# The Northern Rocky Mountain Gray Wolf Is Not Yet Recovered

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*Without seeking independent scientific review, Interior Secretary Ken Salazar recently approved a 14 January 2009 Bush administration rule to remove endangered species protection from the northern Rocky Mountain (NRM) Distinct Population Segment (DPS) of gray wolves less than 14 years after their reintroduction to Idaho and Wyoming. The "delisting" rule does not adequately address lack of genetic connectivity between Yellowstone wolf packs and other NRM populations, for which reason a federal court overturned the 2008 predecessor of the rule. The US Fish and Wildlife Service defies its own policies by delisting the Idaho and Montana portions of the DPS while Wyoming wolves remain endangered. Criteria for this delisting are inconsistent with prior delistings of recovered birds and mammals. New scientific understanding of species recovery argues for a higher delisting threshold for the NRM gray wolf metapopulation. Finally, we argue that ecosystem recovery should be a recovery criterion for this unique keystone predator.*

*Keywords: northern Rocky Mountain gray wolf, Endangered Species Act, US Fish and Wildlife Service, genetic connectivity, population viability analysis*

**Barack Obama, president of the United States, has** promised to let scientific facts, unclouded by politics or ideology, guide his administration's environmental policy decisions. As scientists, we applaud this promise. We believe that Interior Secretary Salazar broke that promise, however, with his 6 March 2009 endorsement—without further independent scientific review—of a politically motivated Bush administration decision to remove protection for an endangered species. Since its preplanning stages in the 1980s, the 1995–1996 reintroduction of the extirpated gray wolf (*Canis lupus*) in Yellowstone National Park (YNP) and parts of Idaho, and its subsequent recolonization of surrounding ecosystems within a portion of the northern Rocky Mountain (NRM) Distinct Population Segment (DPS), has been embroiled in regional and state politics, with powerful special interests opposing the return of this native species. In this article we make the case that the current delisting rule for the NRM gray wolf is premature and inadequate because it (a) is not based on the best available science, (b) is insufficient for maintaining a viable metapopulation, (c) violates the policies of the US Fish and Wildlife Service (USFWS) on DPSs, and (d) does not address deficiencies in state management plans that leave wolf populations at risk.

## A brief history of the restoration and delisting of the NRM gray wolf

In the 1970s, 40 years after wolves were extirpated in the western United States, naturally dispersing gray wolves from Canada began to colonize northwestern Montana. These populations were immediately protected under the 1973 Endangered Species Act (ESA; 16 U.S.C. 1531–1544, 87 Stat. 884), joining those in northeastern Minnesota as the only extant gray wolves in the contiguous United States. Over the next decade, widespread public support for reintroducing the only native large mammal missing from America's first national park induced the USFWS to develop a plan to reintroduce gray wolves to YNP. Because wolf reintroduction was strongly opposed by some powerful public-lands user groups—primarily those with interests in ranching and hunting—and by state legislators in the region, the USFWS's proposal included liberal lethal control measures and designation of these wolves as a "non-essential experimental population." In 1987, in order to facilitate acceptance of wolf reintroduction amid strong opposition, the USFWS set recovery goals of only 10 packs (or breeding pairs) and 100 animals in each of the three states surrounding YNP. These numbers were based not on scientific data or population

*BioScience* 59: 991–999. ISSN 0006-3568, electronic ISSN 1525-3244.  doi:10.1525/bio.2009.59.11.11

viability analysis but on the "opinions of recovery team members" (USFWS 1987, 2009a). The numbers were subsequently "validated" by a 1992 questionnaire sent to biologists asking whether 10 breeding pairs sustained for three consecutive years in a state constituted "a viable population" (EIS 1994).

Once reintroduced into central Idaho and YNP in 1995–1996, wolves expanded quickly into vast areas of federal land in the Greater Yellowstone Ecosystem (GYE) with large populations of ungulate prey; YNP alone had more than 19,000 elk (*Cervus elaphus*) at one census prior to wolf reintroduction (Smith et al. 2003). By 2001, the gray wolf population of Wyoming, Montana, and Idaho had grown to 550, of which 80 were in the naturally colonized area of northwestern Montana. Five years later, the NRM population had grown to 1300; nearly half of the wolves were in central Idaho (USFWS 2009b), where a single, contiguous, roadless expanse of 13,000 square kilometers ($km^2$)—an area larger than the GYE—forms the core of the federal public lands comprising 63 percent of Idaho.

