

Vol. 38, Issue 2  
Winter 2019/20

# PERCREPORTS

THE MAGAZINE OF FREE MARKET ENVIRONMENTALISM



## Conserving Migration Corridors

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MEETEETSE, Wyo. —

**O**n a recent visit to a ranch east of Yellowstone, the challenge of conserving wildlife migration corridors came into stark relief. For generations, ranchers here have grazed livestock on the vast, rolling hills outside America's first national park—but they also do something far less profitable: provide crucial winter habitat for Yellowstone's prized elk herds.

Each year, elk flow like a river from their high-elevation summer range in the park to low-lying ranchlands. The epic migration underscores an important reality: The survival of the very same elk herds that draw millions of tourists to Yellowstone depends on the actions of private landowners beyond the park's boundary.

For ranchers like the one we visited, elk can impose significant costs. As we walk the land, the rancher describes how she is forced to run fewer cattle because of the elk—both because of the forage they consume and the risk of disease transmission. Brucellosis, a disease spread by elk that causes cattle to abort their young, is a major concern that can spell financial ruin for ranchers.

Add to this the ever-growing pressure to subdivide or drill for oil and gas, and her message was summed up in a single sentence: "If environmentalists wish to keep the land from being sold for development, they need to broaden their approach."

With this issue of *PERC Reports*, that is our hope—to begin a dialogue about how conservationists can broaden their approaches to protect migratory species, specifically by working with, not against, the landowners that steward so much important habitat. The essays in this issue demonstrate that corridor conservation will succeed only if it enlists the support of private landowners and harnesses the power of markets.

It's a challenge that PERC is already beginning to tackle. Our researchers are working with landowners to find creative ways to enhance migration corridors in the Greater Yellowstone Ecosystem (see p. 12). We are conducting surveys, studying land-use changes, and working to develop financial tools to help ranchers address the risk of brucellosis transmission. This issue previews some of that ongoing work.

But it's not just about influencing the way we do conservation—it's also about ensuring that policies give landowners ample incentives to conserve habitat for migratory species. That's not always the case. Federal regulations intended to protect monarch butterflies, for example, could have the perverse effect of discouraging landowners from providing habitat for the iconic insect (see p. 26).

In the end, the fundamental challenge remains the same: Whether for elk, waterfowl, butterflies, wildebeest, or salmon, conservationists must find ways to make wildlife more of an asset instead of a liability for private landowners. The future of these migratory species depends on it.



**PERC REPORTS**

The magazine of Free Market Environmentalism  
Vol. 38, Issue 2  
Winter 2019/20

(ISSN 1095-3779)  
2048 Analysis Dr., Ste. A  
Bozeman, MT 59718

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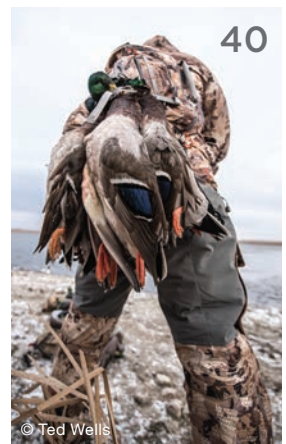


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Cover: © Travis Zaffarano, Wyoming Migration Initiative/ University of Wyoming Cooperative Fish and Wildlife Research Unit

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# Masters of Migration

Conserving migratory corridors will require creative solutions



**J**ack leads the way as we climb through the Ishawooa Hills southwest of Cody, Wyoming. When we get to a highpoint, he stops to look up a drainage into the Washakie Wilderness, perhaps anticipating one of his multi-day back-country adventures. Not today. Jack the dog has brought his human with him, the elk ecologist Arthur Middleton. As one of the foremost experts on ungulate migration in North America, Middleton wants to show us this critical spot. He explains that the Ishawooa Creek watershed, which disappears ominously into the mountains from this vantage point, is a thoroughfare that 4,000 mule deer use seasonally to migrate from the South Fork of the Shoshone River into the high country of Yellowstone.

For thousands of years, migration has been the key to survival for species like elk, mule deer, and pronghorn in this area. And Middleton is the man with the invisible ink pen. Assisted by GPS tracking, his research—millions of

geolocated dots on a map—has revealed the paths of these masters of migration as they journey annually from privately owned, low-elevation ranchlands into some of the most rugged terrain in the lower 48 to reach lush summer grasses of high-elevation plateaus.

Lately, there has been a groundswell of support for protecting wildlife migration corridors, and not just for ungulates like elk and pronghorn. Each year, monarch butterflies migrate north through the heartland of the United States—a journey that takes several butterfly generations to complete—only to be carried by the winds back to their wintering grounds in Mexico. Loggerhead turtles use the earth's magnetic field to migrate in a circle around the Atlantic only to return to the beach of their own hatching to lay eggs. Even timber rattlesnakes migrate—not very far, but enough to make you wary of where you step, as I found out firsthand on a recent visit to privately owned conservation lands in upstate New York.

In the Greater Yellowstone area, Middleton and his fellow scientists study roughly 20,000 elk spread out over nine different herds. For these animals, migration is a strategy to find the best vegetation. It's called "surfing the green wave." Newly emerged plants offer the best nutrition, so in springtime elk follow these green shoots up into the mountains. And in the fall, they reverse their steps and retreat from the snow. According to Middleton, this flow in and out of Yellowstone helps sustain the entire ecosystem.

But there are challenges. Foremost, these migration corridors begin and end somewhere, and that is often on private land. Elk here spend as much as 80 percent of their time in the winter on large cattle ranches. These private lands are critical for healthy migrations. But once elk are on these lands, they compete for winter hay and irrigated alfalfa and can transmit brucellosis, a disease that causes cattle to abort their young. The economic consequences can be dire.

And to the detriment of landowners and the ecosystem, time spent on private lands may be increasing. As wolves and grizzlies grow in number, private ranchlands not only provide a reliable source of food for elk, but also a refuge from predators. Over the past two decades, migratory elk numbers in Wyoming have decreased, while resident elk populations—elk that no longer make the annual migratory journey—have increased. Migratory elk encounter four times as many wolves and grizzlies as resident elk. In the struggle to survive, many elk are staying put.

Finally, mapping these corridors can also be tricky, as not all landowners consider being on a map a good thing. Ranchers often fear that corridor mapping will come along with additional regulations and scrutiny—when most landowners are already being excellent wildlife stewards. As a colleague once observed,

in the West, you can bring a gun to a meeting, you just can't bring a map.

The migration story in the Greater Yellowstone area, where private lands abut protected public lands, is complicated. The fluid nature of migratory animals, personified by spaghetti-like lines on a map, defy geometric solutions. It's not as easy as putting a square box around millions of acres of land and calling it Yellowstone. The temporal nature of migration also creates unique challenges. Traditional tools like easements require a permanent generational commitment that in some cases may be asking too much of working ranches.

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## Migration conservation is about finding what works for both wildlife and people.

As Middleton knows, research of ungulates and their corridors will also have to include research of landowners and their challenges with migration. At PERC, with partners like Middleton, we are doing just that—taking time to learn from landowners, who are often an afterthought in efforts by governments and other well-meaning conservation organizations. As one multi-generational rancher in Montana's Paradise Valley told us, "Nobody ever comes and talks to me."

As part of a multi-year initiative on Yellowstone's migration corridors, PERC is spending time in ranchers' kitchens, walking the land with them, conducting landowner surveys, studying long-term land-use patterns, and leading efforts to develop market-based financial instruments that would help landowners address the risks of brucellosis transmission. But why?

At PERC, we often reference the great Austrian economist Friedrich Hayek's

"knowledge problem." Knowledge, according to Hayek, is dispersed, localized, and particular to individuals, so it defies central planning. And so it may be with migration corridors. Finding solutions will require a decentralized, dynamic approach that accommodates not only the fluidity of wildlife in motion, but also the diverse range of landowners and the particular geographic, cultural, and socioeconomic features of their varied basins.

Our goal is to develop, through a bottom-up approach, market-based tools and economic incentives to help turn migratory wildlife into less of a liability and more of an asset in the eyes of the private landowners who steward so much of their habitat. The work is time consuming and difficult. Ranch by ranch. Understanding the diversity of landowners is complicated. Diplomacy skills are needed. There will be no one-size-fits-all answer. And the effort will likely entail a whole new set of approaches to policy and conservation, some of which don't even exist today. That's where the creative power of free market environmentalism can help.

Migration conservation, at its core, is about finding what works for both wildlife and people. The future of many migrations hinge on the stewardship of private landowners. As Aldo Leopold wrote, "Conservation means harmony between man and land. When land does well for its owner; and the owner does well by his land; when both end up better by reason of partnership, we have conservation. When one or the other grows poorer, we do not."



**Brian Yablonski** is the executive director of PERC. In "Frontiers," he describes how PERC seeks to advance creative conservation through incentives, innovation, and cooperation.

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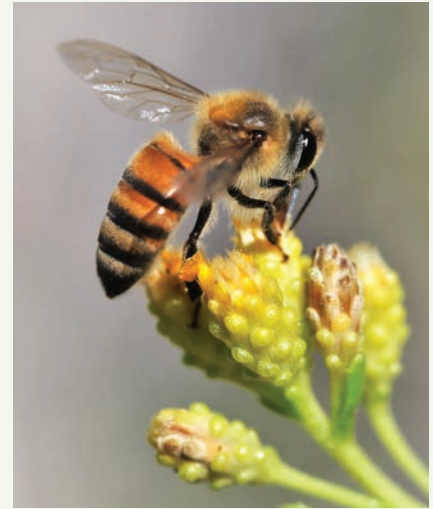


**Salmon cannons?** Thanks to an inventive pneumatic cannon, salmon may soon repopulate the Upper Columbia River in the Pacific Northwest. The river’s salmon population has plummeted, largely because hydroelectric dams prevent the fish from reaching cool waters upstream where they can spawn. Enter the Whooshh fish passage system. Salmon swim into a flexible tube that propels them up and over a dam and on to spawning habitat. An in-tube scanner even differentiates between species and sorts out invasives, such as the northern pike, to ensure the Upper Columbia remains quality salmon habitat. The manufacturers say it could revolutionize salmon recovery.

© Max Forster, Save the Redwoods League



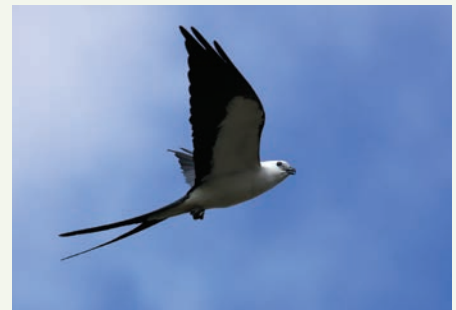
**Stewarding giants.** Save the Redwoods League recently announced plans to purchase the largest private sequoia forest in the world for \$15 million. The conservation group described the 530-acre tract as “the most consequential giant sequoia conservation project of our lifetime.” Several hundred of the massive trees grace the land, which has been owned by the Rouch family since World War II. The family logged and milled pine, fir, and cedar from the property for decades, all the while conserving the towering sequoias, many of which are more than six feet in diameter. “We’ve used the land,” Mike Rouch told *The Mercury News*. “But we have tried to take the best care of it that we can.”



© Renee Grayson

**Beepocalypse no.** In 2006, beekeepers began reporting higher-than-normal hive losses over the winter. The phenomenon was given a name—colony collapse disorder (CCD)—and many predicted disaster. Now, more than a decade later, there’s been no “beepocalypse.” U.S. honeybee colonies are at their highest level since 1993, and a new study by PERC senior fellows Wally Thurman and Randy Rucker and entomologist Michael Burgett finds that CCD has had almost no discernible economic effects. The researchers attribute their findings to a largely overlooked factor: “the ability of well-functioning markets to adapt quickly to environmental shocks and to mitigate their potential negative impacts.”

**Giving kites a launch.** As *bioGraphic* recently reported, managers of privately owned timberlands have emerged as unlikely allies for swallow-tailed kites. The incredible raptors migrate 5,000 miles between Brazil and their breeding grounds in the southeastern United States, but much of their historical habitat has been converted or developed for human use. When breeding and rearing chicks, the kites need a patchwork of trees of varying ages and heights—a landscape mimicked by sustainable timber harvests—to provide nesting, roosting, and foraging habitat. Thanks largely to good forest management by private timber companies in the South, swallow-tailed kite numbers are rebounding.



© cuatrok77

**Telling the truth about trophy hunting.** In July, PERC research fellow Catherine Semcer testified before the U.S. House Natural Resources Committee on the CECIL Act, proposed legislation that would ban imports of African hunting trophies. Semcer's testimony highlighted how economic incentives created by trophy hunting have not only driven the recovery of elephants, rhinos, and other wildlife in southern Africa but also provide critical funding for anti-poaching programs. Following her testimony, Semcer joined 132 other researchers in publishing an open letter in *Science* arguing that attempts to end trophy hunting, like the CECIL Act, will undermine efforts to conserve biodiversity.



© South African Tourism



© Mark Holloway

**Smelter strife.** In October, PERC and Pacific Legal Foundation filed an amicus brief with the U.S. Supreme Court urging it to protect property owners' rights to avoid pollution. Atlantic Richfield Company owns a copper smelter near Opportunity, Montana, that contaminated surrounding areas with toxic metals for nearly a century. Local landowners say the company must return their properties to their pre-smelter status. Atlantic Richfield argues that it has satisfied federal cleanup requirements and, therefore, is not required to do more. The case, which will be argued before the nation's highest court in December, highlights why holding polluters liable for damage done to others' property is crucial for discouraging harmful pollution.

**Hop along.** In July, a long-running episode involving the endangered dusky gopher frog (see Summer 2018 issue) came to a close. A consent decree removed 1,500 acres of Edward Poitevent's property from a critical habitat designation made by the U.S. Fish and Wildlife Service in 2011. The designation generated plenty of controversy but did nothing to promote conservation, and the agency had always conceded that the area lacked certain crucial elements of the longleaf-pine ecosystem the frog requires. "Once I was told that my family's land had been declared a habitat for a frog that disappeared from the land more than 50 years ago, I knew that justice would ultimately prevail," said Poitevent.



