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AESO/SE
02-21-02-F-0503 January 27, 2003

CPT William P. Fay
Environmental Program Manager
Arizona Department of Emergency and Military Affairs
Joint Programs
5636 East McDowell Road, Building M5101
Phoenix, Arizona 85008-3495

Dear Captain Fay:

This biological opinion responds to your request for consultation with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated September 10, 2002, and received by us on September 14, 2002. At issue are impacts that may result to the threatened bald eagle (*Haliaeetus leucocephalus*) from the proposed installation of a wind turbine at Camp Navajo Army Depot located in Coconino County, Arizona.

In your letter, you requested our concurrence that the proposed action would have no effect on the Mexican spotted owl (*Strix occidentalis lucida*) and its designated critical habitat. While we do not normally provide agencies with our concurrence for "no effect" determinations, we are familiar enough with the proposed action to provide our concurrence with your determination for the Mexican spotted owl and its critical habitat.

The biological opinion is based on information provided in the September 10, 2002, biological assessment, the project proposal, telephone conversations with your staff, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, wind turbine installation and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Details of the consultation history are summarized in Table 1.

Table 1. Summary of Consultation History

Date	*Event*
December 7, 2001	We met with the Arizona Army National Guard (AZ ARNG) to discuss this project and others planned for implementation at Camp Navajo.
January - September 2002	The AZ ARNG and the Fish and Wildlife Service discussed the proposed action and consultation procedures on multiple occasions.
May 7, 2002	We were notified by your staff that the wind turbine had been erected by the contractor.
May 8 and 9, 2002	We conducted avian mortality surveys around the wind turbine. The wind turbine was lowered on May 9, 2002.
September 10, 2002	The AZ ARNG requested formal consultation on the effects of installing a wind turbine at Camp Navajo on the threatened bald eagle.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Camp Navajo is located in north-central Arizona, 12 miles west of Flagstaff and adjacent to the small community of Bellemont, on Interstate 40. The installation is approximately 28,372 acres in size and is used for a variety of AZ ARNG training and munitions/missile storage missions.

The AZ ARNG proposes to erect one ten kilowatt wind turbine as a working demonstration project to illustrate the application of wind energy and offset electrical consumption at Camp Navajo. The complete wind energy system consists of the wind turbine, wind turbine tower, tower raising and lowering hardware, tower anchoring foundation, synchronous utility inverter, kilowatt hour meter, interconnecting wiring, grounding, and electrical disconnects. The wind turbine tower is a 100-foot tall, guyed lattice tilt-up tower. The tilt-up tower has two positions: a fully erected, functioning position and a lowered position for maintenance. The complete system has already been installed. The action we are consulting on is the raising of the tower to its full

height. Currently, the lowered tower has approximately a 40-foot high pole, with four guy wires elevated above the ground. The ground footprint is approximately 70 feet by 70 feet, with an anchor point at each corner. The tower has eight guy wires for support (two guy wires at each anchor point). The three 20-foot blades will begin rotating at 7.5 miles per hour. The tower is also equipped with a red, flashing light.

Installation of the wind turbine occured in the northern portion of Camp Navajo, within the consolidated training site facility (Cantonment Area). This location is approximately 660 feet east of Building #72, immediately east of the training site parking lot, and approximately 820 feet northeast of the dining hall and classrooms (Township 21 North, Range 5 East, Section 1, SW 1/4). The immediate area consists of dry meadow habitat with ponderosa pine (*Pinus ponderosa*) stringers to the northeast and east. The closest tree is located approximately 150 feet from the wind turbine.

Conservation Measures

To minimize the effects of the wind turbine on bald eagles, the turbine blades will be painted to make them more visible and raptor food sources (i.e., carrion) will be removed from the vicinity of the turbine to reduce foraging activity in the area. In addition, all electrical wiring will be enclosed in metal conduits. The wind turbine will be monitored for avian mortality year round, but with special attention given to the migratory seasons of the bald eagle and other raptors.

STATUS OF THE SPECIES

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (USFWS 1967), and was reclassified to threatened status on July 12, 1995 (USFWS 1995). No critical habitat has been designated for this species. The bald eagle was proposed for delisting on July 6, 1999 (USFWS 1999). The bald eagle is a large bird of prey that historically ranged and nested throughout North America except extreme northern Alaska and Canada, and central and southern Mexico.

The bald eagle occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major rivers systems, and some seacoast habitats. Generally, suitable habitat for bald eagles includes those areas which provide an adequate food base of fish, waterfowl, and/or carrion, with large trees for perches and nest sites. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and night roosts (USFWS 1995).

