August 19, 2022

Attn: FWS–R6–ES–2022–0100
U.S. Fish and Wildlife Service
MS: PRB/3W
5275 Leesburg Pike,
Falls Church, VA 22041-3803.

Electronically submitted to: https://www.regulations.gov/document/FWS-R6-ES-2022-0100

Re: **Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Gray Wolf in the State of Colorado; Environmental Impact Statement, Docket No. FWS-R6-ES-2022-0100**

Dear Ms. Muñoz:

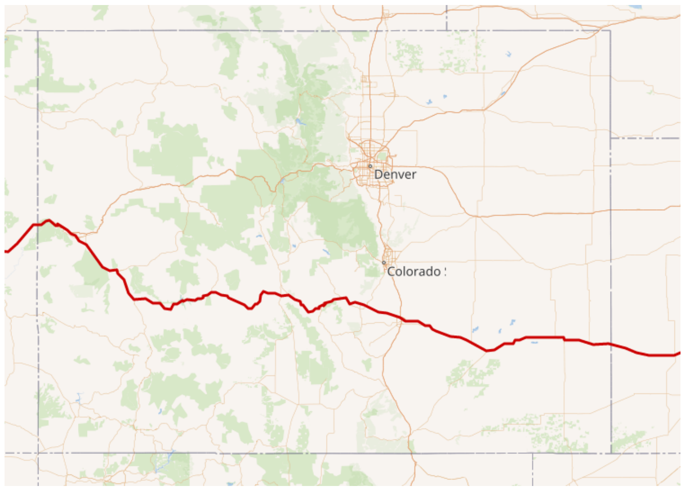
The Arizona Game and Fish Department (Department) would like to thank the U.S. Fish and Wildlife Service (Service) for the opportunity to comment on Docket No.: FWS-F6-ES-2022-0100; *Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Gray Wolf in the State of Colorado; Environmental Impact Statement.*

Under Title 17 of the Arizona Revised Statutes, the Department, by and through the Arizona Game and Fish Commission (Commission), has jurisdictional authority and public trust responsibilities to protect and conserve the State's fish and wildlife resources. In addition, the Department manages threatened and endangered species through authorities in Section 6 of the Endangered Species Act (Act) and the Department's 10(a)(1)(A) permit. It is the mission of the Department to conserve and protect Arizona's diverse fish and wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations. For your consideration, the Department provides the following comments based on the agency's statutory authorities, public trust responsibilities, and special expertise related to wildlife resources and wildlife-dependent recreation.

Nonessential Experimental Populations play a vital role in recovering endangered species, especially those that may be controversial and cause conflicts with humans. This designation would reduce the regulatory impact of wolf reintroduction on those who live, work, and recreate on the landscape. The Department recognizes that the establishment of the Nonessential Experimental Population with a 10(j) designation is the most appropriate avenue for the management of wolves in Colorado. However, releasing northern wolves closer to the existing nonessential experimental population of Mexican wolves (*Canis lupus baileyi*) jeopardizes the recovery of the latter. The Mexican wolf is a separately listed entity under the Act and the Department has a legal and ethical obligation to recover Mexican wolves, not simply fill vacant wolf habitat with any wolves.

Therefore, the Department requests the that the establishment of this statewide Nonessential Experimental Population incorporate two critical components:

1) No initial releases or translocations south of U.S. Highway 50, and
2) Any wolf that moves south or west of the Colorado statewide 10(j) area, regardless of origin, must be returned to the 10(j) area north of U.S. Highway 50 as soon as practicable and before it becomes established.



