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Public Comments Processing

Attn: Docket No. FWS-R2-ES-2017-0036

U.S. Fish and Wildlife Service,

New Mexico Ecological Services Field Office,

2105 Osuna Road NE,

Albuquerque, NM 87113

Submitted via www.regulations.gov

Re: Comments on Mexican Wolf Draft Recovery Plan, First Revision (Docket #: FWS–R2–ES–2017–0036)

Dear Regional Director Tuggle:

I, Dr. Richard Fredrickson, here submit my comments on the U.S. Fish and Wildlife Service's (FWS) Mexican Wolf Draft Recovery Plan, First Revision and associated documents and appendices (82 Fed. Reg. 22918-22920, June 30 2017), which requests "comments on the recovery strategy, recovery criteria, recovery actions, and the cost estimate associated with implementing the recommended recovery actions." My comments presented here are based on 30 years of experience working with endangered species as a wildlife manager and researcher, including work on habitat issues, population viability, and conservation genetics. In addition, I have been involved with Mexican wolves since 2002, and I was a member of the most recent Mexican wolf Recovery Team. More recently, I was a participant in the process leading up to the production of the Draft Plan (Plan), attending four of the five recovery planning workshops. In addition, I have authored and co-author scientific papers on Mexican wolf inbreeding and genetic rescue, taxonomy, and management. My comments focus on the application of best available science the in the development of the Plan.

The Plan does not rely on the best available science.

The Plan is largely underpinned by a population viability analysis (PVA) using Vortex (Miller 2017), and an assessment of potential habitat in Mexico and in the states of Arizona and New Mexico. Here I focus on the PVA.

<u>The PVA is flawed</u>

Rather than exploring a range of conditions that might adequately address the threats to Mexican wolves and result in a robust metapopulation, the PVA instead appears to be constructed to affirm the desires of the four-corners states, in regards to location and sizes of potential Mexican wolf populations. In practice this is manifested in simulation scenarios that considered only two populations: one wolf population in Arizona and New Mexico with a target population size of 320 wolves and another population in the northern Sierra Madre Occidental of Mexico with a target population size of 170 wolves. Populations in other locations and of greater sizes were not seriously considered. This apparently constrained the PVA into a search to find a management scenario that might be adequate.

Parameterization of the PVA simulations was also problematic. The proportion of adult females pairing is known to be a parameter that has large effects on the outcomes of simulated wolf populations (Carroll et al. 2014). The value of this parameter was based on the mean between two estimates using data from the Arizona-New Mexico population. Although both ways of estimating this parameter may be biased, one was likely more biased than the other. As a result, the value for this parameter used in the simulations was likely biased high. A review of the literature on the proportion of adult females breeding among wolves strongly suggests this parameter is density dependent – when prey density is high or wolf density is low, the proportion of adult females paired is high. And when the opposite occurs, the proportion of adult females pairing is low (Fredrickson unpublished). In the simulations, however, only a single, constant value was considered. In part, this was likely due to the very high carrying capacity (K = 1000 wolves) set for the MWEPA which would render density dependent functions largely inconsequential, given that this population was constrained to 320 wolves. The MWEPA, however, is a large area with discontinuous habitat spread across two states. And the existing wolves are concentrated in a single portion of the area. It is likely that wolves respond based on the conditions in their "neighborhood" rather than mean conditions across a two state area. Thus density dependence could be operating. And this is suggested by the data from the MWEPA (Figure 1).

In addition, inbreeding depression documented in the SSP population for the probability of a female giving live birth was not incorporated into the simulation model (Fredrickson unpublished). And it is unclear whether inbreeding depression in the wild populations was fully accounted for. The PVA also assumes that a substantial proportion of Mexican wolf pairs will be fed annually for the next 100 years. Data from the MWEPA indicate that fed pairs produce greater numbers of pups that emerge from the den. Assuming that intensive feeding will continue in both populations for the next 100 years is unrealistic and inflates the viability of the simulated populations. Finally, the sensitivity analysis considered variation only in adult mortality rates, the sizes of populations triggering harvest, and population augmentation strategies. While these are all important, the modeling appendix did not include a thorough sensitivity analysis.

Because few parameters were considered in the sensitivity analysis, I ran simulations to further examine the effects of alternate parameterizations on the probabilities of extinction, quasi-extinction, and population sizes. In particular, I considered a small reduction in the percentage of adult females pairing, small increases in the adult mortality rate, and the effect of ending diversionary feeding once populations reach their targeted census population sizes. For these simulations I reduced the percentage of adult females pairing from 77.6 % used in the PVA to 73.2% based on the analyses in Appendix A (Oakleaf "Estimation of mean pairing rate among wild Mexican wolves). In this appendix this parameter was estimated using data from the MWEPA using two methods: the "direct observation" and "indirect estimation." Oakleaf arrived at 77.6% by taking the mean of these two estimates. But because the direct observation method is likely more biased than the indirect estimation method, I used the mean between 77.6% and the indirect estimation method for the simulations below.

