Supplemental Finding for the Recovery Plan for the California condor (*Gymnogyps californianus*)
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For
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BACKGROUND INFORMATION

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination…that the species be removed from the list." It is possible that for some species, however, delisting cannot be foreseen at the time a recovery plan is written. In some rare cases, the best available information is so seriously limited that it is truly not possible to identify delisting criteria. This would be an unusual case, such as one in which the species' threats are not understood well enough to identify priorities and appropriate mitigation. For example, the natural habitat may have been so reduced for an endangered species that captive propagation and active management is necessary for the life of a reasonable recovery plan. In another example, the population of a long-lived, slow growing species may be so depleted that possible recovery may be beyond the life of a reasonable recovery plan.

A 2006 Government Accountability Office (GAO) audit of the NMFS' and FWS' endangered species recovery programs recommended that the Secretaries of the Department of Commerce and the Interior direct their staff to ensure that all new and revised recovery plans have either recovery criteria evidencing consideration of all five delisting factors or a statement regarding why it is impracticable to do so (GAO 2006). Since the 2006 GAO audit, we have updated our recovery planning and implementation guidance (NMFS and FWS 2010), and new plans have included determinations regarding the feasibility or possibility of incorporating delisting criteria related to each of the five factors, as recommended by the GAO. Active recovery plans remain, however, that lack delisting criteria and contain either an incomplete determination regarding the practicability of incorporating delisting criteria, or are silent about the absence of delisting criteria in the recovery plan. In this document, we clarify why it remains impracticable to incorporate delisting criteria for California condor in the Recovery Plan for the California condor (*Gymnogyps californianus*).

METHODOLOGY USED TO COMPLETE THE FINDING

In determining the practicability of developing recovery criteria for California condor, we searched the relevant scientific literature and sought input from population modeling experts working on the species. We also solicited input from the Southwest Condor Working Group (including the State wildlife agencies from Utah and Arizona) and from the California Department of Fish and Wildlife in December, 2018.

FINDING

The primary objective of the 1996 Recovery Plan for California Condor is reclassification of the species to threatened status. The criterion developed to indicate the need for reclassification is the establishment and maintenance of at least two non-captive populations and one captive population, with each population meeting certain standards. The plan does not include or discuss delisting criteria. The years since the publication of the revised recovery plan have seen the implementation of a variety of recovery actions and the expansion of research on many aspects of condor biology. Despite these positive developments, it remains impracticable to determine delisting criteria because of considerable uncertainty about the conditions that would describe a stable, recovered population. This uncertainty is due to a paucity of information about historical populations, ongoing uncertainty about how specific demographic rates and population size

relate to viability, and how population dynamics between disjunct condor sub-populations and the primary threat, exposure to lead, are likely to change in the future.

There is little information about condor abundance, range, dispersal or demographic rates from the time before the species began to experience population declines. D'Elia et al. (2016) used molecular techniques with historical samples to demonstrate a genetic bottleneck consistent with a relatively abundant species experiencing rapid population decline, but such information is too imprecise to serve as a meaningful guide for recovery. Reliable estimates of key demographic parameters from natural, historical populations of California condor are not available and therefore can provide no insights into what a stable, recovered population of California condors might look like.

There is, however, good information about the extant condor population and its trajectory since being listed as endangered. Beginning in 1982 when the condor population dropped to a low of 22 individuals, the California Condor Recovery Program has made remarkable progress (Walters et al. 2010). By December of 2017, there were 486 California condors, with 293 occurring in three subpopulations in the wild (California, Arizona/Utah, and Baja, Mexico), along with 193 in captivity (Service 2017). There is now successful reproduction occurring in each of the three subpopulations, and in 2017, the first chick from a nesting pair of wild-fledged birds successfully fledged in the wild in Central California (Ventana Wildlife Society 2017).

Despite the increasing population numbers, the primary threat to the species, exposure to lead and resulting toxicosis, continues to be a major factor throughout the range of the species (Bakker et al. 2016; Finkelstein et al. 2012; Herring et al. 2018; Johnson et al. 2013; Kelly et al. 2014; Rideout 2012; Service 2013). Lead toxicosis is the cause of approximately 50% of all condor deaths with known causes from 1992-2017 (USFWS California Condor Recovery Program unpublished data) based on U.S. Fish and Wildlife Service Forensics Lab pathology reports (2013-2017) and San Diego Zoo pathology reports (1992-2012).