Initial eagle population declines probably began in the late 1800s, and coincided with declines in the number of waterfowl, shorebirds, and other prey species. Direct killing of bald eagles was also prevalent. Additionally, there was a loss of nesting habitat. These factors reduced bald eagle numbers until the 1940s when protection for the bald eagle was provided through the Bald Eagle Protection Act (16 U.S.C. 668). This Act accomplished significant protection and slowed

the decline in bald eagle populations by prohibiting numerous activities adversely affecting bald eagles and increasing public awareness of bald eagles. The widespread use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds in the 1940s for mosquito control and as a general insecticide caused additional declines in bald eagle populations. DDT accumulated in individual birds following ingestion of contaminated food. DDT breaks down into dichlorophenyl-dichloroethylene (DDE) and accumulates in the fatty tissues of adult females, leading to impaired calcium release necessary for egg shell formation. Thinner egg shells led to reproductive failure, which is considered a primary cause of declines in the bald eagle population. DDT was banned in the United States in 1972 (USFWS 1995).

Since listing, bald eagles have increased in number and expanded in range due to the banning of DDT and other persistent organochlorine compounds, habitat protection, and additional recovery efforts. Surveys in 1963 indicated 417 active nests in the lower 48 states with an average of 0.59 young produced per nest. Surveys in 1974 resulted in a population estimate of 791 occupied breeding areas in the lower 48 states (USFWS 1999). In 1994, 4,450 occupied breeding areas were reported with an estimated average of 1.16 young produced per occupied nest (USFWS 1995). The Service estimates that the breeding population exceeded 5,748 occupied breeding areas in 1998 (USFWS 1999).

Although not considered a separate subspecies, bald eagles in the southwestern United States have been considered as a distinct population for the purposes of consultation and recovery efforts under the Act. A recovery plan was developed in 1982 for bald eagles in the Southwest recovery region. However, new information has indicated that the bald eagles in Arizona and the Southwest recovery region are not a distinct, reproductively isolated population as was previously believed. In 1994, a male bald eagle which originated from eastern Texas was discovered nesting at Luna Lake in east-central Arizona. The origin of the unbanded female was not determinable. The Service has determined that bald eagles in the Southwest recovery region are part of the same bald eagle population found in the remaining lower 48 states (USFWS 1995). The Service proposed delisting of the bald eagle in the lower 48 states including Arizona, stating that the number of breeding pairs in the Southwestern Recovery Unit has more than doubled in the last 15 years (USFWS 1999).

However, the Arizona Game and Fish Department (*in prep.*) concluded that "evidence from the banding and identification of breeding adults defends the theory that Arizona's breeding population is not supported or maintained by immigration from other states or regions. Because adults return to the vicinity of their natal origin to breed, the large distance the large distance between small populations in the Southwest decreases the chance for movement between neighboring populations. Probably most convincing are the results from banding 256 nestlings over 20 years and identifying 372 breeding adults over 8 years. Only one individual from out-of-state entered the breeding population and one left. Additionally, the proportion of breeding adults with color bands (placed on as nestlings in Arizona) has steadily increased, while the presence of unmarked eagles has decreased. Thus, continued attention to the survivorship of all Arizona bald eagles is vital to the maintenance of our breeding population. We can not depend

on immigration to Arizona from nearby states to make up for poor management in Arizona."

Hunt *et al.* (1992) summarized the earliest records from the literature for bald eagles in Arizona. Coues noted bald eagles in the vicinity of Fort Whipple (now Prescott) in 1866, and Henshaw reported bald eagles south of Fort Apache in 1875. The first bald eagle breeding information was recorded in 1890 near Stoneman Lake by S.A. Mearns. Additionally, Bent reported breeding eagles at Fort Whipple in 1866 and on the Salt River Bird Reservation (since inundated by Roosevelt Lake) in 1911. Additionally, there are reports of bald eagles along rivers in the White Mountains from 1937, and reports of nesting bald eagles along the Salt and Verde Rivers as early as 1930.

It is not known if the population of bald eagles in Arizona declined as a result of DDT contamination because records were not consistently kept during that time period. However, the possibility for contamination was present as DDT was used in Arizona and Mexico. Use of DDT in Mexico could potentially have contaminated waterfowl that then migrated through Arizona in addition to directly affecting juvenile and subadult eagles that traveled into Mexico. Many of the nest sites in Arizona are in rugged terrain not suitable for agricultural development, and may therefore have avoided the direct effects of DDT (Hunt *et al*. 1992).