Modestly reducing the percentage of adult females pairing to 73.2 and ending diversionary feeding had large effects on census population sizes. Table 1 presents the % of iterations becoming extinct, attaining the numerical delisting criterion, and two levels of quasi-extinction for the MEWPA and SMOCC-N populations. In all scenarios considered, 87 – 99% of iterations met the numerical criterion for delisting (eight year moving average of 320 wolves for MWEPA; eight year average of 170 wolves for SMOCC-N). But the eight year moving average dropped below 300 wolves in 80% of the 1,000 iterations when diversionary feeding was stopped and adult mortality was increased to 25.4% (Table 1). When the percentage of adult females pairing was reduced to 73.2% and diversionary feeding was stopped, the eight year average for the MWEPA dropped below 213 wolves in 67% of iterations, and dropped below 113 wolves in SMOCC-N in 81% of iterations. Mean population abundance for the scenario in which diversionary feeding is ended and adult mortality is increased from 24.9% to 25.4% is shown in Figure 2. Mean population abundance for the scenario in which the % of adult females pairing is reduced to 73.2% and diversionary feeding is ended is shown in Figure 3. These simulations illustrate that relatively small changes in parameterization can have large negative effects on outcomes. It also calls into question whether the recovery criteria proposed in the draft plan will be adequate to ensure a viable and resilient metapopulation of Mexican wolves.

The augmentation plan for MWEPA and SMOCC-N has management priorities backwards.

The management plan portrayed in Table 2 of the PVA, prioritizes releasing wolves from captivity to SMOCC-N and translocating wolves from MWEPA to SMOCC-N. It appears to be an aggressive attempt to grow the small SMOCC-N population to larger size quickly. This would minimize the loss of genetic variation from this population while it is at very small size. But this comes at the cost of slower genetic enrichment of the MWEPA population which is currently about four times larger than SMOCC-N and has a mean kinship of around 0.25. The priority should be to genetically rehabilitate the MWEPA population before it grows to substantially larger size, at which point large improvements in the genetic composition of the population may become nearly impossible. The combination of releases of wolves from the SSP into MWEPA and translocation of wolves from MWEPA to SMOCC-N provides what is probably a one-time opportunity. A simulation that translocated high mean kinship wolves from MWEPA to SMOCC-N significantly reduced the overall mean kinship of MWEPA (results not shown). Translocations of this type paired with releases from captivity will provide the best opportunity for genetically improving the population. Under the draft plan, MWEPA will need to be the primary reservoir for genetic variation.

Table 1. Rates (%) of extinction, meeting numerical criteria for delisting, and quasiextinction for the MWEPA and SMOCC-N populations. Delisting is based on attainment of an eight year average of at least 320 and 170 wolves for the MWEPA and SMOCC-N populations, respectively. Quasiextinction rates present the % of iterations in which the 8-year dropped below numerical thresholds beginning in year 51 of the simulation.

	MWEPA				SMOCC-N			
	Extinction	Delisted	N<300	N<=213	Extinction	Delisted	N<150	N<=113
Baseline	3	95	51	20	1	100	69	30
Adult mortality 25.4%	5	92	55	26	1	99	72	36
Harvest begins at *N* = 350	4	95	68	24	Na[1]	Na	Na	Na
73.2% Adult females pair	8	88	67	34	4	97	79	49
Feeding stops at *N* = 320 / 170	5	96	81	42	5	99	87	60
Feeding stops & 25.4% adult mortality	6	93	80	46	4	99	89	61
73.2% Adult females pair & Feeding stops	12	87	90	67	19	87	95	81

