



Letter to the Editor

Reply to Hedrick: Genetics and recovery goals for Mexican wolves



Keywords:

Canis lupus baileyi

Recovery criteria

Inbreeding

Minimum viable population

Hedrick (2016) recently defended past recovery planning that is now being updated and took exception to Harding et al.'s (2016) characterization of the role of theoretical genetic principles in establishing effective and achievable Mexican wolf recovery goals. Previous recovery teams failed on three occasions to revise the 1982 Mexican wolf recovery plan. Earlier teams chose to ignore tens of thousands of square kilometers of suitable habitat in Mexico, inappropriately insisting the Mexican wolf must be recovered entirely outside of Mexico. A comprehensive state-of-the-art analysis now being finalized shows large areas of suitable wolf habitat exist in the remote mountains of Mexico (E. Martinez-Meyer et al., in preparation). To discount that information would be contrary to the ESA requirement to use the best available data in recovery planning. The jaguar recovery team identified large areas in the Sierra Madre of Mexico with sufficient habitat quality to support recovery of that species and some of these same areas will be equally important to Mexican wolf recovery (USFWS, 2010).

Skull morphometrics and early phenotypic descriptions show that Mexican wolves were able to disperse northward and intergrade with larger wolves in central New Mexico and Arizona. Data on other large carnivores (i.e., jaguars, ocelots, black bears) illustrate that even today the connection between Mexico and the southwestern U.S. is more permeable than often asserted. The current progress toward Mexican wolf recovery in Mexico is being accomplished with support from that government and by local agreements with cooperating landowners in areas not dominated by livestock production. Recovery in their homeland is not only successfully occurring, but essential to satisfy the ecological principles of representation, resiliency, and redundancy.

The claim that recovery will require three populations of 250 Mexican wolves each is far from being well supported scientifically. This number was proposed during the second attempt to revise the recovery plan in 2003–05, and derived from a broadly worded recommendation for minimum population size (Soulé, 1980). However, whereas Soulé recognized that the power of random drift and selection to drive genetic change vary continuously with population size, and with circumstances, his proposed number is now often misrepresented as a threshold, the crossing of which reverses a population's trajectory. To the extent that this 'rule' is now seen to override ecological and human considerations that critically impact recovery, its contribution to Mexican wolf recovery planning efforts is negative. The third attempt to revise the recovery plan in 2010 merely accepted the earlier goal of 250 and spent two years attempting to justify it with Vortex modeling simulations (Carroll et al., 2014), which would have been unnecessary if the correct number could

simply be derived from a calculation. Harding et al. (2016) exposed this flawed approach to establishing realistic and achievable recovery criteria. Regardless, scientists involved in current recovery efforts have dramatically refined those earlier simulations to increase realism and include additional data now available.

As stated in Harding et al. (2016), inbreeding depression is an important consideration in the recovery of the Mexican wolf because of its history of near extinction. However, inbreeding levels have not increased in the wild population and a more recent analysis of all available data (1998–2015) on reproductive parameters and inbreeding coefficients (Oakleaf et al., in preparation) indicated overall inbreeding is having less effect on some demographic parameters than earlier data suggested (Fredrickson et al., 2007). The successful Bluestem Pack is often viewed as a single genetic unit, but has had 4 different breeding pairs over the last 15 years; some individuals were from different packs, including a genetically-valuable breeding male.

The assertion that the Arizona Game and Fish Department (AZGFD) has impeded recovery is simply unfounded and contrary to fact. AZGFD has been integrally involved in the recovery of the Mexican wolf for more than 30 years, has spent >\$7.5 million and currently employs a staff of 5 field biologists solely dedicated to Mexican wolf recovery efforts. AZGFD wants Mexican wolf recovery to succeed, but the recovery of controversial carnivores cannot be successful without a solid scientific foundation and stakeholder support. Esoteric and theoretical genetic principles often conflict with robust population performance and what is realistically achievable on the ground. Tolerance has been the single most limiting factor to Mexican wolf recovery, not inbreeding depression. If the recovery plan is revised in a manner that satisfies the legal requirements of the ESA, Mexican wolf recovery will follow the successful model seen in the northern Rocky Mountains and western Great Lakes.

Unsubstantiated and unfounded accusations of state agency obstruction, political meddling, and federal agency inaction will not be adequate rebuttals for the solid foundation of the latest scientific approaches now being assembled to support the successful recovery of Mexican wolves. We owe it to the Mexican wolf to set aside arguments about genetic rules of thumb and produce a realistic roadmap for recovery in its historical range with measurable, objective, and achievable recovery goals on the working landscape of the Southwest.

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