Hastings Environmental Law Journal

Volume 15
Number 2 *Summer 2009*

Article 5

1-1-2009

Wolves in the Crosshairs: A Scientific Case Against the Final Rule of the U.S. Fish and Wildlife Service Removing Northern Rocky Mountain Gray Wolves From the Endangered Species List

Valerie Bittner Esq.

Wolves in the Crosshairs: A Scientific Case Against the Final Rule of the U.S. Fish and Wildlife Service Removing Northern Rocky Mountain Gray Wolves From the Endangered Species List

*Valerie Bittner, Esq.**

"Perhaps animals can confer the wisdom required to save us from our current ecological crisis. If we can recover the knowledge that every life is sacred, we may all have a future."[1]

ABSTRACT

Foremost, this paper examines the intersection of the *life-history strategies* of Northern Rocky Mountain gray wolves (*Canis lupus irremotus*) and the mandates of the Endangered Species Act and the National Environmental Policy Act. This paper also presents a science-supported position militating against a premature and illegal determination of recovery

* Valerie Bittner, Esq., earned B.S. degrees in Forest Resources Management and Conservation Social Sciences at the University Of Idaho College Of Natural Resources and a J.D. degree at the Willamette University College of Law. Subsequently, she clerked for Justice Andersen of the Washington Supreme Court and was appointed as an Assistant Attorney General for the Washington AGO. She is an Executive Board founder of the Washington State Bar Association (WSBA) Animal Law Section and has been an invited lecturer on animal law issues for the WSBA Continuing Legal Education Program. On numerous occasions, Ms. Bittner has acted as *amicus curiae* for the Animal Legal Defense Fund. She works on behalf of natural resources protection organizations throughout the Pacific Northwest region.
Special Acknowledgments: The Author would like to thank these individuals for their professional works, or consultation, or other contributions to this paper: Dr. Ken Fischman, Associate Professor of Genetics (ret.), Columbia University, Edward A. Fitzgerald, Esq., Dr. Thomas M. Gehring, Dale D. Goble, Esq. and Margaret Wilson Schimke Distinguished Professor of Law, University of Idaho, Dr. James Peek, Professor Emeritus of Wildlife Management, University of Idaho, Kimberly Ockene, Esq., Leanore Richel, Veronica Richel, Michael Robinson, Jason Rylander, Esq., Dr. Doug Smith, Dr. Dan Stahler, Linda Thurston, and the Western Watersheds Project.

1. GARY KOWALSKI, THE SOULS OF ANIMALS 146 (Stillpoint Publishing 1999).

of Northern Rocky Mountain gray wolves. Primarily, the illegality stems from the United States Fish and Wildlife Service's failure to evaluate and utilize the *best available scienc*e – significant new information concerning biologically sustainable demographic "recovery" criteria and the social dynamics of extended wolf packs. This new information is based on scientific studies of wolf pack dynamics (particularly, rare *cooperative breeding*), population genetics (especially in the context of *metapopulation* connectivity), conservation biology, deep ecology, and climate change. Failure by the agency to comprehensively incorporate significant new information before proceeding with delisting and the delegation of its conservation authority to the politically structured and scientifically flawed wolf management plans of Idaho, Montana, and Wyoming could lead to irrevocably lost evolutionary potential and a population crash. Ironically, such uninformed action will inevitably result in an emergency re-listing under the Endangered Species Act.

I. Introduction

The following passage reflects the desire of a nineteenth-century farmer to not only kill, but to "exact revenge" because "[w]olves had no place in a society and an environment organized to produce marketable plants and animals."[2]

> On a snowy winter morning in 1814, the wildlife painter, hunter, and naturalist John James Audubon watched a livestock owner torture a family of wolves. . . . On the morning Audubon accompanied him, the farmer caught three wolves in one pit. . . . After hamstringing his prey, the farmer hoisted the animals out of the trap one by one with a rope and his hounds on them. The first wolf, a female fought the dogs. She 'scuffed along' at a surprising rate,' legs dangling behind her, and managed to remove a patch of skin from one of her tormenters before the farmer shot her. . . . Audubon and the farmer hauled up one black-pelted male who was 'motionless with fright, as if dead, its disabled legs swinging to and fro, its jaws wide open, and the gurgle in its throat alone indicating that it was alive.' The hounds then 'worried him to death.' [3]

Perhaps surprising to many, even a naturalist such as Audubon was not shocked by the violence, rather, "[w] atching a pack of dogs rip apart terrified and defenseless animals was a 'sport' both he and the farmer found normal

2. JON T. COLEMAN, VICIOUS – WOLVES AND MEN IN AMERICA 2 (Yale University Press 2004).

3. *Id.* at 1, 2.

and enjoyable."[4] Ironically, the foregoing passage describes not just the past, but also signals the future of gray wolf "management and conservation" in the Northern Rockies under the highly controversial final delisting rule[5]promulgated by the United States Fish and Wildlife Service (hereafter

4. *Id*. at 2.

5. 73 Fed. Reg. 10514-10560 (Mar. 28, 2008). The March 28 Final Rule was successfully challenged in *Defenders of Wildlife v. Hall*, 565 F. Supp. 2d 1160, 1169, 1173, 1178 (D. Mont. 2008). Judge Donald Molloy, following his extensive critique of the Service's analyses and conclusions concerning "genetic exchange" among subpopulations of northern Rocky Mountains gray wolves, enjoined the final delisting rule. In response, on September 22, 2008, the Service moved for an order of remand to re-open public commentary. Ostensibly it did so in order to seriously address the deficiencies raised by the Court in its 40-page opinion. However, just two weeks after receiving an order of remand, the Service published a supplement to the March 28 final rule. *See* 73 Fed. Reg. 63, 926 (Oct. 28, 2008); "With its announcement, FWS offered no new information indicating that the region's wolf population has, in fact, achieved viability. Nor did FWS identify new state laws that are sufficiently protective of wolves to allow the removal of federal protections. Rather, the agency's announcement confirmed that the status of the gray wolf in the northern Rocky Mountains worsened during FWS' brief experiment with state management: between September 2007 and September 2008, the region's wolf population declined by almost a hundred – even without the three wolf hunts authorized in Idaho, Wyoming, and Montana." (*See* Earthjustice, *Comments Re: Proposal to Designate the Northern Rocky Mountain Gray Wolf Population a Distinct Population Segment and Remove This Distinct Population Segment from the Federal List of Endangered and Threatened Species*, 2 (Nov. 26, 2008). Furthermore, the October 28 supplemental publication relies on a non-binding Draft Memorandum of Understanding, Maintenance and Enhancement of Gray Wolf Recovery in the Northern Rockies between the States of Idaho, Montana, and Wyoming and the USFWS ("Gene Flow MOU. However, "[t]he [MOU] does not identify any system to document or monitor genetic exchange between subpopulations of wolves nor does it establish a genetic measure or a coordinated process for determining when intervention would be necessary or how it would be carried out. Overall, the draft MOU is vague, contains no quantifiable goals, and does not even define its terms (such as 'adaptive management' or 'genetic connectivity.' It is also completely non-binding." *See* Sylvia Fallon, Ph.D., Rebecca Riley, Andrew Wetzler, Natural Resources Defense Council, *Commentary Re: Designation of the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment From the Federal List of Endangered and Threatened Wildlife* (Nov. 28, 2008). On January 14, 2009, Deputy Secretary of the Interior announces removal of portions of the northern Rocky Mountain population of gray wolves from the Endangered Species List. *Source*: U.S. Fish and Wildlife

"USFWS", "Service", or "agency") and relinquishment of regulatory powers to Idaho, Montana, and Wyoming wildlife management authorities. Taken together, the federally endorsed post-delisting state wolf management plans are structured to allow the reduction of approximately fifteen hundred adult wolves in 192 packs (with 107 breeding pairs) residing in the vast expanses of Central Idaho, Montana, and Wyoming to as few as three hundred wolves and 30 breeding pairs.[6]

Rather than an ecologically effective meta-population dynamic specified by the Northern Rocky Mountains Wolf Recovery Plan the sanctioned reduction would leave in its wake genetically fractured sub-populations. Furthermore, the Service has consistently authorized[7] unregulated extermination in Wyoming's so-called *predatory animal area*.[8]

The Wyoming legislature enacted a dual-status scheme, whereby *all but seven breeding pairs* outside of the limited *trophy game area* in the Greater Yellowstone Area will be classified as *predatory animals* (akin to nuisance vermin).[9] The Wyoming Gray Wolf Management Plan, which was approved on November 16, 2007 by the Wyoming Game and Fish Commission and sanctioned by the Wyoming Legislature and the Service, delineates the *predatory animal* area in *eighty-eight percent* of Wyoming.[10]

The Service confirms, "[t]he State law requires that when there are seven or more wolf packs in Wyoming "primarily" outside of National Park and Wilderness areas, or fifteen or more wolf packs anywhere in Wyoming, *all* wolves in Wyoming outside of its' National Park/Wilderness units would be classified as

Service News Release: Service Removes Western Great Lakes, Portion of Northern Rocky Mountain Gray Wolf Populations from Endangered Species List. On April 2, 2009, the USFWS' published its Final Rule (which revised and supplemented the agency's March 28, 2008 Final Rule) To Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife. *See* 74 Fed. Reg. 15123-15188.

6. 72 Fed. Reg. 6106 - 6139, 6107 (Feb. 27, 2008); Declaration of Edward E. Bangs, p. 4 (*Defenders of Wildlife, et. al v. Hall, et. al.* (May 2008).

7. *See, e.g.*, Wyoming and Fish Department, *Draft Gray Wolf Management Plan* 4 (Sept. 2007).

8. *Id*. at 14 - 15.

9. *Id*. at 4 (emphasis added).

10. 73 Fed. Reg. 10549 (Mar. 28, 2008) (emphasis added); 74 Fed. Reg., at 15182.The April 2, 2009 Final Rule temporarily maintains the full protections of the ESA in all of Wyoming until the Wyoming Legislature codifies a definitive *trophy game animal area* by committing to an irreducible percentage in its designation of a *predatory animal area* and proscribes reduction by the Wyoming Game and Fish Commission of the *trophy game* area.

predatory animals[11] and 'a predatory animal' . . . may be taken by anyone, anywhere in the *predatory area*, at any time, *without limit*, and by *any means*."[12]

Delisting a species, thereby eliminating their threatened or endangered status under the Endangered Species Act (hereinafter the ESA or Act), may be instituted only on demonstrable grounds of: (1) erroneous original classification; (2) extinction; or (3) recovery of the listed species.[13] In delisting the Northern Mountain gray wolf, challengers of the action assert that the USFWS has steadfastly refused to alter its long-held, scientifically unsound demographic recovery goal and legally unsupportable identification of the limits of the Northern Rocky Mountain Distinct Population Segment (hereafter the NRM DPS).[14]

The main focus of this article's analysis concerns the USFWS' so-called "recovery" criteria and its continuing ignorance of the unmitigated threats threatening the re-emergence of, arguably, the preeminent icon of the American wild.

11. 72 Fed. Reg. 6129 (Feb. 27, 2007). ("When wolves are classified as a 'predatory animal' they are under the jurisdiction of the Wyoming Department of Agriculture …").

12. *Id.* ("taking" methods include and are not limited to "shoot on sight" baiting; possible limited use of poisons; bounties and wolf-killing contests; locating and killing pups in dens including use of explosives and gas cartridges; trapping; snaring, aerial gunning; and use of other mechanized vehicles to locate or chase wolves down.") (emphasis added).

13. 50 C.F.R. 424.11 (d) (Feb. 27, 1980). *See* U.S.C. § 1533 (a)(1) Unmitigated threats triggered listing are: Factor A (the presence of threatened destruction, modification, or curtailment of its habitat or range; Factor B (over-utilization for commercial, recreational, scientific, or educational purposes); Factor C (disease or predation); Factor D (the inadequacy of existing regulatory mechanisms); or Factor E (other natural or manmade factors affecting its continued existence); *See also* explication under Section V., The Legal Foundations of Recovery Planning, *infra*.

14. "[W]e have carefully reevaluated our recovery goal again and reaffirmed that "Thirty or more breeding pairs comprising some 300+ wolves in a metapopulation (a population that exists as partially isolated sets of subpopulations) with genetic exchange between subpopulations should have a high probability of long-term persistence ...") 74 Fed. Reg. 15123-15188, 15134 (Apr. 2, 2009). The boundaries of the NRMDPS "encompass[] the eastern third of Washington and Oregon, a small part of north-central Utah, and all of Montana, Idaho, and Wyoming." *Id.* at 15123.

