U.S. Fish and Wildlife Service clarifications on golden eagle surveys for the proposed Palen project
March 2013

The Service is providing the following clarifications important for conducting timely bald and golden eagle surveys within the 10-mile survey radius of the proposed Palen project. The Service determined additional data on breeding and non-breeding golden eagles (including territorial adults, juveniles, subadults, and floaters) and other birds (including raptors) are needed to inform the baseline conditions, risk analysis and characterization, advanced conservation measures, and other essential information to develop an Eagle Conservation Plan should an application for a take permit be necessary.

We outline aspects of rigorous surveys that will contribute to a risk characterization, and the drafting of an Eagle Conservation Plan, and information necessary for a project-specific application for an eagle take permit. We stress that qualified observers who understand the quality and quantity of data necessary for risk characterization should be used in all aspects of any inventory, survey, and non-breeding season eagle work. Your selected field biologist(s) should have a robust and verifiable golden eagle background, and the requisite skills necessary to identify whether the eagles using the area are adults, subadults or juveniles; male or female; and whether their behavior is indicative of resident or floater birds. Your biological team should have quantitative and ecological modeling skills suitable to develop an appropriate field methodology (based on the referenced cited herein) and conduct a defensible risk characterization appropriate to the scope and scale of the project. Documentation of eagle survey qualifications should be detailed, confirmed with references, and submitted to the Service, and provided to the CEC, BLM, and CDFW prior to the onset of surveys. Applicable experience may include Federal and State permit numbers allowing banding, and/or intensive raptor-specific behavioral monitoring, or protocol-driven survey work on golden eagles.

The Service's current protocol recommends that multiple years of data collection are necessary to conduct a robust risk characterization for golden eagles for proposed projects where take is possible (Pagel *et al*. 2010). The protocol outlines the minimum surveys necessary to inventory habitat and monitor known territories. This level of field effort allows observers to document territory occupancy and reproductive output, and/or to confirm observations from aerial and ground surveys over the course of consecutive years. The protocol was designed to identify eagle use areas and identify and minimize potential observer-related disturbance to golden eagles by surveys when conducted by qualified and experienced raptor biologists. Data that would contribute to risk characterization would likely include the following:

1. Breeding season inventory and monitoring surveys timed early enough to note courtship and nest defense;
2. Breeding season monitoring to determine occupancy and reproductive success at territories;
3. Presence estimation (abundance, distribution, and duration) of juveniles, subadults, and floaters within and near the project footprint (within a 10-mile survey radius);
4. Unlimited distance point counts/long-sit observations to determine/estimate eagle presence;

5. Carcass placement with fixed cameras;
6. Non-breeding season surveys (migration and wintering) conducted using HMANA protocol surveys and unlimited distance long-sit point counts; and
7. Prey base evaluation.

BrightSource should also evaluate the potential importance of habitat within the proposed project footprint to extant or currently unoccupied eagle territories, as well as for wintering/migratory eagles. For example, how might the loss of habitat associated with the proposed project footprint and increased anthropogenic activity near to the project 'disturb' eagles by (*e.g.*, direct, indirect, and cumulative effects) causing nest abandonment or a decrease in productivity for residents and/or wintering bald and golden eagles.

The objectives of breeding season surveys are to identify areas occupied by golden eagles and observe selected factors in their behavioral ecology. Additional objectives of these surveys include the following:

1. Record and report occupancy and productivity of local golden eagle territories;
2. Document and list historical and unsurveyed habitat for future analysis to assist in determining local and regional population trajectories;
3. Determine nesting chronologies;
4. Provide information to document whether local golden eagle conservation efforts meet permit conditions or goals for improvements in the status of golden eagles;
5. Provide a foundation to evaluate whether and which proposed activities or conditions may be affecting golden eagles; and
6. Document foraging behavior, diet, and habitat use within breeding and non-breeding home ranges.

To meet these initial objectives, repeat visits to nest structures are necessary to determine occupancy, reproductive success, and the presence of juveniles, subadults (immature) and adult floaters, which may or may not be associated with the nesting territories, and to do so at the optimal time of year (*i.e*. in general, courtship occurs between December and February and young may be 10 to 11 weeks old by late June). Under normal circumstances, it may take anywhere from 2 to 5+ visits to each territory via ground or ground/aerial methodology to obtain robust information on the nesting territory.

Pagel *et al*. (2010) recommends that the first inventory and monitoring surveys be conducted during courtship when the adults are mobile and conspicuous. When surveys of historical territories are conducted, observers should focus their searches on known alternative nests, and also carefully examine the habitat for additional nests that may have been overlooked or recently constructed. A 'decorated' nest is sufficient evidence to indicate the probable location of a nesting attempt. If a decorated nest or pair of birds is located, the search should be expanded to inventory suitable habitat adjacent to the suspected territory to determine if additional golden eagle territories can be observed.