[1] Not applicable

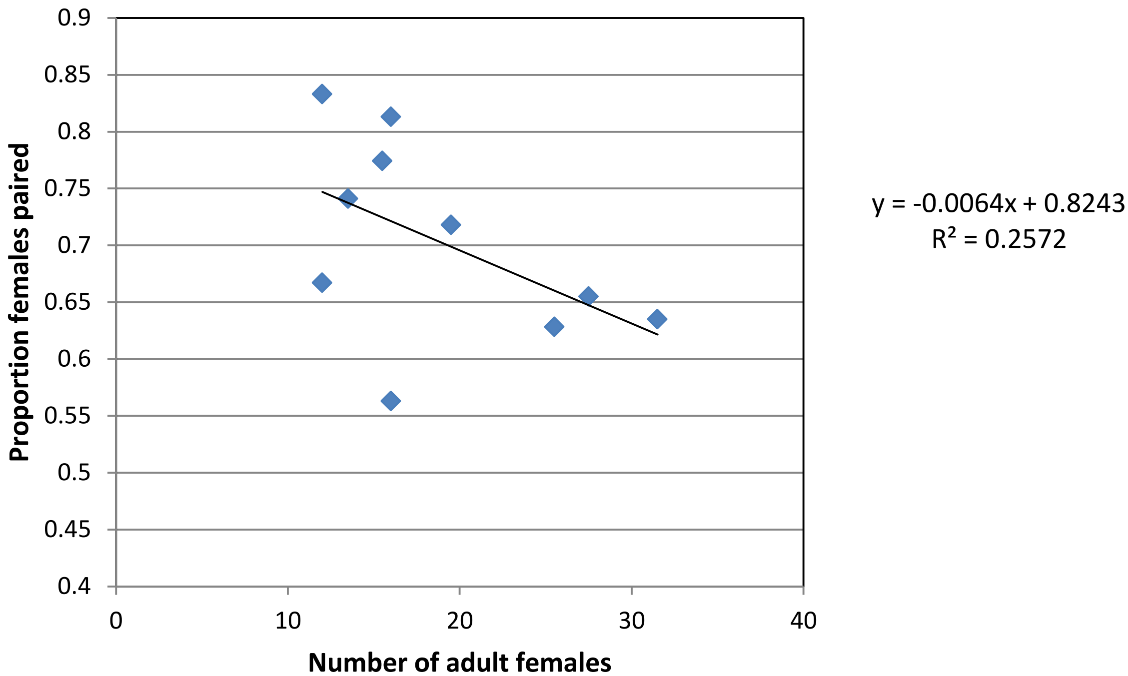

Figure 1. Proportion of adult females paired over ten years in the MWEPA (data from Appendix A).