II. Biology of the Northern Rocky Mountain Gray Wolf

In North America, the lineage of the gray wolf began 37 million years ago.[15] Gray wolves are the largest members of the dog family, *Canidae*.[16] Wolves hunt, live, and travel in packs ranging from four to as many as thirty-seven animals consisting of an *alpha*, or dominant pair, their pups, and several other subordinate or young animals.[17] The *alpha* male and female are the pack leaders, whose role it is to track and hunt prey, choose den sites, and establish the pack's territory.[18]

The pack is the basic social unit in wolf populations.[19] The unique behavioral characteristics of the NRM DPS gray wolf are described as follows:

> Wolf packs are usually family groups consisting of a breeding pair, their pups from the current year, offspring from previous years, and an occasional unrelated wolf. In the NRM, pack size averages about 10 wolves in protected areas, but a few complex packs have been substantially bigger in some areas of Yellowstone National Park.[20]

15. The National Geographic, *Wolves Were Here First*, 2-10 (Jan. 2002).

16. Macdonald and Claudio Sillero-Zubiri, *Dramatis personae: Wild Canids – an introduction and dramatis personae in* D. W. MacDonald & Sillero-Zubiri, *Biology and Conservation of Wild Canids*, 15 (Oxfords U. Press, 2004).

17. L. DAVID MECH, THE WOLF: THE ECOLOGY AND BEHAVIOR OF AN ENDANGERED SPECIES 69 (Natural History Press 1970) [hereinafter, Mech, *The Wolf*] (*emphasis added*).

18. *Id*. *See also*, U.S. Fish and Wildlife Service, Midwest Region, *Fact Sheet* (available at http://www.fws.Gov/Midwest/wolf/biology/biolque.htm) (last accessed Sept. 27, 2007); U.S. Fish and Wildlife Service, *Gray Wolf Populations in the United States*, 2006, 3 Part (11) ("The wolf pack is an *extended family unit*. A pack typically included the alpha pair, the young wolves born that year, perhaps last year's young, and sometimes a few older wolves that may or not be related to the alpha pair.") (emphasis added).

19. MECH, *supra* n. 17, at 68.

20. 71 Fed. Reg. 6634, 6635 (Feb. 8, 2006) (citations omitted); *See* U.S. Fish & Wildlife Services, *Gray Wolf Populations in the United States*, 2006, 3 Part (11): ("The wolf pack is an *extended family unit*. A pack typically includes the alpha pair, the young wolves born that year, perhaps last year's young, and sometimes a few older wolves that may or may not be related to the alpha pair.") (emphasis added).

In the northern Rockies, wolves breed between late January and early March.[21] Usually between two to nine pups are born between late March and late April, following a sixty-three day gestation period.[22] Wolf packs may be sensitive to disturbance by humans during this period.[23]

NRM gray wolves are effective predators and scavengers that feed primarily on large ungulates throughout their range. Ungulates comprise nearly all of the winter diet of most wolves."[24] In Yellowstone, elk made up 89 percent of the 449 kills made by wolves during winters 1995-1997. The pattern has been similar since. In 2001, 281 elk (87 percent), ten bison (3 percent), four moose (1 percent), five deer (3 percent), four coyotes (1 percent), one wolf, and seventeen unknowns (5 percent) were determined to be killed by wolves during the mid-winter observation period.[25]

III. Ecology of the Northern Mountain Gray Wolf – Its Role as a Keystone[26] Species

The gray wolf, along with other keystone predators, helps to regulate prey populations in order for a landscape to support multiple, *trophic*[27] levels in a healthy ecosystem.[28] Specifically, when populations of large herbivores are kept in check by top predators, the amount of primary production (the

21. *Id*. at 117 (table 12 illustrates the breeding seasons of wolves at various latitudes).

22. *Id*. at 118-19 (table 13 shows the average litter size reported for wolves).

23. *Id*. at 8.

24. *Id*. at 10 (citations omitted).

25. MECH, *supra* n. 17, at 10 (citations omitted).

26. European Community Biodiveristy Clearing House Mechanism, http://biodiversity-chm.eea.europa.eu/nyglossary_terms/K/keystone_species (last visited April 8, 2009) ("A species that influences the ecological composition, structure, or functioning of its community far more than its abundance suggests."; "[a] *keystone species* is a species whose very presence contributes to a diversity of life and whose extinction would consequently lead to the extinction of other forms of life."). (http:www.prairiedogs. org/keystone.htm1.).

27. "*Trophic*: Pertaining to nutrition or to a position in a food web, food chain, or food pyramid." U.S. Geological Survey (USGS), *Status and Trends of the Nation's Biological Resources*, http://www.nwrc.usgs.gov/sandt/Glossary.pdf (1998).

28. Michael E. Soule & John Terbough, *Conserving Nature at Regional and Continental Scales: A Scientific Program for North America*, 49 BIOSCIENCE 809, 810-812 (Oct. 1999).

production of organic compounds through photosynthesis) available to smaller animals increases allowing for increased biodiversity.[29] Left uncontrolled, large herbivores will deplete a landscape of its primary productivity.[30] Without predators to regulate the number of ungulates, entire ecosystems are simplified as ungulate population explosions simplify the food web and reduce biodiversity.[31]

In addition to the role carnivores play in increasing biodiversity, they also improve the gene pool of their prey species over time by culling genetically inferior beings.[32] The gray wolf, in particular, exerts this positive force on the prey gene pool, as it often chases after a herd of ungulates until a slower animal is left behind.[33] This "coursing" technique may more effectively reduce the chance of a genetically weak animal from reproducing than other hunting strategies.[34] A cougar, by contrast, will usually hide in a hunting bed until its prey comes within springing distance. The prey in the latter case is almost as likely to be healthy as it is to be weak.[35] Because all carnivores occupy a distinct behavioral niche in an ecosystem and employ different hunting strategies, they play a unique role in the management of the lower *trophic* levels.[36] The interrelationship of complex wolf pack structure and the wolves' conspecific life history strategies with the encompassing ecosystem is thoroughly examined in Section VI. C., *infra*.

IV. The Historical Underpinnings of Wolf Policy

Wolves were once abundant throughout most of North America until wolf hunting and an active, government-sponsored eradication program resulted in the extirpation of wolves from more than 95 percent of their range in the lower 48 states.[37] Twentieth-century wolf killing became firmly institutionalized with the establishment of the Predator and Rodent Control (PARC) branch of the U.S. Biological Survey (Biological Survey) – predecessor of USFWS. PARC agents hired professional wolf hunters ("wolfers") to respond to wolf depredation claims brought by livestock

29. *Id.*
30. *Id.*
31. *Id.*
32. MECH, *supra* n. 17 at ch. 9.
33. *Id.*
34. *Id.*
35. *Id.*
36. *Id.*
37. 72 Fed. Reg. at 6106, 6125.

operators.[38] Their killing methodologies included de-limbing and decapitation by horse team, muzzle and genital wiring, steel leg-hold trapping, poisoning at denning sites, and deployment of the notorious M44, the "coyote getter" (exploding cyanide capsules injected into victims).[39]

Due to the fact that perceived need for federal predator control exceeded the federal funding, the government shifted the cost to the livestock industry in 1917.[40] As a result of this financial contribution, ranchers and woolgrowers, arguably the Biological Survey's "clientele," were increasingly influential.[41] The Biological Survey began cooperative programs with the states, counties, and livestock associations, under which the Biological Survey investigated complaints and provided hunters with equipment, while livestock ranchers financed the governmental eradication program through a head tax on livestock in the affected locales.[42] By the mid-1920s, this funding comprised one quarter of PARC's budget.[43]

Concurrently, scientists began to question federal predator control.[44] For instance, many at the American Society of Mammology meeting in 1924 voiced objections to the federal extermination of predators because they viewed the Biological Survey as an instrument of the livestock industry, particularly in light of the fact that the industry had paid half the yearly budget of $5 million for predator control.[45] The Biological Survey sought to alleviate the economic impacts suffered primarily by ranchers, and noted that large predators "no longer have a place in our advancing civilization.''[46]

Despite growing opposition, and continued criticism of federal predatory control by the scientific community[47], Congress did not attempt to stop this controversial extermination of predators.[48] Instead, in 1931, Congress enacted the Animal Damage Control Act ("ADCA"), granting the statutory authority for PARC.[49] As a result, in 1939, management of predator

38. Edward A. Fitzgerald, *Lobo Returns from Limbo: New Mexico Cattle Grower's Ass'n v. U.S. Fish & Wildlife Service*, 46 NAT. RESOURCES J. 9, 14-19 (2006).

39. *Id.*

40. *Id.* at 14.

41. *Id.*

42. *Id.* at 14-15.

43. *Id.* at 40.

44. *Id.* at 16.

45. *Id.*

46. *Id.* (quoting Biological Survey).

47. *Id.* at 18.

48. *Id.* at 17.

49. Pub. L. No. 776, Chap. 370, 46 Stat. 1468 (1931). ("The Secretary of Agriculture was authorized to investigate the best methods of eradication,

control shifted from the Biological Survey to the Department of the Interior, where the "livestock industry exerted even greater control over the program.[50] Predator control expanded further in 1940 when the Biological Survey combined with the Bureau of Fisheries to form the USFWS.[51]

In addition, the development of the pesticide industry in the 1940s increased the use of "chemical warfare against predators," primarily with the development and use of two toxins: thallium sulfate and compound 1080 (sodium fluoroacetate).[52] Thallium sulfate was ultimately deemed overly efficient killing too many small animals and was replaced by compound 1080, which effectively controlled large predators and posed less danger to small animals.[53] The "coyote getter" also emerged in the 1940s and consisted of an exploding cyanide capsule hidden in a material attractive to animals.[54] The "coyote getter" killed too many pets and was eventually replaced by the M-44, which utilized a spring instead of a cartridge to shoot cyanide into the animal.[55] Federal use of these toxins was so successful that in 1944, following the killing of the last wild wolf in the greater Yellowstone area, Stanley Young, author of the ground-breaking *Wolves of North America*, concluded that "the wolf has been definitely brought under control and presents a very minor problem, except in limited areas in the United States."'[56] The livestock industry's insistence both initiated and continued this eradication program.[57] There remains widespread use of M-44s in areas where wolves are present."[58]

suppression, or control on national forests and other areas of the public domain, as well as on state, territorial, or privately owned lands, of mountain lions, wolves, and other animals injurious to agriculture, horticulture, forestry, animal husbandry, wild game, and birds and to conduct campaigns for the destruction or control of such animals.").

50. Fitzgerald, *supra* n. 38 at 18-19.

51. *Id*. at 19.

52. *Id*.

53. *Id*.

54. *Id*.

55. *Id*.

56. *Id*. (quoting STANLEY PAUL YOUNG & EDWARD ALPHONSO GOLDMAN, THE WOLVES OF NORTH AMERICA, 385 (1944)).

57. *Id*.

58. Defenders of Wildlife, Commentary, *Proposed Rulemaking regarding Establishing and Delisting a Distinct Population Segment for Gray Wolves in the Northern Rocky Mountains*, 16 (May 8, 2007). (Referring to a Mar. 2007 discussion with Mark Collinge, state director of Idaho Wildlife Services in which the Defenders staff was informed that the use of M-44s will be expanded into wolf territory once the wolves are no longer protected under federal law.)

By the late 1950s, the number of gray wolves remaining in the contiguous United States reached a record low with fewer than 1,000 wolves occupying less than 1 percent of the species' historic range in northeastern Minnesota and the adjacent Isle Royale National Park.[59] A growing social consciousness in the 1960s led to increased criticism of the federal government's "war on predators," as driven by biological, economic, and political mythologies.[60] The 1964 Leopold Report found that federal predator control was "no longer a balanced component of animal husbandry."[61] According to this Report, PARC was killing more predators than needed, necessitating proper management.[62] In essence, PARC had evolved into a semi-autonomous agency whose role had exceeded its need.[63] Furthermore, PARC was serving the interests of the livestock and agriculture industry, which paid its bills and ignored the Report's recommendations because they were opposed by the livestock industry.[64] Yet both the livestock industry and PARC would not concede wolf rehabilitation was necessary.[65] Although the Leopold Report ultimately did lead to change in the PARC hierarchy, field agents continued to maintain close relationships with the livestock industry.[66] In 1965, the Department of the Interior established the Division of Wildlife Services (DWS) within the Department of Interior.[67] The DWS was in charge of pesticide assessment, pesticide monitoring, and wildlife enhancement. Although the DWS was created for both conservation and control of wolves, it focused nearly 90 percent on control, and only 10 percent on conservation.[68] Such disparity proved pleasing to the livestock industry, its main constituent.[69]

59. Carlos Carroll, Michael K. Phillips, Carlos A. Lopez-Gonzales, & Nathan H. Schumaker, *Defining Recovery Goals and Strategies for Endangered Species: The Wolf as a Case Study*, 56 BIOSCIENCE 25, 26 (2006).

