



Wildlife Under Pressure

The Dire Need to Combat Habitat Loss



On the Front Line of Wildlife Decline

The modern conservation movement was born out of the hard work and leadership of sportsmen and women who continue to help fund, conserve, manage, and restore natural areas and game populations nationwide.

During the 1800s, the U.S. nearly lost familiar species like mule deer, white-tailed deer, black bear, elk, pronghorn, and wild turkeys to unregulated hunting and market hunting. As populations rapidly declined, hunters led the way to their recovery by supporting ethical, regulated hunting practices. They successfully advocated for a self-imposed excise tax on firearms and ammunition that would return revenue to states for wildlife conservation. Just last year, hunters, anglers and recreational shooters contributed around \$2 billion to conservation through the Pittman-Robertson, Dingell-Johnson, and Federal Duck Stamp programs, and through the purchase of hunting and fishing licenses.

But this success is at risk now due to a larger trend: development-driven habitat loss, including transportation and energy development, conversion to agriculture, and urban sprawl. It's time for hunters and anglers to lead again so these same wildlife species do not suffer again.

America is losing nature at an unprecedented rate. **According to a new analysis from the National Wildlife Federation and Conservation Science Partners, game species lost, on average, 6.5 million acres of vital habitat over the last two decades.** This loss varies by species with some iconic species well exceeding the average. Mule deer, for example, lost over 7.3 million acres of



PHOTO: AARON KINDLE, NWF

It's time for hunters and anglers to lead again so these same wildlife species do not suffer again.

their range, while wild turkey lost over 18.8 million acres.

Stressors like energy development and suburban sprawl are exacerbating the broader loss of wildlife and biodiversity, which jeopardizes the survival of sporting traditions, outdoor recreation-based economies, and the rural communities that depend on them.

In response to this crisis, a wide array of scientists have recommended that we [conserve 30% of all lands and waters by 2030](#). This “30x30” target is [publicly popular](#) and relies on locally led, voluntary conservation measures. Most crucial to its success, however, is the acknowledgement that hunters and anglers are not only victims of nature loss, but also an integral part of the solution as highly [effective](#) conservationists. A 30x30 goal that honors the contributions, traditions, and access requirements of hunters can be successful in achieving genuine conservation outcomes.

The National Wildlife Federation and other groups in [HuntFish30x30](#)—a coalition of hunting, angling and fishing organizations and allies—