Bald eagle breeding areas in Arizona are predominantly located in the upper and lower Sonoran life zones. The Luna Lake breeding area is one of the few territories in Arizona that is found in coniferous forests, as opposed to the majority which occur in Sonoran vegetation communities. All breeding areas in Arizona are located in close proximity to a variety of aquatic habitats including reservoirs, regulated river systems, and free-flowing rivers and creeks. The alteration of natural river systems has had both beneficial and detrimental affects to the bald eagle. While large portions of riparian forests were inundated or otherwise destroyed following construction of dams and other water developments, the reservoirs created by these structures enhance habitat for the waterfowl and fish species (often nonnative species) on which bald eagles prey.

Arizona bald eagles demonstrate unique behavioral characteristics in contrast to bald eagles in the remaining lower 48 states. Eagles in the Southwest frequently construct nests on cliffs. By 1992, of the 111 nest sites known, 46 were in trees, 36 on cliffs, 17 on pinnacles, 11 in snags, and one on an artificial platform. However, while there were more nests in trees, one study found that cliff nests were selected 73 percent of the time, while tree nests were selected 27 percent of the time. Bald eagles in the Southwest are additionally unique in that they establish their breeding territory in December or January and lay eggs in January or February, which is early compared with bald eagles in more northerly areas. It is believed that this is a behavioral adaptation so chicks can avoid the extreme desert heat of midsummer. Young eagles will remain in the vicinity of the nest until June (Hunt *et al*. 1992).

From 1970 to 1990, 226 known eaglets fledged in Arizona, for an average of 10.8 young produced per year. Successful nests contained an average of 1.6 young per year (Hunt *et al*. 1992). In 2000, there were 41 known breeding areas, with 37 of those being occupied. Within those breeding areas, 27 nests were active, and ten nests failed. Thirteen of the 27 nests were

successful in producing young, and a total of 36+ young hatched. Twenty-two of these young survived to fledged (Driscoll *et al*. 1999). In 1999, 40 breeding areas were known in Arizona (Arizona Game and Fish Department *in prep*.). In 2002, 47 breeding areas were known, and 41 were occupied by a pair of birds. The 2002 breeding season produced the most fledglings ever recorded in one year (n=37) (J. Driscoll, Arizona Game and Fish Department, pers. comm.).

Productivity rates are lower in Arizona than the rest of the United States. There were 0.92 average young per occupied breeding area in Arizona before 1984 when there were less than 20 breeding areas, and 0.78 average young per occupied breeding area since 1984, as opposed to 0.96 average young per breeding in Alaska, Wisconsin, Florida, and Wisconsin (Arizona Game and Fish Department *in prep*., Sprunt *et al.* 1973). The average productivity rate from 1971 to 2002 on the Verde River was 0.92; the average productivity rate for the rest of Arizona was 0.72.

Concentrations of heavy metals in bald eagle eggs are a concern in Arizona. Thirteen Arizona bald eagle eggs collected from 1994 to 1997 contained from 1.01 to 8.02 ppm dry weight mercury (Arizona Game and Fish Department *in prep*). Concentrations in the egg are highly correlated with risk to reproduction. Adverse effects of mercury on bald eagle reproduction might be expected when eggs contain about 2.2 ppm mercury or more. Five of 10 eggs approached or exceeded the 2.2 ppm threshold concentration. What is especially alarming is that mercury concentrations in addled eggs appears to be increasing over time. Addled bald eagle eggs collected in Arizona in 1995-97 contained more than two- to six-times higher concentrations of mercury than eggs collected in 1982-84 (appx. 0.39-1.26 ppm) (K. King pers. comm.).

In addition to breeding bald eagles, Arizona provides habitat for wintering bald eagles, which migrate through the state between October and April each year. In 1997, the standardized statewide Arizona winter count totaled 343 bald eagles, including 193 adults, 134 subadults, and 16 of unknown age; in 1998, 183 adults, 103 subadults, and 4 of unknown age were recorded. The highest numbers of bald eagles, in both years, occurred on the Verde River and San Carlos Reservoir (Beatty and Driscoll 1999).

Bald eagles in Arizona consume a diversity of food items, including some invertebrates. However, their primary food is fish, which are generally consumed twice as often as birds, and four times as often as mammals. Bald eagles are known to catch live prey, steal prey from other predators (especially osprey), and use carrion. Carrion constitutes a higher proportion of the diet for juveniles and subadults than it does for adult eagles. Diet varies depending on what species are available locally. This can be affected by the type of water system on which the breeding area is based (Hunt *et al*. 1992).

