian Protection Plans depending on the location) for renewable energy projects. The bolded headings below are intended to be the primary sections of an ABPP. 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. Any national ABPP guidance prepared by the Service in the future will supersede this white paper.

This white paper presents relatively broad approaches for dealing with the possible effects of renewable energy projects on birds and bats. We have developed the approaches described herein with particular emphasis on working with others to achieve the conservation of birds and bats while recognizing the importance of expanding renewable energy production. Our statutory authority for addressing effects to birds stems primarily from the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, as well as the Endangered Species Act (ESA); for bats our statutory authority arises primarily from the ESA. We must be careful to recognize and inform our partners in conservation that an ABPP cannot provide authorization to take endangered or threatened wildlife. When renewable energy projects are expected to take any listed wildlife, the project proponents should be advised to pursue an incidental take authorization pursuant to section 7(o)(2) or 10(a)(1)(B) of the ESA in addition to any recommendations to prepare an ABPP.

An ABPP is a project-specific document that delineates a program designed to reduce risks to bats and birds associated with construction and operation of renewable energy facilities. Although each project's ABPP will be different, the overall goal of any ABPP should be to reduce or eliminate avian and bat mortality. If a project has a National Environmental Policy Act document associated with it, that document should provide much of the analysis needed for the ABPP.

The development and implementation of an ABPP are voluntary actions. They do not limit or preclude the Service from exercising its authority under any law, statute, or regulation, nor do they release any individual, company or agency of its obligation to comply with Federal, State, or local laws, statutes, or regulations. A soundly developed and properly implemented ABPP may ultimately represent a "good faith" effort by companies and other project proponents to conserve migratory birds and bats and to use the most environmentally friendly ways possible to develop energy projects and produce renewable energy.

Our Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures.

However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Companies are encouraged to work closely with the Service to identify available protective measures when developing project plans and/or avian protection plans or avian and bat protection plans, and to implement those measures prior to/during construction or other similar activities.

Adaptive Management

The ABPP should map out how the wildlife monitoring, site planning, construction and operation of a proposed facility will change if unexpected impacts to birds or bats appear likely. Early wildlife surveys may point out a potential problem or a problem may only arise after operation begins. Due to the difficulty of predicting these impacts, project developers need to be flexible and willing to modify their approach if issues arise. Adaptive management is one tool available to reduce risks to bats and birds. Adaptive management is an iterative learning process producing improved understanding and improved management over time (Williams *et al.* 2007). The Department of the Interior determined that its resource agencies, and the natural resources they oversee, could benefit from the implementation of adaptive management (Secretarial Order 3270, dated March 9, 2007). Therefore, DOI adopted the National Research Council's (2004) definition of adaptive management, which states:

> *Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.*

The use of adaptive management should be discussed among the project proponent, Service field office, and the State fish and game agency. Measures to consider as elements of a project's adaptive management approach should include siting or structural changes if a particular turbine proves lethal to birds or bats, operational adjustments such as turbine feathering or cut-in speed and habitat manipulation if monitoring shows problems with given species or seasonal migrations. The DOI Adaptive Management Technical Guide is located on the web at www.doi.gov/initiatives/AdaptiveManagement/index.html.

Surveys

Siting of a renewable energy project is the most important factor when considering potential impacts to wildlife and their habitats. There are many different methodologies that can be used to assess the risk posed to wildlife at a particular site. The tiered approach discussed in the Wind Turbine Guidelines Federal Advisory Committee (FAC) Recommendations is the most recent document to discuss methods to select sites with lower risk to wildlife and is a good source of information. The FAC Recommendations are located on the web at http://www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html. For further suggestions on project siting, see ***Project Design Measures***. During the site selection process, wildlife surveys should be conducted to assess species presence and use of a site. Here are three topics to consider regarding wildlife surveys:

