Western Wildlife Under Hoof:

Public Lands Livestock Grazing Threatens Iconic Species

WildEarth Guardians
A FORCE FOR NATURE

A Report from WildEarth Guardians
By Mark Salvo
April 2009

Mission Statement

WildEarth Guardians protects and restores the
wildlife, wild places and wild rivers of the American West.

Inquiries about this report and WildEarth Guardians' work can be made directly to:

Mark Salvo
Director, Sagebrush Sea Campaign
WildEarth Guardians
c/o 2224 W. Palomino Drive
Chandler, Arizona 85224
503-757-4221
msalvo@wildearthguardians.org

Photos: Front cover, Mark Salvo; Back cover, George Wuerthner.

Executive Summary

In 2008 WildEarth Guardians developed comprehensive Geographic Information System (GIS) coverage of federal grazing allotments on more than 260 million acres of western public land. According to agency records, millions of cattle, sheep, goats and horses are permitted to graze on these Bureau of Land Management and Forest Service lands.

WildEarth Guardians has also collected or synthesized data for current and/or historic range of dozens of focal species in the West. In an effort to assess the degree to which public lands livestock grazing affects native wildlife, we analyzed the spatial overlap between public lands grazing and distribution of a suite of important indicator, umbrella, keystone and flagship species.

Western Wildlife Under Hoof presents the first ever westwide analysis of the overlap of active federal grazing allotments with current and historic range of selected focal species. The results confirm—in graphic form—previous research finding that incessant, ubiquitous public lands livestock grazing has contributed to the decline of native wildlife. More importantly, public lands grazing continues within the much-reduced current ranges of these species, complicating their recovery and in some cases, threatening them with extinction.

Our analyses of GIS data found that:

- Grazing is permitted on approximately 80 percent of public land in the historic range of many trout species and subspecies, likely contributing to the westwide decline of native trout.
- More than 70 percent of moderate and high quality habitat identified for northern aplomado falcon in New Mexico is on public land, and 57 percent of that area is permitted for grazing.
- More than half of Sonoran Desert tortoise estimated range in Arizona is on public land and more than half of that public land is permitted for grazing.
- Almost 2,600 grazing allotments are located in estimated gray wolf current range in the northern Rocky Mountains.
- All but a few thousand acres of the Mexican wolf recovery area is on federal public land and 82% of that area is permitted for grazing.

- Grazing is permitted on:

  61% of black-tailed prairie dog historic range on public land

  78% of Gunnison's prairie dog historic range on public land

  91% of white-tailed prairie dog historic range on public land

  93% of Utah prairie dog historic range on public land

- Active grazing allotments comprise:

  91% of greater sage-grouse current range on public land

  84% of Gunnison sage-grouse current range on public land

The Western United States will become an increasingly marginal landscape for livestock production in the face of climate change and intensified drought. Likewise, continued grazing in a hotter, drier West will render fragile deserts, grasslands and forests, and sensitive streams and wetlands less resilient to the effects of climate change, exacerbating the negative impacts of grazing on sensitive species. While some western birds, native trout, amphibians and reptiles, and a multitude of other species are endangered by many threats, the most ubiquitous threat to species we profiled is federal public lands grazing. We believe these sensitive species must be protected from the continuing impacts from livestock production. To this end, WildEarth Guardians and partners are working to protect imperiled flora and fauna under the Endangered Species Act and create voluntary grazing permit retirement programs to reduce grazing on public lands.

Table of Contents

List of Maps

List of Tables

Introduction

Significant research has documented the many impacts of public lands livestock grazing on fish and wildlife. However, despite the volumes of published studies, the public, conservationists, news media, educators and decision-makers may not fully understand the geographical extent and effects of public lands grazing on native species.

In *Western Wildlife Under Hoof*, WildEarth Guardians presents original analyses and maps of the extent of public lands grazing in historic and current range of selected focal species. The report supports other research that livestock grazing is ubiquitous on western public land and a primary cause of degraded ecosystems and species loss. Data included in Appendix I detail the extent of public lands grazing and wildlife occurrence in the West. Maps presented throughout the report illustrate the significant overlap between active federal grazing allotments and species distribution.

Scientists study focal species—indicator species, umbrella species, flagship species, and keystone species—to assess ecosystem health and land management. We selected the focal species featured in *Western Wildlife Under Hoof* for their scientific, social, economic and political importance to westerners and western landscapes. The availability, or lack of, Geographic Information System (GIS) data for some species' historic or current distribution was also a consideration.

What is Federal Public Lands Livestock Grazing?

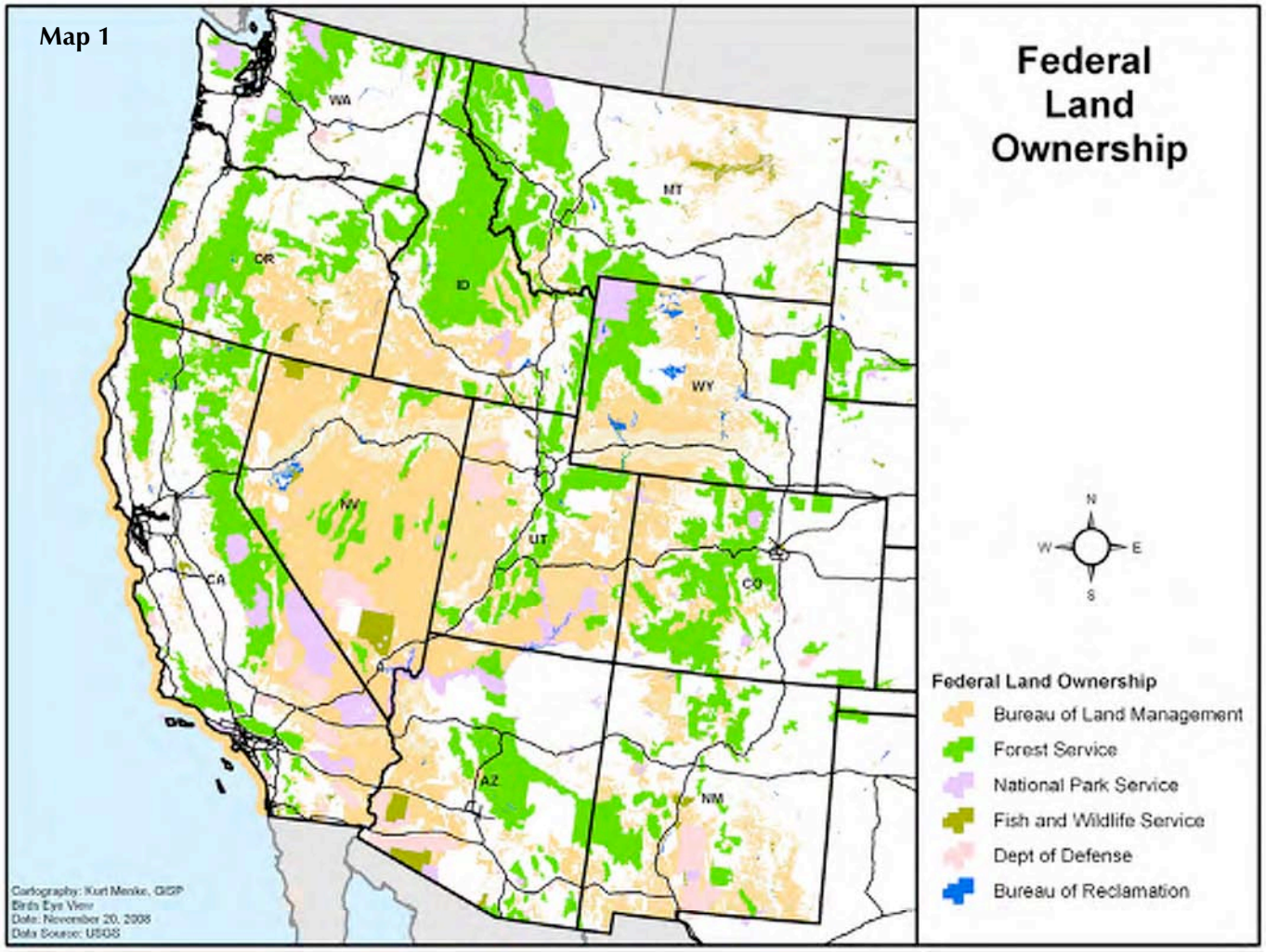
Federal public lands livestock grazing is authorized by various laws, depending on the managing agency. The Forest Service Organic Administration Act of 1897 and Granger-Thye Act of 1950 formally instituted grazing on Forest Service lands. The Taylor Grazing Act of 1934 established grazing on Bureau of Land Management (BLM) lands. These authorities generally require the BLM and Forest Service to offer grazing permits or leases (hereinafter, "permits") on public lands where the land is deemed capable of supporting livestock.

BLM and Forest Service grazing allotments are administratively

Cattle grazing in Sonoran Desert National Monument in Arizona (photo: George Wuerthner)

"attached" to local private ranches. Grazing permittees are assigned an exclusive number of "animal unit months" (AUMs) to graze on the allotments. AUMs are theoretically based on the land's carrying capacity and are the amount of forage necessary to feed a cow and calf, one horse, or five sheep or goats, for one month. In some areas, grazing is permitted year-round; in other areas, it is seasonal.

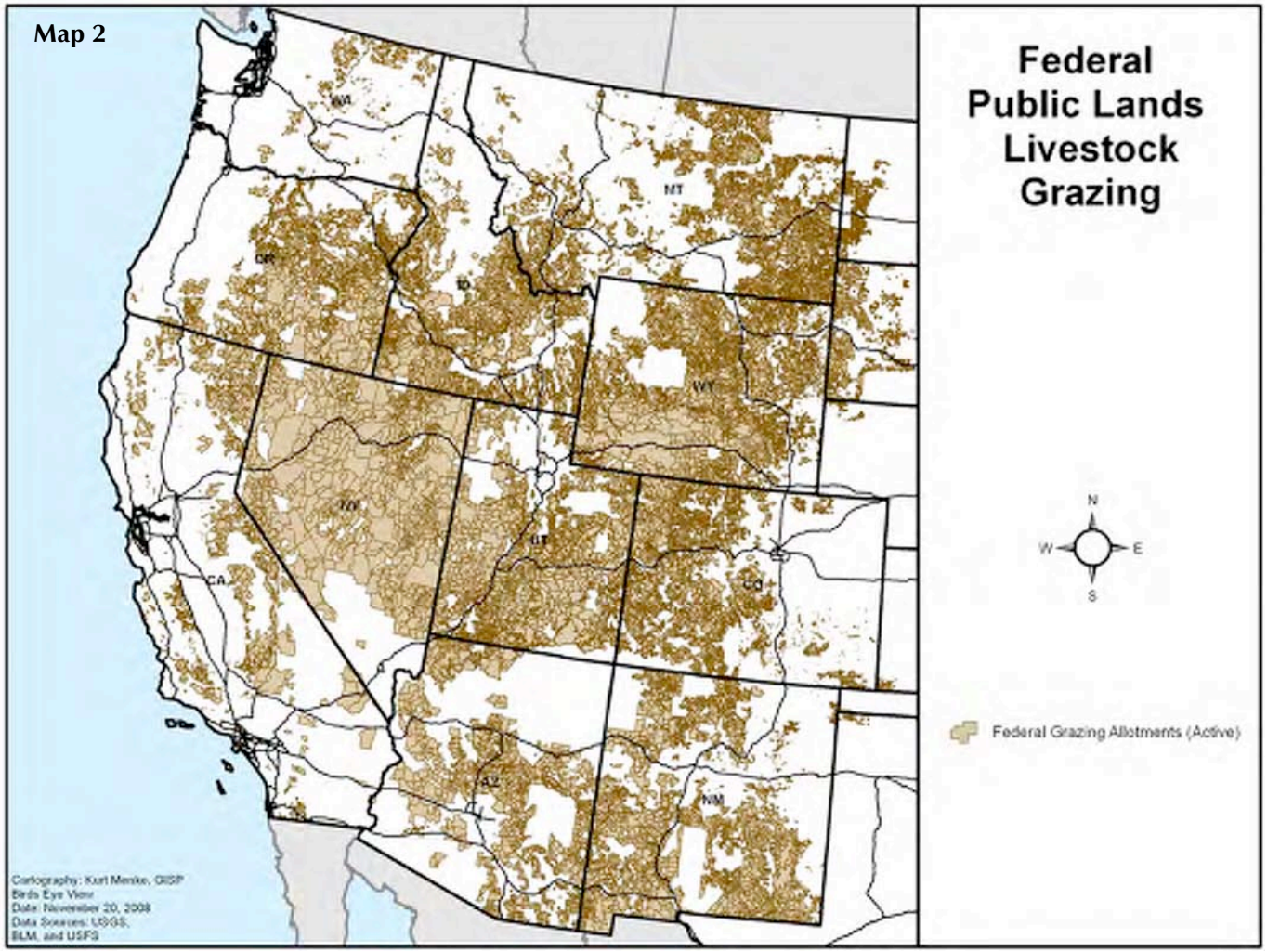
The BLM and Forest Service manage 322 million acres in sixteen western states.* [1]

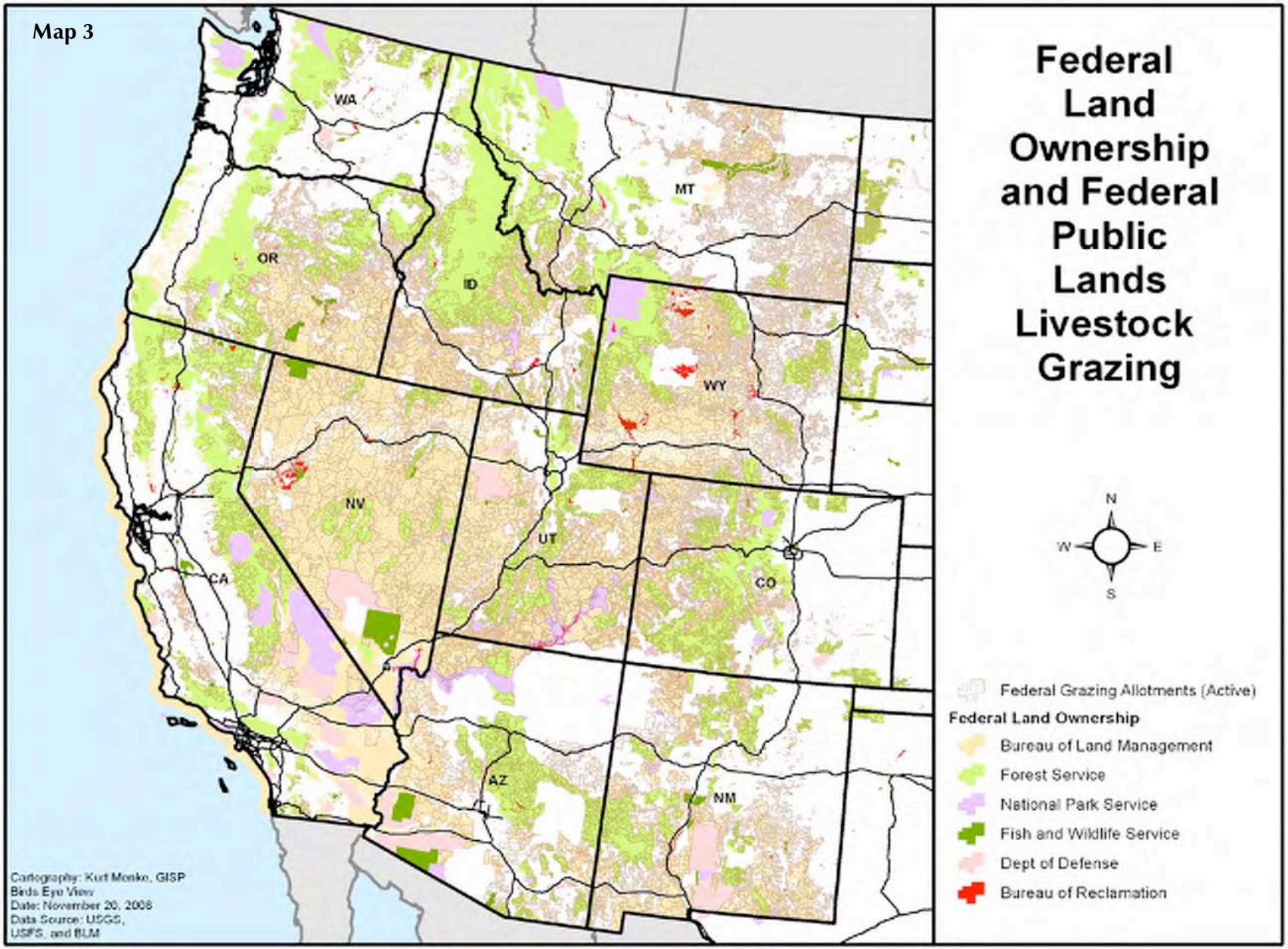


* Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, Wyoming.