The establishment of the Southwestern Bald Eagle Management Committee (SWBEMC) and Arizona Bald Eagle Nestwatch Program (ABENWP) has been essential to the success of recovery efforts for eagles in the Southwest. The SWBEMC includes a number of Federal, State, Tribal, and quasi-governmental agencies and partners, and has been effective at implementing

breeding area closures to reduce the threat of harassment to nesting eagles. The ABENWP coordinates banding of eagles, documents disturbances at nest sites, provides on-site protection, and intervenes as necessary to reduce harassment or as otherwise needed for the benefit of the eagles. This intervention has proven to be very effective in maintaining the southwestern bald eagle population. The ABENWP has "rescued" up to 50 percent of the fledglings produced in a year. These rescue operations include removing fishline and tackle from nestlings and adults, and returning nestlings to their nests after they fell or jumped out of the nest in response to disturbance or to escape extreme heat. Since the 1980's, the ABENWP has rescued 48 eagles and eggs, and documented 52 cases of fishing line or tackle posing a treat to the nesting eagles and eaglets. At least 15 percent of the bald eagle production is due to assistance provided by the Nestwatch program (USFWS 1999).

Even though the bald eagle has been reclassified to threatened, and the status of the birds in the Southwest is on an upward trend, the Arizona population remains small and under threat from a variety of factors. Human disturbance of bald eagles is a continuing threat which may increase as numbers of bald eagles increase and human development continues to expand into rural areas (USFWS 1999). The bald eagle population is Arizona is exposed to increasing hazards from the regionally increasing human population. These include extensive loss and modification of riparian breeding and foraging habitat through clearing of vegetation, changes in groundwater levels, and changes in water quality. Threats persist in Arizona largely due to the proximity of bald eagle breeding areas to major human population centers and recreation areas. Additionally, because water is a scarce resource in the Southwest, recreation is concentrated along available water courses. Some of the continuing threats and disturbances to bald eagles include entanglement in monofilament fish line and fish tackle; overgrazing and related degradation of riparian vegetation; malicious and accidental harassment, including shooting, off-road vehicles, recreational activities (especially watercraft), and low-level aircraft overflights; alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures; collisions with transmission lines; poisoning; and electrocution (Beatty *et al.* 1999; Stalmaster 1987). In Arizona, the use of breeding area closures and close monitoring of nest sites through the ABENWP has been and will continue to be essential to the recovery of the species. Ensuring the longevity of the ABENWP is of primary concern to the Service (USFWS 1999).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

A. Status of the species within the action area

The Bellemont area contains a high concentration of wintering raptors, with most birds using the northern portion of Camp Navajo. A floral and faunal inventory conducted in 1994 and 1995 on Camp Navajo listed the bald eagle as an uncommon winter resident. Surveyors sighted bald eagles on only one occasion during the inventory (Texas Regional Institute for Environmental Studies 1996). There is an unconfirmed record of a bald eagle nesting on Camp Navajo in the mid-1990s (D. Hack, AZ ARNG, pers. comm.). A wounded bald eagle was located within the installation and picked up by Fish and Wildlife Service personnel in November 2000. From February to early April 2001, the Arizona Game and Fish Department conducted a winter raptor survey on approximately 4,500 acres of the northern boundary of Camp Navajo and the adjacent area. Bald eagles were located in close proximity to the three small constructed reservoirs (Pond #1, #2, and #3), which are centered within the study area, as well as near the residential compound. Although the number of non-resident raptors gradually decreased to zero by early April, a total of 15 bald eagles were noted during the survey season (Ingraldi 2001). The AGFD also surveyed Camp Navajo during the same period in 2002, though we do not have the results for those surveys. Bald eagles have been observed taking fish from a six acre constructed pond (Pond #1) stocked with rainbow trout (D. Hack, AZ ARNG, pers. comm.). Currently, the AGFD is conducting a study of wintering bald eagles at Camp Navajo and using carcasses as lures to capture bald eagles for banding. The trapping sites are located approximately 0.5 to 1.0 mile from the wind turbine. In addition, Interstate 40 (which runs parallel to the northern boundary of the installation) is a source of roadkill for wintering bald eagles. On January 11, 2003, Fish and Wildlife Service and AZ ARNG personnel conducted a winter eagle count on the installation and counted ten adult bald eagles within 0.75 mile of the wind turbine site.

B. Factors affecting species' environment within the action area

Actions within the project area that affect bald eagles include on-going research by the AGFD and disturbance from National Guard training activities and operations. As stated above, the AGFD is attempting to capture and band wintering bald eagles at Camp Navajo. This activity may increase stress to wintering eagles and could result in injury or harm. Camp Navajo exists to support military training for the AZ ARNG and is used by both Army and Air National Guard units (transportation, engineer, military police, aviation, ordnance, medical, quartermaster, and other branches for annual and weekend training. Additionally, Camp Navajo is used as a training site by both active component and other reserve component units of all services. The Limited Area, where most of the wintering eagles have been found and where the trapping stations are located, consists mostly of munitions storage igloos. Hunting is also permitted in this area. However, though winter roost sites have never been located at Camp Navajo, habitat exists throughout the installation and the potential exists for activities to cause disturbance to roosting eagles.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Wind-generated electrical energy is renewable, produces no emissions, and is a generally environmentally clean technology. Development of wind energy is strongly endorsed by the Secretary of the Interior, as expressed in the Secretary's Renewable Energy on Public Lands Initiative. However, wind energy facilities can adversely impact wildlife, especially birds (Thelander and Rugge 2000, Hunt et al. 1998).

