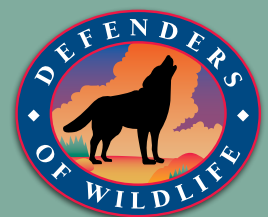


Tackling the Extinction Crisis

Increasing Appropriations to the
U.S. Forest Service and Bureau of Land
Management to Save Endangered Wildlife





DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

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California Tiger Salamander | © Margaret Mantor/California Department of Fish and Wildlife

Summary

The Bureau of Land Management (BLM) and U.S. Forest Service provide habitat for hundreds of plants and animals listed under the Endangered Species Act (ESA) as threatened or endangered. Successful recovery efforts, including those outlined in this report, demonstrate that dedicated effort and sufficient resources can reverse the extinction trajectory.

However, BLM and the Forest Service receive a fraction of the resources necessary to meet their recovery obligations. While the number of threatened and endangered species on lands these agencies administer keeps increasing, funding for recovery efforts is declining in real terms.

To make meaningful progress, we recommend the following course of action:

1. Fund BLM and the Forest Service at a level that ensures the agencies can fully carry out their statutory obligations to help recover threatened and endangered species.
2. Establish and maintain budget lines for the BLM and Forest Service threatened and endangered species programs.
3. Strengthen reporting mechanisms to demonstrate the connection between investment and recovery outcomes.

Introduction

The U.S. is one of the 10 most biodiverse countries in the world (Butler, 2016). Lands administered by the Bureau of Land Management (BLM) and U.S. Forest Service capture much of this diversity and support hundreds of plants and animals listed under the Endangered Species Act (ESA) (Table 1). As of May 2022, the number of ESA listed threatened and endangered species in the U.S. totaled 1,664. Of these species, about 20% occur on BLM lands and about 28% on national forests or grasslands. These federal lands are also home to thousands of additional at-risk species. Federal public lands (Figure 1) provide most of the habitat for many species, and some species depend on these lands completely for their survival.

BLM and the Forest Service administer about 437 million acres of land, primarily in the western U.S. That equates to over 19% of the total U.S. land base and approximately 72% of federal terrestrial holdings.

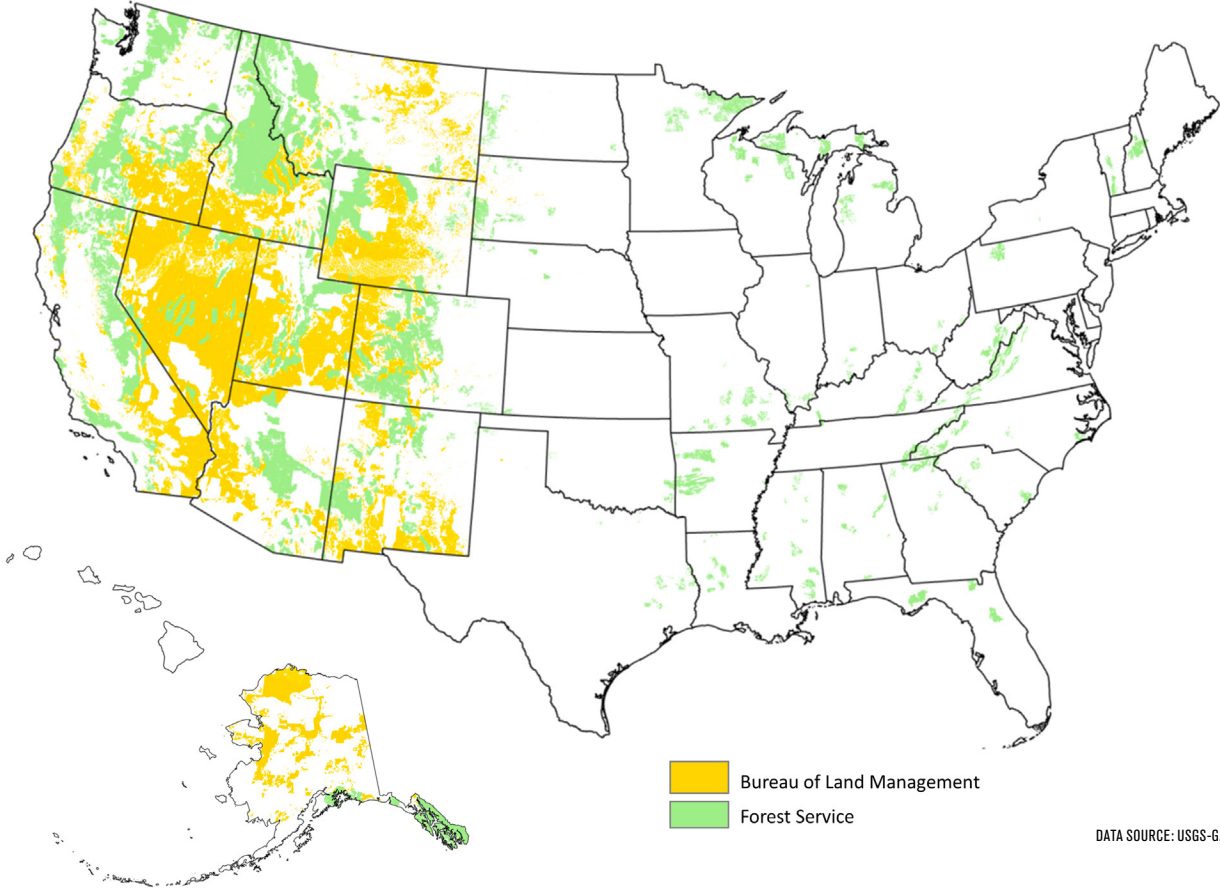
Table 1. Total Acreage and ESA-Listed Species Managed by BLM and Forest Service

Agency	Surface Land Acres Managed	Estimated ESA Listed Species
BLM	244,000,000	330
Forest Service	193,000,000	470

DATA SOURCES: BLM, 2021; FOREST SERVICE, 2018.

These agencies must, by law, allow a variety of uses such as logging, mining and recreation along with conserving threatened and endangered species. The legal requirements to balance uses often complicates efforts to conserve species and habitat.

Figure 1. Multiple-use Federal Lands of the U.S.



Tackling the Extinction Crisis

The Critical Role of Federal Land Management Agencies

The story of the Kirtland's warbler, an engaging little bird that inhabits young, dense forests in northern Michigan and northern Wisconsin, illustrates how important federal land management agencies are to tackling the extinction crisis.