The majority of public lands grazing is permitted on lands managed by the BLM and Forest Service (Maps 2, 3). In FY 2006, the BLM administered 17,880 grazing permits and leases for 15,799 livestock operators to graze almost 13 million animal unit months (AUMs) on 138 million acres of public land.[2]

The Forest Service authorized 7,039 operators to graze almost 7 million AUMs on 93 million acres of public land in FY 2005.[3] There were more than 8,000 grazing permits on Forest Service lands in 2008.




Map 3
Federal Land Ownership and Federal Public Lands Livestock Grazing
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
N
W
E
S
Federal Grazing Allotments (Active)
Federal Land Ownership
Bureau of Land Management
Forest Service
National Park Service
Fish and Wildlife Service
Dept of Defense
Bureau of Reclamation
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2008
Data Source: USGS, USFS, and BLM

The Ecological, Fiscal and Social Costs, and Economic Contributions of Federal Public Lands Livestock Grazing

Ecological Costs

Livestock have done more damage to the Earth than the chainsaw and bulldozer combined. Not only have livestock been around longer than developers, miners, and loggers, but they have grazed nearly everywhere. On public land across the West, millions of non-native livestock (including cattle, sheep, goats and horses) remove and trample vegetation, damage soil, spread invasive weeds, despoil water, deprive native wildlife of forage and shelter, accelerate desertification and even contribute to global warming. Former Secretary of the Interior Bruce Babbitt has written that federal public lands livestock grazing "is the most damaging use of public land."[4]

Cattle in riparian area in New Mexico (photo: WildEarth Guardians)

Livestock grazing has had a profound effect on arid landscapes in the West. Archeological and palynological (pollen, spores) evidence indicates that the introduction of domestic livestock has had a greater impact on the Great Basin than any event in the previous 1,000 years.[5] More than 99 percent of remaining sagebrush steppe has been affected by livestock and approximately 30 percent has been heavily grazed.[6] Research in southeastern Arizona has similarly found that grazing has probably had greater effect on the vegetation, soil, fire ecology, and the spread of nonnative weeds than any other land use in the region. [7] Ubiquitous, constant grazing is deemed the most potent cause of desertification in the United States.[8]

The impacts from grazing are even more apparent in riparian areas. Western streams were historically viewed by the livestock industry and managed by the federal government as "sacrifice areas" for domestic livestock. Decades of heavy grazing in riparian zones has cost western ecosystems generations of willows and cottonwoods, eliminated American beaver from much of the landscape, burdened hydrological systems with millions of tons of sediment, and significantly reduced fish and other wildlife to a fraction of their historic range. Further, nearly all surface waters in the West have been fouled with livestock waste that produce harmful waterborne bacteria and protozoa such as *Giardia*.[9]

Fiscal Costs

Public lands grazing is a fiscal boondoggle. The federal government annually spends over $100 million dollars to subsidize public lands ranching. The Government Accountability Office (GAO) reported the federal government spent at least

$144 million managing private livestock grazing on federal public land in FY 2004, and collected only $21 million in grazing fees—for a net loss of at least $123 million.[10] The BLM and Forest Service accounted for the bulk of these costs, spending $132.5 million on grazing management and collecting only $17.5 million in grazing fees, for a net loss to taxpayers of at least $115 million.[11]

The GAO admitted its report is incomplete because several agencies, including the Natural Resources Conservation Service and the Environmental Protection Agency, which spend millions of dollars mitigating for grazing damage, did not provide estimates of their grazing related costs to the GAO. Other programs that benefit both private and public lands ranchers, such as the "Livestock Compensation Program,"[12] were also not included in the total subsidy to public lands ranchers. Considering the additional direct and indirect costs not included in the GAO report, economists have estimated that public lands grazing on BLM and Forest Service lands may cost as much as $500 million to $1 billion annually.[13]

Of the millions of dollars spent annually to subsidize public lands grazing, between $5-$8 million is dedicated to killing native carnivores to protect livestock grazing on federal lands.[14] Wildlife Services, a euphemistically named branch of the Animal Plant and Health Inspection Service in the U.S. Department of Agriculture, killed 71,196 carnivores to protect livestock in sixteen western states in FY 2007.[15] Native wildlife killed to protect livestock include coyotes, bobcats, wolves, mountain lions, and bears.

Aggregate Federal Public Lands Grazing Employment for Eleven Western States[19]	
Federal grazing-dependent jobs	17,989
Federal grazing-dependent jobs as percentage of total employment	0.06
Income from federal grazing-dependent jobs as percentage of total job income	0.04
Days of normal job growth to replace all federal grazing-dependent jobs	11
Days of normal income growth to replace all federal grazing-dependent jobs	6

Social Costs

More than half of public lands grazing permittees are "hobby ranchers" who do not depend on income from ranching.[16] Another 26 percent are corporate ranchers,[17] some of whom are more interested in investing in land or creating tax shelters than in earning income from ranching. The remainder are family ranchers, some of whom are highly dependent on public lands ranching for income.

An increasing number of federal grazing permittees are facing difficult times. Foreign beef imports, domestic competition, export restrictions, drought, Mad Cow disease, and recreational and environmental conflicts have all conspired to make livestock grazing untenable on some public land. Depending on ranch size, the nominal rates of return from public lands livestock production are reported to range from negative returns to about 3 percent, averaging no more than 2 percent annually.[18] Some permittees have sizeable debt. Many permittees do not have children who are willing or able to take over the family ranch.

Some grazing permittees who are low on operating capital engage in a dubious, though federally sanctioned practice of collateralizing their grazing permits to finance their public lands grazing operations. Both the Forest Service[20] and BLM facilitate the use of *publicly owned* grazing permits and leases as collateral for *private* bank loans. The BLM has documented more than $1.1 billion in liens on BLM grazing permits/leases in the eleven western states;[21] approximately 300 ranch operations have taken more than $450 million in loans on Forest Service grazing permits.[22]

In 2000, the State Bank of Southern Utah submitted information to the Supreme Court confirming that financial institutions hold an estimated $10 billion in loans and related credit transactions with the public lands ranching industry, with grazing permits alone valued at approximately $1 billion.[23]

Economic Contributions

The economic contribution of public lands grazing to local, regional and national economies is miniscule. Only 22 percent of ranchers in the West are public lands ranchers[24] and less than 3 percent of American beef is produced on federal rangelands.[25] Few western communities are economically dependent on public lands livestock grazing,[26] while most public lands ranchers must rely on off-ranch income to support their ranch.[27] In Nevada (the state with more federal land than any other outside of Alaska), federal public lands grazing accounts for 1,228 jobs.[28] By comparison, one casino in Las Vegas employs 37,000 people.[29] In Wyoming, agriculture, including ranching, is "largely a ceremonial occupation."[30] Florida raises more beef cattle than Wyoming.[31]

Fence dividing grazed and ungrazed land in Montana (photo: George Wuerthner)

Wildlife Threatened by Federal Public Lands Livestock Grazing

More than 175 plant and animal species inhabiting federal rangelands are imperiled by livestock grazing,[32] including all of the species presented in this report. In the United States, grazing has contributed to the demise of 22 percent of federally listed threatened and endangered species—nearly equal to logging (12 percent) and mining (11 percent) combined.[33] Livestock grazing is especially harmful to plant species, affecting 33 percent of endangered plants.[34] Livestock grazing is the primary cause of species endangerment in southern Arizona and western New Mexico; the third-ranked cause of species decline in southern Nevada and central Arizona; the fourth-ranked factor in California; and the fifth-ranked cause in northern Arizona, southern Utah and southern Colorado.[35]

Habitat Degradation

Public lands livestock production has an enormous impact on deserts, grasslands and forests. Livestock annually remove vegetation that is critical for shelter and reproduction for ground-nesting birds, reptiles, small mammals and other wildlife. Grazing contributes to the rapid spread of weeds on western public land—estimated at 4,000-5000 acres per day—which reduces habitat quality and accelerates natural fire cycles.[36] Grazing denudes streambanks, eliminating habitat for cold water fishes. Diversion of water from western streams for livestock watering and forage production reduces stream flow (sometimes dewatering streams entirely),[37] while the ditch diversions can also trap and kill fish. Birds and small mammals drown in livestock watering tanks; birds and mammals are also frequently killed in collisions with barbed wire fences.

Pronghorn caught in barbed wire fence (photo: Lance & Jill Morrow)

Poisoning, Disease

The introduction of domestic livestock to the West has had severe consequences for native wildlife. The same government agencies involved in carnivore control on public land have also poisoned millions of prairie dogs on the Great Plains. [38] The livestock industry deems prairie dogs to be competitors for forage.

Domestic livestock are a vector for disease. Domestic sheep and goats frequently transmit diseases to bighorn sheep that cause pink eye, respiratory problems or pneumonia, often killing infected animals.[39] The presence of domestic sheep on public land is preventing the reintroduction and recovery of bighorn sheep across the West. Domestic cattle can also transmit diseases to native ungulates. Cattle originally introduced brucellosis to bison and elk in the Greater Yellowstone Ecosystem[40]—the same buffalo and elk that the livestock industry now vociferously impugns as the source of the disease.

Competition with Native Ungulates

Forage Allocation

The vast majority of forage on public land is allocated to livestock wherever grazing is permitted. In one study, scientists found that domestic livestock consumed 88.8 percent of available forage (cattle and [domestic] horses 82.3 percent, free-roaming horses 5.8 percent, sheep 0.7 percent), leaving 11.2 percent to wildlife species (mule deer 10.1 percent, pronghorn 0.9 percent, bighorn sheep 0.1 percent, elk 0.1 percent).[41] Even where livestock have not consumed all available forage, the mere presence of domestic livestock can cause some wildlife to avoid the area.[42]

Forage Use

It is a simple concept: forage (grass, forbs, woody browse) consumed by domestic livestock is not available as food and cover for native wildlife—species that are important to healthy ecosystems, admired by wildlife enthusiasts, and prized by hunters. Range managers use the rather imprecise animal unit month to measure and allocate forage. An AUM is the amount of forage necessary to sustain a cow and calf for one month (approximately 650 pounds, although some estimates are more, between 800-1000 pounds[43]). Below are generally accepted AUM equivalents.

Native Wildlife	Animals per AUM[44]	Domestic Livestock	Animals per AUM[45]
Bighorn Sheep	6.9	Cow	1
Pronghorn	10.8	Bull	1.25
Mule Deer	7.8	Horse	1.25
Elk	2.1	Goat	5
Bison	0.8	Sheep	5
Moose	1.2		

Native ungulates that have evolved in North America use forage more efficiently than Eurasian livestock.

* * *

Following are individual accounts and maps of public lands grazing in historic and current range of selected focal species. Associated analyses are presented in Appendix I, Tables 1-5 for these species and others, including lesser prairie chicken, Columbian sharp-tailed grouse, Mexican spotted owl, Chiricahua leopard frog, and jaguar. In each case public lands grazing has contributed to the decline of native species and hinders their recovery.

Sage-Grouse

Greater sage-grouse
(photo: photos.com)

Greater Sage-Grouse

Greater sage-grouse are a sagebrush obligate species whose range has been significantly reduced with the loss of sagebrush steppe. Greater sage-grouse distribution has decreased by 56 percent while rangewide abundance has declined by as much as 93 percent from historic levels.[46] The sage-grouse is both an indicator and umbrella species for the Sagebrush Sea, among the most endangered landscapes in North America.[47]

Sage-grouse and sagebrush habitat are negatively affected by domestic livestock grazing. In spring, the breeding season, livestock eat and trample the grasses and forbs around sagebrush, which can degrade or eliminate nesting and brooding habitat. Nests that are exposed to the wind, sun and predators are less productive than nests in healthy sagebrush-steppe. Without the forbs and grasses, insects are also less abundant, reducing an important food source for sage-grouse chicks.

