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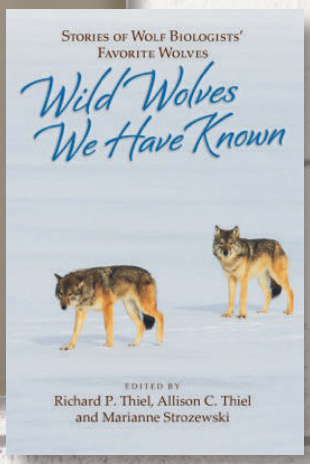

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Jacquelyn Fallon

Pros and Cons:

Recovering Mexican Wolves on a Solid Scientific Foundation

By JIM HEFFELFINGER

The wild Mexican wolf population in the United States has been growing, on average, 14 percent annually since 2009. This strong growth proves the inaccuracy of population models from the 2010-2013 recovery team on which I served (with individuals from Michigan Tech University, Turner Endangered Species Fund, the National Park Service and others) and suggests caution in basing conclusions on those models. The 2017 survey detected all-time, record minimum numbers of wolves (114), packs (22), potential breeding pairs (26) and adult Mexican wolves (88) in the wild. Widespread claims of agency mismanagement and genetic crisis—claims made by scientists, media, wildlife associations and members of the public—are being muted by the successful progress of recovery.

The 2010-2013 attempt to revise the recovery plan was based on what is now decade-old information and has been eclipsed by more current data. The 2017 Mexican Wolf Recovery Plan is based on analyses led by an independent, internationally known endangered species population-viability expert with a group that included some former recovery team members. This latest effort used a more advanced, customized viability model with access to an updated pedigree. For more than two years, scientists updated all available data to determine what is needed for recovery.

The team used wild Mexican wolf data to update: effects of inbreeding, mortality rates, catastrophe probability, percent of females breeding, pup production and historical range. Previous models were based on wolf mortality rates from the northern Rockies, but the current plan uses mortality rates from wild Mexican wolves in the recovery areas. Previous analyses lacked the 15-plus years of data on percent of females breeding in the wild, considered in the current plan. The last recovery team estimated the effects of inbreeding with data from only 39 litters, but the current plan is based on 89 wild Mexican wolf litters from 1998-2014 (50 more litters and eight more years of data). Importantly, overall inbreeding levels of wild-born pups are not increasing—data which conflicts with claims of a mounting genetic crisis.

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The 2017 Mexican Wolf Recovery Plan

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2017 Mexican Wolf Recovery Plan: Really Good on Anti-Wolf Politics, Really Bad on Pro-Wolf Science

BY MIKE PHILLIPS

The 2017 Mexican wolf (*Canis lupus baileyi*) recovery plan is a long overdue update of the original 1982 plan. It calls for the U.S. Fish and Wildlife Service (FWS) to establish two genetically diverse populations in the subspecies' core historical range. The southwestern United States is targeted for a population of ≥320 wolves and northern Mexico for a population of ≥200. FWS predicts that 25 to 35 years and $260 million will be required to establish those populations.

Selection of habitat for the population in Mexico is not based on the best—or even good—science, but rather on political pressure. This was made clear in the following reaction by Utah to an early draft of the plan, which indicated that, because suitable habitat in Mexico was lacking, the recovery region needed to be extended north to areas outside the subspecies' historical range: *Identification of areas outside the historic range of the sub-species as part of the recovery area…will be vigorously opposed (legally and politically) by the Utah Division of Wildlife Resources and the State of Utah.*

Notably, Utah did not indicate that opposition would be based on scientific grounds. Arizona, New Mexico and Colorado adopted similar positions.

The dogged press of political considerations by Arizona, New Mexico, Utah and Colorado ensured that the FWS would finalize the 2017 plan with undue reliance on

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Heffelfinger

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The newest plan also takes into account the gradual phase-out of feeding wolves to divert them from livestock and includes realistic estimates of connectivity between populations. Genetic diversity retention is addressed with objective, measurable and achievable criteria—not ambiguous references to measurements of genetic diversity that will only lead to endless litigation about delisting. To date, human intolerance has been limiting Mexican wolf recovery, not inbreeding depression.