By the end of 2008, the USFWS (2009a) claimed that the NRM wolf population had exceeded minimum recovery goals (300 wolves, overall, in the 250,000 $km^2$ core recovery area, which is a fraction of the area of the NRM DPS) for nine consecutive years, and now exceeded minimum goals fivefold. In this claim, the USFWS shifted the original goalposts of 10 pairs per state sustained for three years (see above); in fact, the northwestern Montana population first reached this minimum in 2007. The lack of rigorous scientific analysis supporting the original population thresholds was not considered in this conclusion, nor was the equally important original goal of genetic connectivity among subpopulations—"The importance of movement of individuals between sub-populations cannot be overemphasized" (EIS 1994, p. 42)—which had not been achieved between the isolated YNP wolf packs and the rest of the DPS (VonHoldt et al. 2008). Without demonstrating the presence of genetic exchange among subpopulations in the putative DPS (a requirement for metapopulation function and prevention of isolation effects; Hedrick 1996), the USFWS had no legal or biological claim that the DPS was validly defined for delisting under the ESA.

The Bush administration delisted the NRM gray wolf in March 2008, but the US District Court in Montana reinstated ESA protections in July 2008 (*Defenders of Wildlife v. Hall,* 565 F. Supp. 2d 1160 [D. Mont. 2008]), declaring the delisting rule illegal under the ESA and the 1994 Wolf Recovery Plan written by the USFWS. The judge emphasized that genetic connectivity had not been reestablished. On 14 October 2008, the federal court approved the USWFS request to vacate the delisting rule and remanded it to the USFWS for further consideration. The USFWS then proposed a nearly identical rule on 14 January 2009. Minimum recovery goals had increased, arbitrarily, to 15 packs and 150 animals in each of the three states (USFWS 2009a). Secretary Salazar, surprisingly, after a month in office and on the advice of USFWS acting director Rowan W. Gould, published the final delisting rule without seeking public comment or an independent scientific review of it, despite some modifications to the Bush administration–era plan. The final delisting rule became effective 4 May 2009 (USFWS 2009a).

### Politics trumps science in arbitrary definition of DPS

The USFWS is disregarding much current scientific research, and its own precedents, in its rush under Secretary Salazar to delist the gray wolf in Idaho and Montana, while admitting that wolves in the Wyoming portion of the DPS are not recovered. Political pressure to control and even reduce current wolf populations is strong in all three states. The USFWS feels it has a solid case for rejecting only Wyoming's wolf management plan, but in a 2004 letter the agency itself ruled as illegal the option of proceeding with a partial delisting before the entire DPS was recovered. The Wyoming management plan allows wolves to be shot on sight in most of the state outside national parks, a practice the USFWS has concluded will put wolves at risk of extirpation in Wyoming. Besides being biologically indefensible, using political boundaries both to define a DPS and to subdivide it for delisting has been ruled illegal in previous court cases (*Defenders of Wildlife v. Secretary, US Department of Interior,* 354 F. Supp. 2d 1156 [D. Oreg. 2005]); moreover, it violates the USFWS's own precept that DPS boundaries be "supported by sound biological principles." An unintended consequence of the sudden change in status across state lines will most likely be the shooting of "protected" wolves from Wyoming, and indeed from the YNP, as soon as they cross into Idaho or Montana (see box 1). Protected dispersal corridors are not explicitly defined in this rule, either for the protection of Wyoming wolves or for the facilitatation of genetic exchange, which the USFWS acknowledges is vital for the long-term viability of wolf populations (USFWS 2009a).

In announcing the delisting rule, Secretary Salazar stated that Idaho and Montana should not be "punished" for Wyoming's failure to produce a viable wolf management plan (Schneider 2009), which implies, of course, that hosting an endangered species living mostly on federal public lands in the northern Rockies is forced punishment on a state. The governors and state congressional delegations from Idaho and Montana hailed the decision and praised Salazar; Wyoming's reaction was a comparatively restrained show of displeasure at their continuing so-called punishment.

### Delisting rule ignores the lack of genetic connectivity

The court ruled that the Bush administration's 2008 delisting plan was biologically indefensible: Plaintiffs had proved that the YNP population was genetically isolated and would suffer decline as a result of inbreeding, and the USFWS acknowledged the point (*Defenders of Wildlife v. Hall*). Recent studies suggest that extinction risk from inbreeding depression and the loss of genetic diversity generally has been underestimated in recovery planning (Frankham 2005). The 2009 delisting rule for the gray wolf differs from its predecessor in two respects: (1) Wyoming has been excluded from the delisting, and (2) the USFWS proposes to facilitate genetic exchange among isolated populations through vehicular transport of wolves around the DPS (USFWS 2009a). It is biologically indefensible to argue that a species is recovered when its persistence requires such extensive and ongoing human intervention ("human-assisted migration management," in USFWS [2009a] terms). Perhaps more important, recent genetic studies of highly structured metapopulations of gray wolves have shown that adaptation to local ecosystems occurs (Musiani et al. 2007), that dispersal may be limited by climate and habitat (Geffen at al. 2004), and that prey specialization can restrict gene flow (Carmichael et al. 2007). Thus, it is vital that wolves make their own "dispersal decisions"; that is, a natural preselection of suitable migrants is necessary to maintain a proper balance between gene flow and local adaptation.