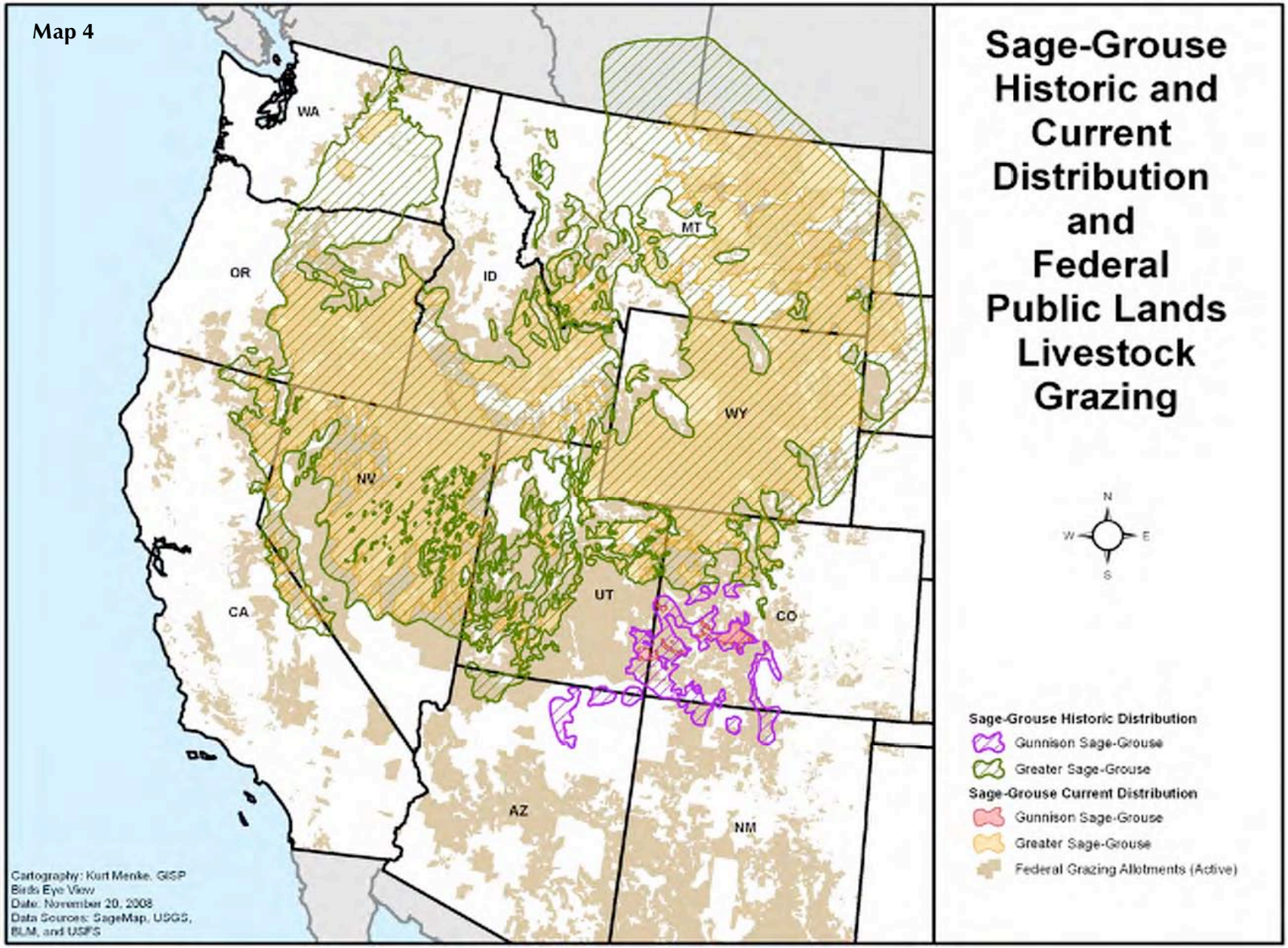
In the hot summer, thirsty livestock often severely overgraze riparian areas and mesic sites (wet meadows) that are important to sage-grouse young and adults. Livestock also eat and trample sagebrush, the only food source available to sage-grouse in winter. Wandering livestock can stress sage-grouse and other wildlife, and their grazing opens the vegetative cover, exposing sage-grouse to predators and the weather. In one case researchers observed a cow eating a sage-grouse egg from a nest![48]

Livestock grazing is permitted on 91 percent of greater sage-grouse current range on federal public land, making it the most ubiquitous use of sage-grouse habitat on federal public land. Greater sage-grouse current range overlaps all or part of 9,517 active federal grazing allotments, and historic range includes all or part of 14,799 active federal grazing allotments (Map 4, Table 1). WildEarth Guardians and partners have petitioned to list the greater sage-grouse under the Endangered Species Act.

Gunnison sage-grouse
(photo: Louis Swift)

Gunnison Sage-Grouse

Gunnison sage-grouse are distinct from greater sage-grouse, identified by researchers as early as the 1970s and recognized as a new species by the American Ornithologists Union in 2000. While its historic range may have included parts of Colorado, Utah, New Mexico, and Arizona, the species now occurs only in small, isolated populations centered around the Gunnison Basin in southwestern Colorado and southeastern Utah. Livestock grazing is permitted on 84 percent of Gunnison sage-grouse current range on federal public land. There are 128 active grazing allotments in Gunnison sage-grouse current range, and 884 grazing allotments in Gunnison sage-grouse historic range (Map 4, Table 1). WildEarth Guardians and partners have petitioned to list the Gunnison sage-grouse under the Endangered Species Act.


Map 4
Sage-Grouse Historic and Current Distribution and Federal Public Lands Livestock Grazing
WA
OR
CA
ID
NV
MT
WY
UT
CO
AZ
NM
N
W
E
S
Sage-Grouse Historic Distribution
Gunnison Sage-Grouse
Greater Sage-Grouse
Sage-Grouse Current Distribution
Gunnison Sage-Grouse
Greater Sage-Grouse
Federal Grazing Allotments (Active)
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2008
Data Sources: SageMap, USGS, BLM, and USFS

Native Trout

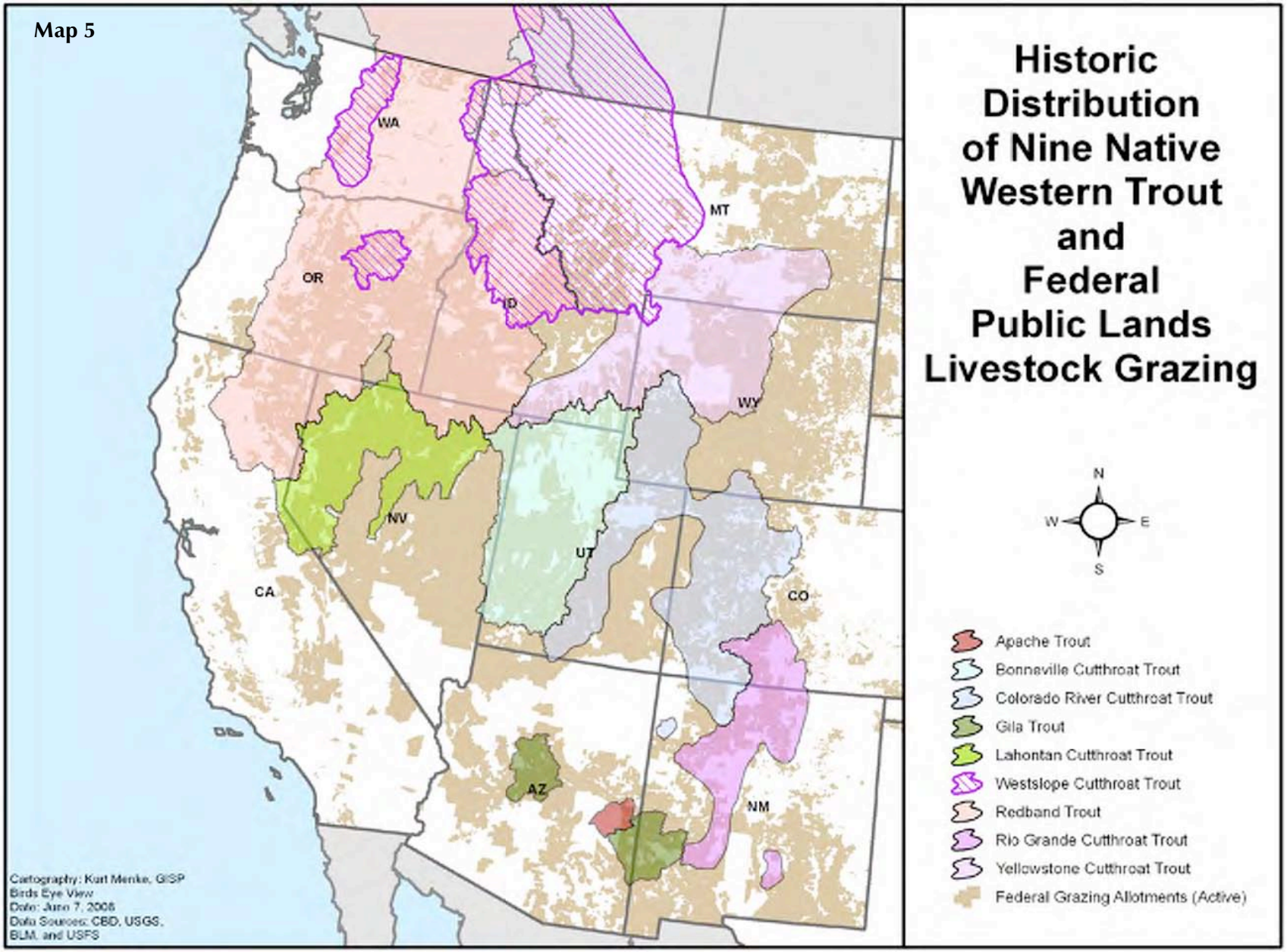
Lahontan cutthroat trout (photo: USFWS)

Livestock grazing in riparian areas—especially in the arid American West—causes immeasurable damage to riparian resources, including the loss of fish and wildlife habitat, soil erosion, and diminished water quality and quantity. Livestock grazing has damaged 80 percent of the streams and riparian ecosystems in the West.[49] Extensive field observations in the late 1980s suggested that riparian areas throughout much of the region were in the worst condition in history.[50]

Although they represent only 0.5 to 1 percent of the surface area of federal public land in the West,[51] riparian areas are critically important to both terrestrial and riparian species in the region. [52] Even severely degraded riparian zones are often the most ecologically productive areas on public land. Domestic cattle tend to congregate in these wet, shady areas for water and forage, and spend 5-30 times more time in the cool productive zones than would be expected based on surface area alone.[53]

Livestock grazing along western rivers and streams imperils a multitude of plants and animals. Grazing removes vegetation that shades surface water, increasing water temperature; livestock compact soil and accelerate erosion in riparian systems; livestock defecate in streams, depositing pathogenic bacteria into the waterway, and increasing nutrient content and water turbidity; lumbering cattle downcut streambanks, which widens the stream channel, and reduces stream bank stability and the number and quality of deep pools and stream meanders that are important for fish and other wildlife.[54]

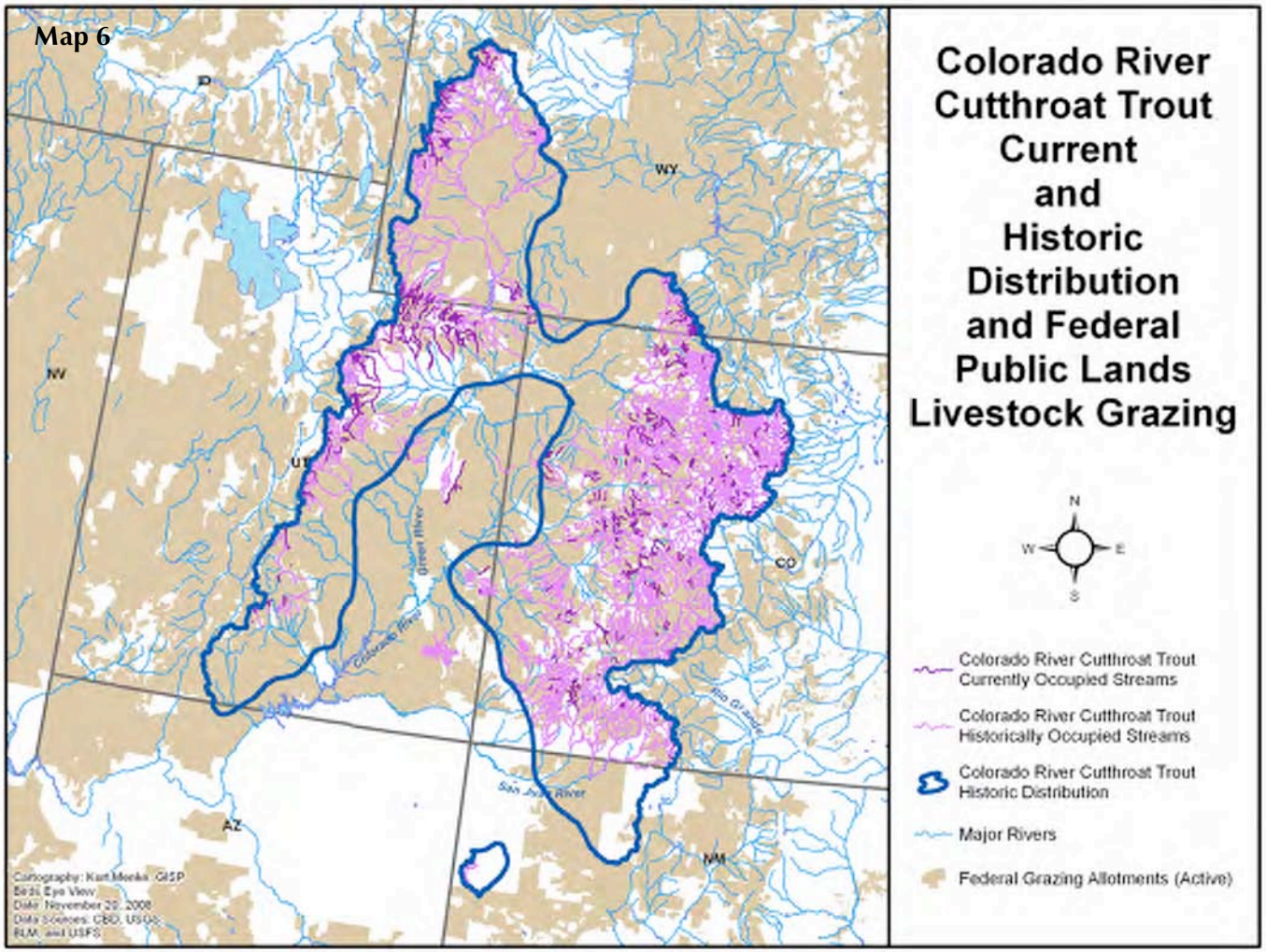
Livestock grazing has contributed to the historic decline of nearly every native trout in the West, fish that require plentiful, cold, clean water and functioning riverine ecosystems. More than half of the historic range of many trout species and subspecies is on federal public land, and grazing was permitted on about 80 percent of these public lands in most cases (Map 5, Table 2).


Map 5
Historic Distribution of Nine Native Western Trout and Federal Public Lands Livestock Grazing
WA
MT
OR
ID
WY
NV
UT
CA
CO
AZ
NM
N
W
E
S
Apache Trout
Bonneville Cutthroat Trout
Colorado River Cutthroat Trout
Gila Trout
Lahontan Cutthroat Trout
Westslope Cutthroat Trout
Redband Trout
Rio Grande Cutthroat Trout
Yellowstone Cutthroat Trout
Federal Grazing Allotments (Active)
Cartography: Kurt Menke, GISP
Birds Eye View
Date: June 7, 2006
Data Sources: CBD, USGS, BLM, and USFS

Colorado River Cutthroat Trout

The Colorado River cutthroat trout is one of fourteen subspecies of cutthroat trout in North America. Watersheds where Colorado River cutthroat trout historically occurred cover 44,968,765 acres in Colorado, Utah and Wyoming, of which 30,624,474 acres (69%) are federal public land. Most of the pubic land within the subspecies' historic range, 24,726,792 acres (81%), is permitted for grazing. There are 3,115 active federal grazing allotments in Colorado River cutthroat trout historic range.