Identification of alternate nests is used to determine the relative value of individual nests when assessing whether abandonment of a particular nest is likely to result in abandonment of a

territory. This information is also used to evaluate whether or not an “inactive” nest can be removed under a permit. The Service has determined that territory loss or permanent abandonment of a territory is a greater impact to populations than temporary abandonment of a nest.

Helicopters are an accepted and efficient means to inventory and monitor large areas of occupied and potential habitat and known territories only if conducted by competent and experienced observers. Inventory and monitoring may take numerous helicopter and flight hours or ground surveying days to obtain robust data useful for risk characterization. Aerial observations can be the primary survey method (with caveats), or, preferably, can be combined with follow-up ground survey and monitoring, provided the data necessary to conduct a risk characterization can be collected. Basic aerial surveys may require numerous hours of flight time to survey “easy” habitat; even more flight time should be allotted for locations where inherent complexities in habitat and topography may be present. For example, areas with large, intricate cliff systems may require additional survey time due to landscape complexity and access limitations when using a helicopter.

Any party seeking to conduct aerial surveys in bighorn sheep habitat should contact the most appropriate representative from the state wildlife agency <u>at least 14 days PRIOR TO</u> any golden eagle helicopter flights to:

1. Determine responsibilities necessary for compliance with state laws and regulation;
2. Identify specific areas where flights are not allowed; and
3. Obtain written concurrence from the state wildlife agency dated prior to first flight. This record should be appended to any final report for the golden eagle survey, Eagle Conservation Plan, or other documentation relevant to golden eagle information presented to the regulatory and wildlife agencies.

While this restriction may limit aerial observations at a territory and within the 10-mile survey radius, aerial observations conducted more than 1500 feet from the cliff area may be permitted and ground observations should be performed. Project proponents should plan eagle surveys well in advance of the nesting season to ensure data collection has begun at the onset of breeding (*i.e.*, during late December, January, and early February) and when the resident eagles are most active and visible at their nest territories.

To increase safety of aerial surveys, and maximize detection potential, the Service recommends that aerial surveys of golden eagles and their nests be conducted by observers who have at least 5 field seasons experience in helicopter-borne raptor surveys around cliff ecosystems for peregrine falcon, prairie falcon, and/or golden eagles, and at least 50 hours of flight time as the principle observer of helicopter-borne surveys for golden eagles or large species of falcons or buteos at cliff and tree nest sites. Aerial observer assistants may train with golden eagle specialists to gain understanding of safety considerations, and obtain important aerial survey experience and flight time. A golden eagle specialist is defined as a biologist or ecologist with 5 or more years of verified golden eagle research/survey experience; who also has possession of Federal or State permit allowing capture, handling, and/or translocation of golden eagles.

Monitoring to document nesting success at known territories may occur solely via ground observations. Observations of known territories should use the methodology described for ground monitoring of potential habitat (Pagel *et al*. 2010). Dates of all visits to the nesting territories should be recorded; date of confirmation of nesting failure, and nesting chronology are key data for site-specific and regional analyses.

Occurrence of non-breeding golden eagles within at least 10 miles of the project boundary should be documented to ascertain potential take of all age classes of non-breeding golden eagles, including floaters. Non-breeding season surveys (approximately April through December) and field documentation of age classes of eagles observed will help fill this important information need. Interactions among eagles during courtship displays or foraging flights during the nesting season also are opportunities for assessing occurrence of non-breeding eagles. Because of the complexity with identification of the sex and age classes of golden eagles and their intra-specific behavioral interactions, surveys of non-breeding eagles during the breeding season should be conducted by highly qualified golden eagle specialists.

Survey information gathered during the non-breeding period is needed to identify foraging areas and quantify extent of use of a given area by golden eagles. Confirmed observations of golden eagles during non-breeding season surveys does not necessarily mean that breeding individuals are present; however, follow-up surveys (inventory and monitoring) during the breeding season may be necessary to denote occupancy at suspected or known territories.

Golden eagles have been surveyed (along with other species of raptors) by using 20- or 30-min point counts on 800-m radius, circular plots. Originally designed to generate an index of abundance of passerines in forested habitat, this protocol has been modified to detect raptors. While we understand that 800-m radius surveys have been used for other projects, we strongly recommend that the project proponent use long-sit, unlimited sight-distance point count methodology, with observation periods of at least 1 to 8 hours per visit. Methods traditionally used to detect raptor presence have also included road or line transect surveys.

Camera “trapping” of golden eagles using carcasses may be used to develop an index of eagle occurrence at proposed project areas. Carrion is used to attract eagles to the ground where they may be photographed to determine age class and possibly identify unique bands, presence of telemetry, or patagial tags, and to examine facultative scavenging. Automatic digital cameras activated by movement, such as trail cameras, motion sensor cameras, and digital game cameras can be used for this methodology. The cameras are then placed at pre-established positions near the carrion.