© Pacific Legal Foundation



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**Insure reefs, protect coastlines.** Coral reefs play a critical role in reducing the damage to coastlines from destructive storms. To protect its coasts, the community of Quintana Roo has taken creative steps to conserve the Mesoamerican Reef in Mexico. In partnership with the state government, local hotel owners, and The Nature Conservancy, the Coastal Zone Management Trust purchased an insurance policy that covers a 160-kilometer stretch of coastline critical to Mexico's tourism industry. If a strong enough hurricane lands along the stretch of coastline—one with wind speeds of more than 100 knots—a payout will be issued to the trust to fund repairs and restore the reef. The scheme demonstrates a new frontier for market-based approaches to conservation.

# The New Endangered Species Act Rules, Explained

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**I**n August, the Departments of the Interior and Commerce announced new rules concerning implementation of the Endangered Species Act. Much of the media coverage was over-the-top, questioning whether the new rules “guttled” the act or were a giveaway to big oil, even asking: “Why does Trump hate polar bears and kids?” This isn’t unusual; almost every proposed change under the law has evoked such responses, even when proposed under presidents generally viewed favorably by environmentalists.

The new rules do a wide variety of things, including codifying long-standing policies, making minor technical tweaks, and implementing more significant, substantive changes to how the law is implemented. So what do these new rules really mean for endangered and threatened species?

## ECONOMIC IMPACTS IN LISTING DECISIONS

The Endangered Species Act requires Interior and Commerce to determine whether or not a species warrants an endangered or threatened listing based solely on the science, without consideration of economic impacts. Previously, agency regulations also required such decisions to be made “without reference to possible economic or other impacts of such determination.” One of the new rules deletes this requirement.

This rule change does not allow economic impacts to affect whether a species is listed as endangered or threatened. Indeed, the rule explicitly “acknowledge[s] that the statute and its legislative history are clear that listing determinations must be made solely on the basis of the best scientific and commercial data available” according to five statutory factors. Thus, the rule gives the agency no authority to decline to list a species based on the economic impacts of such a decision. If the agency attempted to do so, it would violate the statute and the rule.

Although this change has no effect on listings, it may have political significance. In fact, the agencies justify the rule on transparency grounds, explaining that they intend to

report these economic impacts to better inform the public. If the costs are extraordinarily high, some fear this may create political momentum for Congress to amend the Endangered Species Act.

But this risk seems remote. Economic impacts are considered and reported under several other parts of the act. For instance, critical habitat can only be designated “after taking into consideration the economic impact.” The economic impacts reported under this provision can be exceedingly high. Critical habitat for the green sturgeon, for instance, was estimated to cost up to \$600 million per year. Many other species have estimated impacts exceeding \$100 million, and the cumulative impacts are well into the billions. Yet protecting species remains extremely popular.

## CLIMATE CHANGE IMPACTS

The Endangered Species Act distinguishes between “endangered” species (those at risk of extinction today) and “threatened species” (those likely to become endangered “within the foreseeable future”). The new rules define the “foreseeable future” as “extend[ing] only so far into the future as the Services can reasonably determine that both the future threats and the species’ responses to those threats are likely.”

Some have suggested this rule will make it harder for the agencies to list species threatened by climate change; however, the rule merely codifies the policy the agencies have followed since 2009. Since that time, numerous species have been designated based on climate change impacts. In 2012, for instance, the Department of Commerce designated several populations of bearded seal as threatened by climate change and the loss of sea ice, relying on modeling from the Intergovernmental Panel on Climate Change. In doing so, the agency explicitly followed the 2009 policy.

To be sure, others have argued that climate science is too speculative to affect listing decisions. And they will likely continue to do so. But the new rule doesn’t make it harder for the agencies to rely on climate science. Instead, it merely



makes public and binding the policy that has governed listing decisions during the George W. Bush, Obama, and Trump administrations.

## THREATENED SPECIES

One of the new rules restores the Endangered Species Act's distinction between the regulation of endangered and threatened species. When Congress enacted the law in 1973, it reserved the "take" prohibition—which forbids activities that affect any member of a species or its habitat—for endangered species. The prohibition could be extended to threatened species too, but only if the agencies deemed it "necessarily and advisable" for the conservation of the species.

In 1975, the Interior Department issued a blanket rule that extended this prohibition to all threatened species, unless it adopted a special rule relaxing the prohibition for a particular species. In essence, the blanket rule provided no meaningful distinction between regulations for species that are listed as threatened or endangered.

One of the new rules issued in August repeals the blanket rule—thus restoring Congress' original distinction between threatened and endangered species. This move aligns Interior's practice with that of the Commerce Department, which has never had a blanket rule. (The Commerce Department manages marine species, like whales and most fish.) This new rule only applies prospectively. So the blanket rule continues to cover species previously listed as threatened, meaning no species lose any protection because of the change.

This change has been described as "weakening" protections for threatened species. But that doesn't necessarily mean that species will fare worse under the new rule than they did under the old one. In the *PERC Policy Report "The Road to Recovery,"* I've argued that restoring regulatory distinctions between endangered and threatened species will better align the incentives of landowners with the interests of rare species. Under the new rule, burdens imposed on landowners will increase if species decline and relax as they recover, giving landowners a significant stake in a species' status.

In fact, the rule change formalizes a shift begun under the Obama administration. According to a Defenders of Wildlife report published in 2017, the Obama administration's Interior Department relied less frequently on the blanket rule than nearly any other administration, opting instead to relax "take" prohibitions using the same type of "species-specific" rules that will now be more common under the new rules for threatened species. Indeed, the new rule adopts the same policy the Commerce Department has followed for decades, with

no evidence that it has undermined the protection of species under its authority.

Of course, the way agencies implement this change going forward matters a great deal. But the new rule holds significant promise for boosting the rate at which we recover endangered species, which is currently under 3 percent.

## CRITICAL HABITAT

The Endangered Species Act directs that land essential to the conservation of endangered and threatened species be designated as critical habitat. This can include lands occupied by the species or unoccupied lands. The effect on property owners of such designations may include additional permitting or mitigation requirements for any use of designated land that requires a federal permit.

The new rules require all occupied areas to be designated as critical habitat before unoccupied areas can be considered. This restores a rule that was in place until 2016. It likely means that unoccupied areas will continue to be a small percentage of designated critical habitat. Since 2007, for instance, roughly 97 percent of critical habitat was occupied at the time of listing.

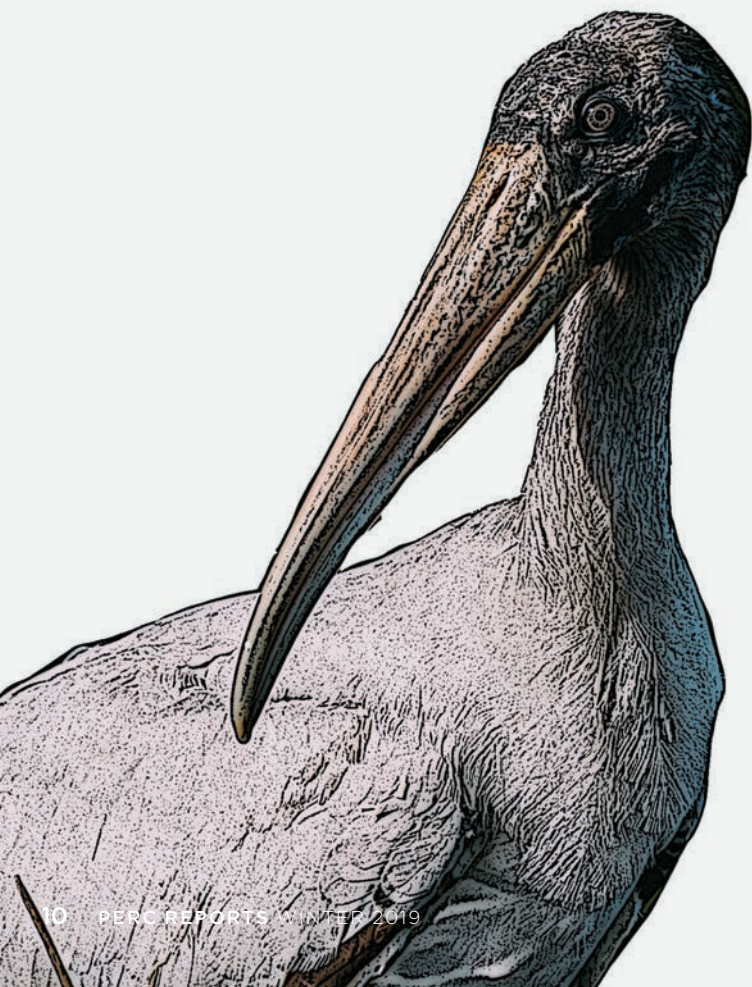
Although unoccupied areas are rarely designated, they are an outsized source of controversy. In 2011, Interior designated 1,500 acres as critical habitat for the dusky gopher frog on private lands in Louisiana, despite the fact that none had



been seen there in 50 years and the land would require extensive restoration work to become suitable for the species once again. Despite the lack of benefit to the species, the designation could have cost the landowner up to \$34 million in lost development value. A challenge to that designation ultimately reached the U.S. Supreme Court last fall, which held in a unanimous decision that only habitable land could be designated as critical habitat.

The new rules aim to reduce the number of such conflicts and address (in part) the effects of the Supreme Court's decision. They require any unoccupied lands designated as critical habitat to "contain one or more of the physical or biological

Restoring regulatory distinctions between endangered and threatened species will better align the incentives of landowners with the interests of rare species.



features essential to the species' conservation" and a "reasonable certainty" that the land "will contribute to the conservation of the species."

These changes will likely marginally discourage the designation of unoccupied land. But given the limited historical reliance on such lands, the need to conform agency practice to the Supreme Court's decision, and the fact that conflicts over these lands benefit neither property owners nor species, the effect of the change will be modest.

## DELISTING SPECIES

Finally, the new rules also provide that "[t]he standard for a decision to delist a species is the same as the standard for a decision not to list it in the first instance." In other words, there is no higher standard for delisting species than applies to the initial decision to list it. This is consistent with the Endangered Species Act's text, which addresses both listing and delisting decisions under the same provision and with the same five-factor test.

Some have argued that the bar for delisting a species should be much higher than the bar to list a species, reflecting a more cautious approach. And some courts seem to have erected such barriers. For instance, asserting that the standard should be higher "when a species is already listed," a federal court recently struck down the delisting of the Yellowstone grizzly bear, despite extensive, bipartisan recovery efforts that enabled the species to exceed its recovery goal (and likely its ecosystem's carrying capacity).

But a heavy thumb on the scale against delisting may not be in the long-term interests of endangered species. One of the primary incentives for recovery efforts is the promise that, if the efforts succeed, the species will be delisted, and federal regulations will be lifted. Making delisting too difficult may have the unfortunate consequence of discouraging efforts to recover species.

## CONCLUSION

The Endangered Species Act is a popular and important law, so it's no surprise that changes to its implementation evoke strong feelings and rhetoric. Ultimately, details matter more than rhetoric. If we're serious about protecting endangered species, it is imperative that we find ways to preserve what the statute does well—prevent extinctions—while improving it as a tool to recover species.

**Jonathan Wood** is an environmental attorney at Pacific Legal Foundation and a PERC research fellow.

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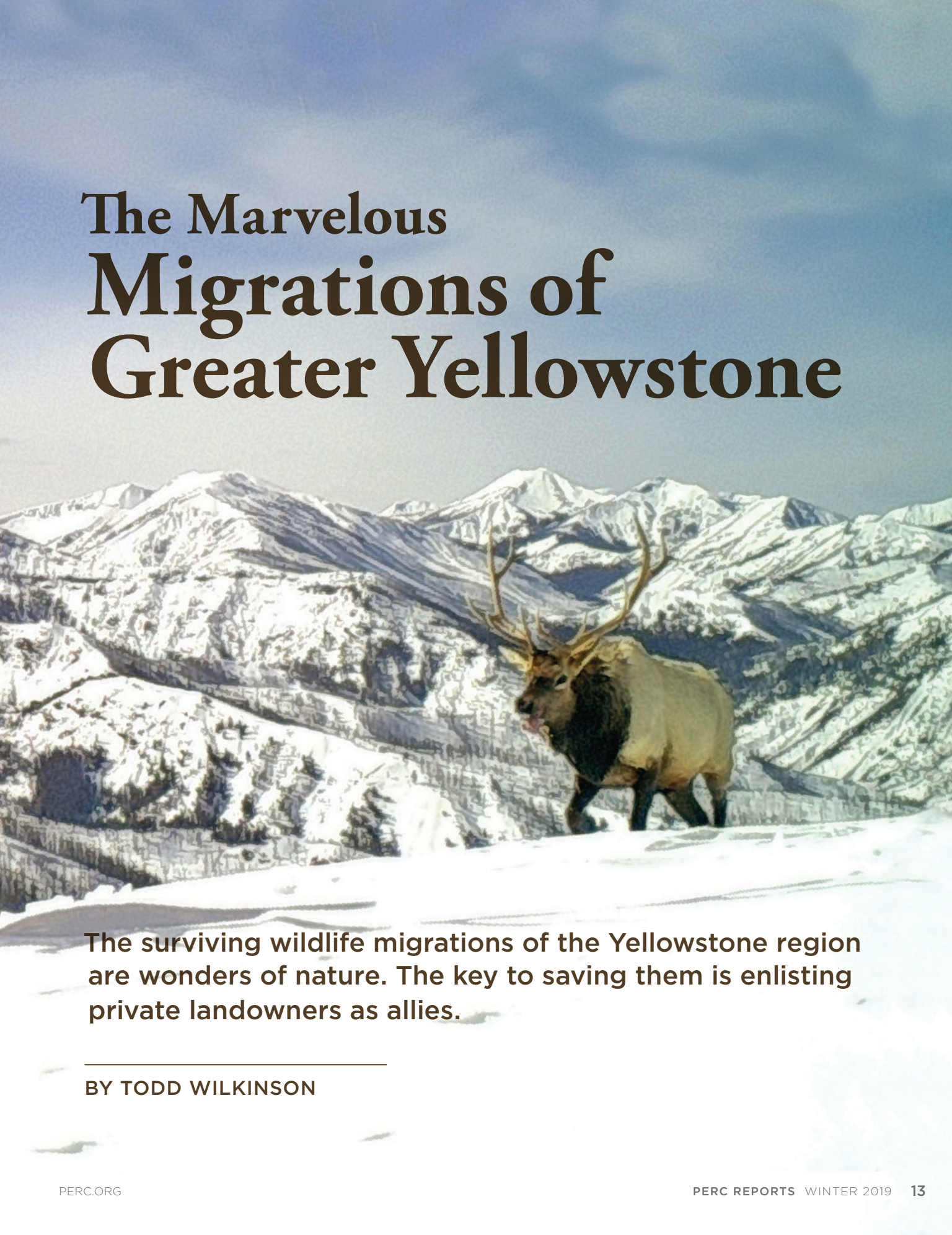


Juvenile Snail Kite © Diana Robinson



© Travis Zaffarano, Wyoming Migration Initiative/University of Wyoming Cooperative Fish and Wildlife Research Unit

# The Marvelous Migrations of Greater Yellowstone



The surviving wildlife migrations of the Yellowstone region are wonders of nature. The key to saving them is enlisting private landowners as allies.