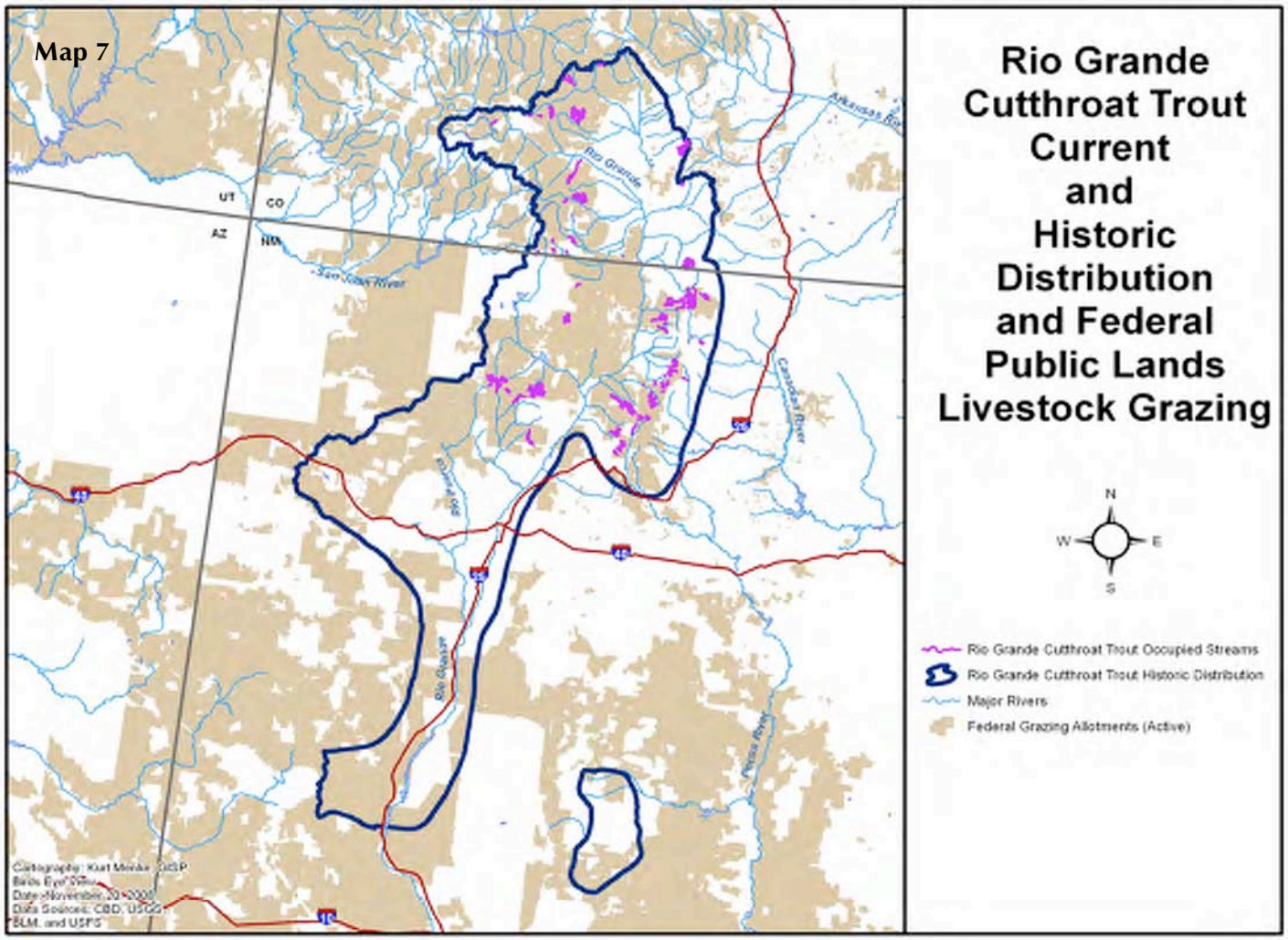
The current range of Colorado River cutthroat trout includes 3,026 stream miles, reduced from 21,383 miles within its historic range. Livestock grazing is permitted on 412 grazing allotments that include 1,746 (58%) of stream miles in the subspecies current range (Map 6, Table 2).



Rio Grande Cutthroat Trout

Rio Grande cutthroat trout are a subspecies of cutthroat trout that occur in New Mexico and Southern Colorado. Watersheds where Rio Grande cutthroat trout historically occurred cover 19,462,867 acres, of which 9,282,782 acres (48%) are federal public land. Most of the pubic land within the subspecies' historic range, 7,223,396 acres (78%), is permitted for grazing. There are 867 active federal grazing allotments in Rio Grande cutthroat trout historic range.

The current range of Rio Grande cutthroat trout includes 856 stream miles, reduced from 10,080 miles within its historic range. Livestock grazing is permitted on 61 grazing allotments that include 648 (76%) of stream miles in the subspecies current range (Map 7, Table 2).



Prairie Dogs

Prairie dogs are classic keystone species. They are highly interactive with western prairies and their colonies create a pattern of different habitats that increase biodiversity on grasslands.[55] Four of five prairie dog species occur in the United States: Utah prairie dog, Gunnison's prairie dog, black-tailed prairie dog, and white-tailed prairie dog.

Prairie dogs live in family groups, dig burrows deep into loamy soils and forage for grasses and seeds. The networks of tunnels that form prairie dog towns aerates and fertilizes the soil, and increases water infiltration, allowing moisture to penetrate deep into the ground and recharge aquifers. A suite of grassland species depends on prairie dogs and their burrows for survival, including many species, such as burrowing owls, swift foxes, mountain plovers, and black-footed ferrets, that have declined in number along with prairie dogs. At least 170 wildlife species benefit from the existence of prairie dogs.[56]

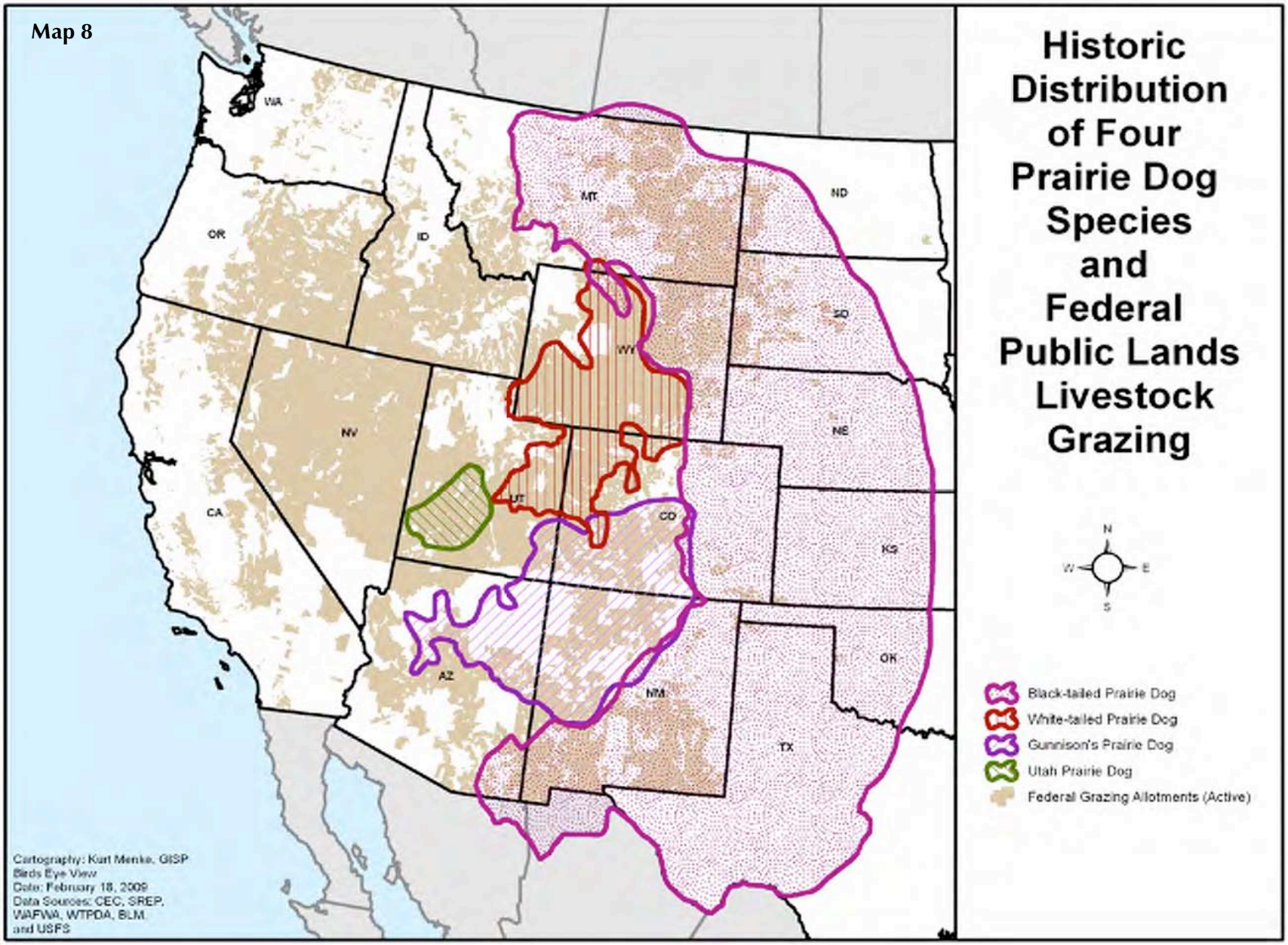
Historically, prairie dogs, American Bison and fire worked together to maintain the endless expanse of grasslands that covered the Great Plains and valleys of the Rocky Mountain west. But many ranchers and federal and state agency officials continue to give credence to myths that cast prairie dogs as nuisance animals—breeding prolifically, destroying forage, and digging pitfalls for livestock. The conversion of native grasslands to cropland and pasture and extensive eradication programs have contributed to the elimination of prairie dogs from 92-99 percent of their historic range. [57]

In fact, domestic livestock destroy and degrade forage and habitat for prairie dogs, not the other way around. Livestock grazing decreases native plant diversity and biomass, modifies plant

Black-tailed prairie dog (photo: Jess Alford)

communities away from grasslands and toward shrublands, and encourages weed encroachment. The natural fire cycle on grasslands (which prairie dogs and bison evolved to accommodate) has also been suppressed to support livestock grazing, hindering regrowth of grasses and encouraging invasion by woody species. Livestock production has severely fragmented prairie dog range, leaving only islands of habitat where small, isolated populations of prairie dogs are more susceptible to disease, predators, "recreational" shooting, and the effects of inbreeding.

Ubiquitous grazing has accompanied the rapid and westwide loss of prairie dog range, particularly on federal public land. Livestock grazing is permitted on thousands of federal grazing allotments on millions of acres in prairie dog historic range (Map 8), including 8,594 allotments in black-tailed prairie dog historic range (Table 3). More than seventy-five percent of prairie dog historic range on public land is still permitted for grazing. The figures are especially high for Gunnison's prairie dog (78%), white-tailed prairie dog (91%) and Utah prairie dog (93%). WildEarth Guardians and partners have petitioned to list all four prairie dog species in the United States under the Endangered Species Act.

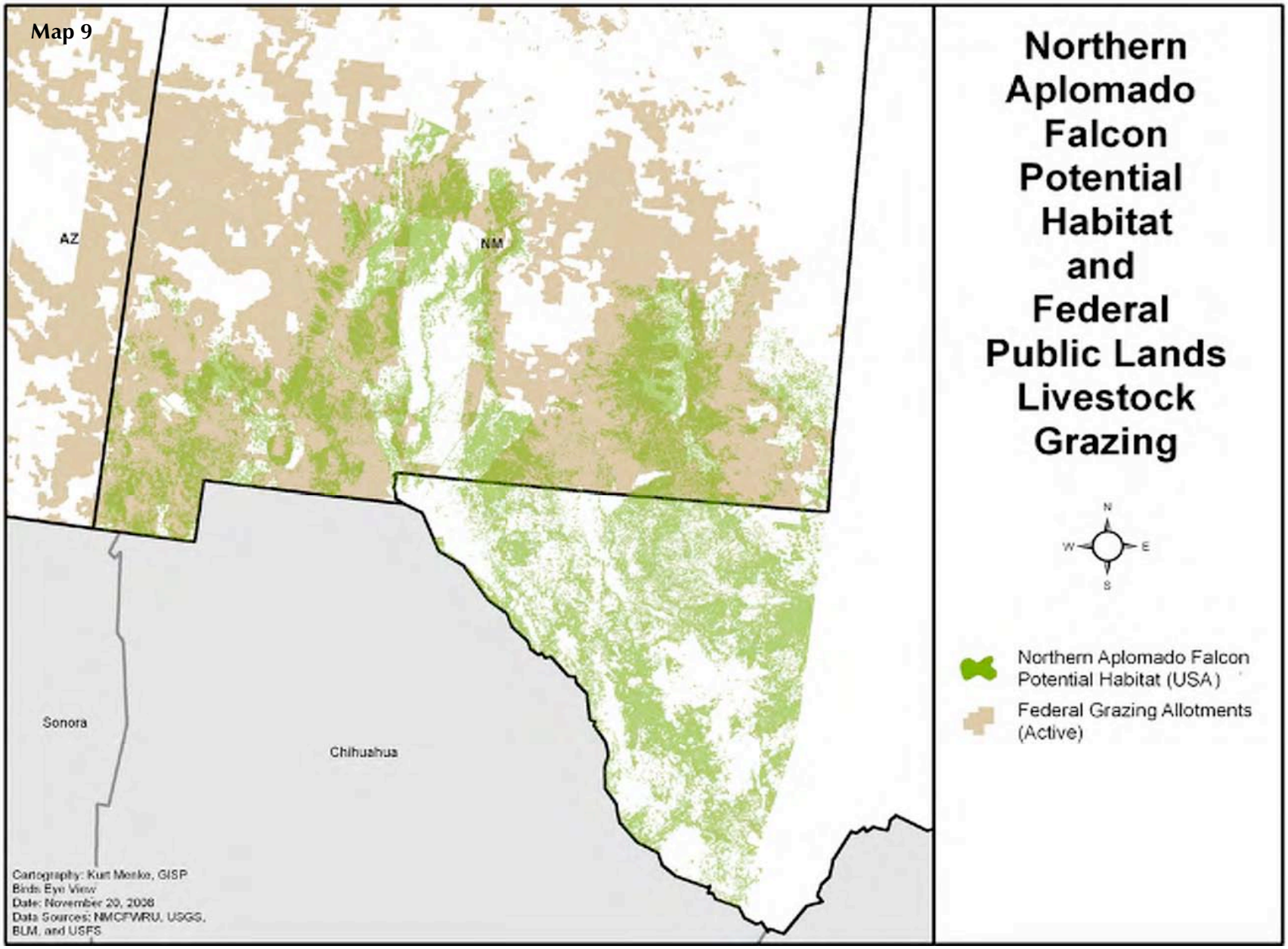

Map 8
Historic Distribution of Four Prairie Dog Species and Federal Public Lands Livestock Grazing
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
N
W
E
S
Black-tailed Prairie Dog
White-tailed Prairie Dog
Gunnison's Prairie Dog
Utah Prairie Dog
Federal Grazing Allotments (Active)
Cartography: Kurt Menke, GISP
Birds Eye View
Date: February 18, 2009
Data Sources: CEC, SREP, WAFWA, WTPDA, BLM and USFS

Northern aplomado falcon (photo: USFWS)

Northern Aplomado Falcon

The northern aplomado falcon is a subspecies of aplomado falcon whose historic range included southwestern Texas, southern New Mexico and southeastern Arizona in the United States. Unfortunately, centuries of livestock grazing in the Southwest have converted the subspecies' grassland habitat to desert scrub. This in turn has exacted a toll on grassland birds that the northern aplomado falcon depends on for prey. Grassland breeding birds are the most rapidly declining guild of birds in North America.[58] As a final insult to the falcon, domestic livestock frequently damage yucca, depriving the subspecies of its preferred nesting sites. A yucca of sufficient height to provide falcons with a nesting site takes over a century to grow, but livestock routinely rub up against and destroy yucca, the old-growth of the Chihuahuan Desert.

Few northern aplomado falcons remain in the United States and the bird is listed as "endangered" and designated as an "experimental, nonessential" endangered species in New Mexico and Arizona. Restoring northern aplomado falcon to southern New Mexico grasslands may be difficult without first removing livestock from potential habitat. More than 70 percent of moderate and high quality habitat identified for northern aplomado falcon in New Mexico is on federal public land (2,092,758 acres), and 57 percent of that area is permitted for grazing on 1,055 grazing allotments (Map 9, Table 1). Prairie dogs are important in maintaining grasslands this falcon prefers.[59] In addition to removing livestock from falcon potential range, restoring black-tailed prairie dog to its historic range in southern New Mexico, southeastern Arizona and west Texas could aid the long-term recovery of northern aplomado falcon (Map 8).