Members of the last Mexican wolf recovery team asserted that recovery will require three populations of 250 Mexican wolves, but this was based on theoretical genetic principles, and on the outdated, obsolete model from 2010-2013. Despite these shortcomings, it is often misrepresented as a threshold for successful recovery. The plan's foundation is an accurate depiction of historical range based on detailed skull and body measurements, historical records, genetic differences and measures of ecological differentiation.

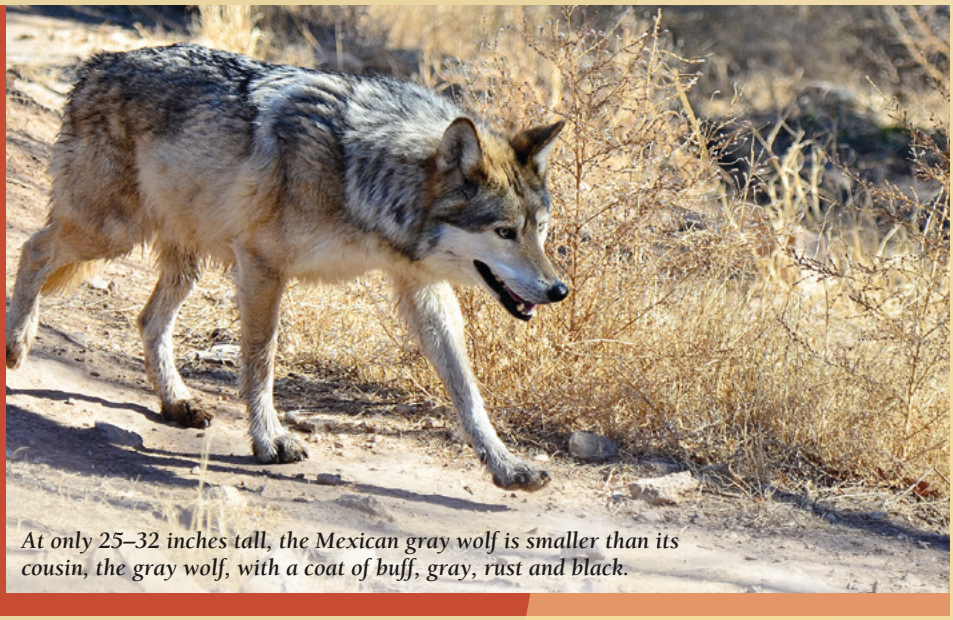
Federal regulations require that Mexican wolves be recovered in their historical range unless it is "*unsuitably and irreversibly altered or destroyed*." Earlier teams chose to ignore tens of thousands of square miles of suitable habitat in Mexico, inappropriately insisting recovery occur mostly outside Mexico. Some advocates with little knowledge of Mexico contradict the best available science and first-hand knowledge of Mexican experts. A state-of-the-art analysis by a binational team identified 28,635 square miles of high quality wolf habitat in Mexico; clearly Mexico will play a vital role in recovery. The same two large recovery areas of suitable habitat in Mexico were independently identified in a jaguar recovery plan. Discounting that information would contradict the Endangered Species Act requirement to use best available data in recovery planning.

This updated habitat analysis includes two measures of human-caused mortality (road density and towns). Adding information on livestock distribution and protected areas would stack four redundant layers representing the same issue. Large tracts of private land with restricted access in Mexico have the same function as official land designations in the U.S. No other carnivore recovery plan has a better representation of relative distribution of prey on the landscape; past efforts simply used a satellite image of green vegetation as a substitute. Criticism that the analysis lacks a measure of livestock density is a red herring, as no accurate records exist on either side of the border.

Wolves have adapted to environments from the Arctic to Arabia, and climate change is not going to alter, destroy or make unsuitable the historical range of the Mexican wolf in a relevant timeframe. Quality wolf habitat exists north of the Arctic Circle, but we must decide how to restore the historical, ecological role of Mexican wolves. Scientists have recently warned of the perils of pushing recovery north of historical range because of genetic swamping by large wolves of Canadian origin that disperse from the Rocky Mountains. (A Yellowstone wolf already visited Arizona).