60. Fitzgerald, *supra* n. 38 at 20.

61. *Id.*

62. *Id.*

63. *Id.*

64. *Id.* at 21 (quoting Cain Commission Report).

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.* (citing Faith McNulty, Must They Die: The Strange Case of the Prairie Dog & The Black-Footed Ferret, 34-45 (1971); George Cameron Coggins & Partheria Blessing Evans, *Predators' Rights and American Wildlife Law*, 24 Ariz. L. Rev. 821, 845-850 (1982); Wick Corwin, *Predator Control and the Federal Government*, 51 N.D. L. Rev. 787, 804-06 (1975).

In 1971, the Council on Environmental Quality and the Department of the Interior sponsored a joint study on federal predator control, and the resulting Cain Commission Report, like the Leopold Report, recognized that the federal predator control program "contain(ed) a high degree of built in resistance to change."[70] According to the Cain Report, the public-private funding scheme "maintains a continuity of purpose in promoting the private interest of livestock growers, especially in the western rangeland states."[71] The Cain Report reiterated that the livestock industry's financial support promoted a policy of predator population reduction that paid scant attention to the effects on other forms of life,[72] and determined that predator control had little impact on predator problems.[73]

In 1973, Congress passed the Endangered Species Act (hereinafter ESA). The landmark case, *Tennessee Valley Authority v. Hill* described the operative validity of the ESA in the strongest possible language:

> [T]he Endangered Species Act of 1973 represented the most comprehensive legislation for the preservation of endangered species ever enacted by any nation. Its stated purposes were "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, and to provide a program for the conservation of such . . . species."[74]

The Court went on to note that "[t]he plain intent of Congress in enacting this statute was to halt and reverse the trend towards extinction, whatever the cost."[75]

After being nearly exterminated from the lower forty-eight states, *Canis lupus* was first classified as endangered in 1967 pursuant to the Endangered Species Preservation Act of 1966.[76] Upon passage of the ESA, the USFWS listed the Northern Rocky Mountain Gray Wolf, *Canis lupus irremotus*, as an endangered subspecies of gray wolf, together with three other gray wolf

---

70. *Id.* at 21 (quoting Cain Commission Report).

71. *Id.*

72. *Id.* at 21.

73. *Id.*

74. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978) (quoting 16 U.S.C. § 1531(b) (1976 ed.)).

75. *Id.* at 184.

76. U.S. Fish & Wildlife Service, Endangered Species, Species Profile: Gray Wolf (*Canis lupus*), http://ecos.fws.gov/speciesProfile/SpeciesReport.do ?spcode=A00D (accessed Sept. 27, 2007); Pub. L. No. 89-669, Secs. 1-3, 80, Stat. 926 (repealed 1973).

subspecies.[77] In 1977, the Service proposed to combine those subspecies, and instead list the entire species, *Canis lupus*, as endangered in the lower forty-eight states, except Minnesota.[78] The proposed reclassification became final in1978.[79]

Largely in response to the political opposition to reintroduction efforts of controversial species, those perceived to be in conflict with human activity, Congress added section 10(j) to the ESA in 1982.[80] Congress intended for the provisions of section 10(j) to "mitigate fears expressed by industry that so-called 'experimental non-essential'[81] populations would halt development projects . . . [and hoped that with] [c]clarification of legal responsibilities incumbent with these populations . . . [that it would] encourage parties to host experimental populations on their lands."[82]

In its initial formulation, the "10(j) rule" provided agencies authority to manage "experimental non-essential" species under the less protective regulatory umbrella afforded to "threatened" species.[83] The 1987 Northern Rocky Mountain Wolf Recovery Plan and the attendant 1994 Environmental Impact Statement classified wolves, which would be re-introduced in

77. 39 Fed. Reg. 1158, 1175 (Jan. 4, 1974).

78. 43 Fed. Reg. 9607-12 (Mar. 9, 1978).

79. *Id*. at 9607.

80. *Id*. at 28.

81. (meaning "non-essential" to prevention of extinction of the species in the wild).

82. H.R. Rpt. 97-567 at 17 (May 17, 1982) (reprinted in 1982 U.S.C.C.A.N. 2807, 2817).

83. 16 U.S.C. Sec. 1539(j); in 2005, the politically flexible 10(j) rule was significantly revised in reaction to the complaints of elk and deer hunters. Specifically, the USFWS adopted an ESA regulation allowing wolves to be killed to address "unacceptable impacts" to wild ungulates. State wildlife management authorities could establish an "unacceptable impact" by documenting both 1) a decline in a wild ungulate population; and 2) proof that wolves are the primary cause of the population decline. *See* 70 Fed. Reg. 1,286-1.307. (Jan. 6, 2005). The 200810(j) regulation (superceding the 2005 regulation) eliminates both of these factors, requiring only that a wild ungulate population is failing to meet state management objectives and that wolves are one of the major causes for that failure. *See* 73 Fed. Reg. at 4,736 (50 C.F.R. Sec. 17.84 (n) (3)). The 10(j) regulation is currently the subject of litigation (*Defenders of Wildlife*, *et al.*, *v*. *Hall*, *et. al*, Case No. 08-14-M-DWM (filed 02/02/2009). The Service's 2005 revisions to the "10(j) rule" turned over much management authority to the States through establishment of a Memorandum of Agreement that contained provisions allowing these states to use the revised 10(j) rule.

Yellowstone National Park in Wyoming, Idaho, and Montana,[84] as those to be managed by the Service (and the States upon delisting) under section 10(j).[85] These documents provided the demographic recovery criteria which have guided the delisting process to date:

> [t]hirty or more breeding pairs (i.e., an adult male and an adult female wolf that have produced at least 2 pups that have survived until December 31 of the year of their birth, during the previous breeding season) comprising some 300 + wolves in a *metapopulation* with genetic exchange between subpopulations should have a high probability of long-term persistence.[86]

On January 3, 1995, USFWS initiated capture operations to facilitate wolf reintroduction from Canada to central Idaho and Yellowstone National Park (YNP).[87] On January 10, 1995, sxiteen wolves were flown to the United States, twelve to the YNP and four to central Idaho.[88] On January 13, 1995, at 12:35 a.m., the shipping containers of the two wolves in the Rose Creek, YNP pen were opened, and biologists saw the first emergence of a wolf onto Yellowstone ground after more than sixty years of absence.[89]

On February 27, 2008, the Service signaled its intention to delist.[90] The Proposed Rule was followed by promulgation of the Final Rule delisting the species on March 28, 2008.[91] Subsequent litigation[92] resulted in its vacation. On April 2, 2009, primarily in response to assertions that its provisions for genetic connectivity were severely flawed, the Service promulgated its revised Final Rule[93] – regulations which are premised on unchanged recovery

84. "Establishment of a Nonessential Experimental Population of Gray Wolves in Yellowstone National Park in Wyoming, Idaho and Montana," 59 Fed. Re g. 60252 (Nov. 22, 1994).

85. 72 Fed. Reg. 6106 (Feb. 8, 2007).

86. 72 Fed. Reg. 6107 (Feb. 8, 2007) (citing Service 1994, pp. 6:75).

87. *Chronology of Wolf Recovery Related to Yellowstone National Park*, Yell-553 (2/98), at 4.

88. *Id.*

89. *Id.*

90. 72 Fed. Reg. 6106 - 31 (Feb. 27, 2008).Designating the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and Removing this Distinct Population Segment from the Federal List of Endangered and Threatened Wildlife.

91. 73 Fed. Reg. 10514-10560 (Mar. 28, 2008).

92. *Defenders of Wildlife, et. al. v. Hall, et. al.* (Case No. CV-08-56-M-DWM) (April 25, 2008)).

93. 74 Fed. Reg. 15123-15188 (Apr. 2, 2009).

criteria and suggested (but not required) gene flow enhancement management practices.

V. The Legal Foundations of Recovery Planning

Under the Endangered Species Act, Congress sought to create a streamlined process for listing species. The listing process begins with a status determination that a species is at risk of extinction, and will terminate if the risk of extinction is reduced to a level that social policy deems acceptable.[94] In making this determination, pursuant to the ESA's overarching objective to "conserve" at-risk species and the ecosystems upon which they depend,"[95] the Service is required to (1 stabilize the species decline in order that extinction of the species is forestalled and survival is secured[96] *and* (2) promote "recovery," the ultimate objective under the Act, by enhancing the specie's demographic component through "conservation"[97] of the species. Concomitantly, the express mission of the USFWS is (in part) ". . . to conserve, protect, and enhance . . . wildlife . . . and their habitats . . . ."[98] The definitions of "endangered" and "threatened" provide the implicit legal standard for determining whether the species is no longer sufficiently at risk to be deemed "recovered." [99] Endangered is defined as "in danger of extinction throughout all or significant portion of its range"[100] and

94. Dale D. Goble, *Recovery*, in ENDANGERED SPECIES ACT: LAW, POLICY, AND PERSPECTIVES, 1-2 (2d. ed. Donald C. Baur & Wm. Robert Irvin eds. (Forthcoming June 2009).

95. 16 U.S.C. § 1531 (b).

96. Goble, *supra* n. 94 at 1. (citing *Gifford Pinchot Task Force v.* U.S. *Fish and Wildlife Serv.*, 378 F.3d 1059, 1070-71 (9th Cir. 2004) ("{t]he ESA was enacted not *merely* to forestall the extinction of species ... but to allow a species to recover to the point where it may be delisted ... {I]t is clear that Congress intended that conservation and survival be two different (though complementary) goals of the ESA.")

97. *Id.* (citing 16 U.S.C. § 1531(b) (2000); *See also*, 16 U.S.C. § 1532(3) (2000). (The drafter of the Act created a nexus with recovery: Conservation means the *use of all methods and procedures* which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with *scientific resources management* such as *research*, *census* . . . *habitat acquisition and maintenance* . . . ") (emphasis added).

98. 74 Fed. Reg. 15123 (April 2, 2009)

99. Goble, *supra* n. 94, at 2.

100. 16 U.S.C. Sec. 1532 (6).

threatened is defined as "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."[101]

Status determinations, incorporated into recovery plans, must be based on the following five factors, which focus on the amelioration of the threats that led to the original listing decision:[102]

> (A) the presence of threatened destruction, modification, or curtailment of its habitat or range;
> (B) overutilization for commercial, recreational, scientific, or educational purposes;
> (C) disease or predation;
> (D) the inadequacy of existing regulatory mechanisms; or
> (E) other natural or manmade factors affecting its continued existence.[103]

These risk factors for extinction rely on two components: *uncertainty* (what is the probability that the species will become extinct?) and *time* (what is the applicable risk assessment timeline?).[104] In essence, the agency is required to estimate the likelihood that the species faces extinction over a concrete period of time.[105] The flaw of this approach lies in the propensity of the agency to conflate the biological issues (i.e., the known viability of a species

101. 16 U.S.C. Sec. 1532 (20).

102. Goble, *supra* n. 94, at 5. (citing Fish & Wildlife Service and National Oceanic & Atmospheric Administration, Interagency Cooperation – Endangered Species Act of 1973, as Amended; Final Rule, 51 Fed. Reg. 19,926, 19,958 (1986); 50 C.F.R. § 402.02); U.S. Fish & Wildlife Service, *Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Pacific Coast Population of Western Snowy Plover*, 60 Fed. Reg. 11,768, 11770 (1995). (The Service explicates that a recovery plan is "the '*umbrella*' that eventually guides all these [conservation] activities " – referencing the mandates that federal agencies utilize *all* of their authorities to advance the *conservation* of species and that federal actions *do not jeopardize* listed species ....".)(emphasis added).

103. 16 U.S. C. Sec. 1533(a)(1); codified at 50 C.F.R. Sec. 424.11(d)(2); *See* Fish and Wildlife Service, Policy and Guidelines for Planning and Coordinating Recovery of Endangered and Threatened Species 1 (May 25, 1990) ("Recovery is the process by which decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival can be *ensured*. The goal of this process is the maintenance of secure, *self-sustaining* wild populations of species.").

104. Goble, supra n. 94, at 2.

105. *Id.*

at a certain demographic level) with conservation agendas[106] – particularly where, as in the case of the NRM gray wolf, "adaptive management"[107] is underscores both Federal recovery and State post-delisting planning.[108] On the other hand, very significantly, the five factor approach permits an individualized examination of the threats facing a species in light of what is known about its *specific life-history and traits*.[109]

---

106. *Id*. at 4.