The specific factors causing bird deaths in wind developments are not well understood. It has been proposed that birds die when trying to pass through the rotor plane because they cannot see the blades, because of turbulence, or because they are fixated on a perch or prey item beyond the blades. Birds may also be killed by striking guy wires, part of the tower, or through electrocution by a turbine related power line. Guy wires associated with communication towers and older wind turbines have been considered a major source of the avian mortality problem associated with towers (NWCC 2001). Lattice towers, because they provide perches for birds, also increase the potential for avian mortality (G. Hunt, pers. comm. 2002). Birds will perch on the towers during the calm (non-windy) periods and then be killed when wind speed increases and the blades strike perched birds. During a four year study at the Altamont Pass Wind Resource Area, of 61 recorded deaths of radio-tagged golden eagles (*Aquila chrysaetos*), 38% were caused by wind turbine blade strikes (Hunt et al. 1998).

According to the National Wind Coordinating Committee, based on information collected to date, siting of windtowers appears to be the most significant factor related to bird mortality, with the effects of other factors such as turbine designs (e.g., lattice towers versus tubular towers, small versus large turbines) less understood (NWCC 2001). Siting includes such variables as turbine height and spacing, location, and relationship to other turbines. Unfortunately, we are unable to recommend any siting considerations to minimize impacts to bald eagles or other wildlife at Camp Navajo because the pad and tower have already been constructed. For example, in wind farm situations, it is recommended that wind turbines are set a distance apart in order to provide greater room for raptors to fly in-between the towers (G. Hunt, pers. comm. 2002). The action the AZ ARNG is consulting on is the raising of the wind turbine. Therefore, the location is a moot point. At Camp Navajo, there is only one wind turbine proposed for installation at this time and the closest tree to the tower is approximately 150 feet. This spacing should provide adequate room for raptors, such as eagles, to fly near the tower without being too close to the blades. The location of the proposed wind turbine is in a relatively flat, open valley. This

location may minimize potential direct impacts to raptors as ridge and upwind slope locations near updrafts are commonly used by soaring birds. However, it has also been suggested that turbines placed near valleys and end-row turbines may result in relatively higher risk to individual birds (NWCC 1999).

Most studies to date examining the effects of wind turbines on wildlife have been conducted on large wind farms (multiple turbines) with large (>200 feet tall) towers. The wind turbine to be installed at Camp Navajo is a single, relatively short tower (~100 feet tall). However, many of the early avian/windpower interaction studies involved examining impacts associated with single, large experimental turbines (>200 feet tall). The first study of avian/windpower interactions took place in Ohio, where a single, large turbine was monitored for avian mortality during four migratory seasons. Two dead birds were found during this period (Gauthreaux 1994). Two large experimental turbines and a meteorological tower in Wyoming were monitored for avian mortality in the early 1980's. Twenty-five fatalities were found over a one-year period, most of them involving passerines that had collided with guy wires on the meteorlological tower (U.S. Bureau of Reclamation 1984). At a single, 200-foot tower wind turbine in California, seven fatalities were recorded from September 1982 to January 1983, and the total fatality estimate with adjustments for scavenger removal and searcher efficiency was estimated at 54 birds (Byrne, 1983, 1985).

Besides the direct effects that wind turbines have on avian communities, there are indirect interactions from turbines that may result in changes in a species habitat. The substantial changes to an area that accompany development may cause substantial changes in the abundance and distribution of potential food for animals. Developing a wind turbine site requires soil disturbing actions which may alter the potential habitat for many species. A notable example of this in wind energy development is the enhancement of habitat for ground burrowing animals (e.g., squirrels, gophers) primarily due to soil disturbance from construction of siting pads, roads, etc. (Salmon 1981). Though wintering bald eagles may not be influenced by such an increase in prey species, other raptors such as red-tailed hawks (*Buteo jamaicensis*) may be affected by this change. According to raptor surveys at Camp Navajo, the red-tailed hawk was detected more frequently than any other raptor recorded during 2001 surveys (Ingraldi 2001).