We have binational recovery plans for ocelot, jaguar, Sonoran pronghorn, thick-billed parrot, condor, masked bobwhite, Kemps-Ridley sea turtle and more; why shouldn't the Mexican wolf also benefit from expansion across borders? This recovery plan, based on updated analyses far more complex and realistic than all previous versions, provides for successful Mexican wolf recovery in its historical range.

Efforts are now appropriately focused on returning this small wolf subspecies to its ecological role in the American Southwest and Mexico. ■



Larry Lamsa

At only 25–32 inches tall, the Mexican gray wolf is smaller than its cousin, the gray wolf, with a coat of buff, gray, rust and black.

Supporting Literature
(with links to full manuscripts)

Harding, L. E., J. Heffelfinger, D. Paetkau, E. Rubin, J. Dolphin, A. Aoude. 2016. Genetic management and setting recovery goals for Mexican wolves (*Canis lupus baileyi*) in the wild. Biological Conservation 203:151-159. https://www.sciencedirect.com/science/article/pii/S0006320716304256

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

Odell, E.A. Heffelfinger, J.R. Rosenstock, S.S., Bishop C.J., Liley, S., González-Bernal, A., Velasco, J.A., Martínez-Meyer, E. 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

Jim Heffelfinger is the Wildlife Science Coordinator for the Arizona Game and Fish Department.

Phillips

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a woefully inadequate habitat-suitability model.

The model relies on correlation between climatic and vegetative factors, and locations where Mexican wolves were collected historically to identify suitable habitat for recovery. FWS and the states justify this reliance by opining that Mexican wolves evolved to be precisely adapted to the narrow range of habitat present within the subspecies' core historical range in Mexico. That opinion, however, is undermined by 1) good science which indicates that wolves are broadly adaptable to climatic and vegetative conditions, and 2) the FWS's longstanding effort to restore the subspecies to Arizona and New Mexico where such conditions differ from those in Mexico.

More important, the model is woefully inadequate because of its disregard for aspects of wolf habitat that good science deems essential to recovery: limited density of livestock, adequate density of wild prey, and large tracts of public land where human-caused mortality is typically low.

Based on the flawed habitat model, the 2017 plan targets 38 percent of recovery on an area in Mexico dominated by small tracts of private property with abundant livestock and unknown numbers of native prey, and where wildlife protection laws are irregularly enforced and access and safety for field personnel are concerns. The FWS would never target such an area in the U.S. for wolf recovery.

Reliance on the model is already proving problematic. Free-ranging Mexican wolves in Mexico are routinely fed artificially to promote survival by minimizing conflicts with livestock. Such "diversionary feeding" is required because of abundant livestock and relatively scarce wild prey, suggesting that the area is not suitable despite being identified as such by the habitat model. The shortcomings of the model will become even more apparent as biologists strive to expand recovery in Mexico, completing a record number of initial releases and monitoring and managing wolves across millions of acres of private land necessary to support ≥200 animals.


Jacquelyn Fallon

Although the U.S. public supports wolf recovery, anti-wolf groups hold immense political influence in Colorado, Arizona, New Mexico, and Utah. These groups were well served by the scientific gloss the habitat model gives to the recovery plan, and by the disastrous decision to exclude from it the high-quality habitat of the Grand Canyon and Southern Rockies ecoregions of northern Arizona/southern Utah and northern New Mexico/southern Colorado, respectively.

If politics demanded that FWS initially focus on marginal habitat in Mexico by adopting a habitat suitability model that discounts the importance of livestock and land ownership, then the agency should at least have defined a recovery region that also included these two ecoregions. Such an approach would have facilitated progress once the inevitable shortcomings of habitat in Mexico became undeniable to even the most ardent opponents to recovery. Failure to advance such a common-sense approach to recovery represents a failure of science-informed planning and leadership by FWS simply for the sake of political expediency.