**Box 1. Sound management? Idaho may reduce wolf population by 40 percent in first year.**

On 17 August 2009, the Idaho Fish and Game Commission voted 4–3 to set "conservative" harvest limits of 220 wolves for the 2009 hunting season; three commissioners voted to set the quota at 430 wolves (*Idaho Mountain Express and Guide*, 19 August 2009). At the same time, the commission agreed to an eventual reduction to 518 wolves, using methods in addition to hunter harvest. In 2008, 153 wolves were known to have died in Idaho, 108 from lethal control actions (Idaho Progress Report 2008, USFWS 2009a). If a similar number of deaths in 2009 were added to the 220 harvested, 373 wolves could die in Idaho in 2009, which, if the population growth rate were the same as the previous year's (10 percent), would mean a 40 percent population reduction in one year. The commission said it will reconsider its 2009 harvest quotas at its November meeting.

The state of Montana set a 2009 harvest quota of 75 wolves. At the time this article went to press, a lawsuit to overturn the NRM delisting, filed by 14 conservation groups, was pending. An injunction filed by those groups to halt the Idaho and Montana harvests was rejected by the federal district court on 8 September 2009, but in the ruling Judge Molloy implied that the plaintiffs might prevail in their overall suit. He wrote: "The service has distinguished a natural population of wolves based on a political line, not the best available science. That, by definition, seems arbitrary and capricious" (*New York Times,* 10 September 2009).

The fallacy of assuming that Wyoming wolves remain protected, given the lack of buffer zones around Yellowstone National Park in state wolf hunts, came into sharp focus this autumn. An early hunt in Montana's Absaroka-Beartooth Wilderness just north of Yellowstone resulted in the deaths of 6 members of the "Cottonwood Pack," which was central to a long-term study of one of the last remaining unharvested gray wolf populations, and whose territory was 95 percent inside park boundaries. These wolves took only wild prey. On 3 October 2009, the radio-collared alpha female of that pack, who had provided crucial data for five of her seven years of life, was killed by a hunter (Morrell 2009).

## Nascent success of wolf restoration may be stalled to placate grazing interests

The premature delisting decision and the definition of the delisted DPS along boundaries of political convenience, which include vast areas of suitable habitat (Carroll et al. 2006) currently unoccupied by wolves (figure 1), run counter to the stated purpose of the ESA: "to provide a means whereby the ecosystems upon which endangered species... depend may be conserved." The success of NRM wolf reintroduction to date is a triumph and a credit to USFWS and state and National Park Service biologists, but the serious compromises to the initial recovery plan and goals, including liberal lethal control and "non-essential experimental status," were made not on the basis of scientific evidence of species recovery but rather on the politics of livestock ranching. The argument that a healthy wolf population will cause significant loss of livestock is not supported when the numbers are examined.

Across the three-state NRM region in 2008, biologists documented that wolves killed 214 cattle, 355 sheep, 28 goats, 21 llamas, 10 horses, and 14 dogs; but the same year, a single severe storm killed more than 1200 calves and lambs (USFWS 2009a). A recent study found that only 3 percent of all livestock losses in the northern Rockies were due to all native predators combined (Van Camp 2003). Worldwide, livestock losses to wild canids generally total less than 2 percent of all losses in a given year, regardless of canid population densities (Alderton and Tanner 1994). Records compiled by the