1. Selection of appropriate survey methodology – Based on the project and questions being asked, there are many suitable methods to survey birds and bats and establish baseline data. Generally, we recommend multiple survey techniques to ensure adequate data collection. A good summary of survey methods can be found in Kunz *et al.* (2007) for night-migrating birds and bats, and in Ontario Ministry of Natural Resources (2006) for bats. Efforts are under way to update the Anderson *et al.* 1999 methods for monitoring diurnally active birds. In addition, the Interim National Golden Eagle Inventory and Monitoring Guidelines; Pagel *et al.* 2010, are available for use. Examples of survey methods that might be appropriate for wind projects include acoustic, radar, infrared, radio telemetry, mist netting, harp trapping, and a variety of observational surveys. Survey methods could include:

    a. Diurnal bird use counts;
    b. Nocturnal bird use counts;
    c. Raptor nest searches (see Pagel *et al.* 2010 for golden eagle protocol recommendations);
    d. Small bird counts (CEC 2007, Environment Canada 2006a and 2006b);
    e. Migration counts;
    f. Acoustic bat monitoring; and
    g. Bat roost exit counts – if applicable.

2. Duration and timing of surveys – To collect data under variable climatic conditions and accumulate sufficient samples for data analysis, pre-construction surveys should be conducted to assess the potential risk of the proposed project to wildlife. Multi-year surveys, up to three years pre-construction, may be warranted. This can vary depending on the project specifics, known or perceived level of risk, variability in use of habitat by avian species, environmental stochasticity, and species present. Surveys should be designed to ensure adequate data are collected on breeding, staging, migration, and winter bird/bat use of the project site, taking into account peak use of the site temporally and spatially. Coordination with the wildlife agencies is recommended when selecting locations for bird and bat data collection.

3. Special status species – When evaluating a project site, special status species should be identified. Special status species include all Federal and State species listed as

endangered or threatened, State species of concern and fully protected species, and those listed on the Fish and Wildlife Service's Birds of Conservation Concern 2008. (http://library.fws.gov/Bird_Publications/BCC2008.pdf).

The ABPP should address whether bald eagles or golden eagles use the project site for foraging, roosting, nesting, wintering, migration, or as a migration stop-over site. The project assessment should address whether there are nesting bald or golden eagles within 16 km (10 miles) of the project site and include whether the project development impacts eagle foraging habitat, roost sites, wintering habitat, migratory stop-over sites, migratory corridors, defended eagle territories, or displaces eagles during either the breeding and/or the winter seasons.

Risk Assessments

It is useful to conduct a risk assessment to identify potential threats to the species and to then develop specific measures to avoid and reduce those threats. A risk assessment should identify potential short and long-term impacts of the project development on bird and bat populations, including the risk of mortality.

1. Site specific threats – Based on the results of site specific wildlife surveys, a site specific risk assessment should address what the potential for take is based on:

    a. Turbine collision and other turbine interactions (such as barotrauma, crippling loss or injury from wind wake turbulence and blade-tip vortices);
    b. Transmission line, power tower, met tower, or guy line collision;
    c. Electrocution potential;
    d. Displacement issues;
    e. Nest and roost site disturbances;
    f. Habitat loss;
    g. Habitat fragmentation; and
    h. Additional human presence disturbances.

2. Cumulative Impacts – Effects that are likely to result from the project in combination with other projects or activities that have or will be carried out should be analyzed. The cumulative effects assessment, where practicable and reasonable, should include the impacts from all threats. The geographic area and time frame of the analysis will depend upon the species affected and the type of impact, such as behavioral modification or direct mortality. Discussions with Federal and State resource agencies will assist the applicant in identifying focal species and issues that will ultimately define the limits of the cumulative impacts analysis.

Project Design Measures

Based on the information gathered in the pre-siting data collection and risk assessment phase, the project design should be tailored so that wildlife mortality risks are avoided and minimized. The primary consideration is how to design the project to reduce the impacts to species and their habitats. Below are measures to consider when siting and designing a wind project, but additional methods to reduce impacts can be found in the FAC recommendations.