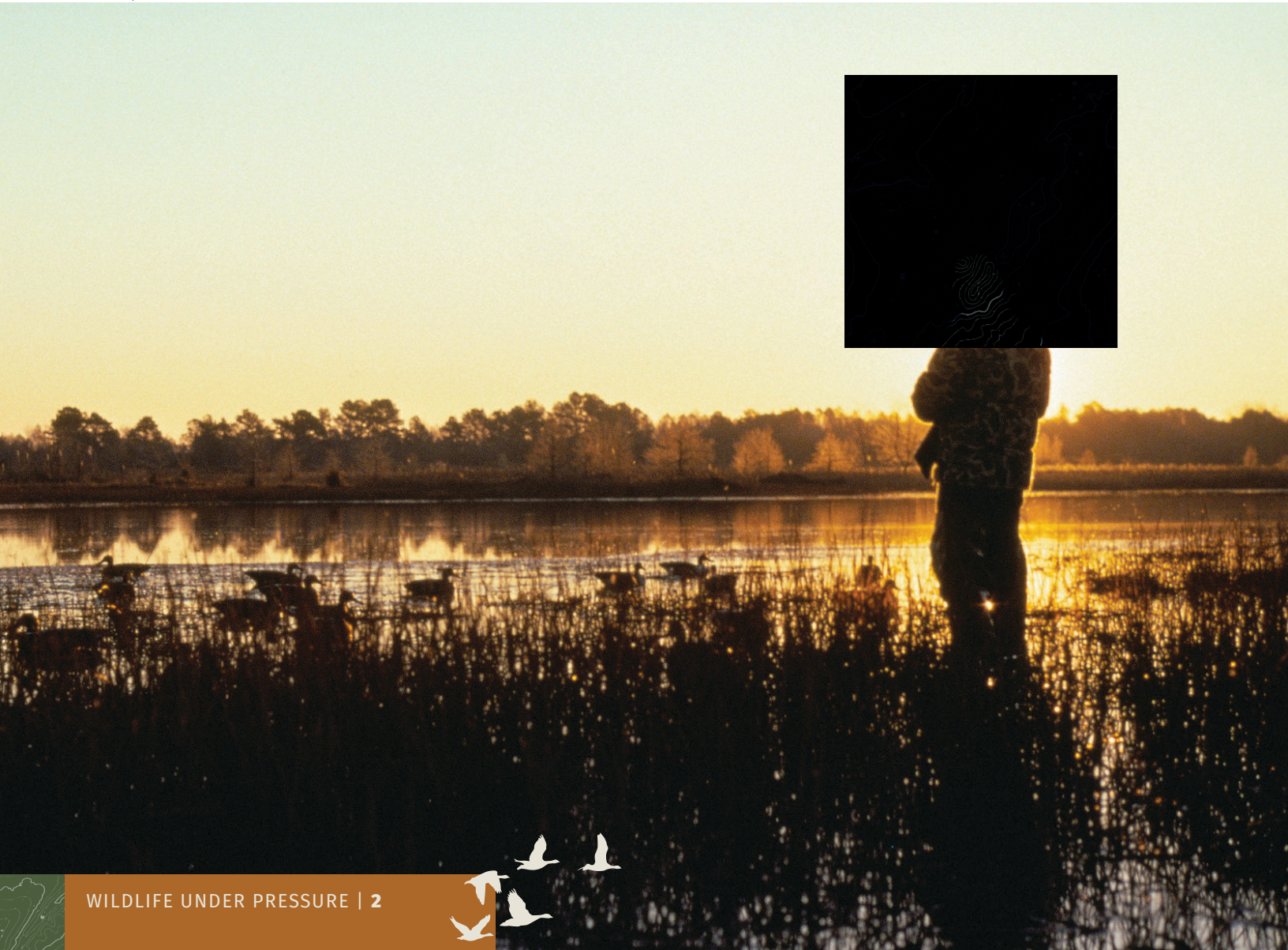
have voiced support for 30x30 as a practical vision to conserve and restore wildlife habitat, increase opportunities, and ensure access to hunting and angling for all Americans. Most recently, the federal government has endorsed 30x30 in its [“America The Beautiful”](#) initiative with an explicit recognition of the role of hunters and anglers in its success. In keeping with this mission, for example, the Interior Department recently opened access to additional hunting and fishing on 2.1 million acres of National Wildlife Refuge lands in the [largest expansion](#) of outdoor recreation opportunities in years and [re-engaged](#) the Hunting and Wildlife Conservation advisory council.

Hunters and anglers are seeing wildlife decline from the front lines. We’re on the river every

summer observing the health and function of our cold water fisheries. We see that mule deer herds are smaller today than they were on hunts with our grandpa decades ago.

To that end, NWF worked with Conservation Science Partners to quantify our own observations and the anecdotes we read on message boards. We wanted to understand how the ranges of iconic and sought-after wildlife have changed in the past few decades. Our findings can inform the bottom-up, stakeholder-centric decision-making process at the heart of the America the Beautiful initiative. This report explores current trends in habitat loss for big game and game birds, its impact on hunters on the ground, and the policies needed to safeguard the future of hunting in America.

PHOTO: PAT HAGAN, USFWS



The State of Game Habitat

Loss of natural lands in the U.S. has vast implications on the quality and availability of habitat for various game species across the country. To assess the effect that nature loss is having on game species, a new analysis from NWF and CSP quantified the loss of natural area in species ranges to transportation and energy development, agricultural use, and urbanization from 2001 to 2017. Specifically, the study looked at eight of the most popular big game mammals—including mule deer, pronghorn, and elk—and 18 species of game birds—such as wild turkey, quail, and several species of waterfowl—using range data from federal, state, and online databases. (See the appendix for details on CSP's analysis.)