Kirtland's warblers, which once occupied at least four national forests, historically relied on large, intense wildfires that naturally killed off large trees to create its preferred habitat.¹ As human populations grew around the warbler's habitat, fires were prevented and suppressed (Bocetti et al., 2014). By 1974, the year after President Nixon signed the ESA into law, the count of "singing male" warblers had spiraled down to an all-time low of 167 (Kepler et al., 1996; U.S. Fish and Wildlife Service [FWS], undated).

The bird's future looked grim, but the species' listing under the ESA spurred the Forest Service to revive and create habitat by changing timber harvesting practices and employing prescribed burning to restore fire, conduct population surveys, develop education programs and devote staff to undertake these activities (Kepler et al., 1996; Michigan Department of Natural Resources et al., 2015). While private landowners, the timber industry, states and other partners also pitched in, the bird would likely be extinct today if the Forest Service had not contributed significantly to these efforts. Four decades after being listed, the Kirtland's warbler population had increased by over 1,400% (FWS, undated). In 2019, FWS, which administers the ESA,² removed the warbler from the endangered species list.

Unfortunately, in contrast to the Kirtland's warbler, most listed species, including those that inhabit federal lands and waters (Table 2), have not found their own happy endings. Numerous threats, many compounded by climate change, have contributed to their imperilment and decline. And the lack of resources to ensure their recovery makes their survival more precarious. BLM and the Forest Service simply do not receive sufficient funding to conduct and lead the necessary habitat and species restoration work to make meaningful progress towards species recovery. Bolstering resources for threatened and endangered species conservation



JOEL TRICK/FWS

The Kirtland's warbler is no longer on the brink of extinction thanks largely to actions instituted by the Forest Service after it was listed as endangered in 1973. The warbler was delisted in 2019. Today the agency hosts guided Kirtland's warbler tours for the public on the Huron-Manistee National Forest in Michigan in collaboration with the Michigan Audubon Society.

would help accelerate the recovery of listed species to where they no longer need ESA protection.

Unlike private land, where habitat is under the constant threat of development, federal lands keep large tracts of natural areas intact and open to the public while allowing consumptive and commercial land uses. Between 2001 and 2017, development in the U.S. consumed an area equivalent to over a football field of natural habitat every 30 seconds (Conservation Science Partners, 2019; Lee-Ashley et al., 2019).

Lands managed by the Forest Service and BLM support well-known wildlife like bears, trout and owls as well as lesser-knowns like cacti, tiny fishes, snails and insects. Some animals and plants occur almost exclusively on federal lands and nowhere else.

All these species, whether big or small, are essential elements of our ecosystems. When they are lost or depleted, nature's careful balance is disrupted. For example, sharp declines of wildlife, including invertebrate and plant populations, indicate impacts to air,

¹ In recent decades, most large wildfires have occurred in the western U.S., but the upper Midwest has experienced some of the largest fires on record including the Great Michigan Fire that burned 3 million acres and the Peshtigo Fire that burned 1.2 million in 1871; together, these fires may have killed over 2,000 people and destroyed thousands of buildings (Booz Allen Hamilton, 2015; Brown, 2004).

² Along with the National Marine Fisheries Service (NMFS).

Table 2. Examples of Listed Wildlife with a Substantial Portion of their Range on Federal Lands

Species Name	Federal ESA Status	Percent of Range on Federal Land	Range Area within Federal Land (mi ²)
Black-footed Ferret	Endangered	78	7,553
Jaguar	Endangered	50	10,139
Mexican Wolf	Endangered	74	18,716
Masked Bobwhite Quail	Endangered	72	300
Red Wolf	Endangered	87	16
Sierra Nevada Bighorn Sheep	Endangered	96	3,794
Greenback Cutthroat Trout	Threatened	59	8,563
Gunnison Sage-grouse	Threatened	70	68,0369
Little Kern Golden Trout	Threatened	92	573
Northern Spotted Owl	Threatened	57	41,691
Paiute Cutthroat Trout	Threatened	97	921
Yosemite Toad	Threatened	95	5,150

DATA SOURCES: FWS, 2020; USGS-GAP, 2018B.

water and soil quality with correlations to human well-being (Cole et al., 1998). Diminishing biodiversity can have serious consequences for our health and welfare.

BLM Lands

BLM administers 244 million acres of surface estate (BLM, 2020). Equivalent in size to Nevada, Wyoming, Utah, West Virginia and Florida combined, the surface estate accounts for 10% of the U.S. land base and contains diverse ecosystems from ancient forests in Oregon to expansive shrublands and deserts stretching across the interior West. The 330 threatened and endangered species that occur on BLM-managed lands include the Mexican long-nosed bat and the limestone salamander, which is found along a 10-mile stretch of the Merced River and one nearby site on national forest lands and nowhere else in the world. For up to 17 listed species, 100% of their populations are known to occur on BLM lands, including the Virgin River chub found only in the



BOB WICK/BLM

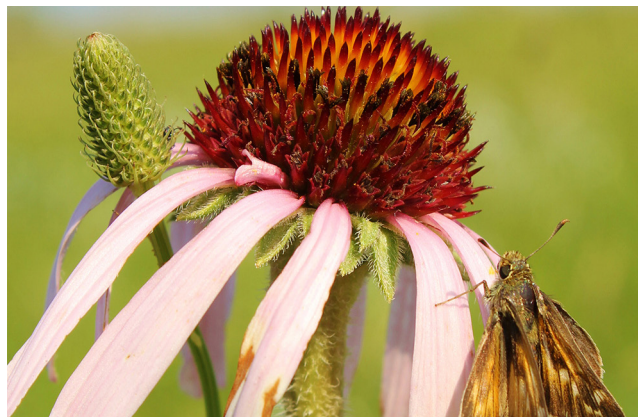
The Red Cliffs Desert Reserve is collaboratively managed by BLM and state and local governments to protect the threatened Mojave Desert tortoise and other at-risk native plants and animals and their habitats.

Virgin and Muddy rivers where Arizona, Nevada and Utah come together; the Bruneau hot springsnail, which depends on geothermal springs in southern Idaho; and the Gierisch’s globemallow, which grows along the Utah and Arizona border. In addition to the 330 listed species, 2,436 sensitive and rare species also occur on BLM-managed lands.