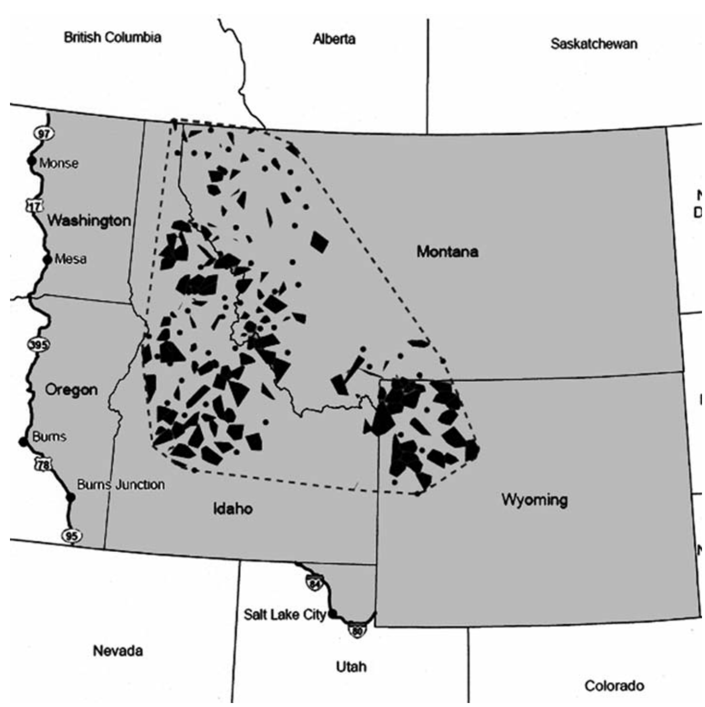


***Figure 1. Boundaries of the Northern Rocky Mountain Distinct Population Segment (NRM DPS) as identified in the April 2009 delisting rule for the gray wolf (gray shading); distribution map of existing wolf packs as of 2007 (dark polygons); and location of core recovery area (dashed line) as published in the* Federal Register *(USFWS 2009b).***

Montana Department of Livestock show that in 2002, Montana's 108 wolves caused less than 0.000008 percent of total livestock losses in the state (including weather, disease, and other causes; Van Camp 2003). In Idaho in 2001, 10 cattle and 54 to 62 sheep were killed by wolves, whereas 2600 cattle and 11,600 sheep were killed by other predators—60 percent of the latter being coyotes (*Canis latrans*) and 9 percent being domestic dogs (*Canis lupus familiaris*), compared with about 0.005 percent killed by wolves (Van Camp 2003).

In fact, domestic dogs commit substantially more depredation on livestock than wolves in many parts of the world where they co-occur (Francis 2004). Wolves in YNP (Berger et al. 2008) and elsewhere (Fuller and Keith 1981) have been shown to suppress coyote populations and increase the relative proportion of carrion in coyote diets, so it is quite plausible that reducing wolf densities could trigger mesopredator release (Crooks and Soulé 1999, Prugh et al. 2009) and actually increase overall depredation of livestock by coyotes.

The cost to federal and state agencies to investigate NRM wolf killings and to destroy 246 suspect wolves in 2008 was about $1 million. From the start of wolf recovery programs in the region through July 2009, a compensation program funded largely by Defenders of Wildlife has awarded livestock owners $1,341,558 in restitution for wolf depredation (USFWS 2009a). In a recent survey, roughly equal majorities of ranchers identified themselves as "very concerned" about both wolf depredation and transmittal of brucellosis to their stock from wild elk (Stronena et al. 2007). This divided concern reveals an unmet need for public education in wildlife management—wolves, which preferentially prey on old and diseased elk (Wright et al. 2006), are in fact strong allies in controlling ungulate disease.

**Idaho's equivocal goals for the gray wolf.** Epitomizing antiwolf ideology, the Idaho legislature in the 1980s prohibited state involvement in the reintroduction of wolves, and in 2001 resolved to eradicate wolves from the state. Idaho governor Butch Otter proclaimed his desire to kill the first wolf when the species became delisted in his state (Brown and Flesher 2009). Idaho now has 846 of the 1645 wolves in the NRM DPS (table 4b in USFWS 2009a [2008 Interagency Annual Report]); the Idaho Department of Fish and Game (IDFG) recently revised its management plan from maintaining 104 wolves to a new "target" population of 500 (it is unclear whether "target" implies average, minimum, or maximum; nor is it clear whether the target applies to a winter census, which would be conservative). Montana has committed to a target wolf population of 400, and the USFWS itself promises to maintain, at minimum, 300 wolves in Wyoming (USFWS 2009a). Salazar's decision to uphold the Bush administration's delisting of the NRM gray wolf will entrust the conservation of more than half the recovering population of wolves to the state of Idaho, whose legislature and chief executive oppose the very principle of wolf restoration. Despite Idaho and Montana's newly promised target populations of several hundred individuals, each state must maintain only 150 wolves in 15 packs to forestall USFWS relisting under the ESA. When the Bush administration first delisted the NRM gray wolf DPS in March 2008, 100 wolves were slaughtered in 112 days (USFWS 2009a [2008 Interagency Annual Report]); should the current harvest scenario follow suit—as is likely—the current populations will decline to the minimal limits within three years (see box 1).