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BY TODD WILKINSON

**M**ention the word “Serengeti” to a room full of informed and enthusiastic lovers of nature and, to a person, there is no question what you are referencing. The same kind of instant place recognition exists when one says “Yellowstone.”

Now meld those two geographical icons together into this: *American Serengeti*. Although the allusion may initially elicit head scratching for some, it is this conjunction that represents one of the most exciting frontiers for 21st century landscape-level conservation.

Yes, there’s a parallel to be drawn between the heralded mass movement of millions of large mammals across the famous plain in eastern Africa and to the ironically lesser-known terrestrial marvel happening right in the middle of the American West.

Yellowstone, the world’s first national park, represents a central hub not only for tourists. It’s also a nexus to some of the greatest Serengeti-like wildlife migrations still occurring on the North American continent. Encompassing the park and the mosaic of public wildlands and private property surrounding it, the larger Greater Yellowstone Ecosystem is home today to the longest migrations for elk, mule deer, and pronghorn known to exist.

Although the phenomenon has been happening for millennia—active use of the pathways stretch back 8,000 years, pre-

dating construction of the Egyptian pyramids—these unparalleled treks of charismatic megafauna in Greater Yellowstone have, in fact, only recently been “discovered” and mapped. Thanks to GPS technology and sophisticated tracking devices, the journeys are only now being understood.

“All along, these migrations were right under our noses,” says Matthew Kauffman, “and though generally we knew wildlife moved seasonally between high elevations and lower terrain, we didn’t understand fully the whys and wheres.” Kauffman is a wildlife biologist with the U.S. Geological Survey and a leader of the Wyoming Migration Initiative, an internationally recognized, multi-agency research outfit pioneering the study of migrations.

Kauffman likens the giant leap in knowledge of these migrations to scientists having their eyes opened upon the invention of electron microscopes to a mind-blowing, previously unknown world of super-minute life forms, including germs, bacteria, and single-cell organisms. It existed nearly invisibly just beyond the grasps of human comprehension.

Now, on a macro-scale at the opposite end of the spectrum, satellite technology has illuminated the routes of hundreds of thousands of wild hooved animals, wonders of nature that command as much awe as the movements of neotropical songbirds flying thousands of miles twice a year between the



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© Gregory Nickerson/Wyoming Migration Initiative, University of Wyoming

Northern and Southern Hemispheres, the remarkable life histories of sea turtles, or the journeys of spawning salmon.

That's the inspiring, tantalizing part of "the American Serengeti." Yet accompanying the emerging revelations is a daunting reality: Without creative actions to secure landscape protection in the next few decades, these ancient animal movements and the integrity of the corridors they depend on could be lost forever.

### THE MARVEL OF HOOVED MIGRANTS

Often wending as tributaries and sometimes forming larger confluences of animal masses, Greater Yellowstone's ungulate movements are every bit like wild free-flowing streams unencumbered by dams. For the public, it means that one doesn't have to travel around the globe to witness epic crossings; they are right here, still hanging on by dint of miracle, in America's backyard.

Kaufmann's colleague Arthur Middleton, a leading elk migration researcher who is affiliated with both the University of California-Berkeley and University of Wyoming, eloquently described these seasonal treks when I spoke to him in 2016 for *National Geographic*: "I've come to think of these migrations as being a kind of pulmonary system of Greater Yellowstone. During spring and summer, imagine the landscape 'breathing

"I've come to think of these migrations as being a kind of pulmonary system of Greater Yellowstone. During spring and summer, imagine the landscape 'breathing in' elk like lungs into the central high country of Yellowstone and nearby wilderness areas, and then in fall and winter the herds move outward, like a deep exhalation, to lower land, to get out of deep snows in order to survive."

in' elk like lungs into the central high country of Yellowstone and nearby wilderness areas, and then in fall and winter the herds move outward, like a deep exhalation, to lower land, to get out of deep snows in order to survive."

Like spokes leading to the center of a wheel, at least a dozen different elk herds, comprising tens of thousands of animals, follow the "green wave" of grass in spring onto the Yellowstone



Plateau, a high mountainous area in the national park where cow elk raise their calves and put on body weight before leaving when the snow begins to fly. The good nutrition they find along the way is what drives individual animal and herd health, including fecundity. Elk physiology is perfectly timed to be at the right place at the right time, when available food is available to propel the animals forward.

Just south of Yellowstone, a pronghorn population spends its summers in Grand Teton National Park and the valley floor of Jackson Hole, Wyoming. In the fall, it departs on a pilgrimage of more than 150 miles through national forests, public rangelands, and cattle ranches southward to the flanks of the Wind River Mountains and Wyoming's Red Desert.

All of Greater Yellowstone's major wild hooved animals—elk, deer, pronghorn, moose, bison, bighorn sheep, and mountain goats—move as part of their evolutionarily ingrained behavior, part of learning passed down in herds from mothers to young over hundreds of generations.

Yet certainly the most impressive commuting prize—at least of what's been uncovered so far— goes to a mule deer. One famous muley doe, research animal No. 255, was shown to travel nearly 250 miles between the Red Desert on the southern tier of Greater Yellowstone and Island Park, Idaho—and then, *astoundingly, back again.*

Distance wise, that's like a deer summering in New York City and wintering in Washington, D.C. More extraordinary is that just one way of Deer 255's trek involved the following: crossing two different national forests, a national park, and the Continental Divide; meandering to and fro across busy highways, through rivers, and over fences; avoiding predators such as wolves, bears, cougars, domestic dogs, and human hunters; and circumnavigating Jackson Hole, the north side of the Tetons, other mountains, and various towns and farmland. She did all of this, then turned around and did it again in the opposite direction.

Scientists are now in the early stages of understanding the ecological function of these ungulate migrations. The groundbreaking research commenced by the Wyoming Migration

Initiative and the Wyoming Game and Fish Department is being expanded to neighboring Montana and Idaho.

All of Greater Yellowstone's major wild hooved animals—elk, deer, pronghorn, moose, bison, bighorn sheep, and mountain goats—move as part of their evolutionarily ingrained behavior, part of learning passed down in herds from mothers to young over hundreds of generations. Why it still happens in Greater Yellowstone is simple. Epic wildlife migrations used to exist across most of America, but various kinds of habitat fragmentation have created impassable barriers, causing some of the migrations to die out. The Yellowstone region has corridors of open space through which animals can still pass.

To return to Middleton's metaphor: "Just like a pulmonary or circulatory system in the human body, if you have a blocked or clogged artery or obstructed breathing passage, you're in trouble," he says. "If these migration routes are going to persist, then protecting the pathways where they happen is essential."

The Greater Yellowstone region encompasses more than 22.5 million acres across three different states and 20 counties. Most of it consists of federal public lands managed by the National Park Service, Forest Service, Bureau of Land Management, and Fish and Wildlife Service, plus some state-owned tracts in Wyoming, Montana, and Idaho.

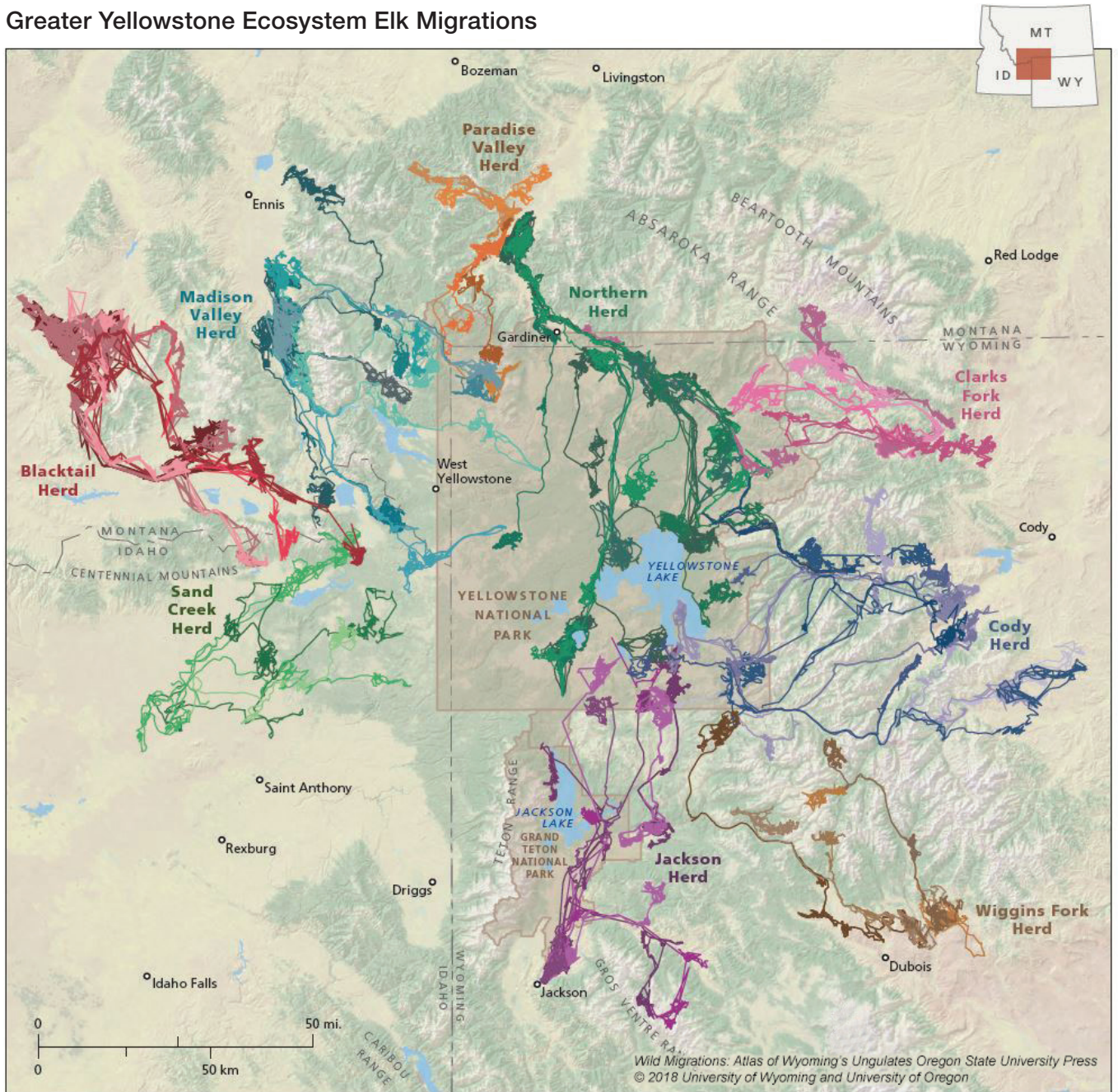
"It's stretching our thinking about how to best manage wildlife cooperatively in a way that transcends boundaries and yet respects them," says Yellowstone National Park Superintendent Cam Sholly. "You can't protect what you don't know exists, so documenting what happens in a spatial and temporal sense is really important." Sholly is the new chairman of the Greater Yellowstone Coordinating Committee. The GYCC, as it's known, comprises senior land managers from all relevant federal and state agencies. It has made corridor protection a priority, and it has support from both the U.S. Interior and Agriculture Departments.

Migrations are more than merely seasonal events involving animal travel. They have a symbiotic relationship with ecological well-being and in some ways represent the bottom tip of an inverted pyramid. When animals move across the landscape, it is about more than them simply traveling between two seasonal home ranges. They are like the sparks that flow through circuitry—transporters of energy. They indirectly convert light from the sun, which has triggered photosynthesis in plants that grow and are eaten, into calories that not only sustain the animal but put on body mass.

As they travel, their bodies support the survival of an array of other species, from grizzly bears to wolves and mountain lions. In death, their carcasses sustain an array of scavengers, from coyotes and foxes to eagles, ravens, and rodents to beetles



## Greater Yellowstone Ecosystem Elk Migrations



that aid in decomposition and foster healthy soils. The grasslands of Greater Yellowstone evolved to be eaten by ungulates; healthy plants and soils absorb carbon and, in turn, nourish other life forms.