Tackling the Extinction Crisis

Forest Service Lands

The Forest Service oversees a massive variety of habitats in 43 states and territories, across 154 national forests, 20 national grasslands and one national prairie. The Ocala National Forest in Florida, for example, boasts the largest big scrub ecosystem in the world, 600 lakes and the threatened Florida manatee. Buffalo Gap National Grassland in the Great Plains supports the most important recovery site for the endangered black-footed ferret. Midewin National Tallgrass Prairie in Illinois is the smallest Forest Service unit at 18,000 acres but provides a home for three listed species: leafy prairie clover, eastern prairie white fringed orchid and the Indiana bat. The spruce-fir forests of the Northeast and Upper Midwest are inhabited by the threatened Canada lynx. The endangered red-cockaded woodpecker depends on the longleaf pine forests of the Southeast, while the threatened Mexican spotted owl relies on the majestic ponderosa pines of the Southwest. The



DAKOTA SKIPPER | ERIK RUMQUIST/MINNESOTA ZOO

The Dakota skipper (above), a small butterfly federally listed as threatened, depends on healthy native plant communities like those on Dakota Prairie National Grasslands (below), a complex of tallgrass and mixed-grass prairie managed by the Forest Service to protect habitat critical to the butterfly throughout its vulnerable life stages.



DAKOTA PRAIRIE NATIONAL GRASSLANDS | USDA-FOREST SERVICE

threatened marbled murrelet nests in the ancient forests of the Northwest. Along with about 470 ESA-listed species, over 4,000 sensitive species and species of conservation concern occur on lands administered by the Forest Service.

Threatened and Endangered Species on the Landscape

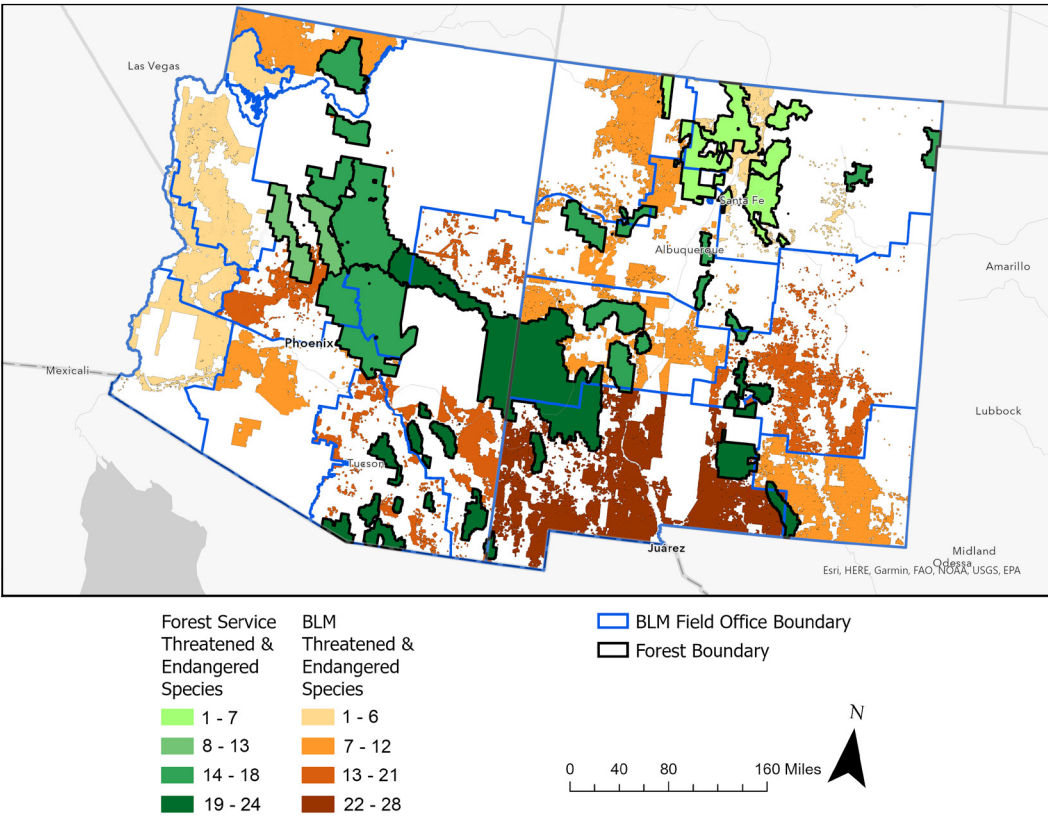
The Forest Service and BLM managers and biologists carry out recovery actions for listed species in the management units that they oversee and frequently work at landscape levels to conserve species that cross state, county and land management jurisdictions. This responsibility can be significant. For example, 43 listed species occur in Nevada and 31 occur in Colorado on BLM lands, while 101 occur on national forests in California.

Using Arizona and New Mexico to illustrate, Figure 2 shows the number of listed species with ranges that overlap the national forests and grasslands and BLM field units (International Union for the Conservation of

Nature, 2021; FWS 2020; U.S. Geological Survey-Gap Analysis Project [USGS-GAP], 2018a,b). The BLM Las Cruces Field Office in the southwestern corner of New Mexico has a high level of species richness; 28 listed species may occupy the area based on range information (BLM, 2016; BLM, undated). The ranges of 24 listed species overlap Coronado National Forest, which has the highest level of listed species richness of lands in the region managed by the Forest Service.

The Southwest is known for imperiled species that occur nowhere else in the U.S. Unique fish species, such as the loach minnow, Gila chub, spikedace and Yaqui catfish, depend on the scarce water sources in this arid region and are threatened by longer, harsher droughts caused by climate change. The desert areas have many unique federally protected plant species including the Lee pincushion, Sneed pincushion and Siler pincushion cacti. A few listed large mammals—the Mexican gray wolf, ocelot, jaguar and Sonoran pronghorn—move between the Southwest and Mexico.

Figure 2. Number of Threatened and Endangered Species with Ranges Across BLM Field Offices and National Forests and Grasslands in Arizona and New Mexico



Tackling the Extinction Crisis

Why Restoring Biodiversity Matters for People, Plants and Animals

Federal lands are increasingly important for maintaining nature and biodiversity and, by extension, our health and well-being.

Human Health

Nothing laid bare the connection between wildlife, the impacts of habitat loss and human health like the COVID-19 pandemic. Habitat loss and fragmentation, pollution, competition with non-native species, climate change impacts and other factors can stress wild animals, leading to disease and the risk of spill-over to humans who encounter them.

In contrast, healthy and diverse wildlife populations with ample room to roam can dilute the effects of Lyme disease, malaria, hantavirus, West Nile virus and other pathogens that affect humans by acting as buffers that can help reduce the chances of transmission (Smiley Evans et al., 2021).

In addition, many pharmaceuticals that we use to stay healthy come from nature. Researchers estimate that three-fourths of all drugs developed since 1981 to combat viral, parasitic and bacterial infections are derived from natural products and species (McNeely, 2021).

For all these reasons, scientists have recommended restoring ecosystems and protecting wildlife and plant habitat to reduce the spread of disease and to prevent depleting the natural sources of medicines that improve and maintain our health (Barbier, 2021; Lawler et al., 2021; Plowright et al., 2021; Reaser et al., 2021).