The findings were inauspicious. Over the last two decades, bird and mammal game species lost, on average, 6.5 million acres of natural area within their geographic ranges to human development—an area larger than the state of New Jersey. Put another way, game species have lost a football field worth of their range nearly every two and a half minutes.

This loss varied by species type. Game birds, which generally had the most extensive ranges, experienced the greatest losses of more than 9 million acres on average. Big game mammals alone lost more than 3 million acres of habitat in the last two decades.

FRAGMENTATION

From an ecological standpoint, many game animals rely on large, connected landscapes for their survival. But the growing extent of fragmentation of America's natural areas—caused by an increasingly dense web of roads, energy development, housing sprawl, and other built infrastructure—is extremely detrimental. Fragmentation of big game and bird game species'

ranges has become so severe that on average, those species are just over two miles in any direction from habitat-disrupting development.

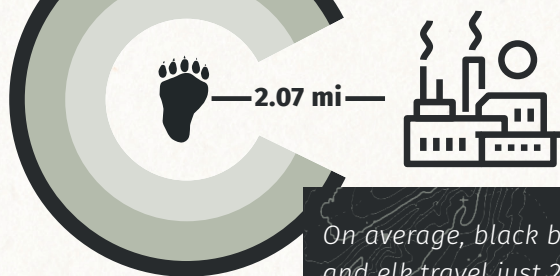
We see this on the ground throughout the West, whether it's oil and gas leasing on the border of Colorado's Arapaho National Wildlife Refuge, urban sprawl in Salt Lake City, Utah threatening elk and mule deer winter range, or natural gas development near Pinedale, Wyoming altering pronghorn and mule deer migration routes. Connectivity is essential for game species.

According to our analysis, big game species setting out from a random point within relatively undeveloped portions of their range would, on average, travel less than three miles before reaching an area with significant levels of modification. These limits are most severe for black bears and elk.

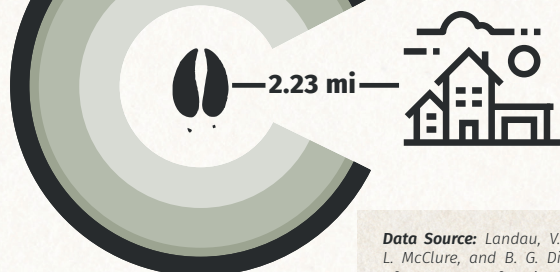
RANGE FRAGMENTATION

SPECIES TYPE	AVERAGE DISTANCE TO DEVELOPMENT
Mammals	2.79 miles
Birds	1.65 miles

Black Bear



Elk



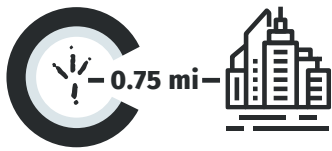
On average, black bear and elk travel just 2.07 and 2.23 miles, respectively, before reaching significant development.

Data Source: Landau, V. A., R. N. George, M. L. McClure, and B. G. Dickson. 2021. *Analysis of Nature Loss for Big Game and Fish in the Conterminous United States*. Technical Report. Conservation Science Partners, Truckee, CA.

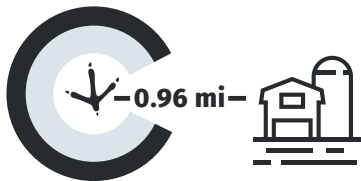


Game birds experienced even higher levels of range fragmentation than big game species.

Species like the greater prairie chicken, northern pintail, and blue-winged teal only need to travel an average of just over 1.5 miles before encountering an area lacking connectivity. For birds, fragmentation was found to be most severe for the northern bobwhite who are, on average, under three quarters of a mile from significant levels of developed habitat.



Northern Bobwhite



Greater Prairie-Chicken

PROTECTED STATUS AND LAND OWNERSHIP

Unsurprisingly, protected lands like national parks, national monuments, wildlife refuges, state conservation areas, and private lands with conservation easements saw the least amount of habitat loss over the past two decades—with just 1 acre of every 195 lost.

In comparison, unprotected private lands were most at risk of development with an average of 1 acre lost for every 87 acres of range—more than twice as much as protected lands.