In the Arizona/Utah and Baja, Mexico subpopulations, mortality levels still exceed natural recruitment (C. Parish pers. comm 2018). As a result, the growth of those subpopulations remains dependent on both the implementation of management activities and the continued release of captive-bred individuals into the wild (Walters et al. 2010). The California subpopulation is somewhat further along, where the ratio of mortality to natural recruitment is now low enough to allow for population stability even without the release of captive-bred condors. Nonetheless, this condition is predicated on the continuation of intensive management activities, including extensive monitoring and treatment for lead exposure (Bakker et al. 2017; Kelly et al. 2014; Kelly et al. 2015; Walters et al. 2010). The Baja, Mexico subpopulation remains small (36 condors), with no captive bred condors released since 2015. Accurate and updated data on mortality and reproduction for the Baja subpopulation is difficult to obtain due to remoteness of the field conditions and limitations on the ability to track wild birds as closely as other field sites. The growth of all subpopulation remains dependent on both the implementation of management activities and the continued release of captive-bred individuals into the wild (Walters et al. 2010).

While the trajectory for these wild subpopulations is promising, the subpopulations are still quite new, particularly considering the long generation time of the species (approximately 25 years) and low reproductive rate, which is approximately one egg every one to two years (Service 1996). In addition, the intensive management of the three wild subpopulations means that the survival and reproductive rates observed currently are unlikely to be reliable predictors of future demographic rates for wild populations that may be less intensively managed. For example, studies have shown that as the size of a flock and age of the birds increase, condors may be subject to increased mortality as they range further afield and experience reduced protections from management actions such as lead-free proffered food (Bakker et al. 2017; Kelly et al. 2014). Such behavioral changes, along with the scope or magnitude of potential resulting effects, present considerable areas of uncertainty in assessing or predicting population dynamics as these populations continue to grow and expand. Population modeling that has taken place for the California sub-population has greatly improved our understanding of the demographic rates that are compatible with population stability, including with different levels of management. To date, however, such models only consider the California sub-population, and cannot yet be applied on a species-wide basis.

Finally, the threat posed by exposure to lead continues to be both problematic for condor recovery and difficult to forecast. In a comprehensive review of the California Condor Recovery Program, Walters et al. (2010) concluded that recovery likely could not be achieved while the species was still exposed to lead through foraging in the wild. Increased awareness of the issue of lead exposure over the last few decades has prompted various efforts to curb the use of lead ammunition, the primary source of lead exposure. Arizona has developed a voluntary hunter education program and now promotes the use of nonlead ammunition. California has taken a more regulatory approach and began requiring the use of nonlead ammunition within the condor range in 2008 (Assembly Bill 821, 2007) and throughout the state beginning in July 2019 (Assembly Bill 711, 2013). Despite these efforts, condor exposure to lead continues to be a pervasive problem, including in those areas into which the condor population may expand, such as Oregon and Utah (Bakker et al. 2017; Haig et al. 2014; Herring et al. 2018; Hunt et al. 2009). We expect that as participation and enforcement of these relatively new programs continue and perhaps expand, we will gain a better understanding of both the effectiveness of the programs in reducing the prevalence of lead and the potential beneficial effects to condors. This understanding will, in turn, allow us to more accurately determine threat-based criteria compatible with condor recovery.

We are continuing to work on a more comprehensive population model at the species level, encompassing all three sub-populations of wild California condors. The uncertainties surrounding current assumptions of future mortality and demographic rates for the species as whole are too great at this time for us to accurately determine recovery criteria for the species. A more comprehensive model of the species will enable us to determine how much of a reduction in lead exposure needs to occur for the entire species, as well as provide demographic parameters that are necessary to achieve and maintain population stability. Stability for this species would be defined by persisting populations without the need for release of captive-bred condors to the wild nor the continued intensive management practices that are currently ongoing.

In summary, we find that the development of measurable, objective criteria that describe recovery for the California condor is not practicable at this time due to: 1) the lack of reliable information about historical, stable condor populations, 2) considerable uncertainty about the demographics and dynamics of the relatively new, changing, and heavily managed wild subpopulations of condor, and 3) the persistent threat posed by exposure to lead and uncertainty about the maximum rate of mortality the species can withstand range-wide, while still achieving natural population growth and stability. We anticipate that as wild-fledged birds become a larger proportion of the wild subpopulations and our ability to accurately model the population dynamics of condors range-wide improves, we will be better able to assess the demographic needs in relation to the primary threats. Such information can be used, in turn, to develop objective criteria for determining when the species may be delisted. The Service's 5-Year Reviews of the species will be instrumental in illuminating how recovery is progressing and at what point the development of sound delisting criteria is practicable.