AMERICANS LOVE WILDLIFE, SUPPORT INVESTING IN CONSERVATION

A 2021 poll, surveying 3,842 voters across eight western states, found that 81% of American voters in the region thought “loss of habitat for fish and wildlife” was a serious to extremely serious concern; the number who thought this was a serious to extremely serious concern grew by 17% between 2011 and 2021. (Over 70% of the lands BLM and the Forest Service manage are in the western U.S.) The same survey found that 91% of those polled believe tax dollars should support land, water and wildlife conservation—98% of Democrats, 90% of Independents and 87% of Republicans (Colorado College, 2021a,b).

Food Security

The U.S. is on the cusp of a food crisis. Pollinator-dependent plants comprise over 75% of our food crops and supply a value of over \$50 billion annually (Reilly et al., 2020). Because of long-term intensive pesticide use on croplands, habitat loss, pollution exposure and disease, our pollinator populations including over 4,000

Human and animal health are inextricably linked with the pathogens they carry and the ecosystems that are shared. The degradation of nature disturbs this delicate balance between microbes, their natural hosts, and environments ...

... Conservation activities, focused on curbing biodiversity loss, such as protection of wild spaces, have the potential to protect human health by both preserving the protective mechanisms that diverse vertebrate populations may have, and providing safe havens for wildlife to flourish separate from humans.

—One Health Institute

(Smiley Evans et al. 2021, p. 72)

native bee species are in a precipitous decline (USGS, undated). Wild bee populations decreased by 23% between 2008 and 2013—just five years (Koh et al., 2016). Some native bumblebee species have declined by up to 96% and have experienced range contraction by up to 87% in as little as two decades in some cases (Cameron et al., 2011). Our federal lands serve as important areas where pollinator habitat can be protected and restored, especially while pollinator conservation strategies are being developed in crop-intensive areas on private land.

Job Creation

Habitat restoration requires an array of skilled professionals—wildlife researchers, environmental planners, heavy equipment operators, biologists, botanists and many others—and drives green job creation.

The Forest Service's Legacy Roads and Trails Remediation Program exemplifies how investment in habitat restoration can provide jobs in communities near federal lands. During its initial 10-year run, the program created or maintained an average of 700 to 1,500 jobs annually by restoring roads, bridges, culverts and trails to improve habitat for threatened and endangered aquatic species, such as salmon and trout, while providing new recreation opportunities and making infrastructure more resilient to flooding (Forest Service, undated; The Wilderness Society, 2011). In another example, researchers found the American Recovery and Reinvestment Act of 2009 created 17 coastal wildlife habitat jobs with each million dollars spent—1,409 jobs total—within its first year and a half (Edwards et al., 2013).

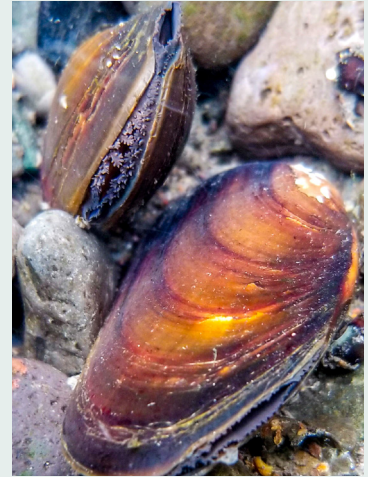
Restoring species benefits local economies in additional ways. For instance, restoring a tidal estuary on the Oregon coast used by endangered salmon raised home prices, reduced water treatment and flood mitigation costs and increased recreational expenditures (Shaw and Dundas, 2021).

MUSSELS: NATURE'S WATER FILTERS

Charisma has little to do with an animal's importance to an ecosystem. Not many people would name freshwater mussels as their favorite critters, but they serve a critical role as nature's water purifiers. Some can filter up to eight gallons a day, removing pollutants and pathogens like *E. coli* (Freshwater Mollusk Conservation Society, undated). Streams without healthy populations of mussels require more treatment by industrial filtration systems to enable human consumption (Vaughn et al., 2015).

Mussel beds also provide other ecosystem services including the delivery of nitrogen and other nutrients that promote the growth of algae, which feeds invertebrates and fish, which in turn feed others up the food chain including people (Vaughn et al., 2015). A range of bird and fish species eat mussels, as do otters and raccoons (Natural Resources Conservation Service, 2007).

Unfortunately, a combination of factors has made freshwater mussels among the most endangered group of animals in the country. Overexploitation by humans (mussels were a billion-dollar industry until a drop-off in the 1920s) including overharvesting for pearls, non-native competitors (especially zebra mussels) and predators, habitat destruction from damming streams, and water temperature changes and drought due to climate change have contributed to their decline. The ecosystems they once supported have collapsed across lakes and stream systems, resulting in declines of other species. Over 300 freshwater mussel species exist in the U.S., but close to 40 are already extinct (eight of them were declared extinct in September 2021), over 70 are listed under the ESA, and around 200 are considered imperiled (Haag and Williams, 2014). At least 62 threatened or endangered mussels have part of their range on federal lands (FWS, 2020).



FRESHWATER MUSSELS | PETER KAUSS/USFWS

Tackling the Extinction Crisis

Threatened and Endangered Species Recovery Laws and Policies

A framework of laws, regulations, policies and recovery plans guide how BLM and the Forest Service contribute to the recovery of threatened and endangered species. This includes the ESA and other laws specific to the agencies that direct them to conserve wildlife, including

AMERICANS SUPPORT THE ESA

As shown in public opinion poll after poll, the ESA has remained wildly popular among both Democrats and Republicans. Close to 80% of Americans support the ESA, including about 90% of those who identify as liberals and 74% of conservatives (Bruskotter et al., 2018).

species listed under the ESA.

FWS and the National Marine Fisheries Service (NMFS) administer the ESA. FWS governs recovery of terrestrial and freshwater species while NMFS governs recovery of marine species (including those like endangered salmon that migrate between inland streams and the ocean). BLM and the Forest Service, as well as all relevant federal agencies, help implement the ESA by undertaking recovery actions to benefit listed species and protecting species and habitat.

FWS and NMFS determine whether to list a species as threatened or endangered. They also designate critical habitat for listed species and, in most cases, are required to develop a recovery plan after they list a species, although not all species have plans. Recovery plans describe management actions necessary for recovering a species and criteria for delisting it. Recovery plans also include estimated costs of recovery and may assign voluntary recovery actions to other federal and state agencies as well as nongovernmental partner organizations.