U.S. Highway 50 in Colorado

The captive Mexican wolf population (n= 366) and the wild populations in the Southwestern U.S. (n=196) and northern Mexico (n= 40) are the only individuals of this endangered subspecies that exist. State, federal, and tribal agencies, as well as nongovernmental organizations, have spent millions of dollars over 4 decades in an effort to recover the Mexican wolf to its historical range to allow it to play its natural ecological role in that environment. Progress was slow in the early stages of recovery, but now there is a solid scientific foundation for recovery that is making great numerical gains while maximizing the retention of genetic diversity. However, extreme caution is warranted here to assure other wolf restoration efforts do not unravel all the progress made in Mexican wolf recovery. Northern wolves are very abundant in the Great Lakes states and Northern Rockies; the desire to see them occupy more areas of the continent does not supersede the potentially dangerous consequences they pose to the recovery of Mexican wolves.

Risk of Genetically Swamping the Recovering Mexican Wolf Population
Wolves are noted for long-range movements and genetic interchange among distant populations, even as far as 678 miles (Wabakken et al. 2007), which is the approximate distance from Denver, Colorado to the wild Mexican wolf population in Chihuahua, Mexico. The wild U.S. population sits about halfway between these two points. Dispersing wolves from the Northern Rockies have already appeared in northern Arizona and New Mexico. In October 2014, a 2-year old female wolf collared near Cody, Wyoming was documented on the Kaibab Plateau in northern Arizona. The wolf was repeatedly sighted in that area for more than two months and returned northward after finding no resident wolves. In July 2008, a wolf with black pelage was documented near the Vermejo Park Ranch in northern New Mexico. No Mexican wolves have ever been documented

with black pelage so this was most likely a wolf from the Northern Rocky Mountains (Odell et al. 2018).

Genetic swamping has been a critical challenge for other endangered canids, notably the Eastern red wolf (*C. rufus*, Kelly et al. 1999). Genetic swamping of Mexican wolves by northern wolves is more than a theoretical possibility – it presents a very real threat to recovery of the Mexican wolf as a separately listed endangered subspecies. All available information suggests releasing larger northern wolves closer to central Arizona and New Mexico will result in hybridization with Mexican wolves. The risk of genetic swamping is particularly high during early phases of Mexican wolf recovery, when the number of wolves on the ground in recovery areas is relatively small.

The Mexican wolf as a subspecies evolved its uniqueness in the high-elevation mountains of Mexico, and mostly separated from the other wolf subspecies to the north by fragmented habitat and discontinuous prey distribution (Heffelfinger et al. 2017a,b). The unique physical and genetic differences of Mexican wolves could not have developed, and maintained itself, if they had shared an extensive zone of genetic exchange with larger northern wolves.

Generally, dispersing wolves are adopted into packs (Boyd et al. 1995) and can assume vacant breeding positions (Fritts and Mech 1981, Stahler et al. 2002, vonHoldt et al. 2008, Sparkman et al. 2012), usurp an existing breeder (Messier 1985, vonHoldt et al. 2008), or bide their time to ascend to breeding positions (vonHoldt et al. 2008). Body size is an important determinant of individual fitness and a driving evolutionary force (Baker et al. 2015). Stahler et al. (2013) demonstrated that body mass of breeders was the main determinant of litter size and survival of the litter. Hunting success is also tied directly to larger body size, which has obvious fitness advantages (MacNulty et al. 2009). This physical superiority offers a decisive advantage for northern wolves obtaining and defending breeding positions in the small Mexican wolf population.

In addition to a body size differential, several characteristics of the current wild Mexican wolf populations make them vulnerable to genetic swamping by northern wolves: 1) social disruption from human-caused mortality, 2) small pack size, and 3) elevated levels of inbreeding. When wolf populations have high rates of mortality, the social turmoil results in a higher rate of acceptance of wolves dispersing from other packs (Ballard et al. 1987, Mech and Boitani 2003:16). Ballard et al. (1987) noted that 21% of dispersing wolves were accepted into other packs. Immigrating wolves are also more readily adopted by smaller packs where additional individuals, especially males, increase hunting efficiency and survival of existing pack members (Fritts and Mech 1981, Ballard et al. 1987, Cassidy et al. 2015). The wild U.S. population of Mexican wolves has consistently maintained a relatively small pack size (mean = 4.1, 1998-2016, USFWS 2017), which means they would more readily accept immigrating wolves from the north. Inbreeding avoidance in wolves has been well-documented, where wolves more readily mate with unrelated wolves (vonHoldt et al. 2008, Geffen et al. 2011, Sparkman et al. 2012). The current wild populations of Mexican wolves have inbreeding levels higher than most wolf populations (USFWS 2017), which means a new wolf immigrant, unrelated to all Mexican wolves, would have a disproportionately high probability of attaining a breeding position (vonHoldt et al. 2008, Geffen et al. 2011, Åkesson et al. 2016).