1. Project siting – After all pre-siting survey data have been collected and analyzed, it is important to select the site that will have the least impacts to bird and bat populations. The ultimate goal is to avoid any take of migratory birds and bats and/or minimize the loss, destruction, or degradation of migratory bird or bat habitat by placing projects in disturbed and degraded areas to the maximum extent practicable. Siting conservation measures should include both the macro- and micro-site scales.

    a. Macro-siting – Consideration should be made to avoid:
        1. Locations with Federally or State listed, or otherwise designated sensitive species, and areas managed for the conservation of listed species, such as designated Areas of Critical Environmental Concern;
        2. Areas frequently used for daily bird and bat movements, such as areas between roosting and feeding sites;
        3. Breeding and wintering eagle use areas;
        4. Known migration flyways for birds and bats;
        5. Areas near known bat hibernacula, breeding, and maternity/nursery colonies;
        6. Areas with high incidence of fog, mist, low cloud ceilings, and low visibility, or where other risk factors may come into play; and
        7. Fragmentation of large, contiguous tracts of wildlife habitat (see Environment Canada 2006a and 2006b).

    b. Micro-siting – Once a footprint has been selected, there may be opportunities for finer scale micro-siting of the project components. Component siting considerations include:
        1. Avoid placing turbines near landscape features that attract raptors;
        2. Avoid placing turbines near landscape features that attract migrant birds, such as water sources and riparian vegetation);
        3. Set turbines back at least 200 meters (~650 feet) from cliff tops where raptors nest (Richardson and Miller 1997); and
        4. Minimize the potential for creating habitats suitable for rodents such as rock piles and eroded turbine pads with openings underneath that will additionally attract raptors, especially golden eagles.

2. Buffer zones – It might be appropriate and necessary to establish biologically meaningful buffer zones to protect raptor and other bird nests, areas of high bird and bat use, and known bat roosts. These buffers should be established up-front and be part of the siting process. The Service recommends that the following avoidance buffers be considered:

    a. Passerines – Avoid disturbance activities (*e.g.*, construction actions, noise) within established buffers for active nests of any protected bird species or any high quality nesting habitat, such as riparian areas. Buffer distances should consider species, terrain, habitat type, and activity level as these features relate to the bird alert distance and bird flight initiation distance (Whitfield *et al.* 2008). Buffer size should be coordinated with the Service biologists prior to activities.

b. Raptors (including eagles) – Avoid siting wind turbines, minimize human access, and avoid disturbance activities (*e.g.*, construction actions, noise) within 1.6 km (1 mile) of an active raptor/eagle nest, unless specific features (*e.g.*, terrain, barriers) dictate reduced buffers (Richardson and Miller 1997). Buffer size should be coordinated with the Service and State agencies.

c. Prairie and Sage Grouse – Avoid construction of wind facilities within close proximity of lekking sites in consultation with State and Federal fish and wildlife agencies.

3. Appropriate facility design – There are many conservation measures that can be incorporated into the facility design that might reduce the potential effects of a project on bird populations; including the following:

a. Using tubular supports with pointed nacelle tops rather than lattice supports to minimize bird perching and nesting opportunities.
b. Avoiding the use of external ladders and platforms on tubular towers to minimize perching and nesting.
c. Considering the use of fewer larger turbines compared to a larger number of smaller turbines.
d. Avoiding the use of guy wires for all meteorological towers and do not light them unless the Federal Aviation Administration (FAA) requires them to be lit, which is generally >60 meters (>199 ft) AGL in height. Any necessary guy wires should be marked with recommended bird deterrent devices (APLIC 1994, USFWS 2000).
e. If taller turbines (top of rotor swept area is >60 meters [>199 ft] AGL) require lights for aviation safety, the minimum amount of pilot warning and obstruction avoidance lighting specified by the FAA should be used (FAA 2007), approximately 1 in every 5 turbines should be lit, and all lights within the facility should illuminate synchronously. Lighting of the boundary of the facility is most important as an aviation safety warning. Unless otherwise requested by the FAA, use only the minimum number of strobed, strobe-like or blinking red incandescent lights, with minimum intensity, duel strobe lights preferred per lit nacelle. No steady burning lights should be used on turbines or facility infrastructures.
f. Focusing facility lights downward to reduce skyward illumination. Lights should be equipped with motion detectors to reduce continuous illumination.
g. Where feasible, placement of electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution of birds. Use recommendations of APLIC (1994, 2006) for any required above-ground lines, transformers, or conductors. When transmission lines must be above-ground, avoid placing lines within wetlands and over canyons.
h. The creation of roads leads to further loss and fragmentation of migratory bird habitat. The Service recommends that the number of roads be minimized for all phases of a project.
i. A well thought out turbine layout can substantially reduce the potential for bird strikes. Some examples of better turbine layouts include grouping turbines versus spreading them widely across the project area and orienting rows of turbines parallel