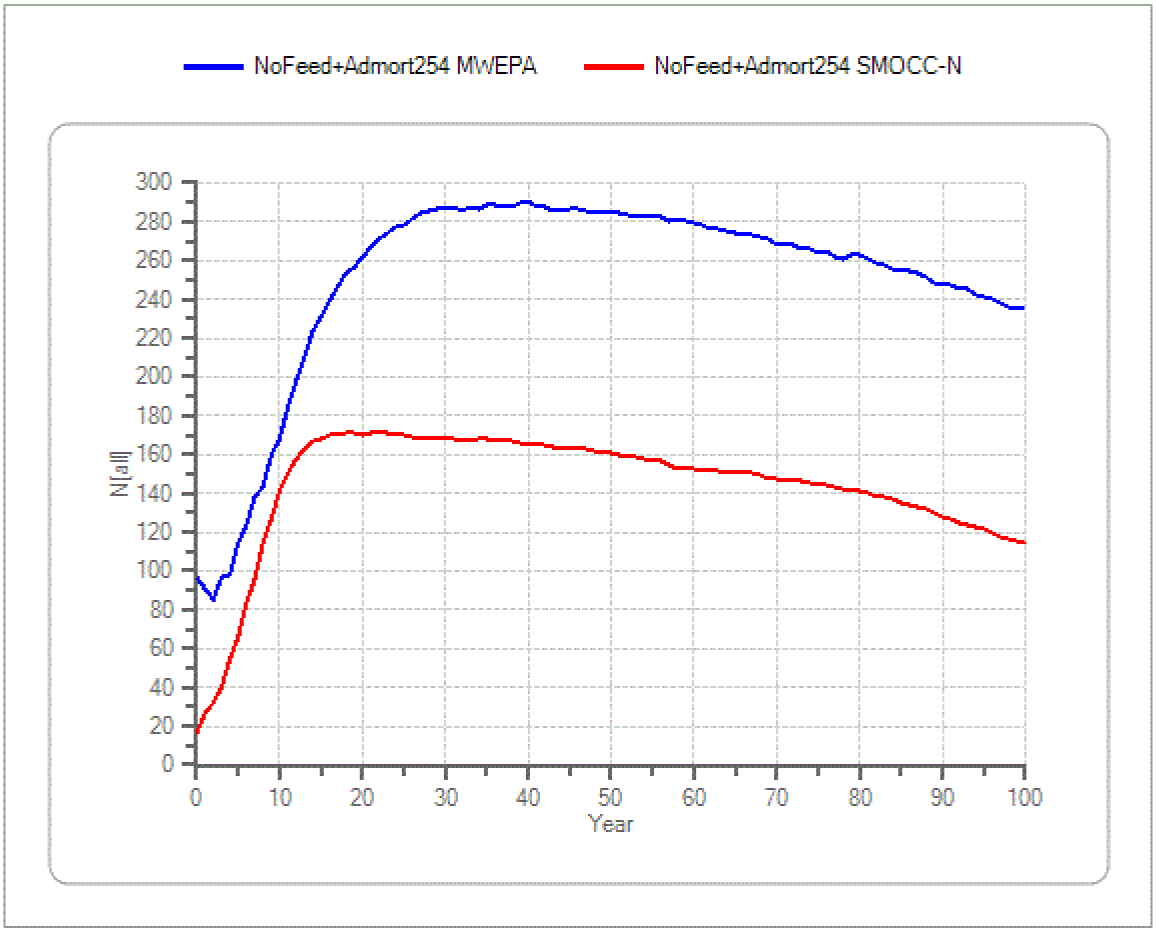

Figure 2. Mean numbers of wolves over time for the MWEPA and SMOCC-N populations when diversionary feeding is stopped once the populations reach their abundance targets (N= 320 for MWEPA, N=170 for SMOCC-N) and adult mortality is increased to 25.4%.

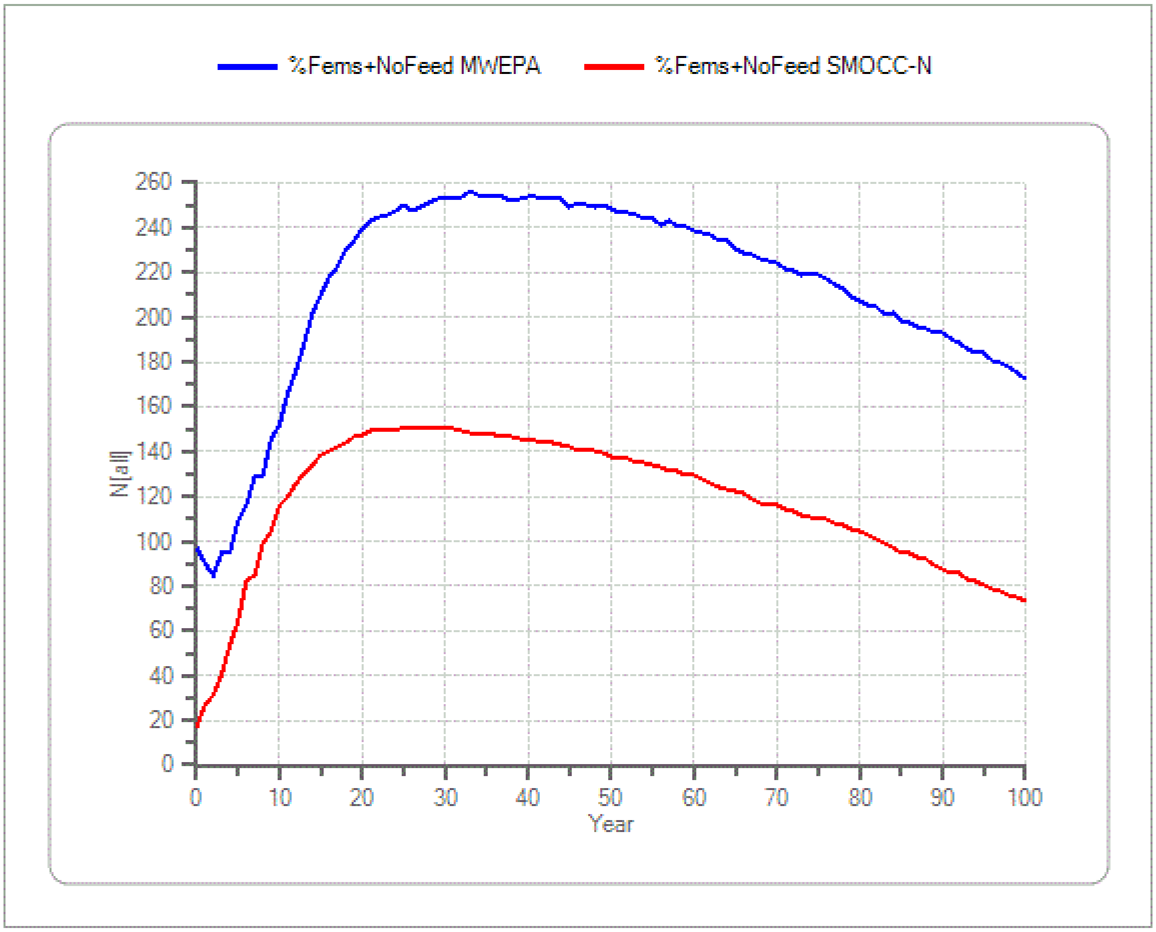

Figure 3. Mean numbers of wolves over time for the MWEPA and SMOCC-N populations when the proportion of adult females pairing is set to 0.732 and diversionary feeding is stopped once the populations reach population abundance targets (N= 320 for MWEPA, N=170 for SMOCC-N).