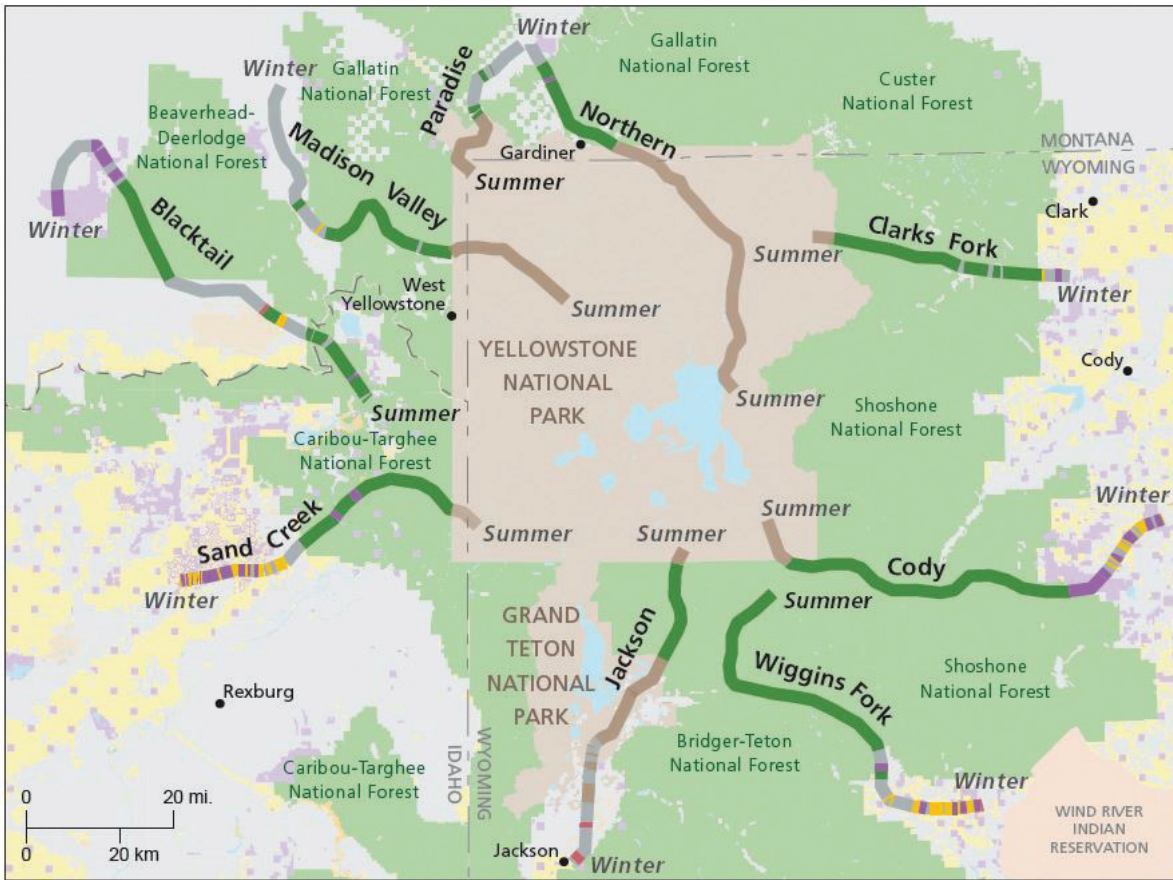
### THE IMPORTANCE OF PRIVATE LANDOWNERS

Were it simply a matter of developing a migration corridor strategy for public lands, the challenge would be much simpler.

However, interspersed among public lands are roughly 5 million acres of private property, taking the form of towns and agricultural lands that experts say represent the most important pieces of the puzzle.

In many ways, the entire Greater Yellowstone Ecosystem depends directly on the goodwill of private landowners, and indeed, they are key in leveraging the functionality of wildlife corridors. Greater Yellowstone is the birthplace of three major

## Migration Corridors and Land Ownership



*Wild Migrations: Atlas of Wyoming's Ungulates Oregon State University Press  
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river systems—the Snake-Columbia, Green-Colorado, and Missouri-Mississippi, with a dozen other rivers and hundreds of major creeks feeding into them.

Here, as in the rest of the arid West, river valleys were settled first because they had access to water. River corridors and the uplands flanking them are known as “riparian areas.” They’re the most productive and important habitat, especially in winter months, and represent vital areas of movement for wildlife.

Today, portions of the Greater Yellowstone Ecosystem are being inundated by rapid human population growth, rising numbers of outdoor recreationists, energy development, and increasing traffic on roads. Some ecologists say it’s a race against time to identify the routes and keep them open.

Consider two data points. In the far northern tier of Greater Yellowstone is one of the fastest growing micropolitan

areas in the country: Bozeman, Montana. The current pace of growth would result in the city’s population doubling roughly every 17 years, meaning the area’s population could swell from nearly 110,000 today to 220,000 by 2037. At the southern tier of the ecosystem, development of oil and natural gas on public lands already is disrupting wildlife movements.

There’s certainly a compelling economic case to be made for the value of the corridors. Nature tourism in Greater Yellowstone, which still has its full complement of species that were present when Europeans came to the continent, is big business. Akin to the Serengeti, it brings money to the region. Between Yellowstone and Grand Teton National Parks alone, visitation supports more than 15,000 jobs and \$1.4 billion in annual economic activity. Wildlife watching, which attracts tourists from around the globe, is a major driver. In addition,

ungulate herds support a robust guiding and outfitting industry and are the backbone of local hunting traditions.

Not long ago, I spoke with Abby Nelson, a wildlife specialist with the Montana Fish, Wildlife, and Parks Department. She said that more than 80 percent of public wildlife coming off of public lands when the snow begins to fall spend all or part of the winter on private land, especially large cattle ranches. These migrations provide a fine lens for understanding why these private lands—and private property rights in general—matter so much, and why broader thinking about how conservation can succeed is necessary. As the latter half of the 20th century demonstrated, the old way of simply drawing a line around public lands and believing they are enough to sustain wide-ranging wildlife isn't enough.

In fact, it's something ranchers have known for generations because every winter they have hosted public wildlife on their lands. Today, as many ranchers operate with thin profit margins and younger generations increasingly buck ranching as a profession, thousands of acres of private land crucial to the health of migrations are at risk of being converted into scattershot sprawl that can be detrimental to migratory wildlife.

Fortunately, seldom in the storied history of Greater Yellowstone has there been a more united effort involving such a wide variety of groups and stakeholders as there is to conserve the region's migration corridors. PERC has emerged as a leader because its *raison d'être* as an organization is identifying ways that market-based solutions and economic incentives can be applied to advance better conservation outcomes.

When thousands of elk, for example, head to lower ground, they cross and seasonally inhabit private ranchlands where they compete with livestock for forage, knock down fences, and can transmit diseases to cattle. A major focus is developing a corridor conservation strategy that incorporates the local on-the-ground knowledge that rural landowners possess and understands and addresses their challenges of living with wildlife.

"It is important that private landowners be treated with respect as allies and that their involvement as long-time habitat stewards is recognized and rewarded," says Brian Yablonski, executive director of PERC who previously worked closely with landowners when he served as chairman of the Florida Fish and Wildlife Conservation Commission.

Lots of different groups, realizing time is of the essence, are making meaningful contributions. PERC is filling a niche no other conservation organization can—by working with both landowners and conservationists to explore how markets can create opportunities for conservation that regulations can't.

"What many landowners want most is to have their voices heard and their property rights respected," Yablonski says.



© Scott Kublin



© Oregon State University

"Making migration work for them is both an opportunity and a challenge. Vitaly important is having management flexibility to use creative options and help make coexistence happen in a way that addresses both the needs of ranchers and wildlife. If these wildlife corridors are going to be saved, solutions need to flow from the ground up. As the father of wildlife ecology, Aldo Leopold, noted, the best kind of durable conservation begins with respecting those who live with it, and when you do that, everyone can benefit."



**Todd Wilkinson** is a journalist based in Bozeman, Montana. He is the author of *Last Stand: Ted Turner's Quest to Save a Troubled Planet* and *Grizzlies of Pilgrim Creek: An Intimate Portrait of 399*.

# Will the Circle Be Unbroken?

## On the future of East Africa's Great Migration

BY CATHERINE SEMCER



**M**ention African wildlife, and many people think of what is known as the Great Migration. The near stampede of wildebeest, zebras, and other big-game species has dominated television nature programs for decades. The millenia-old drama of horns and hooves following the rains across the plains of Kenya and Tanzania has become so ingrained in the public conception of wildlife that the ritual may seem inviolate.

However, new research shows that the Great Migration is slowly collapsing due to widespread habitat loss. At risk is not only East Africa's natural heritage but also a wildlife-tourism economy worth hundreds of millions of dollars in direct expenditures. With each passing day the challenge grows, and options for overcoming it shrink like a water hole in the dry season.

One possible solution lies in Kenya's burgeoning conservancy movement, an effort centered on using wildlife to promote sustainable economic development on private and communal lands. Conservancies aim to maintain habitat and restore wildlife populations by giving rural residents more reason to be invested in conservation outcomes, while still allowing compatible land uses, primarily tourism. For Kenya's conservancies to reach their full potential, however, they must begin to look beyond tourism as a source of revenue, especially in areas within

the Great Migration pathway. If they do so, a country that has staked its global reputation on its conservation programs may yet pull some of its most iconic wildlife back from the brink.

### STAMPEDING TOWARD TROUBLE

The Great Migration encompasses a circular, seasonal movement of wildebeest, zebras, and Thomson's gazelles in the Serengeti-Mara Ecosystem, a nearly 10-million-acre expanse of grasslands that straddles the border between Kenya and Tanzania. Winter and spring find the herds in the lush grasses of the Serengeti. As summer rains begin to fall, the animals move north, fording the Mara River into Kenya before following the seasons south again in a 1,800-mile whirl. It is the largest, most diverse migration of large mammals in the world.

A study by an international team of researchers recently published in *Science* raised alarms that the number of wildebeest in the Great Migration has fallen by half since 1977. While the Serengeti-Mara Ecosystem boasts extensive public protected areas, including Kenya's famous Maasai Mara National Reserve, the matrix of surrounding lands is seeing an unprecedented fragmentation of habitat that is cutting off traditional migration routes, squeezing the wildebeest into narrower and narrower pathways.



© Vince Smith

The potential loss of these migratory wildebeest worries Kenyan policymakers and conservationists alike. Kenya's wildlife economy is big business. The size of the Great Migration, which offers a prolonged season for visitors to witness it, is a significant part of what drew more than 136 million tourists to the country in 2018. That tourism translates into wildlife-related activities that contribute 14 percent of Kenya's gross domestic product and \$1.2 billion in revenue.

If the wildebeest are lost, they will take other species with them. The migration has a direct impact on the size and distribution of populations of lions, cheetahs, and other large carnivores that prey on the herds and are also valued by tourists. The thousands of wildebeest that fall prey to the big cats also feed scavengers, including hyenas. As their carcasses decay, they add phosphorus, nitrogen, and carbon to the soil, supporting the lush vegetation that feeds impalas, hartebeests, and other herbivores that share the plains with wildebeest. The bones that remain take as long as seven years to fully break down, supporting microbes that feed the ecosystem. And the thousands of wildebeest that drown crossing rivers on the migratory route provide up to half of the diet of local fish. On the plains of East Africa, no species and no process is left untouched by the wildebeest migration.

New research shows that the Great Migration is slowly collapsing due to widespread habitat loss. At risk is not only East Africa's natural heritage but also a wildlife-tourism economy worth hundreds of millions of dollars in direct expenditures.

The researchers note that the habitat fragmentation driving the decline of the migration is due to a number of factors, with the expansion of agriculture playing a key role. Practicing agriculture means clearing land, building fences, suppressing fires, and grazing livestock, all of which steadily transform a wildland into a dead end for wildlife.

Since 2010, the number of fenced plots has increased 20 percent in the Kenyan Mara region. The number of bomas, a kind of corral for livestock, appear to be increasing at a rate of three per square kilometer per year in the area. The growth in bomas followed a massive increase in the number of livestock on



**Top:** A lion snares a wildebeest in Serengeti National Park in northern Tanzania at the heart of the Great Migration. **Middle:** Tourists spot and photograph wildebeest along the migration path. **Bottom:** A farm worker in Kenya inspects wheat.



lands outside of protected areas, with sheep and goats expanding as much as 276 percent in some areas and cattle increasing up to 40 percent. This livestock boom also appears to be leading to more illegal grazing in the Maasai Mara National Reserve. The researchers report that between 1977 and 2016, incursions onto the reserve by cattle, sheep, and goats grew by more than 1,000 percent. The result has been to fragment and degrade the habitat wildebeest and other wildlife require to make their seasonal journey.

To mitigate these impacts, the researchers recommend expanding the number of wildlife conservancies within the wildebeest's key migration corridors. Kenya's wildlife conservancies are a novel development in the country's efforts to conserve its natural heritage while promoting economic development. Under Kenya's Wildlife Act of 2013, private landowners, communities, corporations, and other organized groups who form wildlife conservancies obtain legal standing to partner with the Kenya Wildlife Service, the nation's primary wildlife authority, to actively manage wildlife on designated conservancy lands. This management can include everything from accepting translocated animals to increasing options for addressing human-wildlife conflicts. The legal status of a wildlife conservancy coupled with the active wildlife management also makes it easier to contract with and lease access to tour operators, especially for conservancies based around communal lands made up of multiple shareholders. These leases can generate revenue for the conservancy and often also create local jobs catering to tourists and increase the property value of the lands involved.



There are now 14 wildlife conservancies in the Mara region. These conservancies cover more than 335,000 acres that belong to 13,000 owners organized under the Maasai Mara Wildlife Conservancies Association. Collectively, these landowners receive around \$4 million each year in lease payments from photo-tourism operators.

While the conservancy model was a step in the right direction, the ongoing decline of wildebeest populations shows that it is in need of expansion and improvement. Finding ways to make wildlife conservation pay more than agriculture for landowners will be critical to achieving this. Landowners in the Mara region currently receive average annual payments of \$30 to \$50 per hectare to participate in the conservancy system. In contrast, livestock can generate \$40 to \$50 per hectare each

year, while every hectare managed for crop agriculture might earn \$100 annually.

This difference in revenue potential may explain why more landowners have not engaged in the conservancy system—and why agricultural development has bloomed in the Mara to the wildebeest's detriment. The discrepancy is also indicative of what may be an uncomfortable fact for many conservationists: Photo-tourism revenues are often not large enough to incentivize wildlife conservation at the scale necessary to ensure the Great Migration continues. Other sources of funding must be found.

Allowing conservancies to generate additional revenue via wildlife-dependent enterprises like game ranching—and possibly even hunting—might seem like an obvious option. However, doing so would require overturning a nationwide ban on those activities in place since 1977. This is easier said than done given the degree to which the ban has become synonymous with Kenya's approach to conservation.