Wind plants may also increase the number of perches potentially available to birds for perching and nesting. The increasingly common use of tubular towers (rather than lattice towers) is reducing the perching opportunities on generating equipment in wind plants. Although perching by raptors is most obvious because of their size, most birds perch above the ground, including even grassland ground-foraging species such as sparrows and meadowlarks. Thus, use of turbines as perches could enhance the habitat of an area for a species by increasing its hunting success and/or lowering its susceptibility to predation. There is likely some cost/benefit to a bird that is species specific, and also probably location (wind plant)-specific. That is, decreasing starvation by increasing hunting success, while also increasing deaths due to striking blades,

could result in an overall reduction in population mortality. Evaluating attributable risk is an important component in examining the cost/benefit ratio and involves a detailed understanding of species of concern and habitat present.

In summary, the raising of the wind turbine will present a constant, though infrequent, threat to wintering bald eagles that consistently use this area from October through April. The location of the wind turbine is within the area of highest use by eagles at Camp Navajo; especially since Interstate 40 and the AGFD research project provide carrion that will draw bald eagles into the area. Though the occurrence of injury to bald eagles will be rare, the wind turbine design configurations (lattice type tower with multiple guy wires) and siting (location in area of high use) have the potential to injure or kill bald eagles.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area to be considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7, and therefore, are not considered cumulative in the proposed action. Future actions within the action area that are reasonably certain to occur include urban growth and development, recreation, road construction, fuels-reduction treatments, livestock grazing, bald eagle research and other associated actions. These actions have the potential to cause disturbance and harm to wintering bald eagles, and would contribute as cumulative effects to the proposed action.

CONCLUSION

After reviewing the current status of the bald eagle, the environmental baseline for the action area, the effects of the proposed installation of a wind turbine at Camp Navajo and the cumulative effects, it is the our biological opinion that the installation of the wind turbine, as proposed, is not likely to jeopardize the continued existence of the bald eagle. No critical habitat has been designated for this species, therefore, none will be affected. Our reasons for this conclusion are that the population status of the bald eagle continues to improve overall, and the proposed action includes conservation measures which will lessen the impact of the proposed wind turbine on wintering eagles.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to

engage in any such conduct. Harm is further defined by the Fish and Wildlife Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Fish and Wildlife Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the AZ ARNG so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The AZ ARNG has a continuing duty to regulate the activity covered by this incidental take statement. If the AZ ARNG (1) fails to assume and implement the terms and conditions or (2) fails to require contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the AZ ARNG must report the progress of the action and its impact on the species to the Fish and Wildlife Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

We anticipate one bald eagle will be taken due to the constant threat, but infrequent occurrence, that an eagle will be injured and/or killed as a result of direct effects from the proposed wind turbine. The incidental take is expected to be in the form of harm and/or direct mortality

The Fish and Wildlife Service will not refer the incidental take of any migratory bird, bald eagle or golden eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

The Fish and Wildlife Service is very concerned about the protection of migratory birds and ensuring that wind energy projects minimize to the maximum extent practicable the impacts to the local avian community and to birds in migration. We are also very interested in obtaining as much information as possible on the effects of wind energy projects to allow better planning for similar projects in the future. In order to minimize the environmental impacts of wind energy projects, we recommend design considerations and monitoring activities to minimized impacts to birds. We have included this information in Appendix A.

Effect of the Take

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures With Terms and Conditions

The following reasonable and prudent measures are necessary and appropriate to minimize take of the bald eagle:

In order to be exempt from the prohibitions of section 9 of the Act, the AZ ARNG must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The AZ ARNG shall monitor incidental take resulting from the proposed action and report the findings of that monitoring to the AESO.

The Terms and Conditions required to implement Reasonable and Prudent Measure 1 are:

1.a. The AZ ARNG shall work with the Fish and Wildlife Service to develop a protocol for monitoring bald eagles near the wind turbine weekly from October 15 through April 15 yearly.

2. The AZ ARNG shall work with the Fish and Wildlife Service to implement the proposed conservation measures and modify the design configurations in order to reduce impacts to bald eagles.

The Terms and Conditions required to implement Reasonable and Prudent Measure 2 are:

2.a. The AZ ARNG shall paint one of the three blades black and the other two white in order to increase visibility to bald eagles.

2.b. The AZ ARNG shall work with the Fish and Wildlife Service to increase the visibility of the guy wires by attaching visual markers. The markers may include, but are not limited to PVC pipe to cover the guy wires or permanent flagging strung along the guy wires.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The AZ ARNG must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Animals

Upon locating a dead, injured or sick listed species initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona at (480) 835-8289, within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. If feasible, the remains of intact specimens of listed animal species shall be submitted as soon as possible to this office or the nearest Arizona Game and Fish Department office, educational, or research institutions (e.g. Northern Arizona University in Flagstaff) holding appropriate State and Federal Permits.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, we should be contacted regarding final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following:

1. We recommend that the AZ ARNG implement the attached design considerations and monitoring activities to minimize potential impacts to migratory birds and other wildlife.