Much of the 2017 Mexican wolf recovery plan is based on the state's desire to assign to Mexico as much of the burden of Mexican wolf recovery as possible—not the best available science. It is worse than a poor replacement for the 1982 plan. Deeply discounting the cardinal role of wolf-livestock interactions and importance of land ownership ensures that FWS will waste precious time and millions of dollars, all the while failing to recover *Canis lupus baileyi*. ■

Mike Phillips has served as the executive director of the Turner Endangered Species Fund and senior advisor to the Turner Biodiversity Divisions since he co-founded both with Ted Turner in 1997. Before that Mike worked for the U.S. Fish and Wildlife Service and National Park Service leading efforts to restore red wolves to the southeastern U.S. and gray wolves to the Yellowstone Park. Mike has served in the Montana legislature since 2006, and will hold his Senate seat through 2020.

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BANQUET KEYNOTE

MIKE PHILLIPS

THE LAST GREAT WOLF RESTORATION – COLORADO

A presentation on the concept of reintroducing wolves to Colorado, focusing on attributes and challenges.

Attributes may include:
- Prey base
- Amount of public land available
- Varying eco-regions (high deserts, mountains, etc.)

Challenges include factors such as:
- Livestock grazing interests/public grazing allotments
- Conflicting positions among special-interest groups, politicians and USFWS
- Legislatively sanctioned, nationwide delisting of wolves as endangered

PLENARY SESSIONS

PANELS

Wolves of the World

Speakers from regions around the world, including Asia, Europe, Canada, the Canadian Arctic and the United States and Mexico, will cover topics that include progress of recovery in each region, politics in place to ensure a viable population, issues and problems that may need to be addressed.

Ellesmere

A series of speakers will discuss the wolves inhabiting Ellesmere Island and the Canadian Arctic Archipelago, focusing on observations at dens and other aspects of pack life, and including a historical summary of Dr. L. David Mech's two-decade study.

Michipicoten Island

An overview of geography, species history, human disturbances and recent studies of caribou, wolves and beaver.

Isle Royale

A panel of four will present a summary of ups and downs, and changing conditions affecting wolves and trophic systems over 56-plus years of research on Isle Royale. They will also address the ways in which reintroduction of wolves would benefit a future Isle Royale ecosystem, given the uncertainties of future contributions by ice bridges, weather patterns, random population events, herbivory and other factors that influence this island system.

Wolf Depredation Control on Livestock

A panel of experts representing various viewpoints will discuss wolf depredation conflict management. Agencies, field agents, a wolf advocate and a livestock producer will discuss key problems and the latest news, and find areas of agreement and disagreement.

Red Wolves, Eastern Wolves and other Canis Mixes in Eastern North America: Taxonomic validity and challenges to recovery

A panel of five will discuss topics related to eastern canids, including implications for the U.S. Fish and Wildlife Service if science reorganizes North American canid species and declares the red wolf synonymous with eastern wolves, or declares it a variant of gray wolves.

SPECIAL PRESENTATION

20-Plus Years of Wolves in Yellowstone

Doug Smith, project leader for the Wolf Restoration Project in Yellowstone and Emmy Award winning cinematographer Bob Landis will present the history of wolves in Yellowstone since their reintroduction in 1995.

DEBATE

Mexican Wolf Recovery Plan

A debate between Mike Phillips, who will discuss and challenge the current Mexican Wolf Recovery Plan and Jim deVos, who will defend it.

SAMPLING OF PRESENTATIONS

Gray wolves in Mongolia: changing attitudes and current research

PRESENTER **Uuganbayar Ganbold,**
biologist and anti-poaching protection manager, Hustai Nuruu National Park, Mongolia

Gray wolves in Estonia: an overview of population genetics and hybridization with domestic dogs

PRESENTER **Liivi Plumer,**
Department of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Harjumaa, Estonia

Quantifying the diet of the Alexander Archipelago wolf in southeast Alaska using molecular methods

PRESENTER **Aimee Massey,**
Oregon State University, Corvallis, Oregon; Alaska Department of Fish and Game

Through the eyes of a wolf: quantifying and classifying the complexities of facial signaling in wolves

PRESENTER **Elana Hobkirk,**
Durham University, Durham, United Kingdom

Risk effects of wolves on free-ranging livestock: Can prey-gut microbiome predict stress response in predator–prey interactions?