The extensive problem of wolf introgression into coyotes in the northeastern U.S. has been attributed to the advantage of larger body size (Monzón et al. 2013). This dominance of breeding positions by larger wolves has precipitated the expansion of hybridized coyotes into the northeast. These larger hybridized coyotes are no longer typical coyotes and now assume a different ecological niche as predators of adult white-tailed deer. Likewise, a situation of wolves with Canadian genomes hybridizing with smaller Mexican wolves could result in a similar failure to retain the genetic, physical, and ecological characteristics that resulted in Mexican wolves being listed separately.

The genetic sweep that occurred in wolves on Isle Royale (Michigan) is instructive because it happened even among wolves the same size, presumably because of the inbred nature of the receiving island population. The population began with a single pair of wolves in the 1940s and grew to a population of about 50. In 1997, an additional male wolf made it to the island and within 2.5 generations, every individual in the Isle Royale population was related to him (Adams et al. 2011). Although this may not be detrimental when the same type of wolf is involved, this shows the potential for a rapid genetic sweep under predisposing conditions.

In summary, compared to northern wolves, Mexican wolves have higher inbreeding coefficients, smaller packs, more social disruption, and are notably smaller, which sets the stage for irreversible genetic swamping by the larger wolves. Allowing northern wolf genes to spread in the wild Mexican wolf population does not recreate the natural body size cline where wolves are gradually smaller from north to south. Instead, it would allow wolves that evolved on the northern end of the North American cline to breed with the Mexican wolf on the southern end of the continental cline. This presents a very real danger of outbreeding depression whereby the addition of animals that evolved in a very different environment bring with them genes that are maladapted to southwestern environmental pressures. Outbreeding depression could negatively impact the population trajectory and persistence of the much rarer endangered Mexican wolf even more than inbreeding depression.

Hybrids and the Act

How the Act should regard hybrids has been a topic of discussion since its passage in 1973 (Rhymer and Simberloff 1996, Haig and Allendorf 2006). While drafts have been proposed, a policy on hybridization was never finalized. This leaves no clear direction on either the role of the Act in protecting hybrids, or importantly in this case, the implications of hybrids contributing to the recovery and delisting of endangered species. Although the Service intentionally created hybrids between the endangered Florida panther (*Puma concolor coryi*) and Texas pumas (*Puma concolor stanleyana)* this is unlike the situation with Mexican wolves. The Florida panther was suffering from several serious physical abnormalities because of high levels of inbreeding. This effort was a last resort to save the subspecies from extinction and done in a controlled manner with all remaining pure Texas individuals removed after 8 years. The Mexican wolf population has grown an average of 14% annually since 2009, making their trajectory quite different from the dire situation of the Florida panther. The exception made for the Florida panther in no way sets a precedent to allow listed entities to hybridize freely with similar species and subspecies and still contribute to recovery. Uncontrolled and unneeded hybridization early in the growth of the Mexican wolf population would compromise their recovery and delisting because these hybrids will not be representative of the listed entity (*C. l. baileyi*). If inbreeding in Mexican wolves ever rises to the level it represents a threat to extinction, new genetic material would be introduced into the wild population through fostering pups carefully produced in captivity with a small percentage of genetic influence from northern wolves.