The ESA requires all federal agencies, including BLM and the Forest Service, to help recover and conserve listed species (Figure 3). Under Section 7(a)(1) of the act,

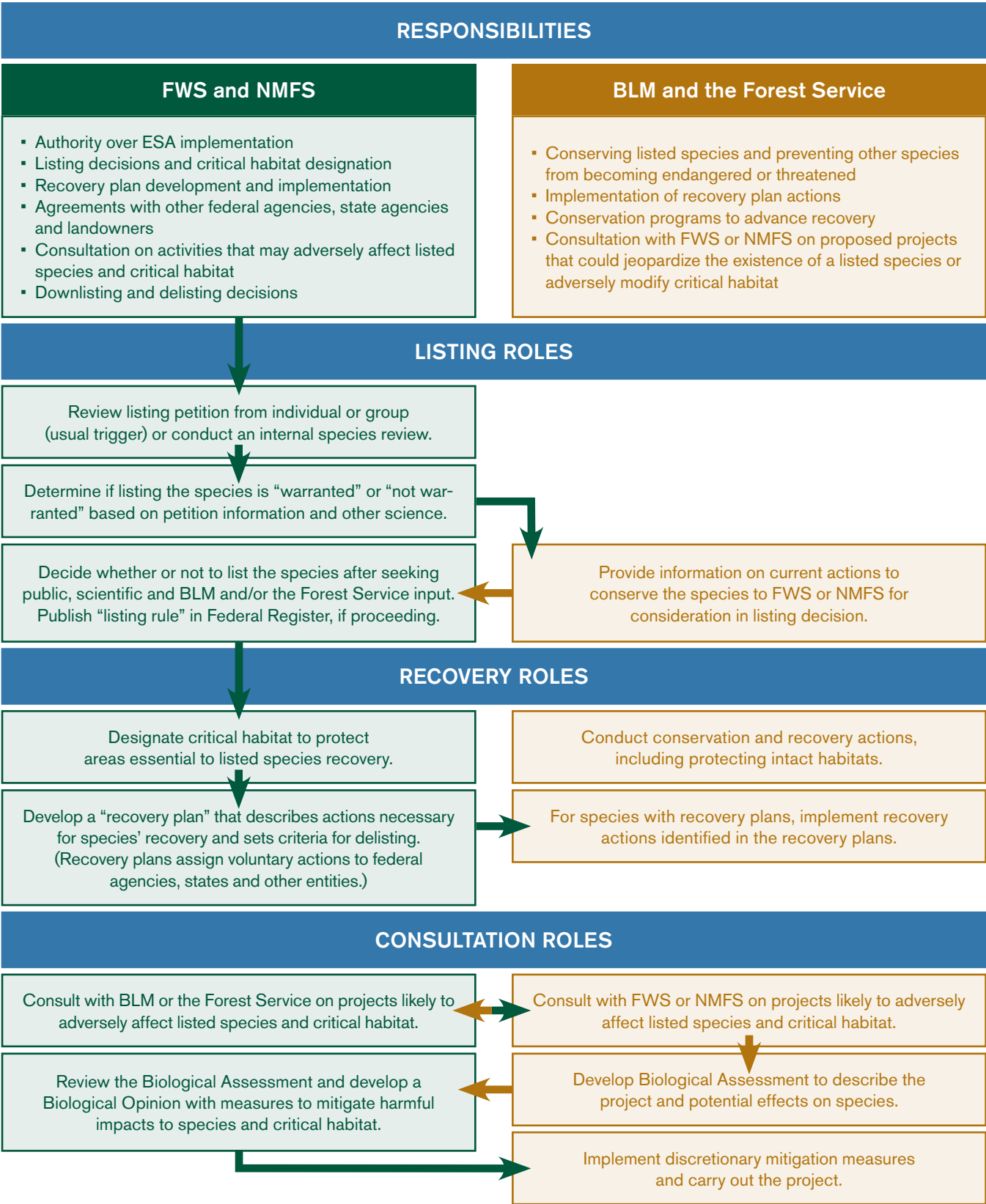
each federal agency must develop conservation programs that advance species recovery (Gerson, 2009). Carrying out the actions recommended in recovery plans can help federal agencies meet their Section 7(a)(1) obligations. Under Section 7(a)(2), agencies must also consult with FWS or NMFS to prevent jeopardizing listed species and their designated critical habitat when planning and executing projects such as timber sales and oil and gas leasing.

BLM and the Forest Service have established agency-specific policies to promote the recovery of listed species. The U.S. Department of the Interior (DOI) and BLM policy directs BLM to recover endangered and threatened species and the ecosystems on which they depend so that listing is no longer required and to implement proactive measures to prevent additional species from becoming endangered or threatened. The National Forest Management Act requires the Forest Service to “provide for the diversity of plant and animal communities,” (16 U.S.C. § 1604(g)(3)(B)) and implementing regulations require that management plans contain provisions that contribute to threatened and endangered species recovery (36 C.F.R. § 219.9(b)(1)).



California's Central Valley spring-run Chinook salmon are listed as threatened under the ESA. The recovery of these fish returning from the ocean to spawn in the rivers where they were born is managed by NMFS.

Figure 3. Responsibilities and Roles of FWS, NMFS, BLM and the Forest Service Under the ESA



Tackling the Extinction Crisis

BLM and Forest Service Recovery Programs and Investments

Although they are required to advance the recovery and conservation of listed species, BLM and the Forest Service receive no direct funding from FWS or NMFS to support fulfilling Section 7 obligations. Increasing investment in threatened and endangered species recovery is likely the most effective tool to delist species (Gerber, 2016).

BLM Threatened and Endangered Species Program

BLM’s real funding for its Threatened and Endangered (T&E) Species Program has, for the most part, been in a steady decline since 2001 (Figure 4). BLM typically receives funding for the T&E Program through a distinct budget line item in Congress’ annual appropriations bills. Although the program received an increase in FY 2022, the funding is still lower in real dollars than the FY 2001 funding level. Between 2001 and 2022, the number of listed species occurring on BLM lands increased. In 1979, there were an estimated 51 listed species under BLM’s jurisdiction (Vernimmen, 1979); in 2022 there are an estimated 330.³