Map 9
AZ
NM
Sonora
Chihuahua
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2008
Data Sources: NMCFWRU, USGS, BLM, and USFS
Northern Aplomado Falcon Potential Habitat and Federal Public Lands Livestock Grazing
N
W
E
S
Northern Aplomado Falcon Potential Habitat (USA)
Federal Grazing Allotments (Active)

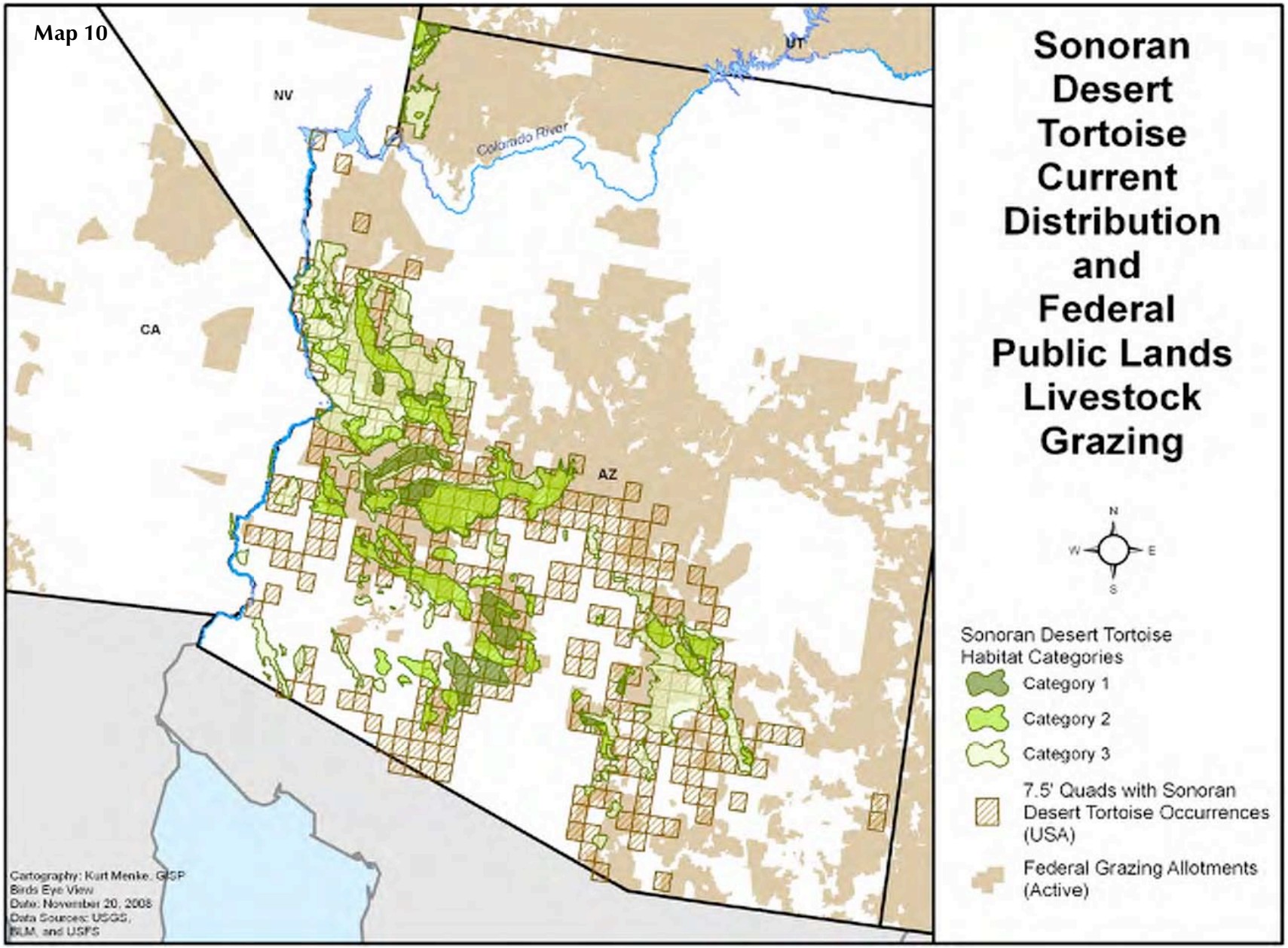
Sonoran Desert Tortoise

Decades of experience recovering the threatened desert tortoise in the Mojave Desert has conclusively revealed that livestock grazing is anti-thema to tortoise conservation. Domestic livestock remove vegetation that desert tortoises need for food, thermal protection, and cover from predators.

A tortoise eats less vegetation in one year than a cow eats in one day.[60] Livestock trample tortoise burrows, and have even been observed making physical contact with tortoises. Grazing contributes to the spread of invasive weeds that eliminate habitat for desert tortoises and other wildlife.

The Mojave Desert population of desert tortoise was listed as "threatened" under the Endangered Species Act in 1990. Livestock have been removed from significant portions of the tortoise's range in the Mojave Desert in attempt to recover the species. WildEarth Guardians and Western Watersheds Project petitioned to protect the Sonoran Desert population of desert tortoise in Arizona under the Endangered Species Act in 2008. As with the Mojave Desert population, livestock grazing is a major threat to the Sonoran Desert tortoise. More than half of the tortoise's estimated range in Arizona is on federal public land (8,406,692 acres) and more than half of that public land is permitted for livestock grazing (on 206 grazing allotments) (Map 10, Table 4). Grazing is even permitted on important desert tortoise habitat in designated wilderness and in the Ironwood Forest and Sonoran Desert national monuments—areas purportedly established for conservation purposes.

Sonoran Desert tortoise (photo: USFWS)


Map 10
NV
UT
Colorado River
CA
AZ
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2008
Data Sources: USGS, BLM, and USFS
Sonoran Desert Tortoise Current Distribution and Federal Public Lands Livestock Grazing
N
W
E
S
Sonoran Desert Tortoise Habitat Categories
Category 1
Category 2
Category 3
7.5' Quads with Sonoran Desert Tortoise Occurrences (USA)
Federal Grazing Allotments (Active)

Gray Wolf

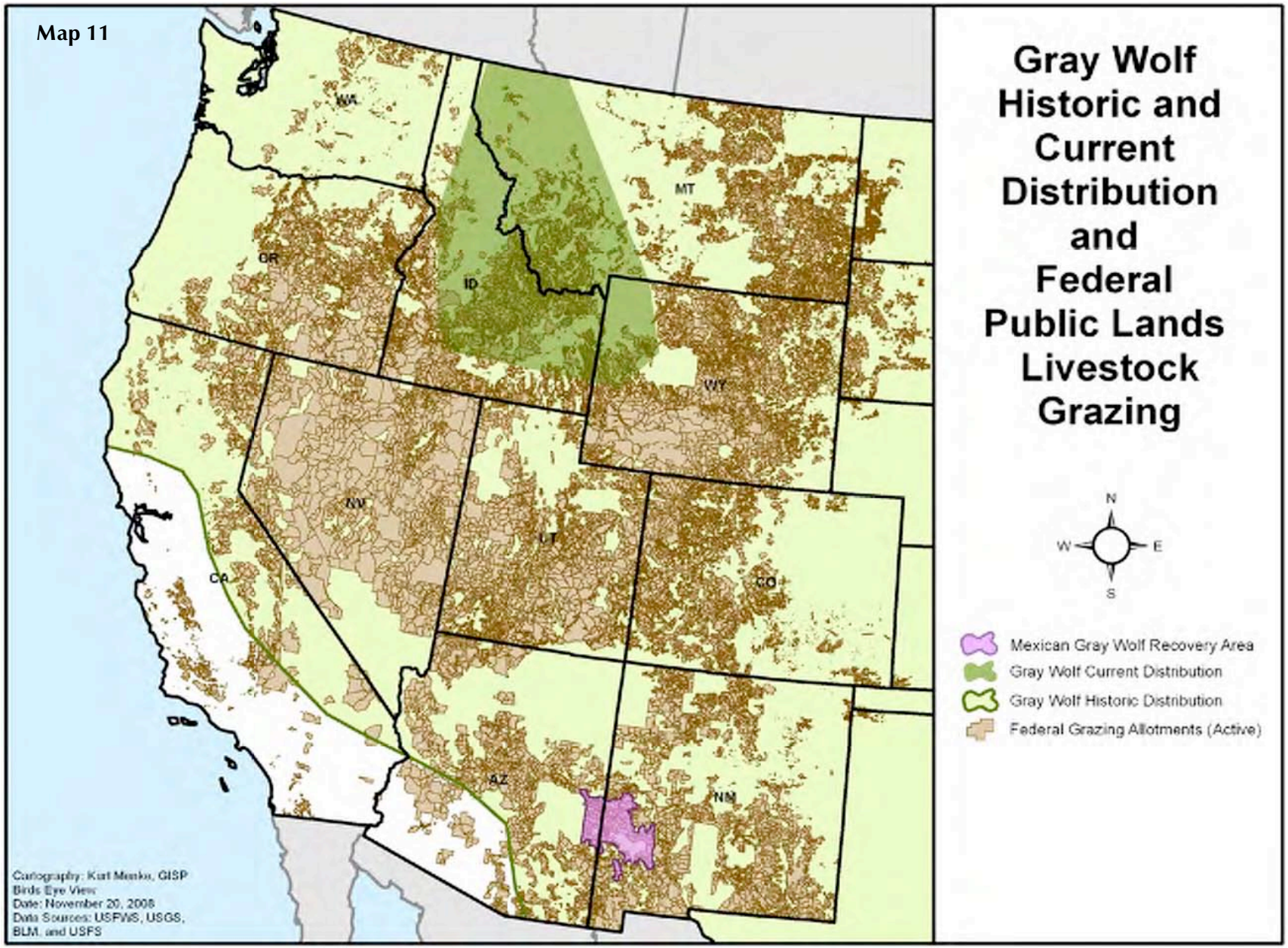
Gray wolf (photo: USFWS)

The restoration of gray wolves to the northern Rocky Mountains has had an unmistakable impact on the regional ecology, and on species ranging from grizzly bears to beetles. Scientists continue to marvel at the benefits wolves have bestowed on Yellowstone National Park since their reintroduction in 1995 and 1996. Wolf packs now perennially cull and control elk herds, spurring the recovery of riparian and meadow ecosystems in the park and resulting in increased populations of other wildlife such as moose and animals that scavenge wolf kills, including ravens, magpies, eagles, and bears. Beaver have flourished in the recovering riparian areas in Yellowstone and their dams and canal systems provide additional benefits to the ecosystem. Riparian songbird diversity may have also increased since the reintroduction of wolves.[61]

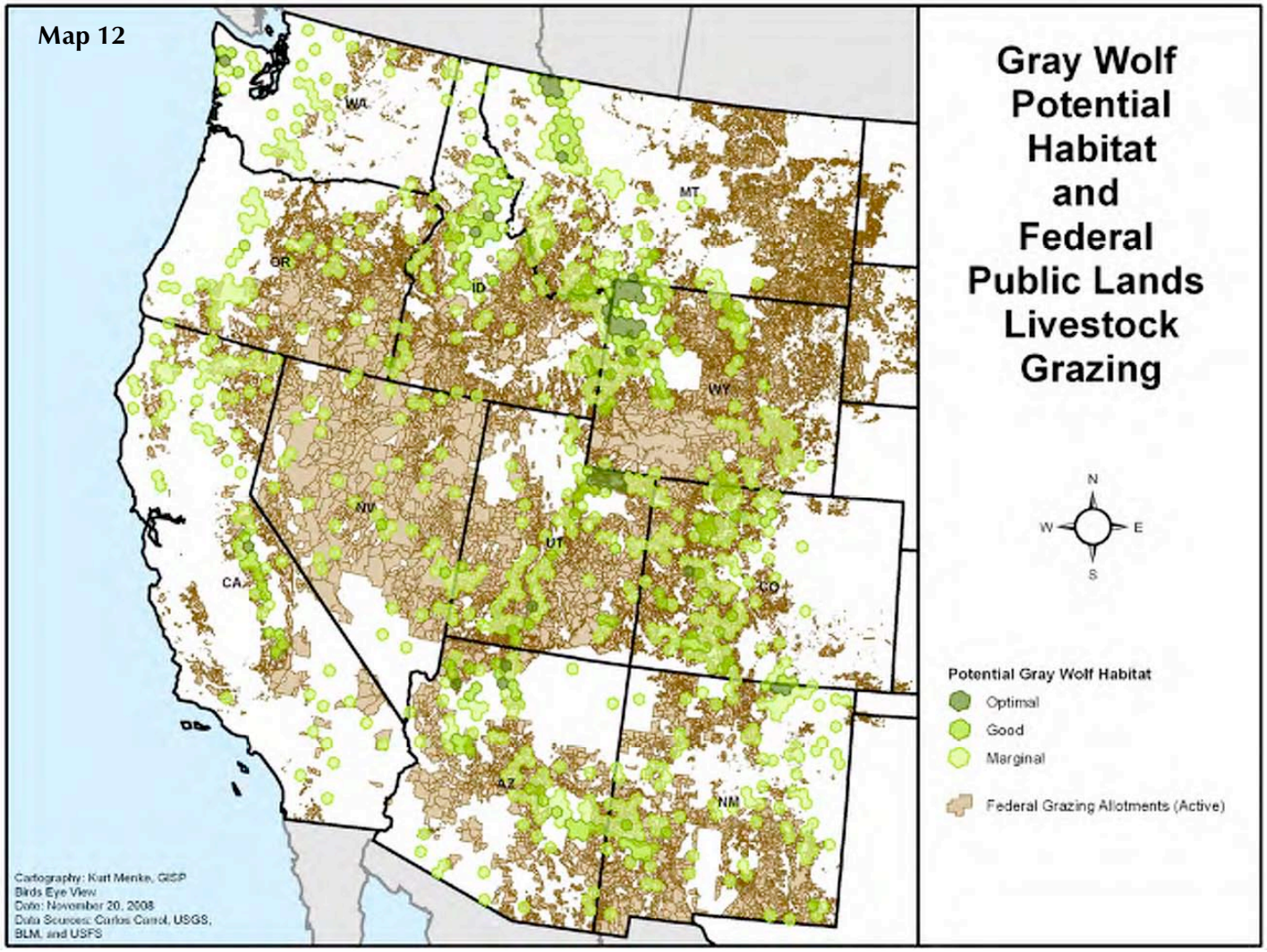
In contrast to the tremendous benefits wolves provide to the Greater Yellowstone Ecosystem and northern Rocky Mountains, livestock killed by wolves is among the least significant causes of livestock loss in the region. The U.S. Fish and Wildlife Service tallied 895 cattle and 1,778 sheep killed by wolves in the Greater Yellowstone Ecosystem, northwest Montana and central Idaho between 1987-2007.[62] This is a tiny fraction of the total number of livestock lost annually from other factors. For example, more than four million cattle died of digestive and respiratory complications, calving problems, disease and other causes nationwide in 2005.[63] Almost 400,000 sheep died of non-carnivore related causes in the United States in 2004, including inadvertent poisoning, old age and rolling over on their back![64]

Despite the small number of livestock lost to predation in the Northern Rockies—and the fact that ranchers are compensated for deaths caused by wolves, bears and other carnivores[65]—the public lands livestock industry continues to call for the removal or termination of wolves in the region. The U.S. Fish and Wildlife Service, along with Wildlife Services, a euphemistically named federal agency housed in the U.S. Department of Agriculture, are tasked with controlling wolves. These agencies (and authorized ranchers) killed 724 wolves in the Northern Rocky Mountains between 1987-2007, and translocated 117 more wolves to protect livestock.[66] In the Greater Yellowstone Ecosystem, approximately half of control efforts have occurred on public land.[67]

Wolves were reintroduced and have flourished where grazing is prohibited on federal public land (e.g., Yellowstone National Park). But these recovery areas are surrounded by federal grazing allotments and wolves frequently come into contact with domestic livestock wherever they attempt to expand their range. Entire wolf packs have been eliminated for killing livestock while exploring new territory on public land. Almost 2,600 grazing allotments are located in estimated wolf current range (Map 11, Table 5), and thousands more allotments block wolf migration to other suitable habitat, such as Rocky Mountain National Park in Colorado.