These differences were particularly acute for big game, whose ranges on protected lands in particular saw very low levels of development, while being subject to the highest rates of loss on unprotected lands. On average, a big game species on unprotected land is expected to lose nearly 4.5 times more habitat than its counterpart on protected land. Even on under-protected lands like national forests with unsustainable logging or multiple-use lands with irresponsible energy development, big game would lose twice as much habitat as on protected lands.



PHOTO: AARON KINDLE, NWF

HABITAT LOSS BY LAND STATUS

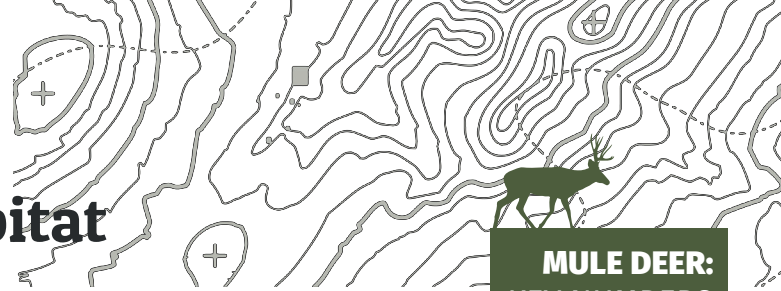
PROTECTED STATUS*	SPECIES TYPE	ONE IN EVERY X ACRES LOST
Protected lands	Mammals	329
	Birds	154
	Fish (Native)	224
	Fish (Non-native)	154
	All	195
Under-protected lands	Mammals	174
	Birds	117
	Fish (Native)	182
	Fish (Non-native)	171
	All	156
Unprotected lands	Mammals	74
	Birds	76
	Fish (Native)	123
	Fish (Non-native)	88
	All	87

* Protected status corresponds to the U.S. Geological Survey's Protected Areas Database of the United States. For definitions of protected, under-protected, and unprotected, please see the appendix.

Data Source: Landau, V. A., R. N. George, M. L. McClure, and B. G. Dickson. 2021. *Analysis of Nature Loss for Big Game and Fish in the Conterminous United States. Technical Report.* Conservation Science Partners, Truckee, CA.



The Direct Effect of Habitat Loss on Hunting



MULE DEER: KEY NUMBERS

RANGE LOST (acres)	1 IN EVERY X ACRES LOST	AVERAGE DISTANCE TO DEVELOPMENT (mi)
7,392,886	106	2.34

STATES WITH THE HIGHEST RATE OF HABITAT LOSS		
North Dakota	Oklahoma	Kansas
1 in every 10 acres lost	1 in every 26 acres lost	1 in every 52 acres lost

These findings at a large scale are disturbing. But how are they playing out on the ground and how has this range loss affected the species themselves, and the hunters and anglers that rely on healthy populations?

For several species, habitat loss is a primary stressor driving decline, and can exacerbate other stressors like disease, predation, and climate impacts. Below, we explore a number of specific examples where this habitat loss has had an acute impact on the sporting tradition.

BIG GAME

One of the most dramatic examples of the disastrous consequences of habitat loss is the decline in [mule deer](#) populations across the West. NWF’s analysis found that mule deer have lost over 7 million acres of habitat in the last two decades—more than any other big game species. This has contributed to population declines in Colorado, Wyoming, and other Western states in which mule deer are popular among hunters.

In western Colorado, for example, the state wildlife agency [reported](#) in 2020 that “mule deer populations face more threats than ever” and named “loss of habitat from development” and “highways bisecting migration routes” among the leading factors in mule deer decline. Between 2006 and 2018, the state’s mule deer population fell by a third, and half of all herds were below their population objectives. The state has been issuing fewer mule deer licenses—which are yet to return to pre-2007 levels—even as applications have risen, leaving more and more hunters unable to hunt one of the West’s signature big game species. Sportsmen and women are bearing the consequence of [unsustainable residential area planning and irresponsible oil and gas development](#).

Nowhere provides a starker case study than the area of northwestern Colorado, once dubbed

the “[mule deer factory](#)” for the strength of its White River herd. Between 2005 and 2012, oil and gas development in the region skyrocketed, with almost 10,000 new wells drilled across mule deer habitat. The resulting fragmentation contributed to a population collapse that significantly limited hunter opportunity. By 2012, the state was issuing 83% fewer licenses for the White River herd than in 2005.