Natural genetic admixture from northern wolves will be an inevitable future occurrence when Mexican wolves are recovered. Those advocating the mixing of Canadian and Mexican genomes disregard the legal, ecological, and ethical obligations of agencies directly responsible for Mexican wolf recovery. Outcomes from the establishment of a Nonessential Experimental Population of wolves in Colorado must benefit the species as a whole. Not establishing safeguards to address the high potential for irreversible genetic consequences would stand in stark contrast to that goal.

The Department wants to thank the Service for the opportunity to comment on this rule. If you have any questions, or desire clarification, please contact Clay Crowder, Assistant Director of Wildlife Management Division at ccrowder@azgfd.gov.

Sincerely,

Ty E. Gray
Director

AZGFD #M22-08031153

Literature Cited

Adams, J.R., L. M. Vucetich, P. W. Hedrick, R. O. Peterson, and J. A. Vucetich. 2011. Genomic sweep and potential genetic rescue during limiting environmental conditions in an isolated wolf population. Proceedings Biological Science. Nov 22;278(1723):3336-44. doi: 10.1098/rspb.2011.0261. Epub 2011 Mar 30.

Åkesson, M., O. Liberg, H. Sand, P. Wabakken, S. Bensch and Ø. Flagstad. 2016. Genetic rescue in a severely inbred wolf population. Molecular Ecology 25:4745-4756.

Baker, J., A. Meade, M. Pagel, and C. Venditti. 2015. Adaptive evolution toward larger size in mammals. Proceedings of the National Academy of Sciences 112:5093-5098.

Ballard, W. B., J. S. Whitman, and C. L. Gardner. 1987. Ecology of an exploited wolf population in south-central Alaska. Wildlife Monographs 98.

Boyd, D. K., P. C. Paquet, S. Donelon, R. R. Ream, D. H. Pletscher, and C. C. White. 1995. Transboundary movements of a recolonizing wolf population in the Rocky Mountains. Pages 135-140 *in* L. N. Carbyn, S. H. Fritts, and D. R. Seip, editors, Ecology and conservation of wolves in a changing world. Canadian Circumpolar Institute, Occasional Publication Number 35.

Carroll, C., J. A. Vucetich, M. P. Nelson, D. J. Rohlf, and M. K. Phillips. 2010. Geography and recovery under the U.S. Endangered Species Act. Conservation Biology 24:395-403.

Cassidy, K. A., D. R. MacNulty, D. R. Stahler, D. W. Smith, and L. D. Mech. 2015. Group composition effects on aggressive interpack interactions of gray wolves in Yellowstone National Park. Behavioral Ecology 26:1352-1360.

Fritts, S. H., and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected wolf population in northwestern Minnesota. Wildlife Monographs 80:3-79.

Geffen, E., M. Kam, R. Hefner, P. Hersteinsson, A. Angerbjorn, L. Dalen, E. Fuglei, K. Noren, J. Adams, J. Vucetich, T. Meier, L. D. Mech, B. VonHoldt, D. Stahler, and R. K. Wayne. 2011. Kin encounter rate and inbreeding avoidance in canids. Molecular Ecology 20:5348–5358.

Goble, D.D., Davis, F.W. (Eds.), The Endangered Species Act at Thirty, Volume 2: Conserving Biodiversity in Human-Dominated Landscapes. Island Press, Washington, DC, USA, pp. 150–163.

Haig, S. M., and F. W. Allendorf. 2006. Hybrids and Policy. Pages 150-163 *in* J. M. Scott, D. D. Goble, and F. W. Davis, editors. The Endangered Species Act at Thirty, Volume 2: Conserving Biodiversity in Human-Dominated Landscapes. Island Press, Washington, DC, USA.

Heffelfinger, J. R., R.M. Nowak, and D. Paetkau. 2017a. Clarifying historical range to aid recovery of the Mexican wolf. Journal of Wildlife Management 81:766-777. DOI: 10.1002/jwmg.21252

Heffelfinger, J. R., R.M. Nowak, and D. Paetkau. 2017b. Revisiting revising Mexican wolf historical range: A reply to Hendricks et al. Journal of Wildlife Management 81:1334-1337.