107. "[A]daptive management consists of managing according to a plan by which decisions are made and modified as a function of what is known and learned about the system, including information about the effect of previous management actions." Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of "New Age" Environmental Protection*, 41 Washburn Law. J. 50, 52 (2001) (citing Ana M. Parma *et al*., *What Can Adaptive Management Do for Our Fish, Forests, Food, and Biodiversity?* I Integrative Biology 16, 19 (1998). Professor Doremus comments: "[a]daptive management holds the hope of improving decisions we must make under conditions of substantial uncertainty by providing a resilient framework that will allow us to recognize and respond to surprises as they occur." *Id*. at 54. On the other hand, Holly Doremus warns: "[a]gencies can use claims of adaptive management as *a ploy to placate demands* for environmental protection without actually imposing enforceable constraints on themselves." *Id*. at 53 (emphasis added). She is particularly critical of the USFWS: "[n]ot surprisingly, the story of the ESA implementation since 1978 consists generally of the *Service exploiting their discretion* to the fullest to avoid political controversy." *Id*. at 58. (emphasis added).

108. See, e.g., Draft Memorandum of Understanding: Maintenance and Enhancement of Gray Wolf Recovery in the Northern Rocky Mountains, p. 3 (2008) ("The States and the FWS further agree that the *adaptive management principles* outlined in the state plans along with careful management of human-caused mortality from agency lethal control and regulation of public harvest will not impede natural dispersal among the population areas."); *See* also, Executive Summary, Montana Wolf Conservation and Management Plan, *Fish, Wildlife, and Park's Preferred Alternative* ("The wolf program will be based on principles of *adaptive management*. Management strategies and conflict resolution tools will be more conservative as the number of breeding pairs according to the federal breeding definition decreases, approaching the legal minimum. In contrast, management strategies become more liberal as the breeding pairs (increase). An *adaptive* approach will help FWP implement its wolf program over the wide range of *social acceptance values*."; *See* also 74 Fed. Reg. at 15131: The true *test* of wolf population *viability* will be determined by *subsequent* management practices." (emphasis added).

109. Goble, *supra* n. 94, at 4.

A 1988 amendment to the Act provided the operational shape of the five risk factors by requiring the Service to incorporate "to the maximum extent practicable," three key informational classifications in all recovery plans:

(i) a description of such site-specific management actions as may be necessary to achieve the plan's goal for the conservation and survival of the species;
(ii) objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and
(iii) estimates of the time required and the cost to carry out those needed to achieve the plan's goal and to achieve intermediate steps toward that goal.[110]

By way of example, in the case of the NRM gray wolf, the Service describes theoretical[111] site-specific management actions to facilitate metapopulation connectivity to be tried under the adaptive management protocols of the tri-state post-delisting wolf management plans. These practices are to encourage genetically effective migration, for instance by: reducing the rate of population turnover and fostering persistent wolf packs in all or select core recovery segments, periodically creating modified wolf density in select areas of suitable habitat to create social vacancies or space for dispersing wolves to fill, maintaining more contiguous and broader wolf distribution instead of disjunction and limited breeding pair distribution and minimizing mortality between and around core recovery segments during critical wolf dispersal and breeding periods (December through April).[112]

In the seminal case *Fund for Animals v. Babbit*,[113] the United States District Court sharply criticized the Plan's recovery criteria and remanded the Service's

110. Endangered Species Act Amendments of 1988, Pub. L. No. 100-478, tit. I, Sec. 1003, 102 Stat. 2306, 2306-07 (codified at 16 U.S.C. 1533 (f).

111. The tri-state wolf management plans do not commit to undertaking these specific management practices. *See* http:*//westerngraywolf.fws.gov*.

112. 74 Fed. Reg., at 15176. It is noteworthy that while the Service implied in the Final Rule of April 2, 2009 that there are commitments in the State wolf management plans to incorporate these management practices, the updated *Idaho Wolf Population Management Plan* 2008-2012 (Adopted March 6, 2008) simply states: "The three NRM recovery states and YNP are committed to continued communication and coordination of border pack management." (NRM Metapopulation, p. 27). Likewise, the Montana and Wyoming wolf management plans do not refer to site-specific management practices but rather promote *adaptive management* throughout their plans (available at http://westerngraywolf.fws.gov).

113. 903 F. Supp. 96, 106 (D.D. C. 1995).

recovery plan in order to address each factor discussed in the grizzly's original listing.[114] For consideration on remand, the court noted the "lack of objective, measurable criteria that assess threats to bear habitat, the reasonableness of the Service's population measuring criteria, and the failure to include measurable criteria addressing genetic isolation."[115] In addition, the court questioned the adequacy of the USFWS' demographic measuring criteria.[116]

While the courts generally defer to the agency's decision if it can *rationally* support its reasoning,[117] the "degree of specificity of recovery criteria is tied to the identified threats the particular species faces," and the "specificity of the information and goals in a recovery plan [must be] bounded by *the available scientific information*."[118] By extension, the courts expect the USFWS to "recommend a wide range of management actions," as circumstances and the *state of the available scientific information* change over time.[119] Indeed, the Service itself recognizes the relevance of recovery plan revision when necessary: ". . . information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species."[120]

114. Philip Kline, *Grizzly Bear Blues: A Case Study of the Endangered Species Act's Delisting Process and Recovery Plan Requirements*, 31 ENVTL. LAW 371, 414 (2001).

115. *Id*.

116. *Id*.

117. Goble, *supra* n. 94 at 36 (citing *Southwest Center for Biological Diversity v. Bartel*, 470 F. Supp. 2d 1137 (S.D. Cal. 2006); *Grand Canyon Trust v. Norton*, 2006 WL 167560 at 2 (D. Ariz. Jan. 18, 2006) (emphasis added).

118. *Id*.; It cannot be overstated that the ESA mandates that site-specific actions, demographic recovery criteria, and time lines be premised on the *best available science and data* (16 U.S.C. Sec. 1533(b)(1)(1994) (emphasis added) and be free from "reference to possible *economic or other impacts*." (50 C.F.R. Sec. 424.11(b)(1999). Of enormous relevance to premature delisting of the NRM gray wolf, "*other impacts*" include the appeasement of socio-political interests (e.g., vociferous livestock interests) given that the "federal courts have rejected [the] '*social tolerance*' approach to conserving endangered species." (Earthjustice Legal Defense Fund, RE: *Notice of Violations of the Endangered Species Act in Revising ESA Section 10(j) Regulation for Central Idaho and Yellowstone Area Nonessential Experimental Populations of Gray Wolves in the Northern Rocky Mountains*, 4 (Jan. 28, 2008) (citing *Humane Soc'y of the United States v. Kempthorne*, 481 F. Supp. 2d 53, 67 (D.D.C. 2006) (rejecting FWS' theory that authorized killing of wolves actually protects wolves from illegal killing by building social tolerance).

119. Goble, *supra* n. 94, at 35.

120. 73 Fed. Reg. 10520 (Feb. 27, 2008).

For example, in the case of the California Condor, the 1979 Recovery Plan concentrated on two recovery programs. One involved captive breeding for wild release and the other concerned research on non-captive Condor habits and habitats.[121] In December 1985, the agency rejected its own proposal to maintain a wild population.[122] The D.C. District Court enjoined the Service for its alleged failure to explain its rationale for altering one of its recovery programs.[123] The D.C. Circuit Court of Appeals reversed.[124] After being informed of a number of *changed circumstances*, the court found that the Service had in fact presented a reasoned rationale justifying its evolving policy. Significantly, the court wrote: "[t]he [agency] simply exercised its discretion to 'adapt [its] rules and policies to the *demands* of changing circumstances.'"[125] Concomitantly, the agencies' discretion is circumscribed by Section 4 of the Act to report to Congress every two years "on the status of efforts to develop and implement recovery plans for all species," as well as the express assumption that the revision of recovery plans will occur when necessary.[126] Necessity, in turn, is informed by the ESA mandate to employ the *state of the best available science*.

In parallel course, the National Environmental Policy Act "imposes a continuing duty to supplement an existing Environmental Impact Statement in response to 'significant new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts.'"[127]

In this vein, while "biological science has barely scratched the surface of a vast knowledge involving chaos theory, linkage zones, deep ecology, biodiversity, ecosystem management, and other emerging theories in the realm of endangered species protection and recovery in the United States, [the] FWS has the unenviable task of disseminating this wealth of scientific knowledge and applying the most contemporary scientific principles, data collection methods,

121. Goble, *supra* n. 94, at 37 (citing *Nat'l Audubon Soc'y v. Hester*, 801 F.2d 405, 406 (D.C. Cir. 1986) (*per curiam*).

122. *Id.* (citing *Nat'l Audubon Soc'y v. Hester*, 627 F. Supp. 1419, 1422-23 (D.D.C. 1986), rev'd, 801 F.2d 405 (D.C. Cir. 1986)(emphasis added).

123. *Id.* at 37.

124. *Id.* (citing *Nat'l Audubon Soc'y v. Hester*, 627 F. Supp. 1419, 1422-23 (D.D. C. 1986), *rev'd*, 801 F.2d 405 (D.C. Cir. 1986)).

125. *Id.* (emphasis added).

126. Natural Resources Defense Council, *et al.*, *Petition To Prepare Recovery Plan Under the Endangered Species Act For The Gray Wolf*, 6 (Feb. 20, 2008).

127. *Turtle Island Restoration Network v. United States Dept. of Com.*, 438 F.3d 937, 949 (9th Cir, 2006) (citing *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 372 (1989).

and monitoring techniques."[128] Significantly, the "continuing duty to supplement" applies in the context of *life-history strategies* analysis.[129]

In the case of the NRM gray wolf population, demographic recovery criteria (dating back more than twenty years) are out of sync with the available state of the best available science in myriad realms, including conspecific behavioral dynamics, population genetics, and conservation science.[130]

VI. The Intersection of Legal and Scientific Bases Militating Against a Premature Determination of Demographic Recovery

The following three sections, supported by contemporary scientific consensus, posits that the arbitrary numerical (*demographic* population-measuring) criteria[131] underpinning the Service's proposed delisting promulgation conflates population viability (preventing extinction) with recovery as envisioned under the ESA. A determination of recovery premised on a perceived resolution of delisting factors which fails to

128. Kline, *supra* n. 114, at 398-99.

129. *See, e.g.*, *The Ecology Ctr. v. U.S. Forest Serv.*, 451 F.3d 1183, 1187 (10th Cir. 2006) (a case where a SEIS was required to consider the Life History Report of the Northern Goshawk).

130. Virginia Morell, *Wolves at the Door of a More Dangerous World*, 319 SCIENCE 890, 891, (Feb. 15, 2008) (Dr. Michael Soule is quoted: "The *most trenchant message from conservation science in the last decade comes from studies about the role of top predators in maintaining the health of ecosystems."*) (emphasis added). Notwithstanding Dr. Soule's expert opinion and the scope of the ESA's overarching purpose to "*conserve* at-risk species *and the ecosystems* upon which they depend" (16 U.S.C. § 1531 (b); (16 U.S.C. § 1532(3) (mandating "habitat maintenance") the Service, *without any support*, asserts: "t[he Act does not require that we achieve or maintain '*ecological effectiveness*' (i.e., occupancy with densities that maintain critical ecosystem interaction and help ensure against ecosystem degradation) (Soule *et al.* 2003, p. 1239)." 73 Fed. Reg. 10529 (Feb., 27, 2008) (emphasis added).

131. The Final Delisting Rule premises delisting promulgation on "recovery criteria" that call for establishment of at least 30 breeding pairs of wolves in three areas comprising a meta-population of at least 300 animals *with genetic exchange* between subpopulations. The heart of these numeric targets – the requirement of 30 breeding pairs of wolves – stem from the Services' formal 1987 Recovery Plan *See* 73 Fed. Reg. 10515, (Feb. 27, 2008) and 1994 Final Environmental Impact Statement (1994 FEIS, App. 9 at 42) (emphasis added).

consider important aspects of the problem and which runs counter to the evidence is reversible error.[132]

A. USFWS' Consideration of Population Viability: Utilization of an Extreme Minimalist Approach Which Erroneously Conflates Preventing Extinction With Recovery and Undercuts Its' "Mission" to "Enhance" the Species.

Fundamentally, rather than predicate its findings and conclusions on the basis of a *population viability analysis*, the Service has repeatedly relied on an opinion poll surveys[133] of scientists[134] respecting population viability for

132. *See, e.g.*, *Nat'l Ass'n of Home Builders v. Norton*, 340 F.3d 835, 841 (9th Cir. 2003) ("An agency action must be reversed when the agency has 'relied on factors which Congress has not intended it to consider, *entirely failed to consider an important aspect of the problem*, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view of the product of agency expertise.'") (citations omitted) (emphasis added).