to known bird movements. In addition, placing large, turbine sized pylons at the end of turbine rows and in ridge dips can re-direct birds and bats away from the danger areas.

Construction Phase Measures

During the construction of energy facilities, standard construction conservation measures should be established. Measures that specifically relate to bird conservation include (but are not limited to):

1. Minimizing the area disturbed to extent practicable, including access road construction – To minimize the amount of habitat disturbance and fragmentation, construction plans should emphasize the minimization and placement of habitat disturbance. Construction roads not required for long-term operation and maintenance of the facility should be closed and restored to the pre-construction habitat type.

2. Minimizing vegetation clearing – Vegetation within the project footprint that will be disturbed should be cleared when it poses the least impact to species, depending on the species impacted. If the proposed project includes potential for take of migratory birds and/or the loss or degradation of migratory bird habitat and vegetation removal cannot occur outside the bird breeding season, project proponents should provide the Service an explanation for why work must occur during the bird breeding season. Further, in these cases, project proponents should demonstrate that all reasonable and practicable efforts to complete work outside the bird breeding season were attempted, and that reason for work to be completed during the breeding season were beyond the proponent's control.

3. When vegetation removal cannot take place outside of the breeding season and a reasonable explanation was provided to the Service, the Service recommends having a qualified, on-site biologist during construction activities to locate active nests, establish avoidance buffers around active nests, watch for new nesting activity, and if necessary stop construction when noise and general activity threaten to disturb an active nest. All active nests of protected birds (*e.g.*, MBTA, ESA, State regulations) should not be disturbed until after nest outcome is complete.

4. Minimizing wildfire potential – Wildfire is a potential threat that could impact bird and bat habitat. The Service recommends that construction activities are conducted in a manner that avoids and/or minimizes the ignition of a wildfire.

5. Minimizing activities that attract prey and predators – During construction, garbage should be removed promptly and properly to avoid creating attractive nuisances for birds and bats.

6. Controlling non-native plants – The introduction of non-native, invasive plant species can impact bird habitat quality. The Service recommends that all appropriate control measures be implemented to prevent the introduction and spread of invasive plant species with and surrounding the project area. Use only plants native to the area for seeding or planting during habitat revegetation or restoration efforts.

Operational Phase Measures

Once a facility is built, appropriate measures should be in place to reduce the attractiveness of the facility to breeding, migrating, and wintering birds and bats to ensure mortality is minimized. The following are examples of measures that should be considered, depending on the species and circumstances of the project:

1. Avoid creating or maintaining attraction features for birds/bats – Through appropriate habitat maintenance, facilities should seek to reduce features that attract birds and bats to the facility. Simple measures could include removal of carrion that attracts raptors and other scavengers to the site, maintain vegetation heights around turbines to reduce raptor foraging (habitat maintenance to reduce prey availability), and minimizing water sources (especially in desert habitats) that birds and other wildlife seek, and avoid creating situations where rodent prey bases will increase (*i.e.*, through creating new habitats for them, disturbance, and cattle grazing) thus drawing in raptors. These measures should be implemented only after completely evaluating each specific project site and implementation of these measures will not have deleterious effects on other special status wildlife species.