### Recovery goals should be updated with new science and data

Recent genetic studies have estimated that 380,000 gray wolves populated the western contiguous United States and Mexico before European settlement (Leonard et al. 2005). By 1930, western US gray wolves had been extirpated, resulting in a 50 percent loss of genetic diversity (Leonard et al. 2005) from pre-extirpation levels. Thus, western wolves have been declared recovered with a population that is less than 1 percent of its original size, and with drastically depleted genetic diversity. This loss of genetic variation is essentially permanent and may in itself reduce the adaptability and viability of the newly founded DPS, even more so if it remains too small to function as a metapopulation. Genetic diversity was never considered in the original recovery goals, which is a significant failure even if it is twice as high as we now know it to be (see Frankham 2005). In light of this new evidence and to avoid further loss of genetic diversity, updated recovery goals should be based on an explicit calculation of the current population's effective population size ($N_e$, or the number of individuals contributing to the gene pool—which must consider minimum number of breeding pairs, spatial dispersion, dispersal and other factors, and can be a small fraction of the census population; Hedrick 1996).

Whether populations are reduced to the legal minimum of 300 wolves in Idaho and Montana or to 900, as those states now promise (including the Wyoming wolves under USFWS management, the legal minimum would be 600 and the promised minimum 1200), we maintain that both the initial recovery goals and the goals of the state management plans are unrealistically low for full recovery, which must include reintegration of wolf populations into ecosystems across the region.

**Culling this recovering population will put it at demographic risk.** Although 1600 wolves may possibly allow adequate connectivity and genetic exchange to sustain the metapopulation, the population numbers proposed under Idaho and Montana's management plans do not. The best-case scenario is the loss of nearly half the population—a substantial population bottleneck (Hedrick 1996). Furthermore, the pack structure of wolves, which in general is one breeding pair per family group, means that the $N_e$ is considerably fewer than the census number. The unregulated harvests allowed under the proposed management plans will disrupt pack structure, which can lead to inbreeding (VonHoldt et al. 2008) and the loss of dispersing individuals, thus further minimizing connectivity and gene flow.

These genetic and structural factors alone could eventually cause the decline of the NRM population, but the wolf-culling levels proposed by Idaho and Montana will directly cause an even more rapid, unsustainable decline. We conducted simple population viability analyses with the program Vortex (Lacy 1993), using the approximate NRM population sizes (1500 in NRM, 150 in YNP), proposed best-case harvest levels (600 animals across the management unit without regard to sex or age of animals taken), and well-documented gray wolf natural history (single litter, mean of six pups per year; Mech 1974). We varied several parameters (age distribution, breeding pool, total percentage of breeding wolves, dispersal survival, age at mortality, and percentage dispersing between NRM and YNP), from realistic and conservative values to extremely liberal (in terms of facilitating persistence) and unrealistic values. In 100 percent of 10,000 simulations for all conditions, the population declined, effectively, to extinction (i.e., 100 individuals, a size well below the 450 at which the DPS would need to be relisted) in less than 10 years.

**An ecosystem recovery cascade has begun but will not be sustained.** More than two-thirds of the NRM DPS is uninhabited by gray wolves (figure 1). Calling for higher recovery goals and recovery over a larger area within the DPS is justified not only because the wolf population is neither genetically nor demographically viable under state management plans but also because the trophic cascade triggered by successful reestablishment of the top predator has already proved to restore degraded ecosystems. In YNP, the reintroduction of wolves has led to restoration of riparian habitat and beaver-pond communities (Ripple and Beschta 2003), aspen forests (Ripple and Beschta 2007), and songbird assemblages (Berger et al. 2001). The recolonization of gray wolves in Banff, Canada, produced similar ecosystem benefits (Hebblewhite et al. 2005), and such benefits have been attributed to other mammalian carnivores worldwide. Further, gray wolves have been shown to buffer the effects of climate change, specifically on carrion availability in YNP (Wilmers and Getz 2005).

These restoration effects were seen in YNP ecosystems when the wolf population reached its "ecologically effective" density (Soulé et al. 2005) of 16 per 1000 $km^2$ throughout the park's 8980 $km^2$ (Ripple and Beschta 2004), although the density of wolves in prime habitats of YNP's northern range had already reached 50 per 1000 $km^2$ by 2002 (Smith et al. 2003). The current density of wolves throughout the NRM DPS is about 5.5 wolves per 1000 $km^2$ (Carroll et al. 2006); if reduced to 150 in each of three states, it would be 1.6 per 1000 $km^2$. In contrast, Minnesota's postdelisting management plan precludes hunting and trapping for at least five years after delisting and calls for a minimum wolf population of 1600, which is 18 wolves per 1000 $km^2$ (MDNR 2001). A similar density of wolves, well-distributed across 277,377 $km^2$ of suitable habitat in the NRM DPS (Carroll et al. 2006), would equal a metapopulation exceeding 17,000. This does not include some suitable habitat in areas of Oregon, Washington, Utah, and Colorado that are outside the arbitrarily drawn DPS boundaries. Utah and Colorado alone could support an estimated 1600 wolves (Carroll et al. 2006).