PRESENTER **Azzurra Valerio,**
Washington State University, Olympia, Washington

Adaptive use of nonlethal strategies for minimizing wolf–livestock conflict

PRESENTER **Suzanne Stone,**
Northwest Senior Field Representative, Defenders of Wildlife, Boise, Idaho

Challenges in wolf management in Croatia

PRESENTER **Djuro Huber,**
Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia

The future of wolf poisoning programs in Canada

PRESENTER **Hannah Barron,**
Wolf Awareness, Inc., Golder, British Columbia, Canada

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Functional response of wolves to human development across boreal Canada

PRESENTER Marco Musiani,
Department of Biological Sciences, Faculty of Science and Faculty of Veterinary Medicine, University of Calgary, Calgary, Alberta, Canada

Wolf tracks at the doorstep: A 1-year cycle of wolf behavior close to houses in Scandinavia

PRESENTER Barbara Zimmermann,
Scandinavian Wolf Research Project, Inland Norway University of Applied Sciences, Koppang, Norway

An 18-year spatial and temporal analysis of colonizing gray wolves *(Canis lupus)* in disjunct population

PRESENTER Theresa Simpson,
University of Wisconsin-La Crosse, La Crosse, Wisconsin

Shooting wolves: photographs and the reconfiguration of the wolf in nonfiction for children

PRESENTER Debra Mitts-Smith,
School of Information Sciences faculty member at the University of Illinois

Wolves at Our Door: results of 4-year Minnesota education program initiative

PRESENTER Misi Stine,
Project Coordinator, Wolves at our Door, International Wolf Center, Minneapolis, Minnesota

Are livestock-guarding dogs a viable tool for preventing damages in open-range livestock? A case study from Portugal

PRESENTER Francisco Petrucci-Fonseco,
Groupo Lobo, Lisbon, Portugal

Patterns of niche partitioning and overlap between sympatric wolves and snow leopards in the mountains of central Asia

PRESENTER Shannon Kachel,
University of Washington, Seattle, Washington

REGISTRATION

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Dietary niche overlap between wolves, coyotes, and hybrids in a 3-species hybrid zone

PRESENTER John Benson,
University of Nebraska-Lincoln, Lincoln, Nebraska

Ecology of the Indian gray wolf *(Canis lupus pallipes)* in the Suleman Range, South Waziristan, Pakistan

PRESENTER Abdul Hamid,
Department of Wildlife Management, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Competition on two legs and four: Impacts of wolf-cougar co-occurrence on resource selection and survival across an anthropogenic gradient

PRESENTER Lauren Satterfield,
University of Washington, Seattle, Washington

Individuality in habitat use of Scandinavian wolves in relation to anthropogenic infrastructure

PRESENTER David Carricondo-Sanches,
Inland Norway University of Applied Sciences, Koppang,Norway

Winter predation patterns of wolves in northwestern Wyoming

PRESENTER Susannah Woodruff,
Regional research coordinator, Alaska Department of Fish and Game

Humans and their role in shaping the ecological functions of wolves

PRESENTER Thomas Newsome,
University of Sydney, Sydney, Australia

Challenging the wildlife decision-making infrastructure

PRESENTER Walter Medwid,
Vermont Wildlife Coalition, Newport, Vermont

Scent-marking and biometeorology: An analysis of behavior across canid species Gray Wolf *(Canis lupus)*, Red Wolf *(Canis rufus)*, and Coyote *(Canis latrans)*

PRESENTER Hannah Jones,
Hardin-Simmons University, Abilene, Texas

Do novel scavenging opportunities or risk of interspecific killing by wolves influence occupancy and activity patterns of smaller carnivores?

PRESENTER David Keiter,
University of Nebraska, School of Natural Resources

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