While the analysis found mule deer to have lost the most acres of habitat, moose have lost the greatest proportion of habitat. Over the last two decades, moose lost one of every 93 acres of habitat within its range—more than any big game species besides the javelina.

This tracks with the [decline in](#)



MOOSE: KEY NUMBERS

RANGE LOST (acres)	1 IN EVERY X ACRES LOST	AVERAGE DISTANCE TO DEVELOPMENT (mi)
2,258,520	93	2.41

STATES WITH THE HIGHEST RATE OF HABITAT LOSS		
North Dakota	South Dakota	Utah
1 in every 15 acres lost	1 in every 52 acres lost	1 in every 132 acres lost



PHOTO: BRANDON JONES, USFWS



[moose populations](#) across its range, and the resulting reduction in hunting opportunities. In Utah, for example, moose populations fell from 4,000 in 2005 to 2,650 in 2017. In Idaho, hunters saw available moose tags decrease by 8% from the 2015-2016 season to 2017-2018, and a further 22% to 2019-2020.

Hunters have been proactive in reducing harvest to conserve moose, but evidence from states like Vermont suggests that a reduction in hunting licenses alone [cannot reverse the decline](#). Biologists name [habitat loss, degradation and fragmentation](#) as contributors to the decline. Other factors like disease, interspecies competition, and predation are also affecting both moose and mule deer, but these stressors are exacerbated by the loss of quality habitat.

GAME BIRDS

Game birds, and waterfowl in particular, have suffered significant habitat loss throughout the central U.S. The blue-winged teal and northern

pintail have lost, on average, 1 in every 66 and 1 in every 68 acres of habitat within their range, respectively—the worst decline of any game bird this analysis considered. Waterfowl [nest](#) in grasslands next to wetlands or ponds. When wetlands are drained for agriculture and grasslands are fragmented to make way for human activities, birds are forced to breed in smaller tracts where they make easier prey for predators.

In North Dakota, where this analysis shows significant habitat loss, the Game and Fish Department has [raised concerns](#) about the impact of habitat loss on waterfowl production. They point to [drought](#) and [cropland conversion](#) as contributors to the decline. As fewer agricultural lands in the state are enrolled in the Conservation Reserve Program—which compensates farmers and ranchers who set aside land for habitat conservation—more grasslands are being lost by conversion to plowed crops.



BLUE-WINGED TEAL: KEY NUMBERS

RANGE LOST (acres)	1 IN EVERY X ACRES LOST	AVERAGE DISTANCE TO DEVELOPMENT (mi)
15,433,280	66	1.26

STATES WITH THE HIGHEST RATE OF HABITAT LOSS

North Dakota	Oklahoma	Utah
1 in every 19 acres lost	1 in every 32 acres lost	1 in every 47 acres lost

PHOTO: MANDELA VAN EEDEN, NWF



“If we’re still attracting large numbers of birds, production can’t be as good as it has been because the nesting cover just isn’t there,” [said](#) Mike Johnson, migratory game bird management supervisor for the North Dakota Game and Fish Department. “It’s only going to get worse as far as we can tell.”

North Dakota is home to the [longest running annual survey of breeding waterfowl](#) in the nation, now in its 74th year. According to the 2021 survey results, breeding pintail ducks in the state [declined by 68%](#) in a year, a big drop after drought conditions dried up all but [15 of the state’s 3,000 small wetlands](#) surveyed. When it comes to ducks, healthy wetlands and good habitat is key to a stable population.

Even the wild turkey—long considered a success story after nationwide conservation efforts restored populations to [nearly 7 million birds](#) from fewer than 30,000 in the 1930s—is affected by declines in habitat quality and quantity. In the Southeast, one of the [fastest growing](#) regions in the country, there are signs of trouble for the wild turkey.