The ESA's stated purpose is ecosystem conservation, and evidence is plentiful that restoration of this once-extirpated keystone predator is effecting ecosystem recovery in the NRM DPS. We believe that the wolf management plans put forth by Idaho and Montana will so deplete the numbers of gray wolves that they will no longer be able to serve as an ecologically effective keystone predator. Soulé and colleagues (2005) recommend that ecological effectiveness be made one criterion for recovery planning and argue that the authority to do so resides within the ESA. Carroll and colleagues (2006) argue that the gray wolf, which has been shown to exert strong top-down controls within ecosystems, is an ideal candidate for use of this criterion. We agree, and we further emphasize that determining ecologically effective densities is a much more scientifically robust method for establishing recovery goals than is opinion polling of recovery team members, the starting point for the USFWS's 1987 recovery plan.

If the NRM gray wolf loses ESA protection permanently and harvesting reduces the population to minimum legal levels, it will very likely decline rapidly to the point where it will, by federal law, require relisting. This will result in a genetically depleted, small, and ineffective population in terms of ecosystem function. Recovery of such a population then will require a substantial and unnecessary additional expense—the federal government has already spent an estimated $30 million for gray wolf recovery efforts in the NRM DPS (USFWS 2009a).

## Misguided concern for ungulate populations also drives aggressive state wolf management

There is no biological basis for declaring the NRM wolf DPS recovered, nor is there a wildlife management justification for the scale of the culling proposed by the states following delisting. Statistics from the IDFG show that wolves account for less than 10 percent of elk deaths in Idaho (much less than the number killed by hunters), that hunter harvest rates of elk were higher in 2005 than they were before wolf reintroduction, that elk mortality due to wolf predation is mostly replaceable, and that elk populations generally are at or above management goals, requiring cow harvest in some units (Wright et al. 2006, IDFG 2007). An IDFG press release in February 2009 reiterated that elk herd numbers had reached or were above management objectives in 26 of 29 hunting districts in Idaho. Further, the idea that wolf control will actually increase adult prey populations remains scientifically unproven. A review of this question completed by the National Academy of Science's Commission on Life Sciences concluded that several specific criteria had to be met for wolf control to affect adult prey populations (NRC 1997). Importantly, one of these was that wolves had to be the dominant predator on all stages of the life cycle of the prey species. In a three-year (2004–2006) study of elk calf mortality in northern Yellowstone, where wolves are particularly abundant, grizzly bears (*Ursus arctos horribilis*) and black bears (*Ursus americanus*) accounted for 58 to 60 percent of calf deaths, whereas wolves accounted for 14 to 17 percent (Barber-Meyer et al. 2008).

### Minnesota wolves appear closer to being recovered

The USFWS also removed the western Great Lakes DPS of the gray wolf from the endangered species list in 2009. We see this DPS—where the amount of federal lands and public-lands grazing is a small fraction of that of the NRM—as a mature analogy to the NRM gray wolf. More than 35 years of protection under the federal ESA allowed the initial population of 350 wolves in Minnesota to increase and disperse to Michigan and Wisconsin, reestablishing sustainable populations in those two states; the regional population of nearly 4000 wolves is much better connected with populations in Canada than is the NRM metapopulation. Reestablishment was a slow and gradual process, taking nearly three times as long as the NRM wolves have been given to disperse across a much larger area (MDNR 2001). Allowing time for natural dispersal to reestablish breeding populations of NRM gray wolves in significant portions of Utah and Colorado, which still lack breeding wolves, or in Oregon, which recorded its first breeding pair in 2009, as well as a broader distribution in Wyoming, Idaho, Washington, and Montana, would enhance natural gene flow and increase the likelihood of long-term recovery of the NRM DPS. Even if that effort is successful, in the western United States the gray wolf will still occupy only a fraction of its historic range (figure 2), with a population two orders of magnitude below historic levels (Leonard et al. 2005).