2. We recommend working with us to modify the survey protocol (Manville 2002) developed for use by the Forest Service in Arizona to monitor the impact of cellular communication towers on migratory birds for use at land-based wind turbines.

3. We recommend that the AZ ARNG continue to monitor wintering bald eagles and locate and minimize potential sources of disturbance to these birds on the installation.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the consultation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to identify and minimize effects to bald eagles from this project. If you have any questions regarding this consultation, please contact Shaula Hedwall of our Flagstaff Suboffice at (928) 226-1811 or Tom Gatz at (602) 242-0210 (x240). Please refer to the consultation number 02-21-02-F-0503, in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, U.S. Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Field Supervisor, U.S. Fish and Wildlife Service, Albuquerque, NM
Natural and Cultural Resource Manager, Arizona Department of Emergency and Military Affairs, Phoenix, AZ (Attn: Catherine Ripley)
Jeff Seaton, Arizona Department of Emergency and Military Affairs, Phoenix, AZ
MAJ Paul Forshey, Arizona Department of Emergency and Military Affairs, Phoenix, AZ
Natural Resource Specialist, Camp Navajo, Bellemont, AZ (Attn: Tom Parker)

John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Forest Supervisor, Coconino National Forest, Flagstaff, AZ (Attn: Cecelia Overby)

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APPENDIX A

GUIDELINES TO AVOID AND MINIMIZE WILDLIFE IMPACTS FROM WIND TURBINES

Wind-generated electrical energy is renewable, produces no emissions, and is a generally environmentally clean technology. Development of wind energy is strongly endorsed by the Secretary of the Interior, as expressed in the Secretary's Renewable Energy on Public Lands Initiative. However, wind energy facilities can adversely impact wildlife, especially birds, bats and insects. As more facilities with larger turbines are built, the cumulative effects of this rapidly growing industry may initiate or contribute to the decline of some wildlife populations. The potential harm to these populations from an additional source of mortality makes careful evaluation of proposed facilities essential. Due to local differences in wildlife concentration and movement patterns, habitats, area topography, facility design, and weather, each proposed development site is unique and requires detailed, individual evaluation.

The following guidance was prepared by the U.S. Fish and Wildlife Service. It is intended to assist the wind industry in avoiding or minimizing impacts to wildlife through: (1) proper evaluation of potential Wind Resource Areas (WRAs), (2) proper siting and design of turbines within development areas, and (3) pre- and post-construction research and monitoring to identify and/or assess impacts to wildlife. Definitions of terms used in this document can be found in Appendix 2.

These guidelines are voluntary. They are based on current science and will be updated as new information becomes available. Data on wildlife use and mortality collected at one site are not necessarily applicable to others; each site poses unique possibilities for negative effects on wildlife. In addition, the wind industry is rapidly expanding into habitats and regions that have not been well studied. The Service therefore suggests a precautionary approach to site selection and development and will employ this approach in making recommendations and assessing impacts of wind energy developments. We encourage the wind industry to follow these guidelines and to conduct scientific research to provide additional information on the impacts of wind energy development on wildlife. We further encourage the industry to look for opportunities to promote bird and other wildlife conservation when planning wind energy facilities (e.g., voluntary habitat acquisition or conservation easements) to compensate for habitat that is lost or degraded through development activities.

The Service is guided by the Fish and Wildlife Service Mitigation Policy (Federal Register 46 (15), January 1981) in evaluating modifications to or loss of habitat caused by development. This policy follows the sequence of steps recommended in the National Environmental Policy Act (NEPA) in seeking to avoid, minimize or compensate for negative impacts. Mitigation can involve avoiding the impact of an activity by (1) taking no action, (2) minimizing impacts by limiting the degree of activity, (3) rectifying an impact by repairing, rehabilitating, or restoring an affected environment, (4) reducing or eliminating an impact by conducting activities that

preserve and maintain the resources, or (5) compensating for an impact by replacing or providing substitute resources or environments. Any mitigation recommended by the Service for wind energy development would be for the purpose of offsetting habitat loss, degradation or fragmentation, and would be voluntary on the part of the developer. Mitigation does not apply to "take" of species under the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, or Endangered Species Act.

The guidelines contain a protocol for pre-development evaluation of all potential WRAs in a geographic area (Appendix 1), and recommendations for siting, designing, constructing, and operating turbines within WRAs. Pre-development evaluations should be conducted by a team that includes Federal and/or State agency wildlife professionals with no vested interest in the sites selected. The pre-development evaluation may also identify additional studies needed prior to development. Post-construction monitoring is recommended at all developed sites. Pre- and post-development studies and monitoring may be conducted by any qualified wildlife biologist.