Karasov‐Olson, Aviv, et al. 2021. Co‐development of a risk assessment strategy for managed relocation. Ecological Solutions and Evidence 2.3 (2021): e12092.

Kelly, B. T., P. S. Miller, and U. S. Seal, editors. 1999. Population and habitat viability assessment workshop for the red wolf (*Canis rufus*). Conservation Breeding Specialist Group (SSC/IUCN), Apple Valley, Minnesota, USA.

MacNulty, D. R., D. W. Smith, L. D. Mech, and L. E. Eberly. 2009. Body size and predatory performance in wolves: is bigger better? Journal of Animal Ecology 78:532-539.

Mech, L. D. and L. Boitani. 2003. Wolf Social Ecology. Pages 1-34 in L. D. Mech and L. Boitani, editors, Wolves, Behavior, Ecology, and Conservation. University of Chicago Press, Chicago, Illinois, USA.

Monzón, J., R. Kays, and D. E. Dykhuizen. 2013. Assessment of coyote-wolf-dog admixture using ancestry-informative diagnostic SNPs. Molecular Ecology 23:182-197.

Odell, E. A., J. R. Heffelfinger, S. S. Rosenstock, C. J. Bishop, S. Liley, A. González-Bernal, J. A. Velasco, and E. Martínez-Meyer. 2018. Perils of recovering the Mexican wolf outside of its historical range. Biological Conservation 220:290-298. https://doi.org/10.1016/j.biocon.2018.01.020

Rhymer, J. M., and D. Simberloff. 1996. Extinction by hybridization and introgression. Annu. Rev. Ecol. Syst. 27, 83–109. http://dx.doi.org/10.1146/annurev.ecolsys.27.1.83.

Shaffer, M. L., and B. Stein. 2000. Safeguarding our precious heritage. Pages 301-322 in B. A. Stein, L. S. Kutner, and J. S. Adams, editors. Precious heritage: the status of biodiversity in the United States. Oxford University Press.

Sparkman, A. M., J. M. Adams, T. D. Steury, L. P. Waits, and D. L. Murray. 2012. Pack social dynamics and inbreeding avoidance in the cooperatively breeding red wolf. Behavioral Ecology 23:1186–1194.

Stahler, D. R., D. W. Smith, and R. Landis. 2002. The acceptance of a new breeding male in to a wild wolf pack. Canadian Journal of Zoology 80:360-365.

Stahler, D. R., D. R. MacNulty, R. K. Wayne, B. VonHoldt, and D. W. Smith. 2013. The adaptive value of morphological, behavioral and life-history traits in reproductive female wolves. Journal of Animal Ecology 82:222-234.

U.S. Fish and Wildlife Service. 2017. Mexican Wolf Biological Report: Version 2. Region 2, Albuquerque, New Mexico, USA. https://www.fws.gov/southwest/es/mexicanwolf/pdf/2017MexicanWolfBiologicalReport Final.pdf.

vonHoldt, B. M., D. R. Stahler, D. W. Smith, D. A. Earl, J. P. Pollinger, and R. K. Wayne. 2008. The genealogy and genetic viability of reintroduced Yellowstone grey wolves. Molecular Ecology 17:252–274.

Vucetich, J. A., M. P. Nelson, and M. K. Phillips. 2006. The normative dimension and legal meaning of endangered and recovery in the U.S. Endangered Species Act. Conservation Biology 20:1383-1390.

Wabakken, P., H. Sand, I. Kojola, B. Zimmermann, J. Arnemo, H. C. Pedersen, and O. Liberg. 2007. Multi-stage, long-range dispersal by a GPS-collared Scandinavian wolf. Journal of Wildlife Management 71: 1631-1634