Map 11
WA
OR
ID
MT
WY
NV
UT
CO
CA
AZ
NM
Gray Wolf Historic and Current Distribution and Federal Public Lands Livestock Grazing
N
W
E
S
Mexican Gray Wolf Recovery Area
Gray Wolf Current Distribution
Gray Wolf Historic Distribution
Federal Grazing Allotments (Active)
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2008
Data Sources: USFWS, USGS, BLM, and USFS

Carlos Carroll and others evaluated and charted suitable wolf habitat in the western United States (Map 12).[68] The analysis was based on criteria such as elk population densities and roadless areas. Optimal, good, and marginal wolf habitat identified by Carroll et al. includes 4,618 federal grazing allotments on BLM and Forest Service land.

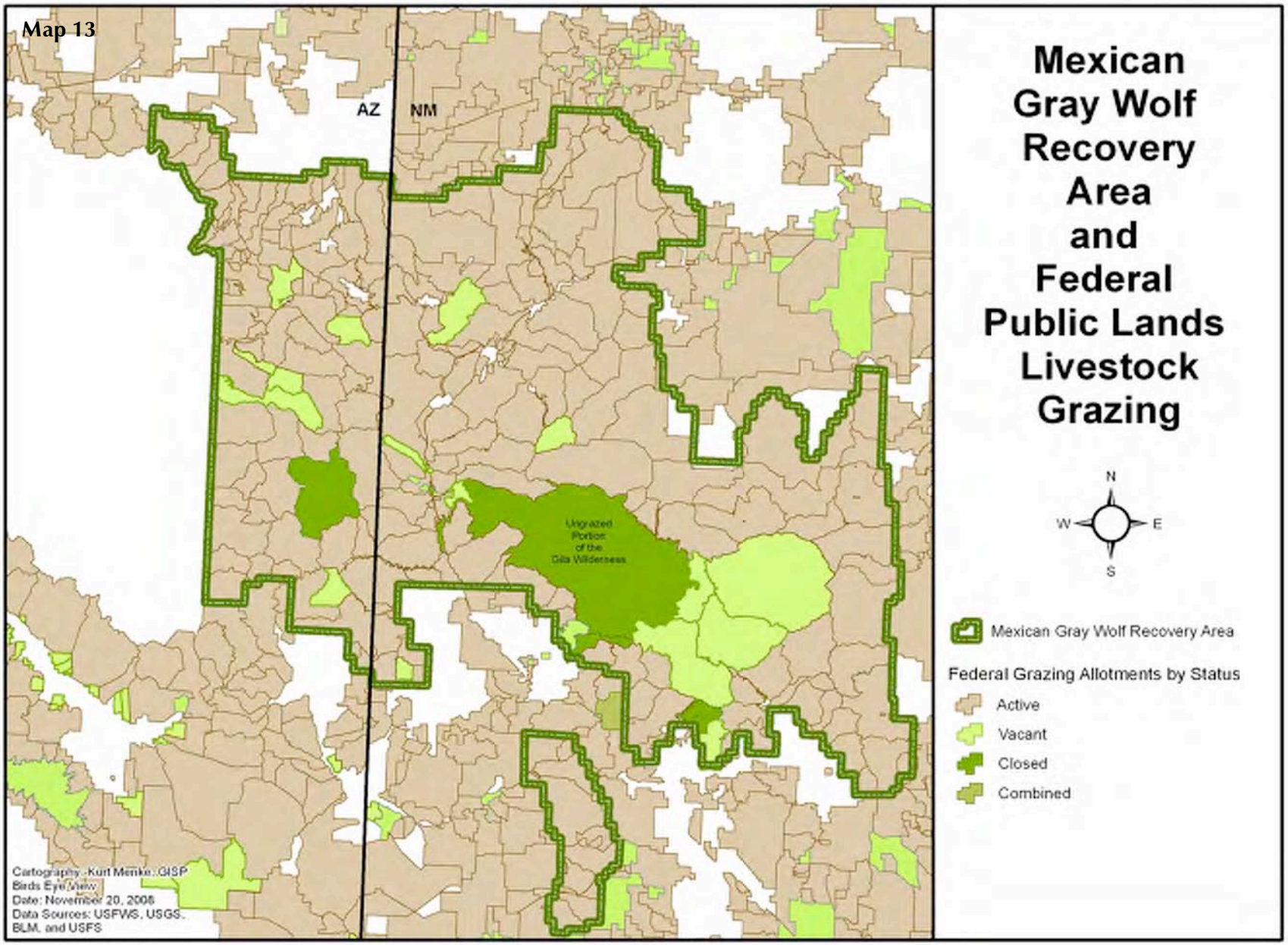


Mexican Gray Wolf

Mexican gray wolf with pup (photo: Joel Sartore-Wild Canid Center)

The effects of livestock grazing and human impact on canrivores may be most dramatically illustrated by the plight of the Mexican gray wolf, one of the most endangered mammals in North America. A decades-long campaign by ranchers and government agents to exterminate top carnivores from southwestern landscapes eventually succeeded in eliminating the Mexican gray wolf from the United States. The reintroduction of the subspecies in New Mexico and Arizona in 1998 was accomplished through a captive breeding program propagated from the last seven Mexican gray wolves in existence. But the reintroduction of the wolf was (and still is) vociferously opposed by public lands ranchers, and after the first eight months, five reintroduced wolves had been shot and killed, two disappeared, and three were recaptured for leaving the recovery area or for deteriorating health. Only three males remained in the wild at the end of 1998.[69]

Recovery of the Mexican gray wolf has been frustratingly slow. From 1998 to 2004, the U.S. Fish and Wildlife Service removed 25 wolves from the Blue Range Wolf Reintroduction Area for preying on livestock. The rate of wolf removal increased after 2005, with the agency removing 45 Mexican wolves from the recovery area due to conflicts with livestock.[70] All but a few thousand acres of the Mexican wolf recovery area is on federal public land, but 82 percent of that area is permitted for livestock grazing (Map 13, Table 5). Like gray wolves in the northern Rockies, Mexican gray wolves are mostly restricted to cattle-free areas bounded by active grazing allotments.


Map 13
AZ
NM
Ungrazed Portion of the Gila Wilderness
Mexican Gray Wolf Recovery Area and Federal Public Lands Livestock Grazing
N
W
E
S
Mexican Gray Wolf Recovery Area
Federal Grazing Allotments by Status
Active
Vacant
Closed
Combined
Cartography: Kurt Menke, GISP
Birds Eye View
Date: November 20, 2006
Data Sources: USFWS, USGS, BLM, and USFS

Recommendations for Resolving Federal Public Lands Livestock Grazing Conflicts

Protect Species under the Endangered Species Act

Listing imperiled species under the federal Endangered Species Act has proven very effective in preventing their extinction. Over 99 percent of the plants and animals protected under the act persist today. Scientists estimate that 227 species would have gone extinct were it not for Endangered Species Act listing.[71] These numbers are particularly compelling given that the law has been underused and undermined by past administrations and underfunded by Congress.

Species do not benefit from Endangered Species Act protection until they are formally listed as "threatened" or "endangered." Once listed, species are protected from harm and adverse modification of designated critical habitat by federal agency actions or federal permitting decisions. Deleterious land uses (such as livestock grazing) may be modified, reduced, or eliminated to protect listed species and aid their recovery. The Endangered Species Act also facilitates reintroduction of species to areas where they have been extirpated and authorizes funding for state programs to benefit listed species.

WildEarth Guardians and partners are working to secure Endangered Species Act protection for a number of species presented in this report, as well as other species affected by public lands grazing.

Voluntary Federal Grazing Permit Retirement

Published research and field observation confirm the importance of removing livestock from public land to recover ecosystems. Riparian areas recover, often very quickly, where grazing is prohibited. Western streams run colder, cleaner, and clearer in livestock-free areas. Sage-grouse, pronghorn and songbird populations have markedly increased where livestock were removed from sagebrush steppe. Bighorn sheep survival increases—due to reduced disease transmission—where domestic sheep are removed from their mountainous habitat. Livestock grazing is often reduced or eliminated wherever federal managers seek to restore imperiled wildlife, such as masked bobwhite, desert tortoise, and Golden trout. It is easier to protect sensitive plants and restore the natural fire regime where grazing is prohibited. Domestic livestock have been removed from grazing allotments in the Greater Yelllowstone Ecosystem to reduce conflicts with wolves, grizzly bears, elk and bighorn sheep.

WildEarth Guardians and our partners are working on proposals to allow the federal government and conservation organizations to buyout grazing permits from willing ranchers and permanently retire the associated grazing allotments from livestock use. Grazing permit retirement is a voluntary, non-regulatory, market-based solution to public lands grazing conflicts that is swiftly gaining acceptance among the environmental community, public lands ranchers and decision-makers in Washington, D.C.

Federal grazing permit retirement is mutually beneficial to ranchers, taxpayers and the environment:

- Ranchers can retire their permits and use their compensation to payoff their debts, restructure their operations on private lands, start a new business or retire.

- Closing grazing allotments will help restore sensitive lands and watersheds, and recover wildlife.

- Retiring permits will reduce the cost of federal public land management.

Permittees who opt to retire their grazing permits and invest their compensation in new economic opportunities would benefit their communities by creating new sources of revenue, taxes and employment. Studies indicate, and as former permittees likely will discover, there is greater economic value in non-consumptive uses of public land (hunting, fishing, birding, hiking, guiding, camping, horseback riding) than livestock grazing.

As livestock are removed from public land, litigation over grazing conflicts with wildlife, watersheds, and other public values will also decrease. Both the removal of livestock and the subsequent reduction in environmental litigation will free up agency resources from developing grazing plans, defending against lawsuits, processing endless paperwork, and responding to public protests over grazing abuse. Fewer livestock on public land will also result in fewer new species listings and speed recovery of species already listed under the Endangered Species Act.

Congress recently enacted legislation to retire grazing permits on approximately two million acres in and near the Cascade-Siskiyou National Monument in Oregon and in newly established wilderness in Idaho's Owyhee Canyonlands.[72] More grazing permit retirement is inevitable. A recent survey indicates that approximately half of public lands ranchers in Nevada may be interested in retiring their grazing permits for a reasonable price.[73] WildEarth Guardians will pursue every opportunity to retire grazing permits on public land where ranchers are willing to relinquish their grazing permits.

Voluntary grazing permit retirement is a permanent solution to public lands grazing conflicts (photo: George Wuerthner)

Appendix I. Spatial Analyses of Selected Species Distribution and Federal Public Lands Grazing

Table 1. Current Distribution of Selected Birds and Federal Public Lands Livestock Grazing

Birds	Current Distribution														
	Current Range (acres)	Current Range Not in Federal Grazing Allotments (acres/%)		Current Range in Federal Grazing Allotments [I] (acres/%)		Active Federal Grazing Allotments in Current Range	Current Range on Non-federal Land (acres/%)		Current Range on Federal Land [I] (acres/%)		Current Range on Ungrazed Federal Land (acres/%)		Current Range on Federal Land Permitted for Grazing (acres/%)	
Northern Aplomado Falcon	2,933,746[II]	788,932	27%	2,144,814	73%	1,055	840,988	29%	2,092,758	71%	1,261,469	43%	1,672,277	57%
Greater Sage-grouse	164,105,708[III]	45,834,868	28%	118,270,840	72%	9,517	58,197,492	35%	105,908,215	65%	9,336,465	9%	96,571,750	91%
Gunnison Sage-grouse	1,188,468	532,506	45%	655,962	55%	128	577,688	49%	610,780	51%	98,327	16%	512,453	84%
Lesser Prairie-chicken	6,912,797[IV]	5,730,358	83%	1,182,439	17%	166	6,174,729	89%	738,068	11%	168,046	23%	570,022	77%
Columbian Sharp-tailed Grouse	10,332,329	4,651,726	45%	5,680,603	55%	1,033	6,281,544	61%	4,050,785	39%	485,738	12%	3,565,047	88%
Mexican Spotted Owl	9,869,507[V]	3,216,310	33%	6,653,197	67%	333	301,327	3%	9,568,180	97%	3,104,163	32%	6,464,017	68%

I. Federal grazing allotments may include non-federal lands (e.g., state land), which primarily accounts for the differences in acreage between a species' current distribution in federal grazing allotments and current distribution on federal land.

II. Moderate and high quality suitable habitat in New Mexico.

III. Greater sage-grouse current range was reviewed in M. A. Schroeder, C. L. Aldridge, A. D. Apa, J. R. Bohne, et al. 2004. Distribution of sage-grouse in North America. Condor 106: 363-376. The associated GIS data are posted on the U.S. Geological Survey "SageMAP" website (http://sagemap.wr.usgs.gov). Although the coverage developed from Schroeder et al. (2004) is the best data available, it probably overestimates greater sage-grouse current range by 40-60 million acres. Existing sagebrush steppe—essential habitat for greater sage-grouse—is only estimated to cover 100-120 million acres (Wisdom et al. [2005]; Knick and Jacobs [2008]; WildEarth Guardians [2008]).

IV. Current range in New Mexico; data from the New Mexico Natural Heritage Program.

V. Critical habitat.

Table 2. Historic and Current Distribution of Native Trout and Federal Public Lands Livestock Grazing

Trout	Historic Distribution									Current Distribution			
	Historic Range (acres)	Historic Range on Federal Land (acres/%)		Historic Range on Federal Land Permitted for Grazing (acres/%)		Active Federal Grazing Allotments in Historic Range	Stream Miles in Historic Range	Stream Miles on Federal Land Permitted for Grazing in Historic Range (Miles/%)		Currently Occupied Stream Miles	Currently Occupied Stream Miles on Federal Land Permitted for Grazing (Miles/%)		Active Federal Grazing Allotments that Intersect Currently Occupied Streams
Apache [I]	1,438,140	353,974	25%	271,214	77%	26	1,613	362	22%	144	60	42%	14
Bonneville	33,789,832	21,019,301	62%	15,992,569	76%	1,202	*	*		*	*		*
Bull [II]	126,199,004	64,953,172	52%	23,787,385	37%	3,090	181,833	30,857	17%	20,838	3,434	17%	532
Colorado River Cutthroat [III]	44,698,765	30,624,474	69%	24,726,792	81%	3,115	21,383	9,061	42%	3,026	1,746	58%	412
Gila [IV]	8,263,836	6,718,092	81%	5,539,518	83%	301	7,491	4,239	57%	93	28	30%	8
Lahontan	24,900,544	18,317,133	74%	16,156,233	88%	457	*	*		*	*		*
Redband [V]	119,670,276	68,370,227	57%	41,221,692	60%	4,177	158,127	50,612	32%	5,638	1,978	35%	363
Rio Grande [VI]	19,462,867	9,282,782	48%	7,223,396	78%	867	10,080	3,737	37%	856	648	76%	61
Westslope Cutthroat [VII]	70,630,178	40,314,370	57%	12,377,389	31%	1,862	60,850	10,862	18%	29,940	5,064	17%	457
Yellowstone Cutthroat	40,244,104	18,752,822	47%	10,885,308	58%	2,297	*	*		*	*		*

* Data incomplete or unavailable.