In Arkansas, wild turkey populations have [shrunk by as much as 65% since 2003](#), driven in part by habitat loss; the state has lost 1 in every 53 acres of turkey habitat since 2001. For hunters, this means fewer opportunities to harvest a turkey. Since its peak in 2003, adult gobbler harvest in Arkansas has [declined by 47%](#). In Mississippi, wildlife managers estimate there were around [410,000 turkeys](#) in the late 1980s. Today, there are an estimated [225,000 turkeys](#), a decline of over 45%. Over the last two decades, 1 in every 98 acres of habitat in the state have been lost, and hunters are feeling the impacts. In 2020, hunter success in Mississippi was at the [second lowest](#) recorded in the history of the state’s Spring Gobbler Hunting Survey. And in South Carolina, where 1 in every 116 acres have been lost, turkey harvest has [dropped by over 40%](#) since an all-time high in 2002 when the Department of Natural Resources estimated

there were [176,000 turkeys](#) in the state. Today, that estimate has dropped to 100,000.

Across the country, the wild turkey has lost over 18.8 million acres of habitat within its range—more than any other bird species besides the mourning dove. Despite these declines, the recovery and restoration of wild turkey habitat is a model for wildlife conservation efforts nationwide. “This was a monumental, continent-wide effort. There aren’t many stories as inspiring,” [said](#) Tom Hughes of the National Wild Turkey Federation. No one wants to see the wild turkey’s progress regress. Researchers are working to better understand the interplay of habitat loss, predation, disease, climate change, and hunting pressure to stabilize and maintain healthy turkey populations for the next generation of hunters and wildlife enthusiasts.



WILD TURKEY: KEY NUMBERS

RANGE LOST (acres)	1 IN EVERY X ACRES LOST	AVERAGE DISTANCE TO DEVELOPMENT (mi)
18,842,000	81	1.60

STATES WITH THE HIGHEST RATE OF HABITAT LOSS

North Dakota	Oklahoma	Pennsylvania
1 in every 19 acres lost	1 in every 33 acres lost	1 in every 41 acres lost



PHOTO: LAURA MENDENHALL



Freshwater Habitat Loss

While this analysis focuses on the effect of habitat loss on terrestrial game and fowl, freshwater fish that matter to anglers are also facing habitat destruction. The factors that affect fish populations are complex due to the reliance of many species on specific water conditions to migrate and breed. **Dams**, **wildfires**, competition from non-native species, and **rising temperatures**—in addition to degradation of the lands surrounding rivers, lakes, and other waterways—are all taking a toll on America’s trout, salmon, catfish, bass, pike, and other iconic species. This includes small temperature changes that wreak havoc on metabolic and reproductive rates, to the gill damage and migration route blockage from ash and excess sediment flow. Several states have resorted to fishing bans in order to let populations recover from the impact of the recent rise in destructive fires.

30x30 must include the protection and restoration of freshwater habitats. Angler’s groups are **already engaged in dam removal** and habitat restoration around valuable rivers. This kind of work must continue in tandem with strategies to better manage fires and conserve terrestrial habitat adjacent to freshwater bodies. For example, healthy forests, grasslands, and swamps can cool down the local environment, provide shade, prevent excessive flooding and runoff, and manage nutrients to the benefit of fish stocks. By combining a vision for land and freshwater conservation, the America the Beautiful initiative is continuing the sportsmen’s tradition of honoring the connectedness of these landscapes, and managing them for mutual restoration.



PHOTO: AARON KINDLE, NWF



Policy Solutions

By conserving, connecting, and restoring 30% of our lands and water by 2030 we can slow the loss of habitat, provide important game and fish species with the room to

stabilize and recover, and meet the needs of the sporting community today and in the future. Here are some areas where we should focus our efforts.

Supporting the conservation efforts of private landowners working to steward wildlife habitat on their lands

Between 2001 and 2017, [45,000 square miles](#) of farms, ranches, and private working forests were lost to urban sprawl, energy development, and other industrial uses. Over the last two decades, habitat loss on unconserved private lands was twice that of habitat loss on conserved lands. The risk of development is particularly acute on unconserved private lands. It is therefore vital to make conservation economically worthwhile to farmers and ranchers. Investing in conservation, restoration, and resilience on working lands is important not only for creating and maintaining habitat for wildlife, but also for revitalizing rural communities and helping farmers and ranchers sustain their livelihoods.