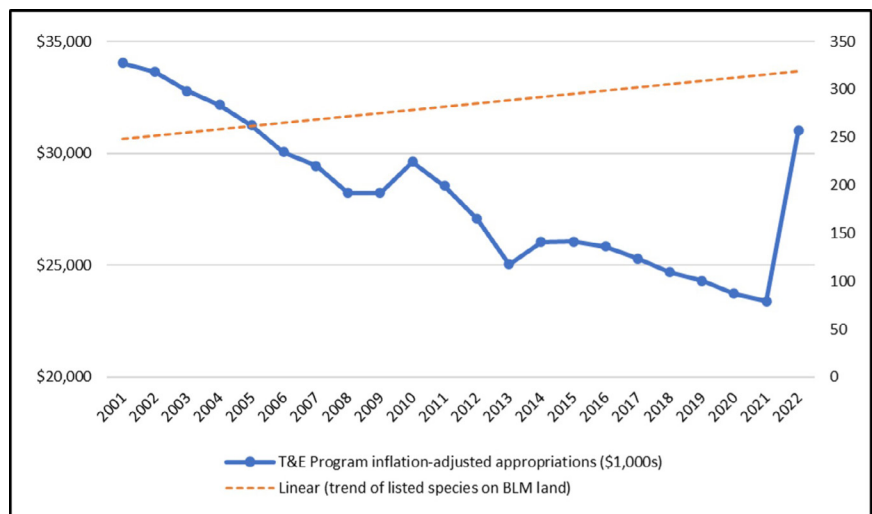
BLM species recovery work is backlogged. In 2020, BLM reported that over 5,000 recovery tasks in approved recovery plans for T&E species fell within the agency’s domain of responsibility (BLM, 2021). In 2009, the agency reported that between 1994 and 2009 it implemented less than



FOREST SERVICE

A Forest Service employee introduces captive-raised mountain yellow-legged frogs to a remote stream in San Bernadino National Forest. The Forest Service receives no direct funding from FWS to carry out management actions essential to the recovery of this endangered species.

Figure 4. Trends 2001-2022: BLM T&E Program Appropriations Compared with Listed Species Occurring on BLM-administered Lands



DATA SOURCE: BLM BUDGET JUSTIFICATIONS.

³ BLM is currently reporting 330 species occurring on BLM-administered lands. This does not include threatened and endangered species that occur on lands with subsurface federal minerals administered by BLM and for which BLM must address in making mineral leasing decisions.

4% of the 1,200 Priority 1 Recovery Tasks identified in FWS recovery plans—the “primary means for delisting species”—and BLM had not even started over 50% of the Priority 1 tasks (BLM, 2010).

The Forest Service Threatened, Endangered and Sensitive Species Program

The Forest Service currently allocates \$0 to threatened and endangered species recovery at a national scale. The agency once had a specific budget line item to fund listed species recovery, but since it eliminated the budget line dedicated to the Threatened, Endangered and Sensitive Species (TES) Program in 2001, funding levels devoted to recovery activities have trended down (Figure 5) and are not coordinated at the national level. Yet, the number of listed species that occur on national forests and grasslands has increased. In 1973, the year the ESA became law, the Forest Service had some level of recovery responsibility for 46 threatened and endangered species; by 2020 that number had jumped to approximately 470.

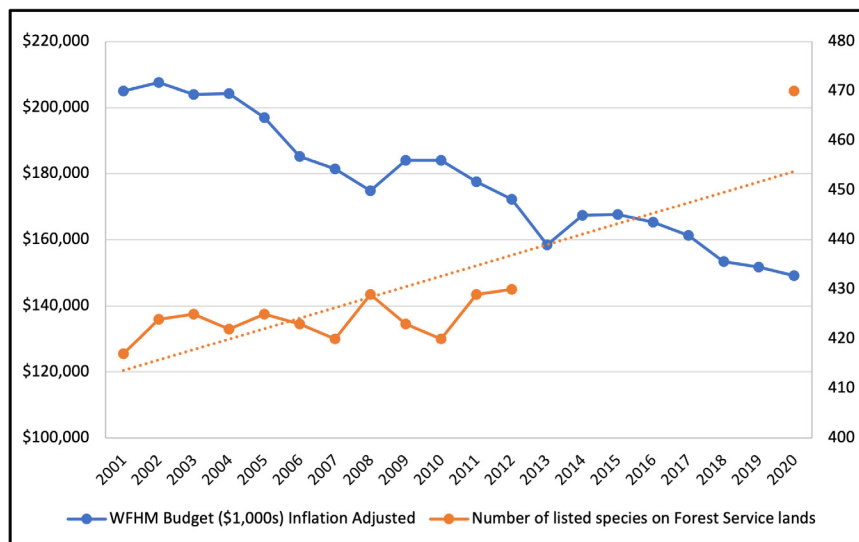
This growing funding gap is reflected in the Forest Service’s work product. For instance, in FY 2020, the Forest Service reported undertaking recovery activities for 114 threatened and endangered species, which is only

ENDANGERED SPECIES PROGRAMS
at the Forest Service received over \$5 million in dedicated funding in 1979—an equivalent of close to \$22 million in 2022 dollars.

Of that allocation, Jerry McIlwain, an endangered species specialist with the U.S. Department of Agriculture at that time, stated, “[t]his sounds like a lot of money, but when you take that much money, allocate it to nine regions, 154 national forest [sic], and umpteen ranger districts, it is not nearly as much as it sounds. In fact, it is not nearly enough to accomplish a proper job” (McIlwain, 1979, pg. 161).

24% of the estimated 470 listed species in the Forest Service’s “recovery portfolio” (Forest Service, personal communication, 2020; Forest Service, 2018).

Figure 5. Trends 2001-2020: Forest Service WFHM Funding Compared with Listed Species Present on Lands Administered by the Forest Service



DATA SOURCES: FOREST SERVICE, BUDGET JUSTIFICATIONS 2001-2021; FOREST SERVICE, 2007; 2008; 2010. (LISTED SPECIES FIGURES UNAVAILABLE FROM 2013 TO 2020.)

The TES Program sits within the broader Wildlife and Fisheries Habitat Management (WFHM) Program. Forest Service records from 1995 to 2001 show that the TES Program budget line averaged about 25% of the WFHM budget. The WFHM Program continues to provide some funds for recovery projects, but its budget has been dropping in real dollars (Figure 5). When funding for the WFHM Program peaked in FY 2002, the budget reached the equivalent of over \$207 million (inflation-adjusted). In FY 2020, that figure dropped to less than \$150 million, a 27% decline. Without the TES budget line, data on the Forest Service’s contribution to recovery activities are not reported annually, making it difficult to discern trends, although we assume a correlated decline.

Tackling the Extinction Crisis

Investment in Recovery Actions

Analysts have determined, based on assessments of recovery plans, that recovering and delisting one species costs an average of \$19 million (Defenders of Wildlife, 2019; Gerber, 2016). BLM and the Forest Service are not responsible for the entirety of the recovery cost of each threatened or endangered species that occurs on the lands that they administer. Species often occur across multiple land ownerships, including state and private lands, and even in other countries, as in the case of migratory birds. For example, a species may depend on federal lands seasonally, for nesting and breeding, but not inhabit the lands for much of the year.