I. Apache Trout: data for currently occupied stream miles was developed by the Center for Biological Diversity for the Western Native Trout Campaign (www.westerntrout.org). Data used to create historic stream miles was acquired from the National Hydrologic Dataset (NHD) medium resolution data, which approximately matched the line data for currently occupied streams. The NHD stream line data was then clipped to the historic watershed boundary for Apache trout, creating a "potential" historic streams layer for this analysis. Whether Apache trout occupied every mile of every stream within this potential historic range is unknown.

II. Bull Trout: data for currently occupied stream miles was obtained from StreamNet (www.streamnet.org). Historic stream miles were generated from the same data set by clipping stream miles to the historic watershed boundary for bull trout, creating a "potential" historic streams layer for this analysis. Whether bull trout occupied every mile of every stream within this potential historic range is unknown.

III. Colorado River Cutthroat Trout: data for both historic and currently occupied streams were obtained from the Colorado River Cutthroat Status Assessment Database.

IV. Gila Trout: data for currently occupied stream miles was developed by the Center for Biological Diversity for the Western Native Trout Campaign (www.westerntrout.org). Data used to create historic stream miles was acquired from the National Hydrologic Dataset (NHD) medium resolution data, which approximately matched the line data for currently occupied streams. The NHD stream line data was then clipped to the historic watershed boundary for Gila trout , creating a "potential" historic streams layer for this analysis. Whether Gila trout occupied every mile of every stream within this potential historic range is unknown.

V. Redband Trout: data for currently occupied stream miles was obtained from StreamNet (www.streamnet.org). Historic stream miles were generated from the same data set by clipping stream miles to the historic watershed boundary for redband trout, creating a "potential" historic streams layer for this analysis. Whether redband trout occupied every mile of every stream within this potential historic range is unknown. Also, the historic range for redband trout extended into northern California, beyond the StreamNet coverage for the Northwest, but the majority of historic redband trout range is included represented in the StreamNet data.

VI. Rio Grande Trout: data used to create historic stream miles was acquired from the National Hydrologic Dataset (NHD) medium resolution data, which approximately matched the line data for currently occupied streams. The NHD stream line data was then clipped to the historic watershed boundary for Rio Grande trout, creating a "potential" historic streams layer for this analysis. Whether Rio Grande trout occupied every mile of every stream within this potential historic range is unknown.

VII. Westslope Cutthroat Trout: data for currently occupied stream miles was obtained from StreamNet (www.streamnet.org). Historic stream miles were generated from the same data set by clipping stream miles to the historic watershed boundary for westslope cutthroat trout, creating a "potential" historic streams layer for this analysis. Whether westslope cutthroat trout occupied every mile of every stream within this potential historic range is unknown. Also, the historic range for westslope cutthroat trout extended into western and central Montana, beyond the StreamNet coverage for the Northwest, but the majority of historic westslope cutthroat trout range is represented in the StreamNet data.

Table 3. Historic Distribution of Four Prairie Dog Species and Federal Public Lands Livestock Grazing

Prairie Dogs	Historic Distribution [I]															
	Historic Range [II] (acres)	Historic Range Not in Federal Grazing Allotments (acres/%)		Historic Range in Federal Grazing Allotments [III] (acres/%)		Active Federal Grazing Allotments in Historic Range	Historic Range on Non-federal Land (acres/%)		Historic Range on Federal Land [III] (acres/%)		Historic Range on Ungrazed Federal Land (acres/%)		Historic Range on Federal Land Permitted for Grazing (acres/%)	
Black-tailed [IV]	394,534,501	334,289,939	85%	60,244,562	15%	8,594	347,652,595	88%	46,881,906	12%	18,146,921	39%	28,734,985	61%
Gunnison's [V]	83,922,534	48,254,987	57%	35,667,547	43%	2,626	48,268,237	57%	35,654,297	43%	7,823,855	22%	27,830,442	78%
Utah [VI]	8,634,366	1,640,307	19%	6,994,059	81%	475	2,522,657	29%	6,111,709	71%	404,184	7%	5,707,525	93%
White-tailed [VII]	49,804,559	11,004,871	22%	38,799,688	78%	3,475	21,005,597	42%	28,798,962	58%	2,475,737	9%	26,323,225	91%

I. While there is some uncertainty concerning the extent of historic distribution of some prairie dog species, the historic ranges depicted on Map 8 and data presented in Table 3 are the best and/or only data available.

II. Historic range in the United States.

III. Federal grazing allotments may include non-federal lands (e.g., state land), which primarily accounts for the differences in acreage between prairie dog historic range in federal grazing allotments and historic range on federal land.

IV. GIS data provided by Colorado Environmental Coalition.

V. GIS coverage developed from A. E. Seglund, A. E. Ernst, D. M. O'Neill. 2006. Gunnison's prairie dog conservation assessment. Unpublished report. Western Association of Fish and Wildlife Agencies. Laramie, WY.

VI. GIS coverage developed from B. C. Steed. 2005. "Why don't we just shoot them?" An institutional analysis of prairie dog protection in Iron County, Utah. Mini-conference paper. Indiana University, Workshop in Political Theory and Policy Analysis (available at www.indiana.edu/~workshop/publications/materials/conference_papers/steed.pdf), *citing* T. Bonzo and K. Day. 2003. Utah prairie dog recovery efforts: 2002 annual report. Publication No. 03-47. Utah Division of Wildlife Resources. Cedar City, UT.

VII. Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schnurr. 2004. White-tailed prairie dog conservation assessment. Utah Division of Wildlife. Ogden, UT.

Table 4. Current Distribution of Selected Amphibians and Reptiles and Federal Public Lands Livestock Grazing

Amphibians & Reptiles	Current Distribution													
	Current Range (acres)	Current Range Not in Federal Grazing Allotments (acres/%)		Current Range in Federal Grazing Allotments [I] (acres/%)		Active Federal Grazing Allotments in Current Range	Current Range on Non-federal Land (acres/%)		Current Range on Federal Land (acres/%)		Current Range on Ungrazed Federal Land (acres/%)		Current Range on Federal Land Permitted for Grazing (acres/%)	
Sonoran Desert Tortoise	14,700,484[II]	7,729,930	53%	6,970,554	47%	206	6,293,792	43%	8,406,692	57%	3,925,863	47%	4,480,829	53%
Chiricahua Leopard Frog	6,260,373[III]	1,551,965	25%	4,708,408	75%	326	1,508,085	24%	4,752,288	76%	854,672	18%	3,897,616	82%

I. Federal grazing allotments may include non-federal lands (e.g., state lands).

II. Current range estimated from recorded desert tortoise occurrences and mapped habitat.

III. Chiricahua leopard frog current range is represented by designated management units.

Table 5. Current Distribution of Selected Carnivores and Federal Public Lands Livestock Grazing

Carnivores	Current Distribution														
	Current Range (acres)	Current Range Not in Federal Grazing Allotments (acres/%)		Current Range in Federal Grazing Allotments [I] (acres/%)		Active Federal Grazing Allotments in Current Range	Current Range on Non-federal Land (acres/%)		Current Range on Federal Land (acres/%)		Current Range on Ungrazed Federal Land (acres/%)		Current Range on Federal Land Permitted for Grazing (acres/%)	
Gray Wolf (Rocky Mtn. pop)	68,559,003[II]	46,323,193	68%	22,235,810[III]	32%	2,590	20,478,243	30%	48,080,762[III]	70%	28,989,570	60%	19,091,192	40%
Mexican Gray Wolf	4,613,690[IV]	843,071	18%	3,770,619[V]	82%	206	4,702	0%	4,608,988[V]	100%	842,580	18%	3,766,408	82%
Jaguar	5,538,957[VI]	1,755,507	32%	3,783,450	68%	380	1,375,612	25%	4,163,345	75%	975,779	23%	3,187,566	77%

I. Federal grazing allotments may include non-federal lands (e.g., state lands).

II. Gray wolf current range was developed from a map published by the U.S. Fish and Wildlife Service (available at www.fws.gov/mountain-prairie/species/mammals/wolf/NationalRangeMap2.pdf; viewed Feb. 25, 2009). The data may be overinclusive of wolf range in the northern Rocky Mountains (see Carroll et al. 2006).

III. Fewer acres are federally permitted for grazing in gray wolf current range in the Rocky Mountains than there is acreage of current range on federal land in the region. This difference partly due to the fact that significant areas of gray wolf current range is comprised of Yellowstone and Grand Teton national parks and other federal land where grazing is prohibited or grazing allotments have been retired.

IV. Designated Mexican gray wolf recovery zone.

V. Fewer acres are federally permitted for grazing in the Mexican gray wolf recovery area than there is acreage of federal land in the area. This difference is partly due to the fact that some federal land in the Mexican gray wolf recovery area is closed to grazing use.

VI. Potential habitat in the United States.

References

[1] GAO. 1996. Land ownership: information on acreage, management and use of federal and other lands. GAO/RCED-96-40. General Accounting Office. Washington, DC: 24-25.
[2] Vincent, C. H. 2008. Grazing Fees: An Overview and Current Issues. (CRS Report for Congress). Library of Congress, Congressional Research Service. Washington, DC: 1-2 (Mar. 10, 2008) (only 7,536,412 AUMs were grazed in FY 2006; the remainder were not used due to resource protection needs, forage depletion caused by drought or fire, and economic and other factors); GAO. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington, DC: 71 (grazing is permitted on 137.7 million acres of BLM land).
[3] Vincent, C. H. 2008. Grazing Fees: An Overview and Current Issues. (CRS Report for Congress). Library of Congress, Congressional Research Service. Washington, DC: 2 (Mar. 10, 2008) (more than 9 million AUMs were under permit on Forest Service lands in FY 2005); GAO. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington, DC: 75 (grazing is permitted on 92.9 million acres of Forest Service land).
[4] Babbitt, B. 2005. CITIES IN THE WILDERNESS: A NEW VISION OF LAND USE IN AMERICA. Island Press. Washington, DC: 148.
[5] West, N. E. 1983. Western intermountain sagebrush steppe. Chap. 13. Pages 351-374 *in* N. E. West (ed.). TEMPERATE DESERTS AND SEMI-DESERTS. ECOSYSTEMS OF THE WORLD 5. Elsevier Scientific Publishing Co. New York, NY: 363 (*citing* Butler 1976; Davis et al. 1977).
[6] West, N. E. 1996. Strategies for maintenance and repair of biotic community diversity on rangelands. Chap. 22. Pages 326-346 *in* R. C. Szaro and D. W. Johnston (eds.). BIODIVERSITY IN MANAGED LANDSCAPES. THEORY AND PRACTICE. Oxford University Press. New York, NY: 336, 337.
[7] Bahre, C. J. 1991. A LEGACY OF CHANGE: HISTORIC HUMAN IMPACT ON VEGETATION OF THE ARIZONA BORDERLANDS. Univ. Arizona Press. Tucson, AZ.
[8] Sheridan D. 1981. Desertification of the United States. Council on Environmental Quality. Washington DC: 121.
[9] Suk, T., J. L. Riggs, B. C. Nelson. 1986. Water contamination with giardia in backcountry areas *in* Proceedings of the National Wilderness Conference. Gen. Tech. Rep. INT-212. USDA-Forest Service, Intermountain Research Station. Ogden, UT: 237-239. Livestock grazing is the single largest contributor to non-point source pollution in New Mexico, accounting for approximately 15 percent of the water quality impairments statewide. Next on the list is urban runoff, accounting for 12 percent of stream water impairments in the state. Approximately 11 percent of stream-quality problems are due to the loss of streamside habitat, such as the removal of shade-providing vegetation and plants that stabilize soil, which is also caused, in part, by livestock grazing. J. Rankin. Plan to take better care of water quality is earning accolades; conservationists disagree. *Albuquerque Journal* (May 15, 2005).
[10] GAO. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington, DC: 5-6.
[11] GAO. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington, DC: 5-6.
[12] The Livestock Compensation Program paid farmers and ranchers $635 in 2002 and 2003. G. M. Gaul, D. Morgan, S. Cohen. No drought required for federal aid: livestock grazing program grew to cover any "disaster." *Washington Post* (July 18, 2006).
[13] Moscowitz, K. and C. Romaniello. 2002. Assessing the Full Cost of the Federal Grazing Program. Center for Biological Diversity. Tucson, AZ. The estimated cost of the federal grazing program at $500 million is consistent with estimates developed by other experts. K. Hess (former special advisor on

policy to the Assistant Secretary for Program, Policy, and Budget of the Department of the Interior) and J. Wald (senior attorney and former Land Program Director, Natural Resources Defense Council) estimated the annual cost of the federal grazing program to be approximately $500 million. Hess, K. and J. H. Wald. 1995. Grazing reform: here's the answer. *High Country News* 27(18). The *Economist* magazine has also reported the annual cost of the federal grazing program to be $460 million. Subsidized cow chow. *The Economist* (Mar. 7, 2002): 39.

[14] Wildlife Services claimed it spent $5.1 million to protect domestic livestock from carnivores on federal public lands in FY 2004 (***$5 million***). GAO. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington, DC: 6. However, this amount may be higher. The agency annually spends approximately $10.3 million on activities in the eleven western states (Wildilfe Services. 2008. Wildlife Services' 2007 Annual Tables: Table A. Wildlife Services Federal and Cooperative Funding by Resource Category – FY 2007. USDA, Animal and Plant Health Inspection Service, Wildlife Services), and it is estimated that 75 percent of this amount is used to control carnivores on public land (*$8 million*). O'Toole, R. 1994. Audit of the USDA Animal Damage Control Program. Cascade Holistic Economic Consultants. Oak Grove, OR: 1.

[15] Data compiled by WildEarth Guardians from Wildlife Services data tables for FY 2007. Total includes black bears, bobcats, coyotes, mountain lions, northern gray wolves and Mexican gray wolves.

[16] Gentner, B. J. and J. A. Tanaka. 2002. Classifying federal public land grazing permittees. Journal of Range Management 55(1): 11.

[17] Gentner, B. J. and J. A. Tanaka. 2002. Classifying federal public land grazing permittees. Journal of Range Management 55(1): 11.

[18] Bartlett, E. T., L. A. Torell, N. R. Rimbey, et al. 2002. Valuing grazing on public land. Journal of Range Management 55(5): 427 (citing multiple references).

[19] Power, T. 1996. LOST LANDSCAPES AND FAILED ECONOMIES: THE SEARCH FOR A VALUE OF PLACE. Island Press. Washington, DC: 184-185 (table 8-2). *See also* USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Draft Environmental Impact Statement. USDI-BLM. Washington, DC: 45.

[20] The Forest Service "escrow waiver" program is further described in M. Salvo. 2002. Mortgaging public assets: how ranchers use grazing permits as collateral. Pages 271-273 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Island Press. Covelo, CA.