The federal government should expand and accelerate our national conservation easement programs by increasing financial incentives for landowners and providing conservation technical assistance and support for new and disadvantaged farmers and ranchers.

OPPORTUNITIES FOR ACTION:

- Invest in climate-smart farming by improving the climate benefits of existing private land conservation programs, like the Environmental Quality Incentives Program, Regional Conservation Partnership Program, and the Conservation Stewardship Program.
- Increase funding for the U.S. Department of Agriculture’s Conservation Technical Assistance Program, which provides landowners with the tools and site-specific solutions to implement conservation practices on the ground.
- Pass the North American Grasslands Conservation Act in Congress to kickstart the conservation and restoration of our grasslands—and to support the wildlife and livelihoods that rely on them. Like the highly successful North American Wetlands Conservation Act (NAWCA), which has been credited with spurring a huge recovery of migratory waterfowl and other wetlands dependent species, this concept would provide funding and other incentives to recover grasslands.



Investing in restoring our natural systems and reclaiming degraded lands

The U.S. must do more to restore the natural systems upon which all life—human life and wildlife—depend. A changing climate and more than a century of fire suppression have left [between 65 and 82 million acres](#) of our national forests in need of restoration. Across the nation’s public lands, hundreds of thousands of abandoned [oil and gas wells](#) and [hardrock mines](#) degrade habitat and pose a risk to human and wildlife health. [More than half](#) of all wetlands, which are rich feeding and breeding grounds for a wide array of [game species](#), have been drained and converted to other uses.

It is imperative that the federal government invests in the restoration of our nation’s natural infrastructure to improve the caliber and quantity of wildlife habitat. And by working to restore degraded lands close-to-home, we can expand access to quality hunting and fishing opportunities.

OPPORTUNITIES FOR ACTION:

- Put people to work in energy-producing states by plugging [orphaned oil and gas wells](#) and reclaiming [abandoned hardrock mines](#). Cleaning up the hundreds of thousands of unattended wells and mines will safeguard groundwater, restore habitat connectivity, and reduce invasive species.
- Pass the Recovering America’s Wildlife Act to provide states, territories, and Tribes with \$1.39 billion annually to catalyze proactive, on-the-ground, collaborative efforts to restore essential habitat and implement key conservation strategies.
- Fund existing ecological restoration plans—at the federal, regional, state, and watershed scale—to make our communities safer and more resilient to climate change. These plans are usually developed with extensive public input and represent strategic opportunities to restore nature in the near term. seasons, access forage, return to or locate new breeding grounds, and adapt to increasing pressures from climate change and human development.



PHOTO: PATRICK SIEVERT, USFWS





Maintaining wildlife movements on public, private, and Tribal land

Habitat fragmentation has become so severe that on average, big game and bird species are just over two miles in any direction from an increasingly dense web of human-made barriers. Robust wildlife populations require safe movement and migration corridors to shelter from the seasons, access forage, return to or locate new breeding grounds, and adapt to increasing pressures from climate change and human development.

Because wildlife do not recognize jurisdictional barriers, keeping habitat connected will require working collaboratively across state and federal agencies, Tribes, landowners, universities, and conservation organizations. Together, we must invest in smart, on-the-ground solutions that support wildlife and people, including: removing or modifying fences that impede wildlife movement, building safe wildlife crossings along transportation corridors, and identifying opportunities to connect protected landscapes, like national wildlife refuges and national parks.

OPPORTUNITIES FOR ACTION:

- Thoroughly map wildlife corridors and expand interagency strategies to conserve connectivity and maintain wildlife corridors on federal public lands.
- Pass the [Wildlife Corridors Conservation Act](#), or parts of it, to maintain wildlife movements across land ownerships. The Act would establish a grants program for private and other non-federal land managers, a program to keep habitat connected on federal lands, and a supportive database.
- Pass the [Tribal Wildlife Corridors Act](#) in Congress to fund critical wildlife migration pathways on Tribal lands, ensuring Tribes have resources to implement conservation measures that protect fish and wildlife and boost biodiversity.
- Engage in implementing the comprehensive new nationwide wildlife crossing program.



