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Fish & Wildlife News

SPOTLIGHT

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On the cover: Eastern collared lizard

(PHOTO BY RANDY JONES/USFWS)

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Martha Williams,
Director

Safeguarding Nature's Playground

Two of my favorite sounds are children laughing and birds singing.

When the two are combined in the same moment—it's the sound of people connecting with nature. For me, that's what it's about, because when people connect with nature, they inevitably care about nature. They also become open to understanding how our connection to nature is important for our communities, our economy, and our well-being.

Imagine our lives without the myriad components that make up the natural world – oceans, rainforests, wetlands, grasslands, deserts, forests, and freshwater systems. Today, these life-sustaining ecosystems face numerous threats including habitat loss and degradation, pollution, and climate change. This, in turn, is contributing to the biodiversity crisis, with a severe loss of animals and plants.

The U.S. Fish and Wildlife Service is deeply committed to using every available tool we have to save the world's most imperiled species and the habitats they depend on. Many of the tools are available to us through the Endangered Species Act — one of the most important conservation laws in the world. Nearly every species protected by the ESA is still with us today, many have been recovered and delisted, and hundreds more are stable or improving.

December 28 marks the 50th anniversary of the ESA, and it's more important than ever that we be proactive, collaborative, and innovative in our efforts to save America's at-risk fish, wildlife, and plant species. You'll read in this issue of *Fish & Wildlife News* about a few of our successes and challenges. You'll hear from young people newly engaged in conservation and from Service veterans.

The ESA recognizes that the conservation of threatened and endangered species is a shared responsibility and necessitates everyone's involvement to be effective. This issue describes essential partnerships that have brought species back from the brink of disappearing and are key to slowing down the extinction crisis.

I want to live in a world where I hear children playing in nature. I want future generations to see a yellow-billed cuckoo and be able to look up at a whitebark pine. I want them to learn how the longsolid and round hickorynut freshwater mussels play an important role in the health of our streams and rivers. As we look to the next 50 years and beyond, let's work together to enhance our partnerships, and make new ones, to achieve the goals of the ESA by protecting threatened and endangered species and their habitats for the continuing benefit of the American people. □

A western yellow-billed cuckoo sits in a tree.
(PHOTO BY PETER PEARSALL/USFWS)

What's in a Name? Frecklebelly Madtom

When you hear the word "catfish" it's a safe bet your mind goes to river fishing at night for flathead catfish on the prowl, dunking worms for channel catfish in a pond, or laying chicken liver on the bottom below a hydraulic boil in a tailwater fishery hoping to muscle out a big blue catfish. All three species have a few things in common: They are active in low light, smell and touch are primary senses, they grow large — quite large — and they make fine table fare.

It may surprise you to learn another group of catfishes is renowned for their *diminutive* size and equally secretive nature, with the most curious of names: the madtoms. Twenty-nine madtom species inhabit streams and rivers in the central and eastern United States, and most fall under the management purview of state fish and wildlife agencies.

Their common names often pay tribute to the waters they swim: Neosho madtom, Ouachita madtom, Ozark madtom, Carolina madtom. Other common names describe their shape or color or other attributes, such as smoky, slender, piebald, pygmy, and frecklebelly. Some of the madtoms are common, and others, well, not so much. We declared the Scioto madtom from central Ohio extinct in 2023. Most of the madtom species now have unnaturally fragmented and limited ranges and are the object of conservation concern.

The Frecklebelly madtom's 's pectoral spines are serrated like a buck saw blade and possess a venomous gland. (PHOTO BY BRETT ALBANESE/GDNR)

The frecklebelly madtom was the subject of recent range-wide surveys. The tiny catfish naturally occurred in medium to large rivers in parts of Louisiana, Mississippi, Alabama, Georgia, and a small portion of Tennessee. A species status assessment paid for by State Wildlife Grants, administered by our Wildlife and Sport Fish Restoration Program, funded several years of population surveys by the state fish and wildlife agencies in all five states. State Wildlife Grants are monies appropriated by Congress that are meant for conservation work for fish and wildlife with a high conservation need.

