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To Maricela Constantino/CBFO/R5/FWS/DOI@FWS, Douglas
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cc

bcc

Subject discreteness write-up

Here's the discreteness discussion for you guys to look at. I'm still expecting, but have not yet received, comments from Spangle and Janet. So, if you guys have edits, please work in track changes so we can merge versions. Thanks!



eagle discreteness argument 7-24.doc

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**DISCRETENESS LANGUAGE FOR BALD EAGLE 90-DAY RULE; TO BE
INSERTED IN RULE R.O.**

7/20/06

The petition provided information for the DPS analysis as follows:

1. The population segment is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

Ecological Factors

The petition notes the region occupied by Sonoran bald eagles is much drier and hotter than that of any other bald eagle population, and represents a significant departure from the habitat selected by bald eagles in the rest of North America. The petition concludes that, in order to adapt to high summer temperatures and to time breeding cycles to the accessibility and spawn of native fish (primarily suckers), Sonoran bald eagles breed earlier, nest earlier, and fledge their young sooner than bald eagles elsewhere (AGFD 1999a, 2000; Gerrard and Bortolotti 1988; Hunt et al. 1992; Stalmaster 1987; USFWS 2003b). In addition, the petition notes that, unlike bald eagles elsewhere in North America, Sonoran bald eagles use cliff nest sites and that 53 of 111 known nests, or 48%, are on cliffs or pinnacles. They further note the only other place this occurs is in the Aleutian Islands (Hunt et al. 1992).

Response to the Petition

The information provided in the petition on behavioral adaptations to the Sonoran desert is, in part, accurate. While it is true that Sonoran bald eagles initiate nesting earlier than eagles in some parts of the country, Stalmaster (1987, p. 63) notes bald eagles in Florida initiate breeding activities in October, even earlier than Arizona bald eagles. Florida bald eagles also lay eggs earlier (Stalmaster 1987, p. 63; Gerrard and Bortolotti 1988 p. 76).

Accordingly, Florida bald eagles hatch and fledge earlier than those in Arizona.

Stalmaster (1987, p.63) concludes timing of various breeding events is tied to latitude of the nesting area, with eagles at more northern latitudes breeding at later dates.

With respect to cliff nesting, the information presented on the use of cliff nests is accurate. However, this is not necessarily a unique trait of Sonoran bald eagles. Gerrard and Bortolotti (1988, p. 41) note bald eagles in other areas may nest on cliffs if suitable trees are not available. Stalmaster (1987) noted exceptions to tree nests as well, but indicated that, while eagles in other areas may rarely use cliffs or other surfaces, this is an exception, whereas in Arizona, cliff nesting is common. In addition, bald eagles are known to nest on cliffs on the Channel Islands off California (L. F. Kiff in NOAA 2005).

Behavioral Factors

The petition provides information to indicate the that Sonoran bald eagles are reproductively isolated. Specifically, the petition contends that 352 out of 353

individuals (or 99.997%) objectively identified while participating in breeding activity in this population came from within the Sonoran bald eagle population. Additionally, the petition notes that, since 1977, biologists in Arizona have banded 256 nestlings with only one individual identified as having emigrated. According to the petition, this indicates that 99.6% of individuals born into the Sonoran desert remain in the desert (AGFD 1999a, 2000). The petition states that, to date, evidence from the banding and identification of breeding adults defends the theory the Sonoran bald eagle breeding population is not supported or maintained by immigration from other states or regions. They quote AGFD (1999a, 2000) as indicating:

“...because adults return to the vicinity of their natal area to breed, the large distance between small breeding 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 only one left. Additionally, the proportion of breeding adults with color bands had steadily increased, while the presence of unmarked Bald 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...”

The petition claims the AGFD (1994b) warned that repopulation of the Sonoran bald eagle population following a population crash would be highly unlikely, and quote the AGFD (1994b) as follows:

“Because Arizona continues to possess nearly the entire breeding population within the Southwestern Region, concerns remain over retaining the genetic integrity of this population...Should a population crash occur in Arizona, the pool of eagles to repopulate the Southwest could be left to the few pairs in the neighboring states or Mexico. However, at this time, there is no documentation of eagles from these neighboring Southwestern states breeding in Arizona or vice versa.”

The petition further notes natal site fidelity is common for bald eagles, noting that, in a study of nine bald eagle populations including thousands of banded birds, only two nestlings were found to have bred in other areas. One of these birds moved 331 km (205 miles) north from its natal site in the Greater Yellowstone Ecosystem (Harmata in litt.) while the other traveled 418 km (260 miles) south from its natal site near Charleston, South Carolina (T. Murphy, pers. comm., Wood in litt.). They conclude that the tendency for banded nestlings to breed within their natal populations is well known (Hunt et al. 1992).

Response to the Petition

The information in the petition appears to be accurate and reliable; however, it should be noted the only individual cited as entering the breeding population from out-of-state refers to a bald eagle from Texas (AGFD 2006, p. 27) that currently occupies the Luna BA, which is not part of the Sonoran bald eagle population. As a result, the appropriate conclusion is all birds objectively identified while participating in breeding activity in the Sonoran bald eagle population came from within the population. We agree with the petitioners that, should the Sonoran bald eagle population experience a rapid decline, there are few eagles in neighboring southwestern states or Mexico which could serve as a source population for the Sonoran bald eagle population. Finally, we find the information from Harmata et al. (1999, p. 788) and Hunt et al. (1992, p. A-144) support the discussion on the natal origins of breeding adults, and the unlikelihood of adult bald eagles immigrating to the Sonoran bald eagle population from surrounding southwestern states or farther.