Even if the ban were overturned, allowing such practices in the Mara would face significant obstacles to adoption. Earlier this year, a government task force studying the issue of consumptive use of wildlife, such as hunting and game ranching, reported that conservancy organizations and individual landowners in the region were divided over the issue. Many are concerned that consumptive use would undermine their reputation as conservationists. Local cultural taboos around the eating of wild game meat also seem to play a role in shaping opinion on the issue.

Allowing hunting in the Mara may also exacerbate conservation challenges. There are growing concerns that the number of tourists visiting the Mara is already unsustainable and causing negative impacts on the region's cheetah population. Adding to all of this is the fact that Africa's tourism industry is extremely vulnerable to shocks and an unreliable source of revenue. This was acutely evident from a 2014 study, when half of the tour operators surveyed in Kenya and Tanzania reported between 20 and 70 percent declines in bookings following an Ebola outbreak in West Africa, even though the affected countries were more than 3,000 miles away.

If Kenya's wildlife conservancies in the Mara are to be productive for both landowners' pocketbooks and wildlife, then conservancies must look beyond wildlife-centered tourism as a means to generate revenue. The Maasai Mara Wildlife Conservancies Association has taken initial steps in this direction by exploring how participation in carbon markets might improve members' bottom lines. This year, the association partnered with Dutch nonprofit Commonland to assess how conservancy members could capitalize on carbon stored in the vegetation and soils on their land.

If Kenya's wildlife conservancies in the Mara are to be productive for both landowners' pocketbooks and wildlife, then conservancies must look beyond wildlife-centered tourism as a means to generate revenue.

While that assessment is still ongoing, it builds on similar projects already in place elsewhere in Kenya. One notable example is the Maasai Wilderness Trust, which has leveraged global carbon credit markets to conserve 1 million acres of land that forms a wildlife corridor between Kenya's Tsavo and Amboseli Ecosystems. Farther north, the company Wildlife Works has successfully used carbon credit markets to conserve 500,000 acres of land that forms a corridor between Tsavo East and Tsavo West National Parks. Bringing this approach to the Mara may create the necessary financial incentives to increase the economic competitiveness of wildlife conservation at the scale necessary to ensure a future for the Great Migration.

Time will tell, especially given some of the uncertainty around the viability and effectiveness of carbon credit markets. What is certain is that the precarious state of the Great Migration challenges the idea that tourism and recreation can supply the funding necessary to deliver conservation at expansive scales.

## KEEPING MIGRATION GREAT

At the current rate of loss, the Great Migration could disappear this century, and with it, an event that shaped a love of African wildlife for millions of people would be gone. Whether this loss comes to pass hinges on whether landowners in the migration path are given sufficient incentives to prioritize wildlife over agriculture. Kenya's wildlife conservancy model has provided a strong foundation for engaging landowners in conservation, but success will depend on building a structure that allows wildlife to outcompete crops and livestock on price, diversifies revenue streams, and leverages the full range of natural assets to take advantage of new markets. If this can be achieved, then the "greatness" of the Great Migration may refer not only to its size, but also the conservation success story it inspired.



**Catherine E. Semcer** is a research fellow at PERC and the African Wildlife Economy Institute at Stellenbosch University in South Africa.



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# The Once and Future Monarch

How human activity has harmed—and could help—  
prospects for the monarch butterfly

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BY TATE WATKINS



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Monarch butterflies gather in a tree. Millions of the migratory insects spend their winter months in fir forests in central Mexico.

Photo © Rafael Saldaña



In 1947, two Harvard students founded the Lepidopterists' Society, a group formed to publish a periodical on lepidopterans—butterflies and moths—and facilitate “the exchange of specimens and ideas by both the professional worker and the interested amateur in the field.” The most iconic of all lepidopterans is perhaps the orange-and-black-winged monarch butterfly, found in every state except Alaska and known for its remarkable trans-continental migrations. A 19th-century account described the butterflies appearing in the Mississippi Valley in “such vast numbers as to darken the air by the clouds of them.”

Despite the renown of the insect, the first members of the society struggled to answer a seemingly straightforward question: “What happens to the butterflies that fly through Texas in the fall?” Scientific observations of the monarch’s migrations had been published dating back to at least 1868. Yet no one knew exactly where the innumerable butterflies went for the winter.

One of various hypotheses that were presented over the years was that the butterflies seen headed south were emigrants—one-way travelers that simply perished—and it was stationary female monarchs that somehow survived the Midwestern winter to reestablish populations each spring. A later theory posited that monarchs migrated eastward to the Gulf Coast of Florida, spending the winter in pine trees near Apalachicola. It took an amateur Canadian entomologist who had seen an adult monarch freeze to death on his windowsill to piece together the basics of the puzzle. He reasoned that if the winter freezes occasionally visited upon the Sunshine State were intense

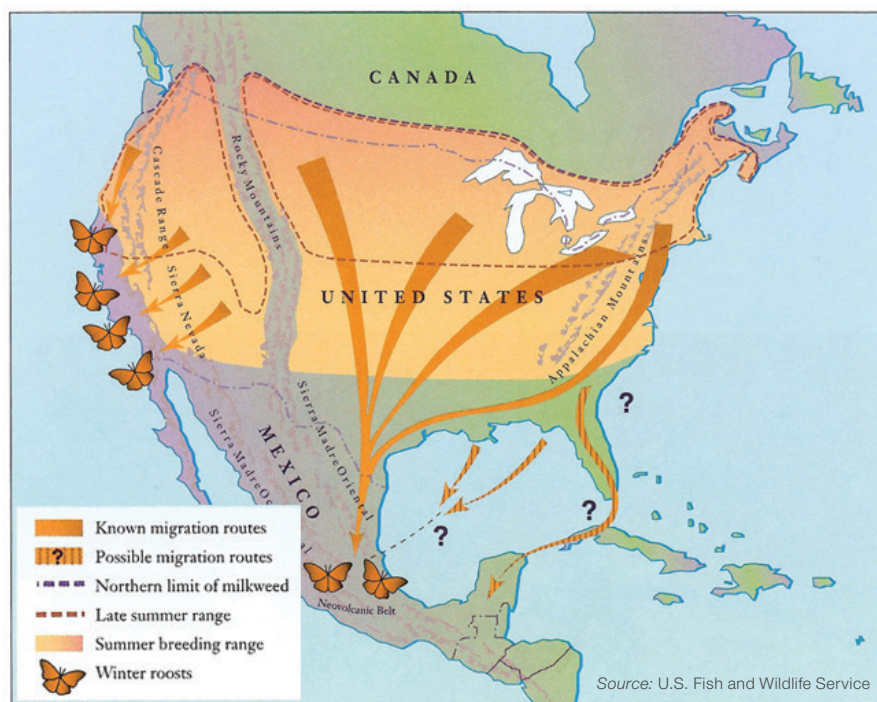
enough to destroy orange groves and kill overwintering bluebirds, there was no way that monarchs could survive such cold snaps. That meant the monarch had to spend its winters farther south, somewhere in the tropics. Eventually, geography and logic dictated that there was only one reasonable answer: Mexico.

On a January evening in 1975, an American transplant to Mexico City named Ken Brugger, who had been crisscrossing the countryside in a motor home searching for a monarch overwintering site as if he were a conquistador traipsing across the continent in search of a city of gold, relayed his discovery of the butterfly’s winter home. “We have found them,” Brugger told Fred Urquhart, a Canadian zoologist who devoted much of his career to studying the monarch, by

phone. “Millions of monarchs—in evergreens beside a mountain clearing.”

Thanks to scientific inquiries that spanned generations of amateurs and professionals, we now know that every winter millions of monarchs pass the cold months roosting in oyamel fir forests of the Sierra Madre mountains in central Mexico. In some spots, they congregate so densely that they blanket virtually every inch of the trees. When they’re assembled in such flocks, they can be counted, which is how we know that this so-called “eastern” population has substantially declined over the past 25 years, losing perhaps 90 percent of its numbers. There is a smaller, western population of monarchs concentrated in California that migrates along a shorter path, from the coast inland toward the

## Monarch Butterfly Migration Routes



Rocky Mountains and back. Its population decline has been even more drastic than the eastern one. In short, the monarch does not darken as many skies as it used to.

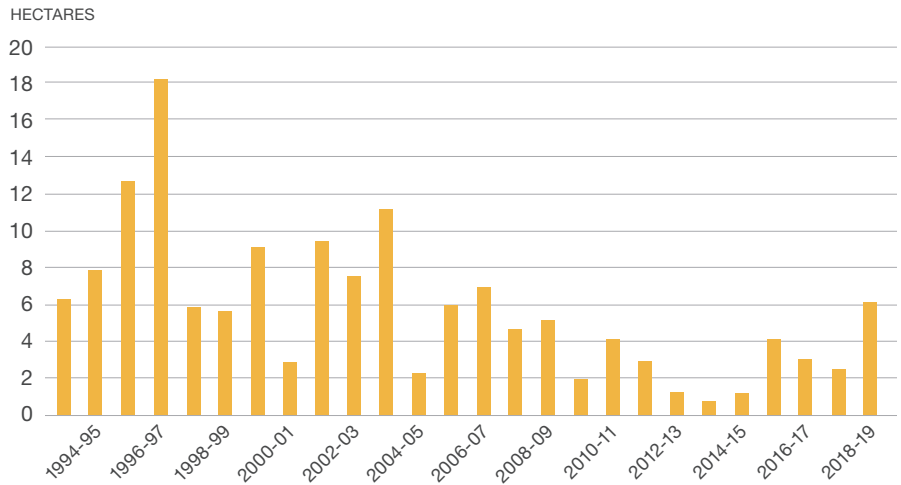
The eastern population includes monarchs that can be spotted in the spring and summer in locales from Central Texas and South Carolina to Minnesota and Ontario and New England, and just about everywhere in between. And a little bit like the lepidopterists who study them, these butterflies stand on the shoulders of those who came before them. Of the eastern population, no single monarch makes the full migration; once the butterflies leave the Mexican forests, it takes four generations for their offspring to complete the annual trip north and back.

There is considerable year-to-year variation in butterfly counts, largely due to swings in weather, but the trend is downward for both populations. Various causes have driven the declines, but the primary one is loss of habitat—milkweed and other nectar plants. Monarchs lay eggs only on milkweed plants, which their larvae feed on exclusively. The caterpillars sequester toxins from the plant inside their bodies, making them poisonous to birds. The defense mechanism is one reason the butterflies can survive the winter in such extreme densities without becoming a buffet for predators.

In the Midwest, widespread adoption of herbicide-resistant crops over recent decades has taken its toll on butterfly habitat. While crop advances have been a boon for U.S. food production, they have also meant more spraying for weeds. That in turn means fewer milkweed plants that previously could

### Eastern Monarch Population

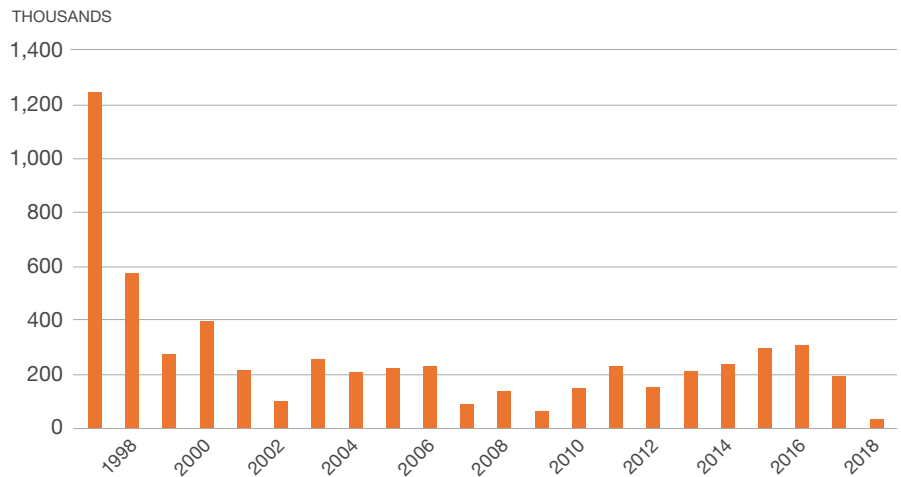
Forest Area Occupied by Monarchs at Overwintering Sites in Mexico



Source: World Wildlife Fund Mexico and Comisión Nacional de Áreas Naturales Protegidas

### Western Monarch Population

Estimated Monarchs Counted at Overwintering Sites in California



Source: Xerces Society for Invertebrate Conservation

**Top Chart:** Every winter, scientists estimate the amount of forest area that eastern monarch colonies occupy at sites in central Mexico. While estimates can vary considerably from one year to the next, population figures have trended downward over the past 25 years.

**Bottom Chart:** At sites along the California coast, volunteers participate in an annual Thanksgiving count to estimate the abundance of western monarchs. The western monarch population has declined even more drastically than the eastern one over recent decades.



© Rafael Saldaña

have thrived in forgotten buffers around cornfields or along fencerows and in ditches. It also means fewer prairie nectar plants, which give adult monarchs energy to fuel basic metabolism as well as extended migration. Expanded use of pesticides is another threat to the species, as are extreme hot or cold spells partially attributed to climate change. Logging at sites in Mexico has also threatened the butterflies' overwintering habitat in recent years.

All of these factors were part of a 2014 petition to list the species as threatened under the Endangered Species Act. A listing would be controversial given that the species is found throughout much of the world and is not under threat of global extinction. (Hawaii, for instance, is home to a resident population of monarchs.) Furthermore, listing a winged insect found throughout the continental United States could have sweeping regulatory repercussions for virtually anyone who might have milkweed or other monarch habitat growing on their property.

The fact that the monarch's migration differs greatly from those made by ambulatory species such as elk or pronghorn presents opportunities and challenges alike. Unlike wildlife that requires wide-ranging terrestrial corridors in which each acre is connected to the next, monarchs need only occasional patches of milkweed and nectar to stitch together their migratory flyway. Yet that flowering habitat has to be dispersed across half a continent, meaning that a fairly large number of people need to be interested in the endeavor. Getting a little bit of effort—say, planting a few milkweed stems in the backyard—out of

a disparate and collectively huge group of people can be a high bar to clear, even for a charismatic species like the monarch.