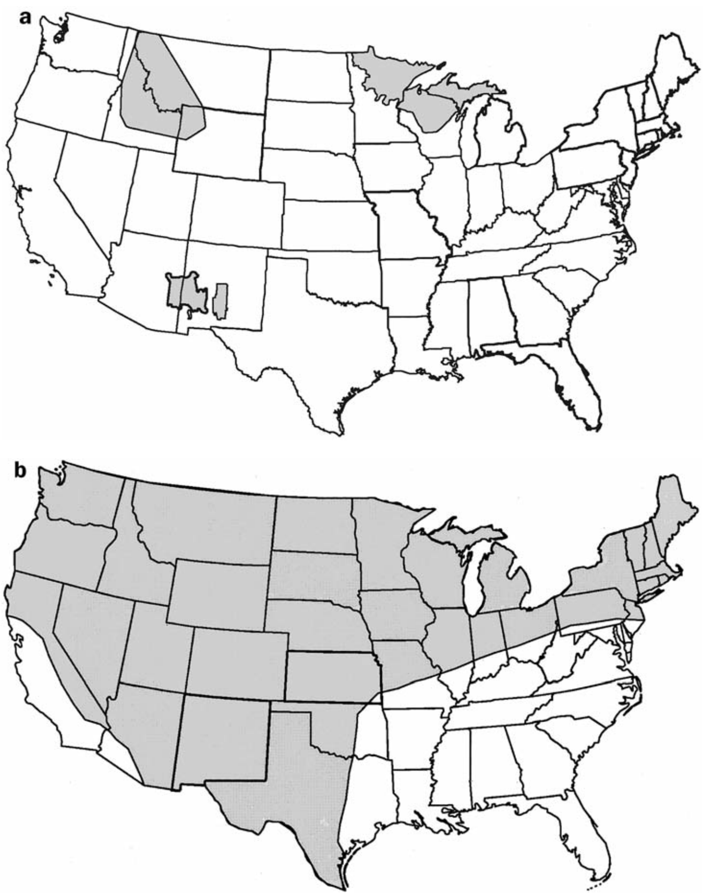


*Figure 2. (a) Current distribution of three populations of gray wolf (Northern Rocky Mountain, NRM; and in clockwise order, Western Great Lakes and Mexican gray wolf) (***Canis lupus baileyi***) in the contiguous United States. Source: USFWS (2009b). (b) Original distribution of the gray wolf (***Canis lupus***) in the contiguous United States. Source: USFWS (2009b).*

### What has recovery looked like for other species?

Before the gray wolf delistings, only nine North American species of mammals and birds had been delisted as a result of recovery (table 1; USFWS 2009b). In these delisting cases, the recovered taxa (or DPSs) had achieved one or both of the following: (1) a minimum population of 1000 breeding pairs, or (2) an increasing or stable population well distributed across the majority of the original range of the species. At least six of these delisted species met both criteria. In contrast, the NRM gray wolf will have been recovered over only about 6 percent of its original range (or 26 percent of the DPS area; table 1; figures 1, 2a, 2b). The USFWS (2009a) claims that the currently unoccupied portion of the DPS area lacks enough suitable habitat to support pack persistence—an assertion Carroll and colleagues (2006) dispute—and thus will not be managed to allow wolf colonization. Aggressive wolf control in these areas will make it unlikely that suitable habitat beyond the DPS boundaries will be colonized.

Extrapolating from data on YNP wolf packs showing that there were only six breeding pairs for 124 wolves (NPS 2008), the current NRM metapopulation could have as few as 77 breeding pairs. The USFWS claims there are "about 100 breeding pairs" in the NRM (USFWS 2009a [press release, 14 January 2009]), but extrapolation from the YNP example suggests that even if the states (and the USFWS, in its management of wolves in Wyoming) maintain the targets they promise, there may be as few as 58 breeding pairs following delisting. Of course, only if the NRM gray wolf metapopulation drops below 450 individuals—which could mean as few as 22 breeding pairs—will the requirement for relisting be triggered.

None of the previously delisted species has been subjected to any significant level of purposeful population reduction; in fact, harvest will be allowed for only one of these delisted species (grizzly bear), and that harvest allowance is not expected to reduce the population size (IGBST 2005; see footnote a on table 1). In contrast, we fully expect that the NRM gray wolf population will be substantially reduced from its current level, especially in Idaho. Most of the species delisted before 2007 have increased considerably since delisting (e.g., a several-fold increase in the North American