Carrion surveys are designed to detect golden eagles already using available habitat. To facilitate this, bait stations should be placed at least 2 miles inside the external survey boundary (*i.e.*, for a 10 mile survey radius = bait station would be placed no more than 8 miles from project boundary; 5 mile survey radius = bait station would be placed no more than 3 miles from project boundary). For large survey radius (at least 10 miles) no fewer than 2 to 5 bait stations per month during the non-breeding season would be located where golden eagles may forage.

Carrion may be obtained locally and could include deer, horses, foals, goats, pigs, cows, and calves; opening the carcass may facilitate its use by corvids that may help attract golden eagles. Placement of carcasses and positioning cameras should be done at night or in a manner to prevent golden eagles from associating the site with humans. All carrion should be free of lead, and if wild game (*i.e.*, vehicle-killed wildlife) is used, permits from CDFW may be required. Decomposing carcasses may be considered a public health nuisance and such concerns should be accommodated.

Close coordination with the Service, CEC, BLM, and CDFW should be conducted prior to using camera traps baited with carrion, especially when activities would take place within desert tortoise habitats or active grazing allotments. Carcass placement should also be coordinated with golden eagle biologists to ensure proper the use of this methodology.

The location of migration routes or areas in relation to a proposed project that is likely to impact golden eagles through injury or mortality may have critical implications. Therefore, evaluations should assess whether migratory or transient golden eagles are likely to be present during the construction and throughout the life of the project. Other factors to consider include numbers of golden eagles moving through the project area, movement patterns (including a three-dimensional spatial analysis), time of day, and seasonal patterns. In the case of power tower development, surveys should identify the locations of migration routes and movements during migration in relation to areas influenced by energy flux as well as surrounding habitats.

Migration surveys are used to count diurnal raptors flying over an established point during seasonal movements. Because many raptors follow distinct pathways during migration, survey data may reflect population trends of raptors over time. At a minimum, raptor migration surveys should encompass the seasonal peak of migration for most species (generally late September through early January); should be conducted through at least midday hours (9 a.m. through 5 p.m., when eagles and most other raptor species are most likely to be migrating); and under good weather conditions (no sustained precipitation or fog). The peak in fall migration of golden eagles is mainly October through December, but is believed to last through the early spring. Because of year-to-year variation caused by weather, habitat changes, prey fluctuations, and other vagaries, migration stations are best staffed for at least three seasons of migration (spring, fall, and winter).

Collection of data on golden eagle use of the proposed project area should follow the Hawk Migration Association of North America's standard field survey techniques, which were modeled after Cape May Raptor observation methods, and are considered the standard protocol for hawk migration counts. The protocol entails conducting observations from optimal vantage points on several successional days for 4 to 8 hours from September to January. At least one to two observation point locations should 1) allow wide expanse of observation area from a single point with visibility of the surrounding airspace, at topographic funnels or corridors such as ridges, cliff rims, or saddles in mountains; 2) be away from public view; and 3) afford a location where topographic and biological features are likely to be used by raptors during migration (see data sheet with synopsis of this approach at http://hmana.org/data_entry_paper.php). We recommend that at least one qualified eagle biologist lead observations at each observation point for the duration selected.

Prey estimation and a thorough discussion of prey availability on the landscape over the life of the project within and near the project footprint is a helpful tool to evaluate potential golden eagle presence, and contributes to a risk characterization. Prey is the primary driver of golden eagle habitat use; availability may be cyclic and can be driven by species' ecology and environmental conditions, particularly precipitation or lack thereof.

For the purposes of the proposed Palen project, pursuant to Pagel *et al*. (2010) we recommend that observers conducting aerial and ground breeding season surveys obtain the equivalent of at least 3 full nesting season surveys for golden eagles and other large species of falcons or buteos at cliff nest sites. Ideally, aerial observers also should have entered multiple nests and monitored detailed nesting behavior of the species.

Data collected during the breeding and non-breeding season would be used to develop or populate a predictive model to evaluate eagle presence and risk of take. We recommend that the DRAFT Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy, Version 1 (Service 2011) (or the most current version) be used to guide this analysis. Please also note that a broad spectrum of data is necessary to characterize risk to other avian species which may be using the project location for wintering and migration. Refer to Bibby *et al*. (2000) for additional information on developing avian census techniques as you develop the project-specific Bird and Bat Conservation Strategy. All of the data collected in a rigorous manner will aid us in assessing the risk to golden eagles and other birds at the proposed Palen site, identify ways to adaptively manage the project to minimize mortalities, develop a meaningful Bird and Bad Conservation Strategy and Eagle Conservation Plan, and finally, may inform the eagle permit process. The Service is available to provide any necessary technical assistance on the proposed project and recommended surveys for avian species.

Literature Cited

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