[21] T. Jones and M. Salvo. 2006. Mortgaging Our Natural Heritage: An Analysis of the Use of Bureau of Land Management Grazing Permits as Collateral for Private Loans. Distributed report. Forest Guardians, Santa Fe, NM; Sagebrush Sea Campaign, Chandler, AZ: 5.

[22] T. Jones and M. Salvo. 2006. Mortgaging Our Natural Heritage: An Analysis of the Use of Bureau of Land Management Grazing Permits as Collateral for Private Loans. Distributed report. Forest Guardians, Santa Fe, NM; Sagebrush Sea Campaign, Chandler, AZ: 5.

[23] Brief of Amici Curiae State Bank of Southern Utah in Support of Petitioner, Public Lands Council v. Babbitt, 529 U.S. 728 (2000).

[24] USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 26.

[25] Rogers, P. Cash cows. *San Jose Mercury News* (Nov. 7, 1999): 1S; L. Jacobs. 1992. THE WASTE OF THE WEST: PUBLIC LANDS RANCHING. Lynn Jacobs, P.O. Box 5784, Tucson, AZ: 354.

[26] *See, e.g.,* GAO. 1991. Rangeland management: BLM's hot desert grazing program merits reconsideration. RCED-92-12. General Accounting Office. Washington, DC: 46.

[27] *See* USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Draft Environmental Impact Statement. USDI-BLM. Washington, DC: 3-75; A. F. Smith and W. E. Martin. 1972. Socioeconomic behavior of cattle ranchers, with implications for rural community development in the West. American Journal of Agricultural Economics 54: 223-224 (describing survey results that 80 percent of ranchers had other income to support their ranch, while 20

percent derived their income from local sources). These statistics comport with recent data for beef operations nationally and agriculture as a whole, T. Power. 1996. LOST LANDSCAPES AND FAILED ECONOMIES: THE SEARCH FOR A VALUE OF PLACE. Island Press. Washington, DC: 186. M. Steinbach described different classes of public lands ranchers (e.g., full-time, part-time, hobbyist, etc.) and their dependence on off-ranch income. M. Steinbach. 2004. Evaluating the consequences of public land grazing permit buyout program, permit reductions, and increased fees on land ownership and open space in western states. Ph.D. Diss. University of Montana. Missoula, MT: 91-97.

[28] Power, T. 1996. LOST LANDSCAPES AND FAILED ECONOMIES: THE SEARCH FOR A VALUE OF PLACE. Island Press. Washington, DC: 184 (table 8-2).

[29] Greenhouse, S. Behind Las Vegas's glitter, heavy losses and layoffs. *New York Times* (Oct. 19, 2001).

[30] Western, S. 2002. PUSHED OFF THE MOUNTAIN, SOLD DOWN THE RIVER: WYOMING'S SEARCH FOR ITS SOUL. Homestead Publishing. Denver, CO: 14.

[31] USDA-National Agricultural Statistics Service website, www.nass.usda.gov, "Livestock and Animals"; visited Sept. 14, 2006. Wyoming had an inventory of 1,440 thousand beef cattle and calves in 2006, and Florida had 1,690 thousand cattle and calves.

[32] USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 26. *See also* B. Czech, P. R. Krausman, P.K. Devers. 2000. Economic associations among causes of species endangerment in the United States. BioScience 50(7): 594 (table 1) (analysis of several studies suggests that 182 species are endangered by livestock grazing) *and* USDA-NRCS. 1997. America's private land: a geography of hope. Program Aid 1548. USDA-Natural Resources Conservation Service: 154 (stating that grazing is a contributing factor in the decline of 26 percent or 161 species on the federal threatened and endangered list). While these statistics are remarkable by themselves, the reported number of threatened and endangered species affected by grazing would be much higher if *livestock production* was considered on the whole as opposed to mere grazing. American livestock production is a pervasive industry that requires millions of acres of open range (public lands) and/or private pastures, feedlots, and related infrastructure and support facilities to feed, water, graze, transport, shelter, butcher, and market livestock. The ecological footprint of this industry is huge. Entire ecosystems and uncountable species are threatened because millions of acres of habitat are converted to monocultural crops of corn, barley, and other livestock food; large-scale agriculture and feedlots deplete aquifers and spoil water quality; rivers are damned and diverted (at public expense) to irrigate forage crops and support ranches in desert environments.

[33] Wilcove, D. S., D. Rothstein, J Dubow, A Phillips, E. Losos. 1998. Quantifying threats to imperiled species in the United States: assessing the relative importance of habitat destruction, alien species, pollution, overexploitation and disease. BioScience 48(8): 610.

[34] Wilcove, D. S., D. Rothstein, J Dubow, A Phillips, E. Losos. 1998. Quantifying threats to imperiled species in the United States: assessing the relative importance of habitat destruction, alien species, pollution, overexploitation and disease. BioScience 48(8): 610.

[35] Flather, C. H. and L. A. Joyce. 1994. Species endangerment patterns in the United States. Gen. Tech. Rep. RM-241. USDA-Forest Service. Fort Collins, CO: 24 (table 9).

[36] Belsky, A. J. and J. L. Gelbard. 2000. Livestock grazing and weed invasions in the arid west. Oregon Natural Desert Association. Bend, OR: 4; Bureau of Land Management. 2000. Use of weed-free forage on public lands in Nevada. Fed. Reg. 65-54544. USDI-BLM.

[37] Chaney, E., W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 5 (fourth printing; produced for the Environmental Protection Agency).

[38] McCain, L., R. P. Reading, B. J. Miller. 2002. Prairie dog gone: myth, persecution, and preservation of a keystone species. Pages 231-234 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Island Press. Covelo, CA.

[39] USDA-Forest Service, Payette National Forest. 2006. Risk Analysis of Disease Transmission between Domestic Sheep and Bighorn Sheep on the Payette National Forest. USDA-Forest Service, Intermountain Region, Payette National Forest. McCall, ID. (Feb. 6, 2006).

[40] Meagher, M. and M. M. Meyer. 1994. On the orgin of brucellosis in bison of Yellowstone National Park: a review. Conservation Biology 8(3): 645-653.
[41] *Cited in* R. R. Kindschy, C. Sundstrom, and J. D. Yoakum. 1982. Wildlife habitats in managed rangelands—the Great Basin of southeastern Oregon: pronghorns. Gen. Tech. Rep. PNW 145. USDA-Forest Service; USDI-BLM. Portland, OR: 6.
[42] *E.g.,* P. K. Coe, B. K. Johnson, J. W. Kern, S. L. Findholt, et al. 2001. Responses of elk and mule deer to cattle in summer. Journal of Range Management 54: A51-A76; K. M. Stewart, R. T. Bowyer, J. G. Kie, N. J. Cimon, B. K. Johnson. 2002. Temporospatial distributions of elk, mule deer, and cattle: resource partitioning and competitive displacement. Journal of Mammalogy 83(1): 229–244.
[43] GAO. 1988. Public rangelands: some riparian areas restored but widespread improvement will be slow. RCED-88-105. General Accounting Office. Washington, DC: 12.
[44] Willers, B. 2002. Where bison once roamed: the impacts of cattle and sheep on native herbivore. Pages 241-244 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Foundation for Deep Ecology/Island Press. Covelo, CA. (p. 243, *citing* U.S. Dept. Agric., 1976, National Range Handbook; and Wyoming Game and Fish Dept., 1998, internal data); and other sources.
[45] Willers, B. 2002. Where bison once roamed: the impacts of cattle and sheep on native herbivore. Pages 241-244 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Foundation for Deep Ecology/Island Press. Covelo, CA. (p. 243, *citing* U.S. Dept. Agric., 1976, National Range Handbook; and Wyoming Game and Fish Dept., 1998, internal data); and other sources.
[46] Hagen, C. A., J. W. Connelly, M. A. Schroeder. 2007. A meta-analysis of greater sage-grouse *Centrocercus Urophasianus* nesting and brood-rearing habitats. Wildlife Biology 13 (Suppl. 1): 42-50; C. E. Braun. 2006. A Blueprint for Sage-grouse Conservation and Recovery. Unpublished report. Grouse, Inc. Tucson, AZ: 3-4.
[47] U.S. Geological Survey. "State and Federal Partnership Forms to Restore Great Basin Rangelands" (news release). U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis Research Group. Corvallis, OR. (Nov. 8, 2005); R. F. Noss, E. T. LaRoe, J. M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological Report 28. National Biological Service. Washington, DC.
[48] Coates, P. S., J. W. Connelly, D. J. Delehanty. 2008. Predators of greater sage grouse nests identified by video monitoring. Journal of Field Ornithology 79: 421-428.
[49] Belsky, A. J., A. Matzke, S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. Journal of Soil and Water Conservation 54(1): 419 (citations omitted).
[50] Chaney, E., W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 5 (fourth printing; published by the Environmental Protection Agency).
[51] GAO. 1988. Public rangelands: some riparian areas restored by widespread improvement will be slow. RCED-88-105. General Accounting Office. Washington, DC; R. D. Ohmart. 1996. Historical and present impacts of livestock grazing on fish and wildlife resources in western riparian habitats. Pages 245-279 *in* P. R. Krausman (ed.). RANGELAND WILDLIFE. Society for Range Management. Denver, CO.
[52] *See* E. Chaney, W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 2 (fourth printing; produced for the Environmental Protection Agency).
[53] Roath, L. R. and W. C. Krueger. 1982. Cattle grazing and behavior on a forested range. Journal of Range Management 35: 332-338; J. M. Skovlin. 1984. Impacts of grazing on wetlands and riparian habitat: a review of our knowledge. Pages 1001-1103 *in* DEVELOPING STRATEGIES FOR RANGE MANAGEMENT. Westview Press. Boulder, CO.

[54] Belsky, A. J., A. Matzke, S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. Journal of Soil and Watern Conservation 54(1): 419-431; *see also* S. Fouty. 2002. Cattle and streams: piecing together a story of change. Pages 185-187 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING. Island Press. Covelo, CA; J. B. Kauffman and W.C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications…a review. Journal of Range Management 36: 685-691; J. B. Kauffman. 2002. Lifeblood of the West: riparian zones, biodiversity, and degredation by livestock." Pages 175-176 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING. Island Press. Covelo, CA; J. Carter. 2002. Stink water: declining water quality due to livestock production. Pages 189-192 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING. Island Press. Covelo, CA.

[55] Kotliar, N. B., B. W. Baker, A. D. Whicker, G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. Environmental Management 24: 177-192; B. Miller, R. Reading, J. Hoogland, T. Clark, et al. 2000. The role of prairie dogs as keystone species: a response to Stapp. Conservation Biology 14: 318-321; B. J. Miller, R. P. Reading, D. E. Biggins, J. K. Detling, et al. 2007. Prairie dogs: an ecological review and current biopolitics. Journal of Wildlife Management 71(8): 2801-2810.

[56] Miller, B., G. Ceballos, R. Reading. 1994. The prairie dog and biotic diversity. Conservation Biology 8(3): 678 (*citing* R. Reading. 1993. Toward an endangered species reintroduction paradigm: a case study of the black-footed ferret. Ph.D. Diss. Yale Univ. New Haven. CT).

[57] McCain, L., R. P. Reading, B. J. Miller. 2002. Prairie dog gone: myth, persecution, and preservation of a keystone species. Pages 231-234 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Island Press. Covelo, CA; Y. Baskin. 1997. THE WORK OF NATURE: HOW THE DIVERSITY OF LIFE SUSTAINS US. Island Press. Washington, DC: 165.

[58] Knopf, F. L. 1996. Prairie legacies - birds. Pages 135-148 *in* F. B. Samson and F. L. Knopf (eds.). PRAIRIE CONSERVATION. Island Press. Washington, DC.

[59] Truett, J. C. 2002. Aplomado falcons and grazing: invoking history to plan for restoration. Southwestern Naturalist 47: 379-400.

[60] Forest Guardians. undated. "Grazing to Extinction" (factsheet). Forst Guardians. Sante Fe, NM.

[61] For additional information on the trophic cascade effects caused by the reintroduction of wolves to Yellowstone National Park, *see* D. W. Smith, R. O. Peterson, D. B. Houston. 2003. Yellowstone after wolves. *Bioscience* 53(4): 330-340; M. Hebblewhite, C. A. White, C. G. Nietvelt, J. A. McKenzie, et al. 2005. Human activity mediates a trophic cascade caused by wolves. Ecology 86(8): 2135-2144; J. C. Halfpenny. 2003. YELLOWSTONE WOLVES IN THE WILD. Riverbend Publishing. Helena, MT.

[62] U.S. Fish and Wildlife Service; Nez Perce Tribe; National Park Service; Montana Fish, Wildlife, and Parks; Blackfeet Nation; Confederated Salish and Kootenai Tribes; Idaho Fish and Game; USDA-Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C. A. Sime and E. E. Bangs (eds.). U.S. Fish and Wildlife Service, Ecological Services. Helena, MT. (Table 5a) (unpaginated).

[63] USDA-NASS. 2006. "Cattle Death Loss." USDA-National Agricultural Statistics Service, Agricultural Statistics Board. (May 5, 2006).

[64] USDA-NASS. 2006. "Sheep and Goats Death Loss." USDA-National Agricultural Statistics Service, Agricultural Statistics Board. (May 6 2006).

[65] Defenders of Wildlife. "The Bailey Wildlife Foundation Wolf Compensation Trust: FAQ" (available at www.defenders.org/wolfcomp.html; viewed June 2, 2006).

[66] U.S. Fish and Wildlife Service; Nez Perce Tribe; National Park Service; Montana Fish, Wildlife, and Parks; Blackfeet Nation; Confederated Salish and Kootenai Tribes; Idaho Fish and Game; USDA-Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C. A. Sime and E. E. Bangs (eds.). U.S. Fish and Wildlife Service, Ecological Services. Helena, MT. (Table 5a) (unpaginated)

[67] Bangs, Edward E. (Wolf Recovery Coordinator, U.S. Fish and Wildlife Service), personal communication with George Wuerthner (Feb. 12, 2003).

[68] Carroll, C., M. K. Phillips, C. A. Lopez-Gonzalez, N. H. Schumaker. 2006. Defining recovery goals and strategies for endangered species: the wolf as a case study. BioScience 56(1): 25-37.

[69] For further information, *see* M. J. Robinson. 2005. PREDATORY BUREAUCRACY: THE EXTERMINATION OF WOLVES AND THE TRANSFORMATION OF THE WEST. University of Colorado Press. Boulder, CO.

[70] U.S. Fish and Wildlife Service. 2008. Mexican Wolf Blue Range Reintroduction Project statistics: Causes of Mexican wolf management removals from the Blue Range Wolf Recovery Area, Arizona and New Mexico, 1998- 2007 (available at www.fws.gov/southwest/es/mexicanwolf/pdf/MW_removals.pdf; viewed Nov. 18, 2008).

[71] Scott, J. M., D. D. Goble, L. K. Svancara, A. Pidgorna. 2006. By the numbers. Pages 16-35 *in* D. D. Goble, J. M. Scott, F. W. Davis (eds.). THE ENDANGERED SPECIES ACT AT THIRTY. Vol. I. Island Press. Washington, DC.

[72] Omnibus Public Land Management Act of 2009, Public Law 111-11 (Mar. 30, 2009).

[73] van Kooten, G. C., R. W. Thomsen, T. Hobby. 2006. Resolving range conflict in Nevada? Buyouts and other compensation alternatives. Review of Agricultural Economics 28(4): 515-530.

WildEarth Guardians
A FORCE FOR NATURE