The U.S. Fish and Wildlife Service will decide whether to list the species, and in particular, the migrating North American populations that are in peril, by the end of 2020. But many groups, including ranchers, farmers, and conservation organizations, have already been at work trying to bolster the monarch's numbers. While human activity has no doubt harmed monarch habitat, the impending listing decision could become a catalyst for humans to embrace monarch-recovery efforts—if the incentives to participate line up for landowners.

## POCKETS OF PRAIRIE

Despite its iconic status, in certain respects, the monarch is not unique. For better and worse, virtually all species have been affected by human activity. In early 20th-century America, for instance, federal and state governments and citizens carried out eradication efforts to get rid of many species then considered to be pests. Yet today, many have rebounded, often with farmers and ranchers becoming species' best friends by providing habitat for once-decimated wildlife like deer and beavers. When it comes to imperiled species, private landowners provide most of the habitat for about half of all species listed as threatened or endangered.

The story of the monarch can partly be told in reverse. In some respects, the species benefited decades ago when humans changed eastern and Midwestern landscapes. As the late Lincoln Brower, an American entomologist who chronicled



the “understanding and misunderstanding” of the monarch’s migration and was one of the petitioners to list the butterfly, put it: “Plowing of the prairies together with clearing of the eastern forests promoted the growth of the milkweed, *Asclepias syriaca*, and probably extended the center of breeding from the prairie states into the Great Lakes region.” To be sure, much of the prairie vegetation that thrived prior to European settlement has long been lost to agriculture, and likewise, the diversity of milkweed species and assortment of nectar plants have diminished. But in the newly plowed and cleared areas, common milkweed—the *Asclepias syriaca* Brower referred to—proliferated. The transformed landscapes gave the plant a foothold along fencerows, buffers, and ditches that surrounded crop fields and in open meadows that replaced stands of timber. “This spread of *A. syriaca* into the opened forest areas,” wrote Brower, “was consistent with the fact that it is the one truly weedy species of the 29 native milkweeds in the monarch’s summer breeding range east of the Rocky Mountains.”

More recently, however, American farming operations have been less friendly to the butterfly and its habitat. One widely cited 2013 study noted the significant decline in agricultural milkweed that coincided with the uptake of crops resistant to the herbicide glyphosate, better known as Roundup. The researchers found that in the Midwest, there was a 58 percent reduction in total milkweed and an 81 percent decline in monarch production from 1999 to 2010. (Glyphosate-tolerant soybeans and corn were introduced in the late 1990s and had adoption rates of 72 and 94 percent

by 2011, respectively.) It’s this type of damage to monarch habitat, however, that has started to mobilize some farmer-conservationists to take action.

“The monarch butterfly migration is just amazing to me,” Tim Richter, manager of a corn and hog farming company that operates in Iowa and Missouri, told farming news outlet AgWeb in July. How far they travel, that they can’t get very far without nectar sources, and that eating milkweed makes them toxic to other animals.



“What we’re finding is that just about everybody has that corner of property that could become habitat. The question is, what will it cost? And is there an incentive mechanism that can help pay for it?”

“I live and farm in a region that is critical to the monarch’s survival,” he says, “and I wanted to help.” Richter is planting milkweed around hog barns at three different sites, something that he says was made cost effective partly because the nonprofit Environmental Defense Fund supplied the seeds. (Not having to mow the four acres, he adds, will save money too.)

It’s an example of various efforts EDF is making to encourage farmers to grow a new crop: milkweed. Providing seeds is one small aspect of the strategy. A much larger component is the Monarch Butterfly Habitat Exchange, which the group has helped establish with a handful of partners. The hope is that, eventually, parties interested in funding monarch recovery will be able to pay farmers and ranchers to restore or enhance milkweed and nectar habitat.

“Our strategy is to get the agricultural community in the center of the country to enhance habitat for the monarch in a voluntary way,” says Eric Holst, associate vice president for working lands at EDF. “We’re not looking to take land out of production but instead looking to piece together nooks and crannies of habitat where feasible.” He adds that EDF believes agricultural areas could provide about half of the habitat that needs to be restored—which the organization pegs at 1.5 million acres—to push the monarch toward recovery.

Holst points out that while vast expanses of Midwestern prairie large enough to support bison, large-scale fire, and ample butterfly habitat may be lost to history, dispersed plots of “surrogate prairie” are easier to come by. “These are small plots,” Holst says, “but have some of the ecological attributes of native prairie. It might be a quarter acre, or an acre or two, in parts of the agricultural landscape that are less valuable for production. Roadsides, ditches, the corner of the field that’s hard to get to—places where habitat might be the higher and better use than wheat or corn for your operation.”

“What we’re finding,” Holst adds, “is that just about everybody has that corner of property that could become habitat. The question is, what will it cost? What will it cost in terms of money, time, manpower, diesel, and is there an incentive mechanism that can help pay for it?” So far, that’s been a tough question to answer. EDF has looked to public funding sources, but according to Holst, many government cost-share programs like those funded through the Farm Bill are oversubscribed. To expand options, the group is also looking to private investors, as with a pilot project with pork producer Smithfield. The pilot, in northern Missouri, is using a \$300,000 investment from the company to plant 1,000 acres of milkweed and wildflowers.

Another strategy EDF is considering is to package monarch habitat restoration

with “stronger drivers,” as Holst puts it, such as water-quality improvement projects. He mentions the Raccoon River, a watershed for the city of Des Moines, as an example. The city has incentives to work with upstream farmers to decrease runoff and invest in wetland restoration, thereby improving water quality. If milkweed and other native nectar plants could be part of the package of planting vegetation buffers, for instance, then the city could improve the quality of drinking water for residents while adding monarch habitat at the same time.

“There’s tremendous desire to restore and enhance habitat,” says Holst, “and it’s fairly easy. It’s not like trying to restore a longleaf pine forest that’s going to take 200 years. On a plot that used to be planted in soybeans, you can have a good prairie plot in one year. And then you

enhance breeding habitat for monarch, but that same habitat is valuable to a whole fleet of other species—pollinators, nesting birds, and other critters.”

Despite long-term population declines, the fate of North American monarchs isn’t set in stone. Rewarding people in a prime position to help bolster habitat might be the best hope for the butterfly to thrive once more. That could mean schemes like the fledgling EDF exchange that can pay farmers to grow milkweed and other flowering habitat. It could also mean enlisting city dwellers. “The interesting thing about the monarch,” says PERC research fellow Jonathan Wood, who has worked extensively on endangered-species policy, “is that most people can contribute to its recovery. People in cities can put in butterfly gardens. You can’t do that with the grizzly bear or the gray wolf.” A 2019 study estimated that metropolitan areas could potentially provide up to 31 percent of the milkweed needed for eastern monarchs to rebound. “While the ag sector and farmers will need to be the backbone,” Wood says, “you can work toward recovery without relying exclusively on rural areas.”

## RECOVERY THREATS

Ultimately, “soft” incentives to aid monarch recovery could end up being just as crucial as monetary ones. A main appeal for landowners, as with many listed species, would be the potential to avoid certain regulations that would normally accompany the listing of a species as threatened. Earlier in 2019, the Interior Department made changes to the way it implements the Endangered Species Act, notably repealing



Common Milkweed (*Asclepias Syriaca*)





the “blanket” rule that automatically extended endangered protections to species listed as merely threatened. Instead, the Fish and Wildlife Service will tailor protections to each threatened species on a case-by-case basis.

The change restored the original distinction between the two types of listings as envisioned by Congress when it passed the 1973 act—a tweak that some decried as “gutting” the statute. Yet the monarch could demonstrate how more precise and targeted protections, rather than the rules that have indiscriminately covered all threatened species in the past, could help align the incentives of farmers and other landowners with imperiled species and ultimately promote recovery.

Before the rule change, if the monarch were to be listed, the mere presence of the butterfly or milkweed habitat in a cornfield might preclude a farmer from cultivating the area entirely—a state of affairs unlikely to foster goodwill between butterfly and farmer. The updated rule will mirror the way that the Commerce Department has tailored protections for marine species for decades. While protections will be customized to fit specific species under the new rules, if a threatened species’ status were upgraded to endangered, it’s likely that much stricter regulations would be triggered. Landowners, therefore, would have every incentive to help recover the species before it was too late. Similarly, landowners would know that regulatory burdens would be relaxed if a threatened species rebounded to the point of delisting, giving them a tangible and substantial reason to take part in recovery efforts.

If the monarch needs 1.5 million acres of additional habitat to rebound,

how likely are farmers and others to plant milkweed if they know it could attract swarms of butterflies that might come with restrictions on how they could use their land? Conversely, a targeted rule for the monarch could provide farmers the assurances and encouragement they would need to plant milkweed, grow nectar, and help the species recover, all without risking land-use regulations that might normally accompany the presence of a listed species. And if a wide-scale and fluid exchange could one day even pay landowners to plant habitat for the butterfly, there’s a much better chance that they would become collaborators in conservation of the species.

A flexible threatened-species protection that’s tailored to the monarch could theoretically complement conservation efforts like the one that EDF is experimenting with. Enrollment in voluntary programs like the habitat exchange could become the mechanism by which regulators grant assurances or relief to farmers and ranchers. For instance, the Fish and Wildlife Service might exempt enrollees from the Endangered Species Act’s strict “take” prohibitions, which can unduly restrict all sorts of everyday land-use activities that pose little or no threat to a listed species or its habitat.

The 2019 estimate for the eastern monarch population showed an increase of 144 percent from the year prior, but the jump was largely attributable to a one-off cycle of perfect weather for the species. Only time will tell whether favorable conditions will repeat and sustain populations enough to keep them off the threatened list. Time will also tell whether the agency’s listing decision—

How likely are farmers and others to plant milkweed if they know it could attract swarms of butterflies that might come with restrictions on how they could use their land?

and potential species-specific protections—will support or impede the type of voluntary conservation efforts that will be so crucial to the butterfly’s recovery prospects.

“There’s a challenge in that you need a little bit of habitat everywhere,” says Holst. “It’s not the same as specific, mappable corridors where you know where your blockages and barriers are. Monarchs stand out in the entire eastern United States. That doesn’t mean you need to turn the entire eastern United States into a wildlife refuge, but you need pockets of habitat everywhere.” If conservationists and policymakers can get the incentives—and rules—right, then more landowners will be enlisted to help the butterfly in coming years. Perhaps then, clouds of the most famous of the lepidopterans will darken the air once more.



**Tate Watkins** is a research fellow at PERC and the managing editor of *PERC Reports*.

# Pacific Salmon Life Cycle

SIX SPECIES: CHINOOK, CHUM, COHO, PINK, SOCKEYE AND STEELHEAD



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Canada

# Saving Salmon and Saving Money

How far upstream can property rights extend?

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BY R. DAVID SIMPSON

**P**acific salmon are in trouble. Rivers to which more than a million salmon once returned each year now receive just a fraction of their historic numbers. From the Mexican to Canadian borders, many populations of salmon—which are born in freshwater, spend most of their time at sea, and return to freshwater to spawn and die—have been designated as threatened under the Endangered Species Act, and several on the Snake and Columbia Rivers are listed under the more dire endangered status.

The demise of salmon may portend that of their ecosystems. Fish returning to their native streams sustain other forms of life, whether as prey for bears or other carnivores or by recycling nutrients to upstream ecosystems after they die and decompose. The multitude of unfortunate juvenile salmon that don't survive the perilous journey also nourish a host of predators.

Salmon have always run a gauntlet. A fish can begin its life in freshwater streams hundreds of miles upstream from the ocean waters where it will spend its adult years. Drought may dry up the tributaries where female salmon lay their eggs in streambed gravel, or floods may flush the eggs away entirely. From the time tiny alevin emerge, carrying their nutritional yolk sacs with them like little lunch bags that sustain them through their first few weeks of life, until they enter estuarine mixing zones as

unrecognizably transformed silvery smolt, young salmon are vulnerable to innumerable birds, mammals, and other fish. Another set of hazards awaits in the ocean: killer whales, sea lions, and other carnivores. When adult fish return upriver to spawn, land-based predators may feast on them.

Humans have multiplied the hazards to salmon. Construction and logging alter hydrology, increasing the intensity of stormwater pulses and reducing water flows between rainfalls. These activities can also smother eggs in silt, remove trees whose shade cools water below, and impose physical barriers to salmon migration. The major dams on the Columbia, Snake, and other rivers can injure or kill fish that pass through generating turbines, and the warm, slack water in the reservoirs the dams impound weaken fish and leave them more vulnerable to predators. Once adult salmon reach the ocean they may be caught by commercial, recreational, or tribal fishers. On the return trip, fish ladders intended to help salmon make their way around dams can instead make them literally fish in a barrel for hungry sea lions.

The decline of salmon is, then, a tale of death by a thousand cuts. This makes salmon recovery an expensive proposition, especially if policymakers and conservationists put maximum effort into protecting the fish at every stage of their life cycle.

The fact that the migratory journey of the salmon is so long and diverse may provide the variability that underpins one of the fundamental principles of economics: gains from trade.

Should costly interventions be implemented at each stage of the life cycle to reverse the dwindling of wild salmon runs? If maximum efforts would prove too expensive, what combination of strategies might prove most cost-effective?

Economics provides both hopeful and cautionary guidance for developing cost-effective conservation strategies. The fact that the migratory journey of the salmon is so long and diverse may provide the variability that underpins one of the fundamental principles of economics: gains from trade. When different measures can be undertaken at different places and times, it may be possible to trade off the implementation of more expensive interventions at one stage for similarly effective but less expensive ones at another. For instance, it might be possible to increase the number of salmon that eventually reach the ocean by the same amount either by curtailing logging near spawning streams or by increasing water releases at a dam on a major river. Ideally, the less costly option would be adopted first. Yet we should also remember the maxim “trust but verify.” Measures that are purported to be cost saving must, in fact, be effective. This, in turn, means that the right incentives must be in place. Widening the reach of property rights in fish may be the best way to do this.