A. Site Evaluation

The site evaluation protocol presented in Appendix 1 was developed by a team of Federal, State, university and industry biologists to rank potential terrestrial wind energy development sites by their potential impacts on wildlife. There are two steps to follow:

1. Identify and evaluate reference sites, preferably within the general geographic area of WRAs. Reference sites are high-quality wildlife areas where wind development would result in the maximum negative impact on wildlife (i.e., sites selected to have the highest possible rank using the protocol). Reference sites are used to put risks of developing specific sites within WRAs into perspective.

2. Evaluate potential development sites within WRAs to determine risk to wildlife and rank sites against each other using the highest-ranking reference site as a standard. Although high ranking sites are generally less desirable for wind energy development, a high rank does not necessarily preclude development of a site, nor does a low rank automatically eliminate the need to conduct pre-development assessments of impacts on wildlife.

B. Studies to Assess and Monitor Wildlife Impacts

1. While ranking potential development sites, the site evaluation team may identify pre-development studies that are needed to better assess potential negative impacts to wildlife. Ranking may also suggest the degree and depth of study required. Developers are encouraged to conduct any studies suggested by the team in coordination with Service and other agency wildlife biologists.

2. Post-development mortality studies should be a part of any site development plan in order to obtain additional information on the extent of mortality, if any. As with pre-development studies, ranking may be suggestive of the degree and depth of study needed. Studies should be designed in coordination with Federal and other agency wildlife biologists.

C. Site Development Recommendations

1. Avoid siting turbines on major bird migration corridors or in areas where birds are highly concentrated, unless mortality risk is low (i.e., birds present rarely enter the rotor-swept area, such as Sage Grouse). Examples of high concentration areas for birds are wetlands, State or Federal refuges, private duck clubs, staging areas, rookeries, and landfills. Avoid known migratory or daily movement flyways and areas with a high incidence of fog, mist, low cloud ceilings and low visibility.

2. Configure turbines to avoid areas or features of the landscape known to attract raptors (hawks, falcons, eagles, owls). For example, Golden Eagles, hawks and falcons use cliff/rim edges extensively; setbacks from these edges may reduce mortality. Other examples include avoiding siting turbines in a dip or pass in a ridge, or in or near prairie dog colonies.

3. Develop a habitat restoration plan for the proposed site that avoids negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. For example, avoid attracting high densities of prey animals (rodents, rabbits, etc.) used by raptors, reduce availability of carrion by practicing responsible animal husbandry to avoid attracting Golden Eagles and other raptors, avoid creating wetlands adjacent to turbines, and maintain contiguous habitat for area-sensitive species (e.g. Sage Grouse).

4. Configure turbines to minimize mortality; for example, orient rows of turbines parallel to known bird movements.

5. Where the height of the rotor-swept area produces a high risk for wildlife, adjust tower height where feasible to reduce the risk of strikes.

6. Avoid placing turbines near bat hibernation and breeding colonies, in migration corridors, or in flight paths between colonies and feeding areas.

7. Avoid siting turbines in habitats of any species of wildlife, fish or plant protected under the Federal Endangered Species Act.

D. Turbine Design and Operation Recommendations

1. Use tubular supports with pointed tops rather than lattice supports to minimize bird perching and nesting opportunities. Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting. Do not use guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices (Avian Power Line Interaction Committee. 1994).

2. When using three-bladed turbines, paint one of the three blades black and the other two white to increase visibility to birds.

3. If taller turbines (top of the rotor-swept area is >199 feet above ground level) require lights for aviation safety, use the minimum amount of pilot warning and obstruction avoidance lighting specified by the Federal Aviation Administration (FAA) should be used. Unless otherwise requested by the FAA, only white strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. Solid red or pulsating red incandescent lights should not be used, as they appear to attract night-migrating birds at a much higher rate than white strobe lights.

4. Where feasible, place electric power lines underground to avoid electrocution of birds. Use recommendations of the Avian Power Line Interaction Committee (1994, 1996) for any required above-ground lines, transformers or conductors.

5. High seasonal concentrations of birds may cause problems in some areas. If, however, power generation is critical in these areas, an average of three years monitoring data (e.g., acoustic, radar, infrared, or observational) should be collected and used to determine peak use dates for specific sites. Where feasible, turbines should be shut down during periods when birds are highly concentrated at those sites.

6. When upgrading or retrofitting turbines, follow the above guidelines as closely as possible. If studies indicate high mortality at specific older turbines, retrofitting or relocating is highly recommended.

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