133. Craig M. Pease, Professor of Science and Law, RE: RIN *number* 1018-AU53, 10-11 (May 8, 2007): "*Opinion polls are not a substitute for scientific data*. Scientific conclusions must be justified by data and its analysis, not popular opinion. Yet the Proposed Rule justifies the 30 breeding pairs recovery goal by citing an opinion poll, the "Survey of wolf biologists" found in the 1994 EIS (Serv. 1994, Appendix 9) and as updated in Bangs (2002). An opinion poll of scientists, is not science. Neither of these opinion polls (Serv. 1994, Appendix 9 or Bangs 2002) contains any data on gray wolves. Rather they contain opinions as to what gray wolf data might show, were the USFWS to gather and analyze such data. This is a critical distinction. *Scientific conclusions are reached by gathering data to test hypotheses about nature, not by polling scientists to determine what the data might show, were they to be gathered*. In science, the ultimate arbitrator of the truth is not an opinion poll, but data." (internal emphasis provided).

134. Fallon, *supra* n. 5. "[T]he Service's [s]urvey did not provide a definition of viability, leaving a critical element to the discretion of the evaluator. Additionally, the survey presented the biologists with the Service's arbitrary recovery goals, rather than soliciting the biologist's own definition of recovery. Furthermore, the survey was designed in a way that likely biased support for the Service's pre-established goal. ... Furthermore, while some biologists did agree with one or the other of the definitions, many were also careful to warn that their response represented their opinion only, which was subjective since none of the definitions were based on explicit data. For example, Bob Stephenson wrote, '[u]nless someone has done a study of minimum viable population (MVP) of wolves from a genetic

gray wolves. This not only contravenes the ESA,[135] but also fails the practical requirements of the requisite formal population viability analysis ("PVA"). A PVA must reflect a scientifically grounded assessment of population, as opposed to, for example, the point estimates reflected in the proposed rule. A true PVA incorporates in it modeling rubric standard 95 percent confidence intervals or similar metric of sampling error.[136]

Determination of a *minimum viable population* ("MVP") is a crucial assessment in any PVA. An MVP is a population size capable of long-term persistence in the face of numerous uncertainties.[137] Determining biologically supportable MVPs requires consideration of genetic diversity, demographic stochasticity,[138] environmental stochasticity, plant succession, natural catastrophes, and social dysfunction.[139] Similarly, the following demographic factors affect a population's likelihood of long-term persistence and must be analyzed when determining a population's MVP:

---

standpoint there would be no way to know for sure whether this population would sustain itself in the long term.' John Weaver responded,' [i]n lieu of a formal PVA [population viability analysis] for gray wolves in the Northern Rocky Mountains, I can only respond subjectively to the proposed definitions.' Mark Boyce cautioned, "[a[definition for viable population is arbitrary, and we do not know enough to say how many is sufficient.' Lu Carbyn advised, 'I would not split hairs over what is viable or not – make sure you have large enough areas with suitable prey base – then let nature seek its own level.' Finally, Kyran Kunkel concludes, '[w]hen any of the above definitions are finally made, I think it is essential for us to realize and state that these definitions are not based on any true knowledge of what a population of viable populations for wolves is but rather, mostly a guess based on the best information available. ...'"

135. Pease, *supra* n. 133, at 13. ("'[i]t is illegal for the USFWS to rely on an opinion to determine what constitutes a viable gray wolf population. Scientific decisions are not made by opinion poll, and by so the USFWS has gone beyond the statutory mandate to rely only on the "best scientific and commercial data available" (16 U.S.C. § 1533(b)(1)(A)).

136. Pease, *supra* n. 133, at 1.

137. Steven H. Fritts & Ludwig N. Carbyn, *Population Viability, Nature Reserves, and the Outlook for Gray Wolf Conservation in America*, 3 RESTORATION ECOLOGY 26, 28 (1995).

138. Merriam-Webster's Collegiate Dictionary 1157 (10th ed., Merriam Webster 1997) (*Stochastic*: 1. Involving a random variable, a stochastic process; 2. Involving chance or probability).

139. Fritts & Carbyn, *supra* n. 137, at 28.

sex ratio, litter size, survival rates, age distribution, and age at first reproduction.[140]

Most wildlife ecologists agree that the probability of population extinction is high when the number of individuals is low.[141] A population viability analysis of the relatively small population of 280 to 300 wolves in Italy approximately the same size of that in the Northern Rockies following planned post-delisting culling[142] indicated that populations of this size are vulnerable to extinction in 60 to 100 years if there is more than 10-percent change in the percentage of adult mortality.[143] Other research has shown that a population of 100 individuals is usually too small to ensure long-term species persistence, that 1000 individuals may be adequate for "species of normal variability," and that 10,000 individuals "should permit the persistence of most birds and mammals."[144] Even the Service's 2002 survey of wolf biologists yielded the conclusions that ". . . 500 [wolf individuals] has been advocated as a general rule for a minimum population size . . . and the [t]otal 6-part metapopulation should be equal to/ greater than 5,000 throughout [the] western U.S."[145] The 2007 Peer Review opinions on the proposed rule suggesting that administrative and management expediency has superceded sound science underscore the foregoing view.[146] Perhaps

140. *Id*. (citing Mark L. Shaffer, *Minimum Population Sizes for Species Conservation*, 31 BIOSCIENCE 1131, 1132 (1981).

141. C.D. Thomas, *What Do Real Population Dynamics Tell Us About Minimum Viable Population Sizes*, 4 CONSERVATION BIOLOGY 324 (1990).

142. Dr. Kenneth Fischman, Associate Professor of Genetics, Columbia University (ret.), Testimony on the Idaho Wolf Population Management Plan, (Dec. 12, 2007) ("The (pre-delisting) population of Idaho is very small. I would like to put the 673 wolves in Idaho in geographical and comparative perspective. The size of Idaho is 82,751 square miles. That works out as *one wolf for every 123 square miles*.") (emphasis added).

143. P. Ciucci & L. Boitani, *Viability assessment of the Italian wolf and guidelines for the management of the wild and captive population*. Ricerche di Biologia della Selvaggina No. 89 (1991).

144. Fritts & Carbyn, *supra* n. 137, at 29 (citing Thomas, *What Do Real Population Dynamics Tell Us*, 4 CONSERVATION BIOLOGY 324-27 (1990)).

145. USFWS, *Wolf Population Recovery*, 010690-010699, 010695 (Feb. 11, 2002). (emphasis added).

146. Peer Reviewers of the Proposed Rule maintain: "[t]he very figure of 300 wolves was an "*administrative goal*" and, now with actual population numbers, that figure should probably be evaluated" (Dr. Lu Carbyn, Peer Review at 1 (undated); "[t]he Population Viability Analyses for the NRM DPS was an "ad-hoc measure" of population viability for wolves" (Dr. Mark Hebblewhite, Peer Review at 7 (May 5, 2007); "*[m]y strongest recommendation* for

equally troubling is the Service's apparent conflation of preventing extinction with population conservation and enhancement.[147]

Given path-breaking advancements in the state of the best available science related to population genetics, evolutionary biology, and conservation science that have occurred since the Service's 1994 reintroduction plan,[148] as well as the unresolved and abundant on-the-ground dangers compromising the guaranteed recovery of a *metapopulation* throughout three vast States, it is incumbent upon agency, to familiarize itself with the latest scientific advancements. USFWS must guard against "shifting baseline syndrome"[149] and thereby reconfigure its entrenched population recovery criterion to reflect a biologically sustainable and ecologically effective population,[150] as well as one which passes legal muster.[151]

management after delisting is that states *do not try to manage* wolves at an *extreme minimal level*, to satisfy the requirements of federal monitoring and their own management plans. Managing at bare minimum levels will require much more careful monitoring, continual tweaking of management strategies, the need to response to challenges to monitoring data, contention between the states about 'who' owns a wolf pack, and the *very real danger of wolves being relisted under an emergency action*" (Thomas Meier, Biologist, Denali NP, Peer Review 2 (May 9, 2007). (available at http://www.fws.gov/mountain-prairie) (emphasis added).

147. *See* E-mail from Edward E. Bangs, (Jan. 12, 2008 , 3:57:43 PM PST: "[i]f you accept that *the purpose* of the Endangered Species Act is to *prevent the extinction* of species – then the NRM wolf program has been an amazing success story and the ESA did its job – it is time to move on. The plain facts are that the NRM wolf population no longer needs [or meets the legal requirements of] the ESA's protections." (emphasis added); Virginia Morell, *Wolves at the Door of a More Dangerous World*, 319 SCIENCE 890,

148. 72 Fed. Reg. 6107 (Feb. 8, 2007).

149. Dale D. Goble, *Recovery In A Cynical Time – With Apologies To Eric Arthur Blair*, 82 U. WASH. L. REV. 581, 607-10 (2007) (emphasis added) (Professor Goble describes the institutionalized process this way: "[The shifting baseline] syndrome has arisen because generation [of agency personnel] … accepts as a baseline the stock size and species composition that occurred at the beginning of their careers, and uses this to evaluate changes. When the next generation starts its career, the stocks have further declined, but it is the stocks at that time that serve as new baseline. The result obviously is a gradual shift of the baseline, [and] a gradual accommodation of the creeping disappearance of resource species.").

150. Dale D. Goble, *Recovery In A Cynical Time – With Apologies To Eric Arthur Blair*, 82 U. WASH. L. REV. 581, 607-10 (2007) (Professor Goble describes the institutionalized process this way: "[The shifting baseline] syndrome

B. The Service's Demographic Population Target Has Failed to Account for the Genetic Risks Associated With Effectively Isolated Populations

As discussed above, determining a *minimum viable population*, entails estimation of the risk of extinction for a specific period in the future. Key starting points include the minimum number of individuals required for preservation of the population and the minimum geographic area required.[152] The required minimum number of individuals is significantly influenced by birth rate, mortality, immigration, and emigration.[153]

Another key factor in the evaluation is the genetic structure of the population, as a reduction in the genetic diversity undermines the general vitality and reproductive ability of individuals.[154] Inbreeding has been found to reduce the lifespan of individuals and the reproductive ability of females in wolf populations kept in captivity.[155] Mating between closer relative in the wild also tends to increase offspring mortality.[156]

Therefore, the smaller the overall population, the more likely that each wolf pack will become genetically isolated, inbred, and subject to demographic variation, inbreeding depression and complete die-off.[157] The Founder Effect, in which one or more gene variants predominate due to Random Genetic Drift (a stochastic process, whereby chance events can cause the frequencies of alleles to drift randomly from generation to

---

has arisen because generation [of agency personnel] … accepts as a baseline the stock size and species composition that occurred at the beginning of their careers, and uses this to evaluate changes. When the next generation starts its career, the stocks have further declined, but it is the stocks at that time that serve as new baseline. The result obviously is a gradual shift of the baseline, [and] a gradual accommodation of the creeping disappearance of resource species.").

151. *Fund for Animals v. Babbitt*, *supra* n. 113, at 108. ("[judicial] deference does not require the Court to accept the population targets if there is no scientific support or if they are blatantly wrong.").

152. Shaffer, *supra* n. 140, at 131.

153. Ministry of Agriculture and Forestry, *Management Plan for the Wolf Population of Finland*, 15 (2006) *available at* http://wwwb.mmm.fi/julkaisut/julkaisusarja/2005/MMMjulkaisu2005_11b.pdf).

154. Michael Gilpin, *Spatial Structure and Population Vulnerability*, *in* VIABLE POPULATIONS FOR CONSERVATION, 125-39 (M.E. Soule, ed., 1987).

155. Linda Laikre & Nils Ryman, *Inbreeding Depression in a Captive Wolf (Canis Lupus) Population*, 5 CONSERVATION BIOLOGY 33, 38 (Mar. 1991).

156. Peter Wabakken *et al.*, *Severe Inbreeding Depression in a Wild Wolf (Canis Lupus) Population*, 1 BIOLOGY LETTERS 17, 17 (Mar. 2005).

157. *Id.* at 15.

generation) is much more prevalent in small populations. Studies of evolution at the molecular level have provided strong support for Random Genetic Drift as a major mechanism of evolution.[158] Several recent studies have provided direct empirical evidence for the influence of genetics on population decline and recovery.[159]

Consideration of genetic effects over longer time frames is important for the long-term viability of populations and species. Recent considerations of this problem have led to the recommendation that an effective population size[160] of approximately 1,000 individuals is needed to allow continued adaptive evolution and to avoid the accumulation of new harmful mutations. However, such large populations will not be realistic for many species except by increasing connectivity among geographically separated populations over a wide area.[161]

Representation, redundancy, and resiliency form the basis of conservation science planning to promote true population viability.[162] These

158. D. T. Suzuki, A. J. F. Griffiths, J. H. Miller, & R. C. Lewontin, *Random Genetic Drift in* AN INTRODUCTION TO GENETIC ANALYSIS 704 (4th ed. W.H. Freeman 1989). Suzuki *et al* explain: "For example, consider what would happen if [a] … wildflower population … consisted of only 25 plants. Assume that 16 of the plants have the genotype AA for flower color, 8 are Aa, and only (one) is aa. Now imagine that three of the plants are destroyed by a rock slide before they have a chance to reproduce. By chance, all three plants lost from the population could be AA individuals. The event would alter the relative frequency of the two alleles for flower color in subsequent generations. This is a case of microevolution caused by genetic drift … ".