#### YOU NEED A (SALMON RESTORATION) BUDGET

Much of the recent focus on salmon restoration has been on mitigating the impacts of dams. The Bonneville Power Administration, a federal agency that markets renewable energy from dozens of hydroelectric facilities in the Northwest to private buyers, reported spending almost \$500 million on salmon conservation programs in 2018. The agency forfeits millions of dollars more in potential revenue every year by spilling water to facilitate fish passage rather than generating electricity.

Costs could be even higher if one of the most controversial proposals for salmon restoration—removing dams—were implemented. Bonneville puts the cost of breaching its four dams on the Lower Snake River in southeastern Washington at between \$1.3 billion and \$2.6 billion. Removing the Lower Snake Dams would result in the loss of more than 3,000 megawatts of generating capacity—about enough power to supply the city of Seattle. The dams also provide irrigation water and facilitate barge navigation.

If restricting dam operations is expensive, and removing dams is very costly, then why are dams the focus of so much attention? One reason may simply be that dams are the most visibly “unnatural” modification that humans make to free-flowing rivers. This may make them seem the logical target for intervention to protect salmon. In a sense, dams are like point sources of environmental harm. Because they are large and visible, it’s relatively easy for regulators to impose requirements on them—and to determine if those requirements are being met. This is in contrast to what might be involved in restricting a multitude of relatively small, geographically dispersed, and operationally diverse nonpoint sources, such as farms, construction sites, or logging operations.

Yet one might reasonably expect that the overall burden of salmon restoration could be more cost-effective if conservation measures were more widely distributed. Dam owners and operators have attempted to do so. In 2018, Bonneville spent more than \$100 million on projects such as restoring marshland habitats where young salmon rest, feed, and escape predators, and reconnecting such areas to major rivers by removing levees. Bonneville has also purchased and acquired easements to estuarine waterfronts and other sensitive habitats whose condition affects salmon survival. On the supply side of the market, some landowners have adopted measures to help salmon in hopes of receiving compensation from fishers, utilities, or conservationists. A Habitat Farming Enterprise Program initiated by apple growers in Washington State, for example, enlisted orchard owners to replace apple trees with cottonwoods, as the latter provide much more shade and hence keep water temperatures lower on salmon streams.

By and large, however, attempts at more efficient conservation cost-sharing between dams and landowners have not prospered. The reason for this may be exemplified by the skepticism expressed in a 2016 federal district court decision. The court found in favor of the National Wildlife Federation, which had sued the National Marine Fisheries Service regarding the agency’s 2014 plan to protect salmon on the Columbia River from the threats of hydropower dams. Judge Michael Simon wrote that the salmon survival benefits claimed for habitat improvement were too speculative and uncertain to justify forgoing further restrictions on dams.

Restrictions on nonpoint sources would likely provide more certain conservation benefits if they were applied universally, rather than on a targeted basis. Nonpoint sources are, by their nature, numerous and heterogeneous. Regulations broad enough to affect anything—and everything—that fits a particular definition might reduce uncertainty about conservation consequences. The economic argument for widening the scope of conservation measures, however, is that they can then be targeted to the spots where they would be most cost-effective. If controls on nonpoint

sources are applied indiscriminately, they may not save money. For example, a series of court decisions that culminated in a 2018 U.S. Supreme Court ruling required Washington State to modify or replace more than 1,000 culverts beneath roads crossing salmon streams. The state estimates the cost of complying with the ruling to be more than a billion dollars. One has to wonder if most of the conservation benefits could be realized at a fraction of the cost by focusing on fewer culverts in the most critical locations. Economic studies prioritizing expenditures on habitat for terrestrial endangered species often find that most of the benefits can be achieved at a fraction of the cost of protecting all areas; it seems likely a similar finding would arise in the analogous context of salmon conservation. Similarly, zoning standards that restrict development near salmon streams may be ham-fisted instruments if they are applied across properties of very different economic and ecological value.

### OWNING THE DAM AND THE FISH

The costs of many proposals for salmon restoration are high either because they fall on a relatively small number of large dams or because they are applied with too broad a brush. When attempts have been made to share the burden of compliance between dams and landowners more cost-effectively, they have been met with doubts that they would be effective.

This raises an interesting question: What if not only the burden but also the benefits of salmon conservation were better targeted? What would happen if a dam operator had powerful and direct incentives to assure that cost-cutting measures also guaranteed conservation success? What would happen if it owned the dam and the fish?

This is the type of hypothetical that is often posed in environmental economics courses, where it is referred to as “internalizing the externality.” In the case of dams and fish, though, there is at least one real-world example of this thought experiment. Salmon had been in decline on the Deschutes River in northern Oregon, a tributary of the Columbia, since Portland General Electric began construction of the Pelton Round Butte Dam Complex in the mid-1960s. The Confederated Tribes of Warm Springs, a consortium of local Native American groups, were guaranteed the right to fish for salmon on the Deschutes River under an 1855 treaty. As salmon declined, the tribes faced both economic and cultural impoverishment. Controversy and finger-pointing attended discussions of the causes of the salmon decline, with the tribes blaming the Portland General Electric dams and the utility pointing to both up- and downstream threats to salmon.

An innovative solution was available in this case, however, because the tribes had a few advantages that other groups interested in conserving salmon might not. First, they had a unified and concentrated interest in salmon conservation. Second, they





had leverage. They owned much of the land on which the dams were built. Moreover, hydroelectric dam operators are required to relicense their facilities at regular intervals by application to the Federal Energy Regulatory Commission. Other parties can bid for the license. So when the Pelton Round Butte Dams came up for relicensing in the early 2000s, the tribes were prepared to play hardball: They threatened to compete for the license.

A compromise was struck. The tribes purchased an ownership share in the Portland General Electric dam complex. This diversification of shareholder interests has led to a better balance between electricity generation and salmon conservation. While salmon runs are naturally variable, measures adopted since the change in ownership have been credited with contributing to record fish returns in recent years. The joint owners now have direct and powerful incentives both to preserve salmon and economize on the costs of doing so. The utility and tribes now combine on a variety of efforts to protect salmon. They have invested more than \$10 million to improve upstream salmon habitat by removing barriers and fencing out livestock, restored a daily average of almost 33 million gallons of in-stream water flow, and spent more than \$100 million to construct a 273-foot-deep selective water withdrawal system to control temperatures in the water streams in which salmon migrate. While there are still some controversies involving salmon management on the

Deschutes, and more study would be required to tell whether the combination of measures now in place is truly cost-effective, it is reasonable to suppose that shared ownership has aligned incentives better and improved management.

### PROPERTY RIGHTS IN FISH BIG AND SMALL

Could the Pelton Round Butte outcome be replicated more broadly? Realistically, the combination of factors that made for success is likely to be rare. It is unlikely that many settings would feature a conservation group as cohesive and well-aligned in its interests as the tribes, a focus on just one or two dams, and the opportunity to apply legal and regulatory leverage to affect a solution.

What the example underscores more broadly, though, is the importance of ownership rights in assuring efficient resource management. The key is to give the same party incentives both to earn money and save fish—or, really, to give them incentives to earn money by saving fish. More than a half-century of work on fisheries economics has underscored a key point: Property rights are essential to efficient fishery management. This has led to a variety of proposals to assign property rights to mature fish. Fisheries economists are virtually unanimous in their support for such systems, which are alternatively referred to as catch shares, individual fishing quotas, or individual tradable quotas. Such



The key is to give the same party incentives both to earn money and save fish—or, really, to give them incentives to earn money by saving fish. More than a half-century of work on fisheries economics has underscored a key point: Property rights are essential to efficient fishery management.

#### Round Butte Dam

© Scott Carlton / NOAA Fisheries West Coast

a quota is a property right: the right to catch a fish. The quotas are tradable; if you are better positioned to catch fish than I am, I can sell you my quota. While formal, codified systems of tradable quotas are a relatively recent innovation in fisheries management, they are becoming more widely adopted, with demonstrated ecological and economic benefits.

Quotas are typically assigned for catching fish in the ocean. Suppose, though, that a dam operator could generate tradable quotas it could sell to fishers based on the number of salmon that survive its dams. It would then have a greater incentive to assure that more fish survive passage down (and later up) the river. Moreover, the dam operator might also have a powerful incentive to subsidize upstream habitat protection measures that really are cost-effective in preserving salmon eggs and hatchlings. The operator would in a sense be buying juvenile fish from upstream landowners who have preserved habitat for them, protecting the fish until they mature, and then selling quota to downstream fishers to catch the adult salmon. Rather than leaving questions concerning the efficacy of habitat conservation programs to regulators and courts, the organizations paying to conserve habitat would have an incentive to assure it works. Finally, dam operators would have an incentive to resolve the most contentious issue they now face. The dam would, in effect, be a generator of both electricity and of fish. If the owner found it would be

more profitable to generate solely fish rather than both fish and electricity, it could decide to demolish the dam.

These suggestions may seem pie-in-the-sky now. Tradable fishing quotas are not even in place in many salmon fisheries yet. It's certainly premature, then, to suggest that additional quotas could be generated in the upstream reaches that stock those fisheries. A host of legal and technical issues would need to be resolved before such property rights could be established. On the one hand, their complexity should not be understated. On the other hand, though, experience with property rights shows their potential not only in managing fisheries efficiently and cost-effectively but also in reducing the unproductive finger-pointing that results when costs must be borne without realizing attendant benefits. Wild Pacific salmon are in trouble. It's worth experimenting with new approaches to rescue them.



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# Protecting America's Duck Factory

## Lessons from Ducks Unlimited

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BY HENRY HOLMES

**B**irds have gotten some bad news lately. In October, a study in *Science* found that bird populations in North America have declined by nearly one-third since 1970. Amidst the grim headlines, however, was a silver lining: Wetland birds showed a net gain in population. In particular, migratory waterfowl have flourished, increasing their numbers by 56 percent over that period.

The resurgence of waterfowl populations can be attributed in large part to a unique combination of private conservation, sportsmen-led efforts, and government action. It was duck hunters, in fact, who spearheaded a comprehensive wetlands conservation and waterfowl recovery movement in the early 20th century. Ducks Unlimited, the world's largest wetland and waterfowl conservation organization, has led the way, providing valuable scientific expertise and financial support for conservation. Many of those efforts have been focused on the Prairie Pothole Region—otherwise known as America's duck factory.

The Prairie Pothole Region, which extends predominantly across Montana, the Dakotas, Minnesota, and Iowa, gets its name from the vast expanse of shallow, kettle-shaped wetlands that dot the landscape. It's called a duck factory for good reason: Prairie potholes provide habitat for up to three-quarters of North America's breeding ducks. Despite the recovery of waterfowl populations, Ducks Unlimited has identified the region as the most important and threatened waterfowl habitat on the continent. Even though federal regulation under the Clean Water Act has often not extended to the majority of prairie potholes, Ducks Unlimited has found creative and effective ways to protect waterfowl in the region.

### PRESERVING PRAIRIES

Ducks Unlimited promotes wetlands conservation in a variety of ways, including complementing federal incentive programs, conducting scientific research, and working with private landowners. The organization's Preserve Our Prairies initiative is a great instance of public-private cooperation at work. The goal of the initiative is to implement a working lands approach to conservation by providing willing landowners with attractive land conservation programs that diversify their incomes. Fundamental to this approach are incentives that exceed the cost of meeting wetlands conservation requirements. Ducks Unlimited's primary wetlands conservation programs include enrolling lands in conservation easements, purchasing critical lands to restore habitat, and providing sustainable grazing management and cover crop assistance.

The region is called a duck factory for good reason: Prairie potholes provide habitat for up to three-quarters of North America's breeding ducks. Ducks Unlimited has found creative ways to protect waterfowl there.

The principal tactic Ducks Unlimited uses to protect waterfowl habitat is to assist with the purchase of conservation easements that permanently protect wetlands and grasslands from conversion into cropland. Between 1998 and 2012, the U.S. Fish and Wildlife Service and its conservation partners spent \$152 million on easements in the Prairie Pothole Region, with Ducks Unlimited as the main provider of private matching funds. The organization contributed \$27 million over that period, about 18 percent of total funding.

Conservation easements allow landowners to maintain ownership of the land and continue farming and ranching, provided they refrain from plowing grasslands and draining wetlands. Easements run with the land, meaning that any prescribed conservation measures continue even in the event of a land sale. Agricultural land values and the relative cost of easements have declined or stabilized across most of the Prairie Pothole Region due to decreased crop prices in recent years, making conservation easements particularly attractive for landowners and conservation organizations.

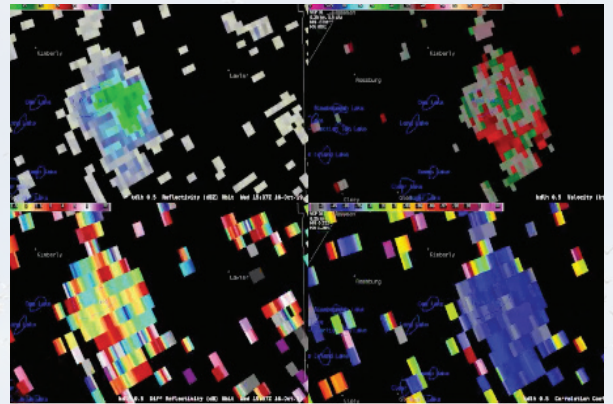
Landowner demand is a critical component to a voluntary conservation easement strategy—and meeting that demand requires resources to fund easement purchases. More than 1,500 landowners across the Dakotas and Montana have expressed interest in enrolling their land in conservation easements under the Preserve Our Prairies plan. In 2017, the easement program protected 86,633 acres across Montana and the Dakotas, a testament to the collective efforts of private fundraising and revenue generated through the Migratory Bird Conservation Fund. The fund collects revenue through multiple channels: the sale of duck stamps, which duck hunters are required to purchase annually; appropriations authorized by the Wetlands Loan Act; excise taxes on hunting equipment such as ammunition; and access permits to national wildlife refuges. Through these mechanisms, hunters who benefit from more and better wetlands bear some of the costs of conservation. Where demand for conservation easements currently exceeds funding, Ducks Unlimited has responded by launching a five-year private fundraising goal of \$65 million through 2024 that would unlock an additional \$130 million in matching public funding.