LITERATURE CITED

Bakker, V.J., D.R. Smith, H. Copeland, J. Brandt, R. Wolstenholme, J. Burnett, S. Kirkland, and M.E. Finkelstein. 2017. Effects of Lead Exposure, Flock Behavior, and Management Actions on the Survival of California Condors (Gymnogyps californianus). EcoHealth 14: 92–105.

D'Elia, J., S.M. Haig, T.D. Mullins, and M.P. Miller. 2016. Ancient DNA reveals substantial genetic diversity in the California Condor (*Gymnogyps californianus*) prior to a population bottleneck. Ornithological Applications 118: 703-714.

Finkelstein, M.E., D.F. Doak, D. George, J. Burnett, J. Brandt, M. Church, J. Grantham, and D.R. Smith. 2012. Lead poisoning and the deceptive recovery of the critically endangered California condor. Proceedings of the National Academy of Science. June 25, 2012.

Haig, S.M., J. D'Elia, C. Eagles-Smith, J.M. Fair, J. Gervais, G. Herring, J.W. Rivers, and J.H. Schulz. 2014. The persistent problem of lead poisoning in birds from ammunition and fishing tackle. Ornithological Applications 116: 408-428.

Herring, G., C.A. Eagles-Smith, and D.E. Varland. 2018. Mercury and lead exposure in avian scavengers from the Pacific Northwest suggest risks to California condors: Implications for reintroduction and recovery. Environmental Pollution 243: 610-619.

Hunt, G.W., C.N. Parish, K. Orr, and R.F. Aguilar. 2009. Lead poisoning and the reintroduction of the California condor in northern Arizona. Journal of Avian Medicine and Surgery 23(2): 145-150.

Johnson, C.K., T.R. Kelly, and B.A. Rideout. 2013. Lead in ammunition: A persistent threat to health and conservation. EcoHealth 10: 455-464.

Kelly, T.R., J. Grantham, D. George, A. Welch, J. Brandt, L. J. Burnett, K. J. Sorenson, M. Johnson, R. Poppenga, D. Moen, J. Rasico, J. W. Rivers, C. Battistone, and C. K. Johnson. 2014. Spatiotemporal patterns and risk factors for lead exposure in endangered California condors during 15 years of reintroduction. Conservation Biology, Volume 00, No. 0, 1–10. Society for Conservation Biology DOI: 10.1111/cobi.12342.

Kelly, T.R., B.A. Rideout, K. Grantham, J. Brandt, L.J. Burnett, K.J. Sorenson, D. George, A. Welch, D. Moen, J. Rasico, and M. Johnson. 2015. Two decades of cumulative impacts to survivorship of endangered California condors in California. Biological Conservation 191: 391-399.

Rideout, B.A., I. Stalis, and R. Papendick. 2012. Patterns of mortality in free-ranging California condors (*Gymnogyps californianus*). Journal of Wildlife Diseases 48(1): 95–112.

U.S. Fish and Wildlife Service. 1996. California Condor Recovery Plan, Third Revision. Portland, Oregon. 62 pp.

U.S. Fish and Wildlife Service. 2013. California condor (*Gymnogyps californianus*) 5 Year Review: Summary and Evaluation. Pacific Southwest Region. Sacramento, California.

Ventana Wildife Society. 2017. Ventana Wildlife Society's Condor Restoration Program. Annual Report for 2017. Unpublished Annual report to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. Monterey, California.

U.S. Fish and Wildlife Service. 2017. California Condor Recovery Program 2017 Annual Population Status. Unpublished report. Ventura, California.

Walters, J.R., S.R. Derrikson, D.M. Fry, S.M. Haig, J.M. Marzluff, and J.M. Wunderle Jr. 2010. Status of the California condor (Gymnogyps californianus) and efforts to achieve its recovery. The Auk 127(4): 969-1001.

PERSONAL COMMUNICATION

Parish, C. 2018. Personal communication to Steve Kirkland, USFWS Condor Field Coordinator.