Carrying out climate-smart conservation by conserving large, intact ecosystems

How should we prepare for and respond to the [impacts of climate change on wildlife](#) and their habitat? To ensure that fish and game can survive climatic shifts, we need to make conservation “[climate-smart](#).” Many of our existing protected areas are too small or isolated to accommodate shifts in species’ ranges as wildlife adapts to changing climate conditions. Protective designations like national monuments and national wildlife refuges are one tool to expand the geographic scope of conservation efforts and restore and protect large, intact ecosystems, which can also be used to preserve sporting opportunities.

To help communities and land managers make informed decisions, scientists are developing a deep well of research on how to make on-the-ground conservation efforts resilient to the effects of climate change. This growing field of scientific work should be more widely funded and more accessible to conservation managers working to better protect our wildlife and ecosystems.

OPPORTUNITIES FOR ACTION:

- Expand existing National Wildlife Refuges and look for opportunities to designate new National Wildlife Refuges that safeguard critical wildlife habitat and open new opportunities for recreation on our public lands.
- Use the Antiquities Act to designate new, locally-driven national monuments that ensure healthy ecosystems remain intact and preserve sporting opportunities for generations to come. Proposed monuments like [Avi Kwa Ame](#), an important migratory corridor in Nevada’s Mojave Desert, and [Castner Range](#), a diverse Chihuahuan Desert ecosystem in West Texas, have broad community support and deserve permanent protection. Avi Kwa Ame would protect hunting access for generations of sportsmen and women to come. And while Castner Range has never permitted hunting in the area, its designation would expand close-to-home access to the outdoors for frontline communities.
- Ensure that a portion of the Land and Water Conservation Fund’s \$900 million in dedicated conservation funding supports large landscape conservation and connectivity across jurisdictions.





PHOTO: BECCA ACETO

Hunters and anglers are not only victims of nature loss, but also an integral part of the solution.

Conclusion

Destruction of natural areas and habitat loss is an existential issue for hunters and anglers and sporting traditions, and for the rural economies that depend on them. This analysis finds clear declines in the ranges of species of high importance, corroborating the experiences of hunters and anglers on the ground in several states. Ambitious conservation goals like the America the Beautiful initiative are right to prioritize sportsmen and women as

key stakeholders, and to emphasize bottom-up, locally driven, consultative, inclusive, and science-based processes when deciding what, where, and how to conserve. These principles are consistent with the conservation history of hunting and fishing communities. The sporting community's participation and leadership will be decisive in whether the America the Beautiful initiative can succeed in reversing habitat loss for America's most iconic wildlife.



Appendix

Download
the data

A full list of species considered and a more detailed methodology can be found [online here](#).

ANALYSIS

Conservation Science Partners' analysis of the human footprint organizes the primary drivers of natural area loss into the following four categories of stressors:

- **Energy:** This data includes oil and gas wells, coal mines, solar farms, and wind farms.
- **Transportation:** This data includes roads, railways, pipelines, and powerline infrastructure.
- **Urban sprawl:** This data primarily measures residential land use but also includes industrial and commercial structures.
- **Agriculture and logging:** This data includes lands that are in agricultural use—for example, for crops, pasture, and grazing—and logging of publicly owned forests.

In assessing the impact of these four stressors on the nation's landscape, CSP took into account both the relative intensity of development at any given place and the context in which a location is embedded—called the “ecological edge effect.” For example, building a parking lot results in a total loss of the natural function of the land on which it is located, along with a partial loss of the function of natural areas that are immediately adjacent to it. But pasture land alone may not be considered significantly developed.

PROTECTED STATUS DEFINITIONS

PROTECTED STATUS	GAP STATUS	DESCRIPTION
Protected lands	I	Permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management
Protected lands	II	Permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance
Under-protected lands	III	Permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type (e.g., logging, Off Highway Vehicle recreation) or localized intense type (e.g., mining)
Under-protected lands	IV	No known public or private institutional mandates or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. The area generally allows conversion to unnatural land cover throughout or management intent is unknown
Unprotected lands	NA	Private land with no known protections from conversion; not included in the PADUS database