Ducks Unlimited also makes outright purchases of priority lands at market value from willing sellers through its “revolving lands strategy.” This provides an attractive option for ranchers to retire debt and receive financial security from the sale. Priority lands have much of their waterfowl habitat value intact but are at high risk of environmental degradation because they are adjacent to lands that are farmed intensively or are unprotected by conservation easements. After Ducks Unlimited buys a property, it restores habitat and places a conservation easement on the land. A central element of this strategy is ensuring that wetland restoration provides both economic and ecological returns for future buyers, such as wildlife agencies or private landowners who are willing to work with Ducks Unlimited to maintain sustainable, grassland-based ranching or recreational operations. Ducks Unlimited then reinvests the capital from the sale into the next land purchase.

In addition to buying property, Ducks Unlimited provides financial incentives and technical assistance to ranchers and



## FIRE OR FOWL?



In October, meteorologists with the National Weather Service suspected that smoke from a wildfire was responsible for a radar plume they spotted near Rice Lake National Wildlife Refuge, in northern Minnesota. After checking in with refuge officials, they learned that it wasn't a fire that was blotting the radar—it was an estimated 600,000 ducks. The officials were performing a waterfowl survey that day, and their airboats had temporarily sent tens of thousands of ducks flapping skyward.

Just a week later, the weather service meteorologists spotted the same type of radar pattern over the refuge. Sure enough, wildlife officials were undertaking another survey, that time estimating that nearly 900,000 waterfowl were airborne over the refuge, most of them ring-necked ducks. An abundance of wild rice at the refuge attracts so many waterfowl to the area, where they refuel during their long migration south.

Snow goose migration in North Dakota

© Rick Bohn / USFWS



farmers for wetlands conservation. For ranchers, this includes fencing and watering systems, which separate livestock from waterfowl habitat, and grassland restoration. Farmers receive funds to plant non-cash cover crops outside the normal growing season to provide soil nutrients and wildlife habitat. Cover crops are also an attractive alternative to tile draining, a method that uses perforated pipes buried below the soil surface to remove surrounding groundwater, which is optimal for farming but often detrimental to surrounding wetlands. In the Midwest, where farmers have used tile draining for decades, historical wetlands losses have eclipsed 80 percent in most states.

## WATER RULES

Despite the resurgence of waterfowl, some environmental groups argue that a proposed reclassification of the “waters of the United States” will significantly reduce wetlands protection in the Prairie Pothole Region by narrowing federal jurisdiction. The definition of such waters, commonly known as WOTUS, demarcates the scope of federal jurisdiction under the Clean Water Act to regulate activities that may alter or pollute the nation’s waters, including certain wetlands. The proposed rule excludes a provision from a more expansive 2015 version that provided case-by-case protection to certain prairie potholes. Whether such changes will have a meaningful impact on conservation in the region is a matter of debate. One thing is certain: *carte blanche* regulation often falls short of its desired purpose—and that makes the multitude of private conservation approaches that Ducks Unlimited is pursuing all the more important.

Ducks Unlimited’s programs in the region are critical to conserving waterfowl habitat, but they alone are insufficient.

Federal conservation grants, effective incentive programs, and public-private partnerships are essential to wetlands protection, particularly as complements to private conservation in the stead of federal regulation under the Clean Water Act.

One example of federal funding is the North American Wetlands Conservation Act, which provides matching grants to organizations that have developed wetlands conservation partnerships that benefit migratory birds. The act has funded more than 2,900 projects over the past two decades, totaling \$1.7 billion in grants, matching \$3.5 billion in private funds, and affecting 30 million acres of habitat. In the most recent cycle of standard grants, Ducks Unlimited and its project partners in the Prairie Pothole Region received \$4.0 million in grants contributing to more than \$12.8 million in total proposed investment. In this way, private organizations enhance federal programs by providing matching investment and on-the-ground implementation on private lands.

Changes to the 2014 Farm Bill improved government incentive programs by amending the “swampbuster” provisions to make subsidies for crop-insurance premiums contingent upon conservation compliance—for instance, not draining wetlands to plant crops. These additional constraints on farm subsidies, however, are only effective because the bill also included changes to these programs that ensured the benefits would exceed the costs of meeting compliance requirements.

One instance of inducing conservation compliance was extending coverage to small, or “shallow,” agricultural losses that are not normally covered by crop insurance. A recent economic analysis by the U.S. Department of Agriculture suggests that these changes to crop insurance programs resulted in strong



compliance incentives for farms and ranches in the Prairie Pothole Region that include potentially convertible wetlands. The Conservation Reserve Program has also been an important government incentive program. Under this program, landowners agree to 10- to 15-year leases that provide annual rent payments in exchange for removing certain lands, such as wetlands, from agricultural production.

Ducks Unlimited is also an active member of the Prairie Pothole Joint Venture, which includes federal and state agencies as well as conservation groups that work together to protect and restore high-priority wetland and grassland habitat. Voluntary partnerships such as these are critical vehicles for agency and private-sector cooperation because they leverage public and private resources to address specific regional conservation needs. Private organizations, such as Ducks Unlimited, can further build and maintain relationships with private landowners to maximize the benefits associated with public-private partnerships.

### POTHOLE PARTNERSHIPS

Ducks Unlimited’s conservation efforts and federal programs disperse the costs of wetlands protection from private landowners to wider beneficiaries through revenues from excise taxes, incentive programs, and private contributions. Yet even with Ducks Unlimited’s Preserve Our Prairies initiative, grassland-loss rates exceed conservation rates throughout the Prairie Pothole Region, and wetland-protection rates only exceed loss rates because of the Farm Bill’s swampbuster provisions. Many farmers and ranchers consider these federal programs a form of regulation, which makes some landowners less willing to use them. Thus, it is critical for private organizations like Ducks

Voluntary partnerships such as the ones Ducks Unlimited participates in are critical vehicles for agency and private-sector cooperation because they leverage public and private resources to address specific regional conservation needs.

Unlimited to improve the implementation of these programs to strengthen trust in local communities.

A considerable amount of additional funding—from both private and public sources—will be needed to support adequate wetland and grass conservation goals in an incentive-based system. How the conservation community responds will also be critical to the success of an incentive-based approach to working lands. Two things are certain: Ducks Unlimited has laid a brilliant and ambitious plan to save waterfowl and wetlands in the Prairie Pothole Region, and they need our help.



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# The High Life

How volunteers and enthusiasts help maintain access to highpoints across the 50 states

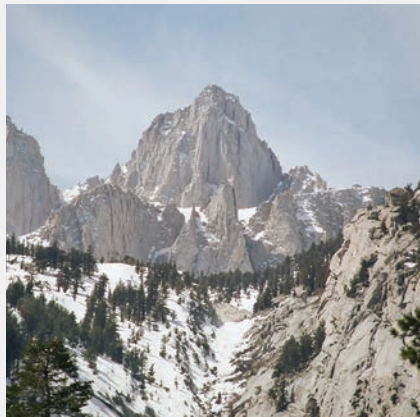
BY GREG KAZA

**F**or many ancient civilizations, mountains were considered the realm of divine beings. For countless people today, summits stand as symbols of individual freedom and sources of human inspiration. Mountains also contribute a multitude of tangible benefits, such as providing freshwater and boosting biodiversity.

Today, as more people venture out to explore mountainous landscapes, the popularity of visiting a highpoint—the highest point in a given county, state, or other geographic area—has grown as well. Many of these sites lie within public lands, including rock-and-ice summits found in national parks. Others, especially in the East, are found on private lands. In fact, of the 50 state highpoints across the country, one-fifth are found on private property. Over recent years, various private and voluntary solutions have emerged to help ensure access to these special places for future generations.

The Highpointers Foundation is one group working to preserve access to these lofty places. Established by mountaineers and other explorers, the nonprofit aims to help conserve and care for highpoints while also educating people about them. The organization also strives to “maintain positive relationships with owners of highpoints on private property” and “support public and private efforts to maintain the integrity of and safe access to state highpoints.” The foundation has raised and spent more than \$120,000 on amenities at 31 highpoints and an exhibit at the American Mountaineering Center in Golden, Colorado.

The foundation emerged 13 years ago out of the Highpointers Club, a voluntary group of several thousand people who visit the summits. “It is an activity and a Club that brings together people from all walks of life,” notes an entry at the mountaineering website SummitPost, “making it quite an interesting group.” Some points can be reached by motor vehicle and a short walk, while others are major mountains that require specialized equipment and training to conquer. The group’s newsletter, *Apex to Zenith*, features



Mount Whitney, California

stories about completers—people who have reached the rarified air of every state highpoint in the country. As a 2018 *Backpacker* story by Loren Mooney noted, more people have climbed Mt. Everest than have reached every U.S. highpoint.

Club founder Jack Longacre was often asked what proof summitters need to prove they have been to a highpoint. “We do not require any ‘proof’ of climbing

any of the highpoints,” he replied. “It is entirely by the honor system. It is my consensus that outdoor type people are almost 100 percent purists and are possessors of very high personal standards.” More to the point, he noted that technical highpoints are group efforts that necessarily entail witnesses. “So why would you miss the fun of doing the other H.P.s?” In a nod to practicality, Longacre also recommended taking a picture of each summit.

The first 48-state completer was A.H. Marshall. The “wiry railroad telegraph operator,” as Mooney described him, had no blueprint to follow:

He first had to create a highpoints list—nobody had compiled one before—which required meticulous research of conflicting sources and writing letters to dozens of Forest Service officials for different maps and advice. As a perk of his telegraph job, he got free railroad travel. So over several summers, he traveled by rail, hitchhiking, and foot—ticking off highpoints as fast as a modern-day peakbagger with the benefit of a rental car...

Marshall nabbed his last highpoint in 1936. Three decades later, Vin Hoeman became the first person to reach all 50. While the pursuit may remain niche, the enthusiasm of its adherents is undeniable. “Some of the world’s most passionate athletes are high pointers,” Peter Frick-Wright has written in *Outside*, “climbers who will do anything to reach the tallest point in every state, county, or whatever other designation they can dream up.”

Highpointers pride themselves on their love of geography and orienteering. In his 1970 booklet *Highpoints of the States*, Frank Ashley described Oklahoma's Black Mesa as one of the largest and most isolated mesas in the world: "For years [the] area was outlaw hide-out—'no man's land'—due to the fact that no state or territory claimed [the] area." Despite its remoteness, the foundation raised funds to place a granite bench at the trailhead, one of 30 benches it has placed at state highpoints.

The Highpointers Foundation's greatest achievement is perhaps maintaining public access to all 50 state highpoints. Forty highpoints are on land controlled by federal, state, or county governments. Alaska's Denali, the highest mountain in the country at 20,310 feet, is in Denali National Park and Preserve. California's Mount Whitney (14,505 feet), the highest point in the lower 48, is in the Inyo National Forest. Across the country and at the other end of the spectrum, Delaware's highpoint, Ebright Azimuth (448 feet), is near a public sidewalk. Florida's Britton Hill—at 345 feet, the lowest U.S. highpoint—is a county park.

A few of the points found on public land have passed to authorities through the generosity of private landowners. Iowa's Hawkeye Point (1,670 feet) is one example. In *Fifty State Summits*, surveyor Paul Zumwalt explains that a U.S. Geological Survey crew located the highest point in Iowa behind a barn owned by the Sterlers, a farming family. In 2008, the family donated the land to Osceola County to become a park, and the local community embraced the project. The foundation built a campground at the site and made renovations, including an observation platform constructed around a corn silo and an informational kiosk that featured various state license plates sent to the Sterler family by visitors. "That's the best example of a community getting behind a highpoint," foundation president Dave Covill said of the project.

The remaining 10 highpoints are on private property. In these states, the Highpointers Foundation and their allies have preserved public access through private diplomacy and problem solving informed by conservation values. A multi-year access controversy at Rhode Island's Jerimoth Hill (812 feet) inspired highpointers to focus on the issue. In his highpoints book, Ashley wrote of the



Jerimoth Hill, Rhode Island

site: "Owner of property welcomes all visitors with open arms." Yet a subsequent owner grew impatient with the stream of visitors to the property, as then-Highpointers Club chairman Roger Rowlett told NPR's "All Things Considered" in a 2005 interview: "The property owner who was there had people that were visiting him at—during all points of the day and night. And he didn't like people coming across his private property. ... So he'd blocked access to it." The club worked with the landowner, Rowlett explained, to negotiate access on particular days and keep the site open to the public. From being one of the most restrictive state highpoints, Jerimoth Hill became an example of how private individuals could work to keep access.

The Highpointers Foundation has played an influential role working with property owners in other states. Foundation president Covill called signing a perpetual-access easement with North Dakota ranchers in 2018 "by far our most important project." The agreement,

which keeps White Butte (3,506 feet) open to the public, "took cooperation with surveyors, attorneys, the county—and of course the ranchers, whose idea it was." In Nebraska, the private landowners of Panorama Point (5,429 feet) had asked visitors not to stray from the weather-battered road leading to the site. The foundation provided funding for gravel to fill low spots and repair the dirt lane.

The group has also helped purchase signage directing visitors to highpoints on private land in Indiana (Hoosier Highpoint, 1,257 feet), Louisiana (Driskill Mountain, 535 feet), and Maryland (Backbone Mountain, 3,360 feet). And in Michigan, it helped improve the visitor experience at Mount Arvon (1,979 feet), which is on land owned by a paper company. While serving in the state legislature in the 1990s, I helped secure an easement to the remote summit. The foundation later placed a bench at an overlook just below the point, where trees were cleared to allow visitors to see Lake Superior clearly.

In all, the Highpointers Foundation has funded 14 registers, nine plaques, three tower restorations, two kiosks, a summit boulder, a picnic table, maps, and 9/11 posters that were donated to the U.S. Forest Service. The latter featured a Highpointers Club member on each summit with their state flag.

At a time when private solutions to conservation issues are often overlooked, these mountaintop enthusiasts demonstrate how voluntary and grassroots efforts can provide wider benefits that can be enjoyed by anyone. Thanks largely to the Highpointers Foundation, access to America's highest corners remains open to all.



**Greg Kaza** is executive director of the Arkansas Policy Foundation. He has summited 45 of the 50 state highpoints.



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