159. Fred W. Allendorf, *Genetics and the persistence of small populations*, in *Genetic aspects of viability in small wolf populations: with special emphasis on the Scandinavian wolf population* (Report from an international expert workshop at Farna Herrgard, Sweden 1st – 3rd May 2002).

160. Carroll, *et al*, *supra* n. 56, at 27 (An *effective population size* is defined as a "population [that] contains enough individuals to *establish* the species in the ecosystems")(emphasis added).

161. *Id.* (emphasis added).

162. *Id.* at 26; *see also* 68 Fed. Reg. 15809 (Apr. 2003) ("Representation, resiliency, and redundancy are three principles of conservation biology that are generally recognized as being necessary to conserve the biodiversity of an area (Shaffer and Stein 2000). The principle of *representation* is the need to preserve 'something of everything' – every species, every habitat, and every biotic community – so biodiversity can be maintained. At the species level it also calls for preserving the *genetic diversity that remains within a species*, in order to maximize the species' ability to cope with short-term environmental variability and to adapt and evolve in response to long-term environmental

fundamental conservation biology principles reflect the understanding that a single population does not represent species recovery, even if it is large enough to be significantly resilient to extinction. For wide-ranging species such as the wolf, the importance of *connectivity* (protecting dispersal linkage areas which enhance viability by connecting larger with smaller populations)[163] may justify its addition as a fourth principle for defining recovery goals.[164]

Although the Service's Rule claims that there is connectivity between populations providing for a "viable, self-sustaining, and evolving representative metapopulation,"[165] genetic researchers following a 2005 sampling study of over 500 individuals from the 1995 reintroduction of Canadian wolves into Idaho and Yellowstone, have determined that while the Montana, Idaho and Yellowstone populations are "genetically distinct" and currently display high levels of genetic variation, there is cause for concern:

> Despite currently high levels of (genetic) variation, there is concern for maintaining the genetic health over the long-term given the lack of connectivity with other populations. Population-based simulations provide a pessimistic outlook for genetic viability of the Greater Yellowstone wolf population if the population is isolated and not maintained at high numbers.[166]

change. Redundancy and resiliency both deal with "enough to last," but they address it at distinctly different levels. R*edundancy* addresses the need for a sufficient number of populations of a species, while *resiliency* deals with the necessary size (numerical and geographic) of those individual populations are needed for species' persistence *over time*. L*arger* populations are more resilient to environmental changes and other threats to their existence.") (emphasis added).

163. In the 1994 EIS review, Dr. Steve Fritts, EIS Team Wolf Scientist and Northern Rocky Mountain Wolf Recovery Coordinator, based the Service's [recovery plan] population goals for wolves in the northern Rockies on a premise that this population "would be connected to the Canadian population via the Rocky Mountain chain northward from Glacier National Park [in Northwest Montana] to the Banff Jasper Parks in Alberta and B.C." (USFWS 1993); Morell, *supra* n. 130, at 892 quoting Dr. Robert Wayne, Evolutionary Biologist: "[A] metapopulation was one of the goals of the original 1987 federal wolf recovery plan."

164. Carroll *et al.*, *supra* n. 56, at 26. (emphasis added).

165. 72 Fed. Reg. 6119 (Feb. 8, 2007).

166. Defenders C*ommentary*, *supra* n. 58, at 13-14 (citing Vonholdt, *et al*, G*enealogy and genetic viability of the gray wolves* (C*anis lupus*) *of Y*e*llowstone* N*ational* P*ark* P*roceedings*. N*orth* A*merican* W*olf* C*onference* (2007)) (emphasis added).

Additionally, recent field studies describe poor connectivity among the Service's designated population recovery area, unsuitable corridor habitat, and increased development pressures that may reduce the chances for improving connectivity and gene flow.[167] For example, "through the winter of 2006, only eight wolves have successfully traversed between northwestern Montana and central Idaho, and of those, only three have successfully bred."[168] Attempts made by wolves to move between the central Idaho and Yellowstone populations have fared even worse. In the eleven years since reintroduction only one known wolf completed the journey.[169]

This finding must be considered in its temporal context given the study by Leonard *et al.*, which "indicates that wolves from pre-extermination populations 'had more than twice the diversity of their modern conspecifics."[170] The alarming correlation is that even the populations in Canada that provided the genetic foundations of the population, and are relied upon by the Service as a continuing source in the tentative NRM DPS, were already depauperate."[171] The effects of this loss of variability are likely to manifest in the long term, beyond the agency's 30-year planning horizon.[172]

In short, in its assessment as to whether the NRM wolves are endangered in the context of genetics, the Service has failed to work out properly the genetic implications of effectively isolated small sub-

---

167. *Id.*

168. Michael J. Robinson, *Comments, Re: Advanced notice of proposed rulemaking for the creation of a northern Rocky Mountain gray wolf distinct population segment and to delist the* DPS, 4 (2006) (citing 71 Fed. Reg. 6634, 6637 (Feb. 8, 2006).

169. *Id.*, at 6; Geneticist Fischman comments on these findings:

> The numbers of dispersing wolves moving between Northwest Montana and Central Idaho are so small that they are likely to have little or no effect on gene transfer between these populations. The fact that in an eleven year time span only two of eleven wolves wolves bred, demonstrates that a larger number of wolves would be necessary if movement of the animals between these regions would have much opportunity to be translated into effects on gene pools. Even more importantly, apparently there have been no *genetic studies* performed that show *evidence* that genes, as well a few individuals, have moved between these regions.

Email from Dr. Kenneth Fischman, (Dec. 31, 2007, 7:11:12 PM PST) (on file with author) (emphasis added).

170. Robinson, *supra* n. 168, at 7 (citing JA Leonard, C Vila, and RK Wayne, *Legacy Lost: Genetic Variability and Population Size of Extirpated* US *Grey Wolves* (*Canis lupus*), 14 MOLECULAR ECOLOGY 9 (2004).

171. *Id.*

172. *Id.*

populations of NRM gray wolves because it is has omitted evaluation of factors that scientists have long identified as being critically important: maintenance of quantitative genetic variation, inbreeding depression, MHC genetic variation (basis for pathogen resistence), founder effects, environmental stochasticity, and avoidance of heuristic assessments of risk.[173] As noted by Morrell, "basically, the goals of the USFWS's wolf recovery plan aren't in sync with the latest thinking in conservation science. Biologists have moved away from the idea of a minimum viable population [MVP] to a more comprehensive population analysis. That 300 figure reflects old thinking."[174] In summary, Dr. Robert Wayne states that "[the recovery goal] severely underestimates the number of wolves required for maintaining a genetically healthy, self-sustaining metapopulation."

As will be discussed in the next section, the Service in its stubborn adherence to its recovery criteria (". . . the Act does not require or authorize the Service to manage a listed species to keep it from surpassing minimum recovery goals." [74 Fed. Reg., at 15140]), fails to incorporate contemporary tenet of conservation science – the *best available science* – to assess how the reduction of the population census to one-quarter of its pre-delisting size will affect "*wolf behavior* and the ability or incentive of individual wolves to leave core recovery areas."[175]

In short, leading conservations assert that the Service must re-examine and consider substantially increasing its demographic recovery goals in the tri-state core recovery areas if this population is to be managed as isolated subpopulation.[176] If, in the alternative, the NRM DPS over the long term will depend upon a certain degree of immigration from adjoining populations in order to sustain genetic viability, then it is incumbent on the Service to describe these other populations and commit to restoring protected dispersal corridors between them.[177]

173. Pease, *supra* n. 133, at 1.

174. Dr. Carlos Carroll, *Wolves at the Door of a More Dangerous World*, 319 SCIENCE 890, 892 (2008) (emphasis added).

175. Earthjustice Legal Defense Fund, Re: RIN Number 1018-AU53, *Comments on the Proposal to Designate the Gray Wolf Northern Rocky Mountain Distinct Population Segment and to Remove this Distinct Population Segment from the Federal List of Endangered and Threatened Wildlife*, 11 (May 8, 2007).

176. Robinson, *supra* n.168, at 5.

177. *Id.*(citing J.K. Oakleaf, *et al.*, *Habitat selection by recolonizing wolves in the northwestern United States*, 70 J. WILDLIFE MGT. 554 (2006); Carroll, Carlos, *et al.*, *Defining recovery goals and strategies for endangered species using spatially-explicit population models: the wolf as a case study*, 56 BIOSCIENCE 25 (2006). This seems particularly warranted given the Service's admission that "[w]e do not dispute the fact that the NRM can support a wolf population several times higher than

C. Entrenched Focus on an Arbitrary "Recovery" - Measuring Criterion Has Led to the Illegal Failure to Consider the Contribution of the Life-History Strategies of Extended Wolf Families to an Ecologically Effective Metapopulation

As discussed, courts[178] have linked the "best available science" mandate of the ESA and the "hard look" requirement of National Environmental Policy Act to a legally sufficient consideration of threats to sensitive, threatened and endangered species' "*life-history strategies*."[179] At the same time "[i]n enacting the Endangered Species Act, Congress recognized that individual species should not be viewed in isolation, but must be

---

the minimum recovery goal necessary to meet the (ESA's) requirements." 74 Fed. Reg., at 15140.

178. *The Ecology Center v. U.S. Forest Serv.*, 451 F.3d 1183, 1187 (10th Cir. 2006) (a case where a Supplemental Environmental Impact Statement was required to consider the 'Life History Report" of the Northern Goshawk); *The Center for Biological Diversity v.* FWS, 402 F. Supp.2d 1198, 1210-11 (D. Or. 2005) (the listing petitioners claimed, in part, that the agency failed to properly consider the declines in the anadromous "*life-history strategy"* and habitat of "sea-run cutthroat trout" in light of current threats to the species' anadromous *life-history strategy*); *The Center For Biological Diversity v. Norton*, 411 F. Supp. 2d 1271, 1288 (D. N.M. 2205) (the court acknowledged the required consideration of the FWS of the "*life history requirements"* of a cutthroat trout subspecies); *see also*, *Inland Empire Public Lands Council v. United States Forest Serv.*, 88 F.3d 754, 777 (C.A.9 (Mont.), 1996) (acknowledging the need for "*life history information*" or a functional equivalent where the former is not available).

179. *Life-history strategy* is an analytical framework widely used in animal and human biology, psychology, and evolutionary anthropology which postulates that many of the physiological traits and behaviors of individuals may be best understood in terms of the key maturational and reproductive characteristics that define the *life-course*. Examples of these characteristics include: age at weaning, age of sexual maturity or puberty, adult body size, age-specific mortality schedules, and age-specific fecundity. Two of the most well-known trade-offs involve number of offspring (few or many) and timing of reproduction (accelerated maturation and reproduction) versus delayed, *allowing for larger size and more complex social supports*. (emphasis added) (available at http://en.wikipedia.org/wiki/Life). For further information on *life-history theory*, *see* Lev. Y. Yampolsky, *Life History Theory*, Ency. Of Life Sci. (2002), http://www.els.net.

viewed in terms of their relationship to the ecosystem of which they form a constituent [sic] element."[180]

Myriad scientific studies focused on the life-history strategies of the gray wolf document that wolves live and interact in ways different from the majority of mammals.[181] While many mammals are solitary, the basic structure of wolf society is the *pack*, which is generally composed of an extended wolf family. The pack establishes firm boundaries and defends its home territory against other wolves. Wolves that live on deer tend to have packs of five to seven wolves, whereas wolves that prey on moose and bison tend to have packs of more than fifteen wolves.[182] In sum, aside from prey availability and competition from other wolves, the wolves' conspecific life-history strategies contribute to the complexity (age-structure composition) and ultimate size of the pack. In a congruent fashion, the wolves' system of mating and level of sociality "can influence fine-scale[183] genetic structure through patterns of breeding and population assembly rules."[184]

Through her groundbreaking exploration of scientific literature and intensive field study of wolf packs in Yellowstone National Park, wolf biologist Linda Thurston sought to ascertain why individual wolves would care for offspring who were not their own and why lone female breeders remained in packs.[185] Thurston reached many important conclusions concerning the advantages of the life-history strategies (e.g., deferred

180. *United States v. McKittrick*, 142 F.3d 1170, 1174 (9th Cir. 1998) (emphasis added). *See also*, H.R. Conf. Rep. No. 97-835, 97th Cong., 2d Sess. At 30 (1982), reprinted in 1982 U.S.C.C.A.N. 2860, 2871.