Evidence of Genetic Discontinuity

With respect to genetic isolation, the petition found that the current understanding of genetics does not refute the discrete and isolated nature of the Desert Nesting bald eagle. The petition notes a review of all information regarding genetic analysis of the Southwestern Desert Nesting Bald Eagle reveals consistent uncertainty, and concludes current genetic data support no definitive conclusions concerning isolation or lack of isolation (CBD 2004e, Hunt et al. 1992, SWCBD 1999). The petition states that, while

no definitive conclusions are supported by the limited genetic data, this is not required under the current DPS policy. Specifically, the petition quotes from the policy:

“Thus, evidence of genetic distinctness or of the presence of genetically determined traits may be important in recognizing some DPS’s, but the draft policy was not intended to always specifically require this kind of evidence in order for a DPS to be recognized...”

Similarly, the petition notes absolute reproductive isolation is not required under the policy, which states:

“The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment. This would be an impracticably stringent standard, and one that would not be satisfied even by some recognized species that are known to sustain a low frequency of interbreeding with related species...”

Response to the Petition

The information presented within the petition on completed genetic studies for bald eagles appears accurate and reliable. Hunt et al. (1992, pp. E-96 to E-110) contains the genetic work completed to date on the southwestern bald eagle population. Vyse (1992, p. E-100, E-101) notes the data are inconclusive, as evidenced by such statements as

“These findings must be assumed to be preliminary (and treated with due caution), because of a lack of information concerning sampling procedures. The results we have obtained could easily be explained by sampling procedures;” and “At present these data (HinfI/M-13) are too incomplete to be considered further.” In addition, Zegers et al. 1992, p. E-106 to E-109) notes that “Question 4...is difficult to answer with precision because of the different sample sizes between 1985 and 1990...this difference is possibly an artifact of the many fewer samples in 1985;” and “...six loci may not be enough to give a reliable estimate of the true genetic distance;” and “We feel caution should be exercised when interpreting these results due to the low numbers of individuals sampled from most states but especially because of the few loci examined.”

Furthermore, the language attributed to the DPS policy is quoted accurately.

Evidence of Morphological Discontinuity

The petition contends that quantitative measures of the physical differences between Sonoran bald eagles and bald eagles elsewhere offers evidence of morphological discontinuity. The petition sites quantitative measures of physical difference, stating that average weights of male bald eagles are 3.3 kilograms (kg) (7.3 pounds (lbs.)) in Arizona, 4.1 kg (9.0 lbs.) in California, and 4.7 (10.4 lbs.) kg in Alaska. Similarly, average weight for females is 4.5 kg (9.9 lbs.) in Arizona, 5.1 kg (11.2 lbs.) in California, and 5.8 kg (12.8 lbs.) in Alaska (Hunt et al. 1992).

Response to the Petition

The information provided on size differences appears to be accurate and reliable, as found in Hunt et al. (1992, p. A-159). Stalmaster (1987, pp. 16-17) notes southern eagles are much smaller and lighter than their northern counterparts. This is consistent with Bergmann's Rule, which holds that animal size increases with increasing latitude. Gerrard and Bortolotti (1988, p. 14) note Florida birds are the smallest, with a gradation of small to large from south to north. The importance of this morphological difference and its potential isolating effects are discussed by Hunt et al. (1992, p. A-165), who notes morphological differences such as small size may be an adaptation related to desert conditions, noting a decision to release birds into Arizona from elsewhere should be considered only as a last resort, as the introduction of foreign genes into the Sonoran desert population might disrupt coadapted gene complexes specific to the desert population.

2. It is delimited by international government boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

No specific information was identified in the petition for this category.

ADD TO FINDING AT END OF THREATS ASSESSMENT IN 90-DAY RULE:

<<<Insert in first paragraph following the first sentence. Move language on threats to new paragraph.>>>

In evaluating this petition, we sought to determine if sufficient information was provided to warrant continued consideration and development of a 12-month rule. We find available genetic studies on bald eagles are dated, the sample size was small, and researchers conducting the studies found the results to be inconclusive. We therefore believe that the best available genetic information is inconclusive with regard to the discreteness of the Sonoran bald eagle population. However, we believe the petition presents substantial information on distinct morphological features of the Sonoran bald eagles with respect to size. Additionally, we believe the petition provides substantial information on natal site fidelity in breeding birds and the limited number of other eagles in neighboring southwestern states or Mexico. Finally, we believe the strongest argument presented by the petitioners for a positive discreteness finding is provided by the data indicating that 20 years of monitoring have resulted in the determination that no eagles have immigrated to and only one eagle has emigrated from the Sonoran bald eagle population. These three factors lead us to find that the petition contains significant information with respect to the discreteness requirements of the DPS policy to warrant considering the Sonoran bald eagle population as discrete from other bald eagle populations.