*Table 1. Mammals and birds delisted as a result of recovery.*

| Species | Taxon delisted | Year | Numbers at time of delisting | Extent of original range occupied | Populations or subspecies still listed as threatened or endangered |
|---|---|---|---|---|---|
| Brown pelican (*Pelecanus occidentalis*) | Atlantic and East Gulf coastal populations | 1985 | 17,000 bp | Nearly all | Pacific and western Gulf coast populations[a] |
| Gray whale (*Eschrichtius robustus*) | Eastern Pacific DPS | 1944 | Fewer than 17,000 individuals | Nearly all | Western Pacific population |
| Arctic peregrine falcon (*Falco peregrinus tundrius*) | Subspecies | 1944 | 190 bp | Majority | American peregrine falcon subspecies |
| American peregrine falcon (*Falco peregrinus amatus*) | Subspecies | 1999 | 1000 bp | Majority | None in North America |
| Aleutian Canada goose (*Branta canadensis leucopareia*) | Subspecies | 2001 | Fewer than 20,000 individuals | Nearly all | None |
| Columbian white-tailed deer (*Odocoileus virginianus leucurus*) | Douglas County, Oregon, DPS | 2003 | 5000 individuals | Nearly all | Columbia River DPS |
| Grizzly bear (*Ursus arctos horribilis*) | Yellowstone DPS | 2007[b] | 500 individuals | 68% | Other lower 48 populations |
| Bald eagle (*Haliaeetus leucocephalus*) | Lower 48 populations | 2007 | About 10,000 bp | Nearly all | Sonoran Desert DPS relisted |
| Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) | Narrowly endemic subspecies | 2008 | Unspecified | Less than 85% | *Glaucomys sabrinus coloratus* subspecies |
| Gray wolf (*Canis lupus*) | Western Great Lakes DPS | 2009 | About 4000 individuals | About 30% DPS | Outside DPS boundaries |
| Gray wolf (*Canis lupus*) | NRM DPS | 2009 | About 1600 individuals | About 26% DPS; 6% region[c] | Outside DPS boundaries |

bp, breeding pairs; DPS, distinct population segment.

a. On 12 November 2009, the Department of the Interior announced it would delist these populations of brown pelican.

b. On 21 September 2009, Federal District Court Judge Donald Molloy overturned the 2007 delisting, citing insufficient state protections and failure of the USFWS to adequately consider the decline of whitebark pine, a key winter food for grizzlies (*Idaho Statesman,* 22 September 2009).

c. The 250,000-square-kilometer core recovery area (CRA) = 26 percent of DPS (land area of Wyoming, Idaho, and Montana, plus portions of Washington, Oregon, and Utah); DPS = 23 percent (CRA = 6 percent) of land area of the US states west of the 97th parallel originally inhabited by non-Mexican subspecies of *Canis lupus* (excludes New Mexico and Arizona).

peregrine falcon population; USFWS 2009b). Meeting the two criteria stated above (a minimum of 1000 breeding pairs and a stable population over most of the original range) was not a coincidence for most of the nine delisted species but was actually a legal requirement of the ESA, which defines as endangered "any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Therefore, by law, a species must no longer be at risk of becoming endangered across a significant part—much less a majority—of its range before it can be considered recovered and delisted (Vucetich et al. 2006). In the case of the NRM gray wolf, the state and federal plans have the explicit goal of preventing colonization of areas outside the core gray wolf recovery zone, which certainly equates to a "significant portion of its range" (figures 1, 2b). Given that American society has deemed such a loss unacceptable, as evidenced by the unanimous passage of the ESA by the US Senate in 1973, it has been argued that achieving restoration across a minority of a species' range does not pass the normative test for delisting, regardless of the results of population viability analyses or other scientific data (Vucetich et al. 2006).

**Restoring science to its rightful role in environmental policy.** In summary, despite the Obama administration's stated intention to ensure the inclusion of science in policy decisions, it appears that in the decision to delist the NRM gray wolf, the USFWS and the new Interior secretary have ignored the best and latest available science, as well as the legal letter and spirit of the ESA. The documented, politically motivated suppression of science in many US government agencies, especially in the USFWS (UCS 2005), should dictate that all decisions made over the last eight years be subject to intense, independent scientific review. In this specific case, there has been no new evidence presented that runs counter to recent court decisions (*Defenders of Wildlife v. Hall*). The administration has not sufficiently reviewed the delisting rule, which is based overwhelmingly on biased state plans and an outdated and inadequate federal plan, claiming that gray wolf recovery has been and will continue to be sufficient. The complex life history, ecology, and important functional role of wolves within the NRM ecosystem preclude a rushed decision on the basis of poor science. Indeed, the ESA requires that a species be restored to its native role within its ecosystems. The United States should provide global leadership in supporting the effective conservation and restoration of native large mammal species, starting with the GYE, one of the few remaining areas in the world with an intact historical species assemblage and, hence, an intact ecosystem (Morrison et al. 2007). Under this flawed delisting plan, the current status of the NRM gray wolf, both biologically and legally, clearly does not meet the definition of recovery and must be rescinded if President Obama is to keep his promise on science-based environmental policy.

## Acknowledgments

The ideas in this article were generated, in part, through discussions among members of the Conservation Committee, American Society of Mammalogists. Bob Wayne and Ed Bangs provided information on gray wolf research and delisting. Jennifer Leonard provided valuable information and input. Bob Wayne, Suzanne Stone, and two anonymous reviewers helped improve the manuscript.

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