2. Turbine feathering and cut-in speed - Data suggest that most bird fatalities at wind projects occurred at times of low wind speed (typically <6m/sec), conditions under which rotor blades are moving, but the amount of electricity generated is minimal (Kunz *et al.* 2007). Turbine feathering, electronically pitching the blades parallel to the wind, could significantly reduce bird impacts by making the blades stationary at low wind speeds (Kunz *et al.* 2007, Manville 2009). In addition, changing the blade cut-in speed and reducing operation hours in periods of low wind (*e.g.*, from cut-in at 3.0 mps to 5.0 mps) has been shown to reduce bat mortality by up to 92% with minimal power loss (Arnett *et al.* 2009). The Service recommends setting a maximum turbine rpm rate that allows for sufficient energy production but minimizes the potential for avian and bat collisions. In addition, the Service recommends reducing operation hours during periods of low wind.

3. Locking rotors during daytime and at night during peak migration periods and peak presence – In areas with high concentrations of migrating raptors, passerines, and bats, and high concentrations of overwintering raptors, it may be appropriate to turn the turbines off during peak migration periods or peak use of an area (Manville 2009).

4. Following APLIC guidelines for overhead utilities – If overhead transmission lines are necessary, facilities should follow all APLIC (1994 and 2006) guidelines.

5. Minimizing lighting – Research indicates that lights can both attract and confuse migrating birds (Gehring *et al.* 2009, Manville 2005, 2009) and bats are known to feed on concentrations of insects at lights (Fenton 1997). The goal of every facility should be to minimize operational lighting to the maximum extent practicable.

    a. To avoid disorienting or attracting birds and bats, FAA visibility lighting of wind turbines should employ only strobed, strobe-like or blinking incandescent lights,

preferably with all lights illuminating simultaneously. Minimum intensity, maximum "off-phased" duel strobes are preferred by the Service. No steady burning lights, such as L-810 Steady-Burning Obstruction Lights, should be used. See also Project Design recommendations for additional lighting guidance.

b. Keep lighting at both operation and maintenance facilities and substations located within ½ mile of the turbines to the minimum level for safety and security needs by using motion or infrared light sensors and switches to keep lights off when not required, shielding operational lights downward to minimize skyward illumination, and do not use high intensity, steady burning, bright lights such as sodium vapor or spotlights.

Post-construction Monitoring

An essential element to understanding the actual impacts of each wind energy facility is post-construction monitoring. The goal of the post-construction monitoring program is to validate the pre-construction risk assessment and allow the facility to implement adjustments based on identified problems and triggers. Monitoring objectives usually include: estimates of bird/bat fatality rate due to all aspects of facility operation; assessments of changes in bird/bat behavior due to all aspects of facility operation; assessments of changes in population status within and adjacent to the project footprint; assessments of displacement and avoidance of birds/bats from within the project footprint; and, determining whether avoidance and minimization measures implemented for the project were adequate to reduce mortality. A monitoring plan will depend upon the species impacted and the facility. Consult the Service and State fish and wildlife agencies for assistance in monitoring design and protocol.

Decommissioning

Decommissioning is the cessation of wind energy operations and removal of all associated equipment, roads, and other infrastructure. The land is then used for another activity. During decommissioning, contractors and facility operators should apply measures for road grading and native plant re-establishment to ensure that erosion and overland flows are managed to restore pre-construction landscape conditions. The facility operator, in conjunction with the landowner and State and Federal wildlife agencies, should restore the natural hydrology and plant community to the greatest extent practical. For specific decommissioning measures, see the FAC Recommendations (Wind Turbine Guidelines Advisory Committee 2010).

Reporting

All post-construction monitoring results and risk assessment validation should be reviewed by the appropriate agencies annually. Additional reporting may be a condition of permits issued. Confidentiality should be maintained between the proponent and the agency(ies) reviewing the project reports. For Service reviews, to the extent allowable under FOIA, project-specific information will remain confidential between the Service and the proponent and be protected from release to the public.

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