181. Douglas W. Smith, *Ten Years of Yellowstone Wolves* 1995-2005, 13 YELLOWSTONE SCI. 7 (Winter 2005).

182. *Id*. at 15. (emphasis added).

183. DA Randall, JP Pollinger, RK Pollak, A *Stochastic Simulation of the Extinction Process*, Version 9.50, Chicago Zoological Society (2005); Wayne *et al.*, *Inbreeding is reduced by female-biased dispersal and mating behavior in Ethiopian wolves*, 18 BEHAVIORAL ECOLOGY 579 (2007).

184. D. A. Randall, J. P. Pollinger, R. K. Pollak, A *Stochastic Simulation of the Extinction Process*, Version 9.50, Chicago Zoological Society (2005); Wayne *et al.*, *Inbreeding is reduced by female-biased dispersal and mating behavior in Ethiopian wolves*, 18 BEHAVIORAL ECOLOGY 579 (2007).

185. Linda M. Thurston, Homesite Attendance as a Measure of Alloparental and Parental Care by Gray Wolves (Canis lupus) in Northern Yellowstone National Park, (May, 2002) (unpublished M.S. thesis, Tex. A and M U.) (on file with the *Yellowstone Wolf Project*).

maturation, bi-parental, and rare alloparental[186] care, etc.) associated with complex, long-lived packs.

Cooperative breeding systems *only* occur in roughly 3 percent of bird and mammal species.[187] This particular type of breeding consists of "multigenerational group living," referring to systems in which adults provide significant care to young that are not their own genetic offspring.[188] Additionally, the term cooperative behavior is more appropriate for use with family groups."[189]

In order to make cross-species comparisons between mole-rats, primates, and canids, Thurston first defined "care" and posited how it should be measured. Thurston broke "care" into direct and indirect forms.[190] "Direct care" was defined as "acts toward young that have an immediate physical influence, and that contribute to increased survivorship of young."[191] She

186. *Id*. at 2-3 (citing E.O. Wilson, *Sociobiology*: *The New Synthesis* (Belknap Press 1975). (The term "*alloparenting*" refers to the phenomenon when "individuals assist in care of young that have been produced by others." *Alloparenting* typically included "caring for young through guarding, grooming, carrying, playing with, feeding, and nursing." *Id*. at 2-3 (citing S.R. Creel & N.M. Creel, *Energetics*, *Reproductive Suppression and Obligate Communal Breeding in Carnivores*, 28, Behavioral Ecology and Sociobiology, 263-270 (1991); C. S. Asa, *Hormonal and Experimental Factors in the Expression of Social and Parental Behavior in Canids*, in N. G. Solomon & J. A. French, *Cooperative Breeding in Mammals* 129-149 (Cambridge University Press 1997) [hereinafter Asa, *Hormonal and Experimental*]; and J. M. Packard, *Wolf Behavior*: *Reproductive*, *Social and Intelligent*, in L.D. Mech and L. Boitani, *The Ecology and Behavior of the Wolf* (University of Chicago Press forthcoming 2003)). Furthermore, alloparents are typically, but not always, the offspring of the breeders. *Id*. at 3 (citing S. T. Emlen, *Predicting Family Dynamics in Social Vertebrates*, in J. Krebs & N. B. Davies, *Behavioral Ecology*: *An Evolutionary Approach* 228-253 (Blackwell Scientific Publications 1997) [hereinafter Emlen, *Predicting Family Dynamics*]).

187. Thurston, *supra* n. 188, at 1 (citing Emlen, *Predicting Family Dynamics*, *supra* n. 189, at 228-253); *see also*, Doug Chadwick, *Returning of the Gray Wolf*, National Geographic (1998) ("Like humans, wolves display a variety of temperaments and psychological quirks. Their family structure *more closely resembles ours* than do those of many primate societies.") (emphasis added).

188. Thurston, *supra* n. 188, at 1 (citing Emlen, *Predicting Family Dynamics*, *supra* n. 189, at 228-53).

189. *Id*. at 82.

190. *Id*.

191. *Id*. (emphasis added).

defined "indirect care" as acts that occur in the absence or presence of young which increase survivorship of young at a later date."[192]

Mammalian cooperative breeders have many similarities with respect to *alloparental* and parental care. Their emphasis is on "the family," since even individuals participate in an "extended family" situation.[193] In order to better predict when alloparenting occurs within a species, Thurston examined the various benefits associated with this type of care.[194] For example, the benefits of alloparenting include "the opportunity to apprentice both in improving infant care skills and learning to forage."[195] "Future reproduction" also may be "improved through experience gained while alloparenting."[196] Juvenile wolves learn to hunt from the pack, as if attending "hunting school."[197] Another benefit is the "increased survival of close kin," which "increases inclusive fitness" of the pack.[198]

Alloparents also "gain an increased probability of survival while they are tolerated in their natal territory when conditions are harsh outside."[199] Their higher survivorship also likely creates a "higher chance of their offspring surviving if they breed later when conditions improve."[200] Finally, there is "an increased chance that they inherit a breeding position."[201]

Another study examined whether "larger canids produce larger litters because the size and type of food they consume improves the economy of provisioning."[202] The study concluded "larger canids that live in larger

192. *Id.*

193. *Id.*, at 82-83 (citing Emlen, *Predicting Family Dynamics*, *supra* n. 189, at 228-53; and N. G. Solomon & J. A. French, *The Study of Mammalian Cooperative Breeding*, in N. G. Solomon & J. A. French, *Cooperative Breeding in Mammals* 1-10 (Cambridge University Press 1997)).

194. *Id.* at 83.

195. *Id.* (citing L. D. Mech, *The Arctic Wolf: Living with the Pack* (Voyageur Press 1988).)

196. *Id.*

197. *Id.*

198. *Id.* at 84.

199. *Id.* (emphasis added).

200. *Id.* at 83 (citing Asa, *Hormonal and Experimental*, *supra* n. 1, at 129-149). (emphasis added).

201. *Id.* (citing S. D. Tardif, *The Bioenergetics of Parental Behavior and the Evolution of Alloparental Care in Marmosets and Tamarins*, in N. G. Solomon & J. A. French, *Cooperative Breeding in Mammals* 11-33 (Cambridge University Press 1997)).

202. *Id.*, at 81 (citing P. D. Moehlmann & H. Hofer, *Cooperative Breeding, Reproductive Suppression and Body Mass in Canids*, in N. G. Solomon & J. A. French, *Cooperative Breeding in Mammals* 76-128 (Cambridge University Press 1997) [hereinafter Moehlman & Hoefer, *Cooperative Breeding*]). (emphasis added).

groups and that species that live in large groups are more likely to eat vertebrates and to have a larger maximum prey size."[203] A parallel study regarding "food transfer through regurgitation in wolves," found that "all adults regurgitated food and that pups were more likely to receive food than the breeding female or *alloparents*."[204] Furthermore, "pack splitting" (where single wolves join with a group of wolves from either their natal pack or a different pack and become either a subordinate breeder or inherit a dominant breeding position) may . . . reflect a less risky strategy for establishing territories [because] a larger group is more likely than singletons to establish a territory (disperse) in a saturated landscape."[205]

Thurston's findings and conclusions are consistent with other studies and findings in connection with the principle of "effective dispersal" and the principles of a "genetically effective population,"[206] which results from the former.[207] "Effective dispersal" refers to dispersers who are sufficiently fit upon leaving the natal territory to *reproduce*.[208] According to Dan Stahler, "effective dispersal" is key to genetic variability, and thereby, a "genetically effective population" which has the ability to evolve and adapt to rapid environmental change, including global warming.[209]

Given the ESA's mandate that the state of the *best available science* be assimilated and applied (including advanced principles of conservation biology), as well as case holdings respecting the incorporation of life-history

203. *Id.* (citing Moehlman & Hofer, *Cooperative Breeding*, *supra* n. 205, at 76-128). (emphasis added).

204. *Id.* (citing L. D. Mech *et al.*, *Regurgitating Food Transfer Among Wild Wolves*, 77, Canadian Journal of Zoology, 1192-95 (1999)).

205. Bridgett M. Vonholdt, *st al.*, *The genealogy and genetic viability of reintroducted Yellowstone grey wolves*, 17 Molecular Ecology 1, 17 (2007) (citing *Yellowstone Wolf Project*, NPS, unpublished data). Vonholdt *et al* describe the mechanisms observed in the Yellowstone wolves to obtain mates as: (1) utilizing a breeding vacancy within a natal or neighboring pack; (2) becoming a subordinate breeder; (3) joining with a group of wolves from either their natal or different pack; and (4) usurping an established breeder. *Id.* (emphasis added).

206. Pease, *supra* n. 133, at 7 ("Effective population size (Ne) is defined as the number of animals that would have the same reduction in genetic variability over time as an ideal population in which, for example, population numbers are constant, sex ratio equal, and all members contributed equally to each subsequent generation.").

207. Interview (Aug. 20, 2007) with Dr. Dan Stahler, Project Biologist, for the National Park Service, Yellowstone Gray Wolf Restoration Program.

208. *Id.* (emphasis added).

209. *Id.*

strategies in recovery planning, the "complexity of wolf pack dynamics must be considered and incorporated into long-term wolf management plans and policies."[210] For example, it is vital to know beforehand the *intra-pack* status of the wolf targeted for agency-culling or recreational trapping. If the wolf who was killed would have been an effective disperser, the opportunity for increased genetic diversity and population connectivity is eliminated. Similarly, if the deceased wolf is the breeding female following whelping (birth), then the pup's survival will be severely compromised.[211]

"Policy makers developing wolf depredation management strategies should . . . assess the potential negative impacts of wolf removal on *pack structure* and persistence, especially in *recovering* populations"[212] Given this truism, "demographic and genetic monitoring should continue to give necessary background data, e.g., kinship and genetic variation in single individuals and packs."[213] Furthermore, "molecular data and kinship data should be analyzed together to determine consistency and used to rank importance of individuals."[214]

Notwithstanding expert agreement, some (including the USFWS) still theorize that the naturally high fecundity rate of wolves provides iron clad insurance against steep and indiscriminate human-caused mortality. However, it is important to remember that due to the wolf's unique ecology, their population density is usually far lower than population densities of any other large carnivores.[215]

210. Thomas M.Gehring & B. E. Kohn, *Limits to Plasticity in Gray Wolf, Canis lupus, Pack Structure: Conservation Implications for Recovering Populations*, 419 CANADIAN FIELD-NATURALIST 420 (2003).

211. *Id.*

212. *Id.* (citing G. C. Haber, *Biological Conservation, and Ethical Implications of Exploiting and Controlling Wolves*, 10 CONSERVATION BIOLOGY 1068-81 (1996).

213. Olof Liberg, *Genetic aspects of viability in small populations*, 37 Swedish Environmental Protection Agency Report no. 5436 (2002).

214. *Id.* (emphasis added).

215. Paul C. Paquet *et al.*, *Wolf Reintroduction Feasibility in the Adirondack Park*. Conservation Biology Institute, at 2 (1999) *available at* http://www.protectadks.org/issues/wolves/cbi-feasibility-study.pdf ("There are several reasons for this: (1) wolves are easily disturbed or displaced by human activities; (2) social animals are more susceptible to removal than solitary animals; (3) unlike bears, wolves are active throughout the year; (4) wolves occupy large home ranges, which increases exposure to humans; and (5) wolves often travel long distances, which increases exposure to humans.").

In some instances, wolf packs are so viciously hunted,[216] that packs break apart, thus preventing the pack from retaining older wolves with experience in the wild.[217] Animals, such as wolves, that learn through social transmission require time to modify their behavior based on threats.[218]

Other consequences of indiscriminate killing include the following findings: "the [r]emoval of entire packs of wolves . . . within a territory can lead to the formation of sink habitat[219] into which dispersing wolves may move to occupy;"[220] the deleterious loss of genetic variation resulting when an entire pack is eliminated.[221]

---

216. Dr. Marco Musiani, *Prof. Marco Musiani's Profile*, U. of Calgary, Canada ("A *few* hunters are capable of killing *more than* 600 *wolves per season* in an area of just 8,000 square Km."); Dr. H. Dean Cluff ("Wyoming's predatory animal designation is not conducive to regulate wolf harvest by humans. The danger is that unleashing such potentially indiscriminate killing can adversely affect the number of wolves in the state of Wyoming and the metapopulation thereby undermining recovery efforts.").