Recovery actions and their costs vary widely. For example, in 2019 and 2020, the Forest Service spent \$120,000 for road decommissioning to improve bull trout habitat in Lolo National Forest in Montana. Prescribed fire projects across tens of thousands of acres on several national forests in Florida cost about \$1 million to benefit listed species including the red-cockaded woodpecker, flatwoods salamander, Florida scrub jay, Lewton's milkwort, sweet-scented pigeonwings, eastern indigo snake and sand skink. The longleaf pine ecosystem evolved with wildfire, and the species dependent on this system require the habitat conditions that fire perpetuates. BLM invested \$340,000 in Oregon's Warner Basin Aquatic Habitat Partnership, which began construction in 2021 for fish passages and habitat improvements for the Warner sucker and other non-listed species such as the Warner



RED COCKADED WOODPECKER | MARK RAMIREZ/FWS

The endangered red-cockaded woodpecker (above) excavates nesting cavities in the large, old trees of long-leaf pine forests, a disappearing ecosystem that evolved with wildfires. The Forest Service now uses frequent prescribed burns (below, left) on several Florida national forests to maintain what remains of this vital habitat.



JOSH O'CONNOR/FWS

Lakes redband trout. During 2020-2021, BLM spent \$50,000 on Colorado hookless cactus recovery activities and \$340,000 for plague mitigation on a black-footed ferret reintroduction site in Wyoming. At the lower end of the cost spectrum, the Forest Service invested \$250 for an Indiana bat nesting and roosting structure in the Cherokee National Forest in Tennessee and \$150 to repair locks for gates meant to keep livestock separated from grizzly bears in the Flathead National Forest in Montana.

Other agencies, nongovernmental organizations and industry partners often contribute funding for recovery work on BLM and Forest Service lands. In FY 2011, for example, the Forest Service allocated \$30.3 million through the WFHM Program, other agencies provided \$12.3 million, and partners such as zoos contributed \$16.1 million to recovery efforts, enabling the restoration of 700,000 acres of terrestrial habitat and 620 stream miles in 2011 (Forest Service, 2012). However, the level of outside funding cannot be guaranteed from year to year.

Table 3. Examples of Forest Service and BLM Recovery Actions and Costs Per Action for One Year

Species Name	Unit Name	Activity and Purpose	Agency 1-Year Outlay
Bull Trout (Mid-Columbia Recovery Units)	Salmon-Challis National Forest	<i>Beaver Reintroduction:</i> “Beavers initiate and maintain critical watershed processes important to water retention, sediment sequestration, cold water storage, and floodplain connectivity. The reestablishment of these processes in the riverscape is critical to the recovery of bull trout and their habitat” (FWS, 2015, pg. C-43).	\$6,420
Dakota Skipper	Dakota Prairie National Grassland	<i>Invasive Plant Eradication:</i> This butterfly relies on “high-quality prairie dominated by native grasses and with a high diversity of native forbs [flowering plants]” (FWS, 2021b, pg. 13) that is largely absent of non-native plant species.	\$17,967
	North Dakota – BLM	<i>Surveys:</i> Future restoration depends on accurate information about population locations and habitat conditions. This project helps support FWS and North Dakota recovery efforts with surveys and DNA collection.	\$250,000
Wood Bison	Alaska – BLM	<i>Species Relocation:</i> Moving wood bison individuals from Canada in preparation for relocation to portions of their historical range in Alaska.	\$340,000
Gila Trout	Coconino, Gila, Coronado, Tonto and Prescott National Forests	<i>Species Reintroduction:</i> “Reintroduction of fish to extirpated habitats and stocking of fish to unoccupied streams will increase the number of Gila trout populations across its range, thus increasing the species’ ability to withstand catastrophic events such as large-scale, high intensity wildfires” (FWS, 2021c, pg. 96) and climate change.	\$50,074
Grizzly Bear	Beaverhead-Deerlodge National Forests	<i>Bear-resistant Containers:</i> Bear-resistant containers reduce bear habituation to human food and reduce conflict with people.	\$2,768
Western Snowy Plover	California – BLM	<i>Dune Restoration:</i> In cooperation with partners, BLM funded dune restoration activities to recover habitat for western snowy plover, with benefits to other species such as the beach layia and Menzie’s wallflower.	\$50,000
Arroyo Toad	Cleveland National Forest	<i>Dam Removal:</i> “...dams and reservoirs, with the associated problems of altered water regimes, sediment trapping, and support of exotic species, probably are the primary cause of the decline and fragmentation of this metapopulation” (FWS, 1999, pg. 17).	\$180,000
Oregon Silverspot Butterfly	Siuslaw National Forest	<i>Meadow Restoration:</i> Wildfire suppression and the loss of other natural disturbances degraded this habitat by enabling trees, brush and non-native plant species to spread. The Forest Service employs hand removal of brush and trees to restore meadow habitat.	\$7,446
Eastern Rattlesnake	Huron-Manistee National Forest	<i>Brush Pile Installation:</i> This activity involves creating woody debris brush piles for habitat enhancement. Pregnant eastern rattlesnakes prefer cover of brush or debris piles to gestate their eggs.	\$5,345

Tackling the Extinction Crisis

Recovery in Action

The following project examples provide a glimpse at how recovery projects can operate on the ground.

Inyo California Towhee: Recovering Thanks to BLM Conservation Actions

FWS listed the Inyo California towhee as threatened in 1987. At that time, the species' population had declined to only 100 to 200 individual birds. Over 25% of the species' range occurs on BLM lands in the Mojave Desert where they depend on riparian habitat fed by springs (FWS, 2020). Dense vegetation helps protect them from predators and provides nesting areas along with shade from the hot desert sun. Before their listing and subsequent recovery, a slew of threats had significantly degraded the Inyo California towhee's habitat. Guided by the species' recovery plan, BLM reduced threats and restored habitat by:

- designating the Great Falls Basin Area of Critical Environmental Concern to protect key riparian areas;
- removing wild horses and burros from towhee habitat;
- fencing off key riparian areas to livestock grazing and off-road vehicle use;
- relinquishing all mining claims and closing the last mine in towhee habitat; and,
- removing non-native tamarisk, a plant that out-competes native plants for water, from several springs.

Due to the success of BLM's actions in recovering the species, FWS has proposed to delist the Inyo California towhee.

The Black-footed Ferret: Back from Presumed Extinction but Challenges Remain

The black-footed ferret was among the first endangered species listed in the U.S. Scientists declared the species to be extinct in 1979, but a Wyoming ranch dog brought a ferret home in 1982. Wildlife officials captured the last remaining 18 animals for a captive breeding program to repopulate public and private lands.