217. *See* USFWS *Weekly Reports* (wholesale pack culling continues under the auspices of USDA Wildlife Services in coordination with the USFWS (*Weekly Reports* are available at http://www.fws.gov/mountain-prairie).

218. Paquet, *supra* n. 260 at 6 ("Many researchers believe that the response of species to a particular disturbance depends largely on *disturbance history*. Disturbance history is a critical concept in understanding the behavior of long-lived animals that learn through social transmission. New disturbances, with established background disturbance, may surpass the level of habituation or innate behavioral plasticity that allows the animal to cope with the disruption.").

219. Robert Pahre, *Interagency Coordination among Wildlife Management Agencies in the Presence of Source-Sink Population Dynamics*, 3 (2006) *available at* http://www.isnie.org/ISNIE06/Paper06/03.4/pahretrans-boundarycoordination 2006.pdf) (The BIDE (birth-immigration-death-emigration) model of "source-sink" population dynamics explicates that a given piece of land ("habitat") could be a "source" that produces more wildlife that it can sustain, with the "surplus" dispersing elsewhere, while a "sink" (where mortality exceeds reproduction) imports those surpluses).

220. Thomas M. Gehring & Bradley A. Potter, *Wolf habitat analysis in Michigan: an example of the need for proactive land management for carnivore species*, 33 WILDLIFE SOC'Y. BULL. 1237, 1242 (2005) (internal citation omitted).

221. Allendorf, supra n. 159, at 37. "[t]he inbreeding coefficient is not as important as the *genetic relationship* . . . of the individual to the rest of the population when judging which *individual* could be taken out . . . [t]he worst thing that can be done genetically is take out an entire pack." (emphasis added).

Preservation of *pack structure* is vital as "packs are the essential social and biological units necessary for *long term* survival of wolf populations."[222] In turn, a thriving metapopulation is necessary to achievement of "ecological effectiveness."[223]

An ecologically effective population contains enough individuals to reestablish the specie's role in ecosystems.[224] The argument for reestablishing ecologically effective populations is most persuasive in the case of the wolf and other "keystone species,"[225] which strongly influence ecosystem function[226] through inter-specific interactions such as

222. Paquet *et al.*, *supra* n. 216 at 37. (emphasis added).

223. Michael E. Soule & John Terbough, *Conserving nature at regional and continental scales – a scientific program for North America*, 49 BIOSCIENCE 809, 810 (1999).

224. Carroll *et al.*, *supra* n. 174, at 27. (emphasis added).

225. Rocky Mountain Animal Defense, *Keystone Species: Why Prairie Dogs Are So Important*, http:www.prairiedogs.org/keystone.htm1. ("A *keystone species* is a species whose very presence contributes to a diversity of life and whose extinction would consequently lead to the extinction of other forms of life.").

226. Notwithstanding the plethora of empirical studies in conservation science explicating the critically important symbiotic interrelationship of an "ecologically effective" species with "the ecosystem upon which the species depends", the Service nonsensically asserts: "... the Act does not require that we achieve or maintain "ecological effectiveness" (i.e., occupancy with densities that maintain critical ecosystem interactions and help ensure against ecosystem degradation) (Soule *et al.* 2003, p. 1239) (72 Fed. Reg. 10529). To the contrary, "[i]n evaluating any policy or listing determination under the ESA, its polestar must be the viability of naturally self-sustaining populations in their naturally-occurring habitat."; Earthjustice Legal Defense Fund, *Commentary Re*: RIN 1018-AW37, *Comments on the Renewed Proposal to Designate the Northern Rocky Mountain Gray Wolf Population a Distinct Population Segment and Remove This Distinct Population Segment from the Federal List of Endangered and Threatened Species*, 11 (Nov. 26, 2008)(citing *Trout Unlimited v. Lohn*, 2007 WL 1795036, at * 16 (No. CC06-0483-JCC, W.D. Wash. 2007). It should be noted that while the Service continues to deny its' mandate to maintain ecological effectiveness, it acknowledges ways in which it *could* provide for "natural genetic exchange" if it were so motivated. By way of example, "[s]ome possible management practices to consider include: reducing the rate of population turnover and fostering persistent wolf packs in all or select core recovery segments or all or select areas of suitable habitat (citation omitted); maintaining higher rather than lower overall wolf numbers in all or select recovery areas; maintaining more contiguous and broader wolf distributions instead of disjunction and limited breeding pair

predation.[227] For example, the return of wolves to Yellowstone has triggered a cascade of top-down effects on the ecosystem.[228] Wolf predation has reduced the ability of elk to concentrate browsing on preferred species such as aspen (*Populus tremuloides*), leading to the recovery of riparian vegetation and associated species.[229] In short "[f]rom elk to grizzly bears to rodents to raptors, the presence of wolves is reshuffling the ecological deck in the park, altering relationships between species, having myriad unanticipated secondary and tertiary effects,[230] and increasing species richness."[231]

The importance of wolf ecology and population dynamics has even broader implications in the context of climate change. Biologists Post, Stenseth, and Peterson of the University of Norway concluded that '[i]n response to increased winter snow . . . wolves hunted in larger packs and, consequently, tripled the number of moose killed per day compared with less snowy years when they hunted in smaller packs."[232] This greater killing efficiency brought a decline in the moose population that resulted in less browsing pressure on balsam fir saplings, which showed a noticeable

distribution; minimizing or precluding human-caused wolf mortality between and around core recovery segments during critical wolf dispersal and breeding periods (December through April); and reducing the rates of or eliminating human-caused mortality in core recovery segments during denning and pup rearing periods (April through September). *See* 73 Fed. Reg. 63930 (Oct. 28, 2008).

227. Carroll *et al.*, *supra* n. 174, at 27 (emphasis added).

228. *Id*.

229. *Id*.

230. Jim Robbins, *Weaving a New Web: Wolves Change an Ecosystem*, SMITHSONIAN ZOOGOER (May/June 1998) ("One of the major elements of change in the ecosystem brought by wolves is the new-found abundance of protein in the form or red meat … Until the wolves arrived back, most elk were available only in the spring, after the winter die-off. Now elk meat is available all year long. Once wolves have made a kill and fill their bellies, they become 'meat drunk' and disappear to sleep it off. Other species that have been waiting move in.' A lot of other predators and scavengers have a seat at the wolf kill table," says John Varley, Chief Scientist for the park (YNP).")

231. *Id*.; It should be noted that the Service is well aware of its obligation to apply an "ecosystem approach" in its conservation planning. 74 Fed. Reg. 15144 ("Successful recovery of a rare species requires that the necessary components of its habitat and ecosystem be conserved, and that diverse partnerships be developed to ensure the long-term protection of those components"); *See* National Policy Issuances 95-03 and 96-10; 59 FR 34274, July 1, 1994.

232. Paquet *et al.*, *supra* n. 215, at 5.

increase one year after snowy winters.[233] The authors maintain that this "evidence indicates that cascading behavioral responses of apex predators to climate change may have a substantial impact on ecosystem function."[234] Understanding the mechanisms or pathways that confer community resistance to climate change will be important to conservations and managers in mitigating the effects of a changing climate on shifting community patterns and local extinctions.[235]

The foregoing conclusions are reflected in the standing 2001 Order of the Department of the Interior ("DOI")[236] that agencies consider and analyze potential climate change effects in all of their management planning. Additionally, the scientific consensus is that restoring wildlife habitat in order to build resilience to global warming is critically important, and is accordingly reflected in the newly passed Global Warming Wildlife Survival Act.[237] However, notwithstanding the DOI Order and the state of the best available science concerning amelioration of climate change effects, the Governmental Accountability Office ("GAO") in its recent report to the United States Congress concluded that the USFWS was out of compliance.[238]

233. *Id.* (emphasis added).

234. *Id.* (emphasis added).

235. Christopher Wilmer & Wayne Getz, *Gray Wolves As Climate Buffers in Yellowstone*, Vol. 3 (No. 4) PLOS. BIO. 92 (2005).

236. ORDER NO. 3226; Subject: Evaluating Climate Change Impacts in Management Planning (Jan. 19, 2001). Sec. 3 requires: '[e]ach bureau and office will consider and analyze potential climate change impacts when undertaking long range planning exercises, when setting priorities for scientific research and investigations, when developing multi-year management plans, and/or when making major decisions regarding the potential utilization of resources under the Department's purview.

237. H.R. 3221 (passed by the House of Representatives in August of 2007) and presently before the Senate Committee on the Environment and Publics Works. The Act would direct the federal government to develop coordinated national strategies to identify, monitor, and protect or restore wildlife populations and habitats are likely to be harmed by global warming. (accessed at http://www.ens-newswire.com/ens/oct2007/2007-10-17-01.asp).

238. GAO Report to Congressional Requesters, *Climate Change – Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources*, Report Summary (Aug. 2007). In part, the report summary states: "[w]hile a broad order developed in January 2001 directed BLM, FWS, and NPS to consider and analyze potential climate change effects in their management plans and activities, the agencies have not yet provided specific direction to managers on how they are to implement the order …[i]n particular, the managers lack computational models for local

To summarize, the scientific case supporting biologically sustainable "recovery" criteria is premised on a genetically viable *metapopulation* founded on multi-generational wolf families. It follows sequentially in this manner: the genetically effective metapopulation of Northern Rocky Mountain gray wolves (and the ecologically effective population derived there from) depends on the effective dispersal of as many fit individuals as possible. Fit wolves in the context of the conspecific life-history strategies of C*anis lupus* comprise those wolves with superior genes. These wolves have delayed dispersal from intact natal families until they are sufficiently fit from the standpoints of nutrition, hunting training, and socialization to travel long distances, escape extirpation, and reproduce in new territories. By extension, on the basis of cutting edge studies of wolf biology and genealogy, it is clear that the entirety of the natal pack *must* be protected from indiscriminate culling while juvenile wolves receive all of the benefits of delayed maturation.[239]

With respect to long-term conservation implications the nexus between protection and conservation of the gray wolf's life-history strategies and a genetically sustainable population is clear. As Vondholdt *et al*. conclude:

> [P]opulation management should include efforts to ensure that the *social dynamics function remain unhindered*, thus promoting the diversity of behaviors that allow for *inbreeding avoidance* and *pack formation* as found in the Yellowstone population.[240]

VII. Conclusion

The United States Fish and Wildlife Service, the environmental trustee in charge of endangered species recovery, has employed an extreme and risky minimalist approach in a designation of its demographic "recovery" goal. Renowned wolf biologists comment in Peer Reviews on the highly controversial decision to delist the gray wolf, that the Service's Northern

---

projections of expected changes and detailed inventories and monitoring systems for an adequate baseline understanding of existing local species."

239. Fischman, *supra* n. 142. Dr. Fischman concurs: "[the point here, *which cannot be emphasized too strongly*, is that the tight-knit social structure of a wolf pack makes it imperative that it remains as intact as possible, so that the young can benefit from the responses and anticipation of more experienced members of the pack. I*ndiscriminate killing of pack members could make the young much more vulnerable and their behavior more unpredictable*" (internal emphasis).

240. Vonholdt *et al*, *supra* n. 205, at 19 (emphasis added).

Rocky Mountain thirty breeding pair criteria is "ad-hoc," and that it reflects an "administrative goal" born out of "management expediency."

Arguably, it also reflects unconstrained and politically motivated "adaptive management" rather than a commitment to employing the best available science and data in the realm of conservation science. Specifically, the Service's entrenched and arbitrary focus on scientifically out-of-date demographic recovery criteria has led to the agency's illegal failure of its recovery planning to protect, conserve, and enhance the invaluable contributions of the complex *life-history strategies* of complex wolf packs to a genetically effective metapopulation and balanced ecosystem. This analytical neglect, which in turn is reflected in the Service's leadership, contravenes the overarching purpose of the Endangered Species Act, namely the conservation of at-risk species in the context of their *interrelationships* to their encompassing ecosystems, as well as the agency's enunciated "mission."

Furthermore, premature delisting on the basis of biologically unsound recovery criteria could easily backfire if a fractured population subject to indiscriminate culling precipitously declines. That is an emergency re-listing would likely weaken the credibility of the Act in the minds of those who oppose the costs of conservation and take issue with the primary mandate to make science-based decisions free from the influence of political and economic factors. As Professor Holly Doremus astutely noted, "[d]ecisions to experiment should be undertaken only if they can be defended . . . to enhance the survival of the species. . . ."[241] Perhaps then the magnificent gray wolves of the American West would finally have a chance to be restored to a rational facsimile of the nation they once were.

241. Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of "New Age" Environmental Protection*, 41 Washburn Law. J. 52, 88 (2001). (internal citations omitted) (emphasis added).