If not for the Buffalo Gap National Grassland in

South Dakota, the black-footed ferret might be extinct. The grassland and Badlands National Park, which share borders, support the Conata Basin black-footed ferret reintroduction site, and the National Park Service (NPS) is a key partner. Surveys conducted in 2021 found that about 35% of the total wild population, approximately 400 ferrets, reside in Conata Basin.

Because ferrets eat prairie dogs almost exclusively and live in their burrows, they require large prairie dog colonies to survive. Both species are susceptible to mass die-offs due to sylvatic plague, which is carried by fleas. The Forest Service and other partners support plague mitigation at Conata Basin, which typically involves dusting prairie dog burrows with insecticide powder and testing other plague prevention measures.

The Forest Service provides about \$80,000 to \$100,000 annually to plague prevention, FWS contributes about \$50,000, and partners—including Defenders of Wildlife—typically add to that total. The Forest Service provides field support and equipment to help with ferret research and surveys in collaboration with NPS, FWS, USGS, Prairie Wildlife Research, Defenders of Wildlife and others.



KIMBERLY FRASER/USFWS

Once thought to be extinct, the black-footed ferret was saved by a captive breeding program, reintroduction in Buffalo Gap National Grasslands, and a strong partnership between the Forest Service, which manages the grasslands, and the National Park Service, which administers the adjacent Badlands National Park.

The Forest Service also works to keep prairie dog colonies from expanding into neighboring private ranches to avoid conflicts. Because Buffalo Gap National Grassland is integral to black-footed ferret recovery, Forest Service funding for recovery actions remains essential.

**Borax Lake Chub:
Beneficiary of BLM's
Endangered Species Investment**

Borax Lake is one of the most unusual fish habitats in the U.S. Perched 30 feet above large sodium-borate deposits and fed from geothermal springs, this natural lake provides a unique ecological niche for the Borax Lake chub, a small minnow endemic to the lake and its marshy outflows. About 80% of the chub's range occurs on BLM-administered land (FWS, 2020).



RICK SWARTZ/OREGON DEPARTMENT OF WILDLIFE AND FISHERIES

The Borax Lake chub is an endangered species success story, delisted thanks to BLM's efforts to protect its unique habitat—a single geothermal-spring-fed lake in Oregon (below).



BORAX LAKE | GEORGE OSTERTAG/ALAMY STOCK PHOTO

Tackling the Extinction Crisis



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Dr. Aaron Hall, Defenders of Wildlife’s senior aquatic ecologist, releases hatchery-raised greenback cutthroat trout in one of the designated release sites in the Arapaho and Roosevelt national forests, part of a recovery effort led by the Forest Service to restore this threatened native trout and state fish of Colorado.

Since being listed as endangered in 1980, BLM, The Nature Conservancy, Oregon Department of Wildlife and Fisheries and others have partnered to recover the species. BLM and partners protected the chub’s habitat by prohibiting geothermal and other mineral development, fencing it off from grazing and unauthorized off-road vehicle use and purchasing land inholdings (Tripp, 2013). In 1983, BLM designated an Area of Critical Environmental Concern of 520 acres to protect lands around the lake. Success came in 2020, when FWS removed the Borax Lake chub from the endangered species list.

Greenback Cutthroat Trout: Forest Service and Partners Help Rescue Colorado’s State Fish

Colorado almost lost its state fish, the greenback cutthroat trout, due to threats such as logging, mining, damming rivers and competition with non-native fish like rainbow trout. The Forest Service and partners including Colorado Parks and Wildlife, FWS and Trout Unlimited are working to recover this federally threatened species. Over the past decade, the Forest

Service and collaborators have reintroduced “greenbacks” to their native habitat in the Colorado mountains.

In July 2019, 50 agency staff and more than 100 volunteers, including Defenders of Wildlife staff, stocked 1,500 greenbacks from an FWS hatchery by carrying them in backpacks to release sites in the Arapaho and Roosevelt national forests (Trout Unlimited, 2019). Two years later, 6,000 more greenbacks found a new home in these national forests.

While the Forest Service is the lead agency responsible for implementing the project, the restoration efforts are funded primarily through a \$1.25 million trust established by the Water Supply and Storage Company, which operates a large reservoir that is part of the recovery effort (Trout Unlimited, undated). The Forest Service contributed about \$241,500 in 2019-2020 to recovery actions such as constructing barriers to protect the native greenbacks from introduced non-native fish and decommissioning a trail to prevent off-road vehicles from damaging an important stream. With more funding and other resources, the greenback cutthroat trout could be swimming downstream toward recovery and off the threatened species list.

Recommendations

Addressing biodiversity loss and preserving the ecosystems and species on which we depend is one of the most important and significant challenges of our time. Biodiversity loss can feel like an overwhelming problem. In September 2021, DOI announced that FWS had proposed 23 species for delisting due to their extinction rather than recovery (DOI, 2021). We see and experience the cumulative effect of choices made over the last few centuries that brought us here. The good news is that action taken now can help prevent future extinctions and safeguard vulnerable wild animals and plants in our trust.

As the stories above show, success is possible. As of spring 2022, FWS and NMFS have delisted about 55 formerly threatened and endangered species due to their recovery (FWS, 2022). Some species that still require ESA protection perch on the brink of recovery and delisting. Victories require different conservation and habitat restoration actions, as well as a diverse array of partnerships and varied government collaboratives, but they all have one element in common: monetary investment at the federal level. That investment can take many forms—species surveys and habitat condition assessments, planning and executing restoration projects, purchasing equipment, modifying infrastructure, paying contractors, monitoring—all of it fueling local economies and creating jobs. To assure meaningful progress toward recovering listed species, we recommend the following course of action:

1. Fund BLM and the Forest Service at a level that ensures the agencies can fully carry out their statutory obligations to help recover threatened and endangered species.
2. Establish and maintain budget lines for the BLM and Forest Service threatened and endangered species programs.
3. Strengthen reporting mechanisms to demonstrate the connection between investment and recovery outcomes.

While we cannot bring back the passenger pigeon or the Carolina parakeet and other extinct species, we have

the power to save the endangered species that remain and restore the biodiversity fundamental to our own well-being. BLM and the Forest Service are essential to combating the extinction crisis and recovering the animals and plants that inhabit the lands they manage. Enabling these agencies to succeed at this important, and legally required, role necessitates significant investment. Ramping up appropriations for threatened and endangered species is an achievable action to protect America's natural heritage.



DANIELA ROTH/FWS

The Siler pincushion cactus was downlisted from endangered to threatened as a result of recovery actions carried out by BLM. Management efforts to fully recover this rare plant found primarily on BLM lands in southwestern Utah and northwestern Arizona continue.

Tackling the Extinction Crisis

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Tackling the Extinction Crisis

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