The frecklebelly madtom had that need; the fish has declined in number over the years, and the recent State Wildlife Grant-funded surveys proved that. The frecklebelly madtom has suffered from habitat loss due to damming and dredging and agriculture. The frecklebelly, like all the madtoms, not to mention some sport fish that co-occur with it, such as the redeye bass, need clean swift-flowing water over a rocky river bottom. Perturbations that cause sediments to fall out in the stream bottom and clog the cobbles rob the fish of a place to hide, feed, and spawn.

Frecklebelly madtoms are shaped for life in fast water: low profile, flattened heads, and a torpedo-like body, all in the length of your finger. They subsist on mayfly and caddisfly larvae. Blackflies make up a large part of their diet, something anyone who frequents streams for work or fun can appreciate given their propensity to inflict painful bites.

The frecklebelly's scientific name, *Noturus munitus*, is something to unpack. Think "munitions." The little fish's pectoral spines are serrated like a buck saw blade and possess a venomous gland. They sting like a bee and turn a biologist's hand numb and send his or her feet into an involuntary dance in shin-deep water. That sting might be the origin of madoms' unusual common name, implying an angry tomcat. They are also known to writhe and wriggle untiringly in captivity.

All the madtoms are in the genus, *Noturus*, attributed to a 19-century Turkish polymath naturalist with the greatest eccentricities, Constantine Rafinesque. The man walked over the Alleghenies and long reaches of the Ohio and lower Wabash rivers in 1818 collecting plants and fish and fossils. He eschewed a horse because mounting and dismounting took too much of his time from looking at plants. Rafinesque ascribed the Greek genus name to a stonecat madtom from the Ohio River, referring to its long fleshy adipose fin that adjoins the tail. »

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And this coincidence is too eerie to overlook: Rafinesque tragically lost all his belongings—his papers and plant and fish collections—in a shipwreck on the Atlantic Coast. Tulane University ichthyologist Dr. Royal Suttkus gave the frecklebelly its scientific name in 1965 and lost belongings, collections, and papers in a hurricane in 2005. And what's more, Suttkus had many years prior named a new minnow species, *Notropis rafinesquei,* the Yazoo shiner, in honor of the eccentric naturalist.

State Wildlife Grants are the juice that makes things go for research and management of obscure but not necessarily unappreciated fish and wildlife species. The frecklebelly surveys conducted up to 2019 revealed that the fish was absent from the Tennessee-Tombigbee Waterway but was more abundant elsewhere than previously thought by scientists.

Such was not the case in the upper Coosa River lying in part over the Georgia-Tennessee state line. The frecklebelly madtom in those sites was afforded protection under the Endangered Species Act in its 50th year in existence. As the frecklebelly in its furthest fringe is added to the list of federally threatened species, the Apache trout in Arizona is set to come off—a beneficiary of Sport Fish Restoration grants and the contributions of the fishing tackle industry (see p. 34). □

CRAIG SPRINGER, Wildlife and Sport Fish Restoration Program, Headquarters

Game Mammal Study Across Hawaiian Islands Supports Hunters and Endangered Species

Putting up fences and hunting are the two main strategies for controlling invasive game mammals throughout the Hawaiian Islands. Hunting for non-native feral pigs, axis deer, black-tailed deer, feral goats, and other introduced game mammals is an important cultural, recreational, and subsistence activity in many communities. It also can help the native and endangered flora and fauna of the Pacific Islands by removing non-native threats.

Goats and other feral mammals provide hunting opportunities across the Hawaiian Islands, but can have negative impacts for native species. (PHOTO BY DEREK RISCH)

Maintaining a public hunting program for these game mammals that does not threaten native species and ecosystems in Hawai'i is a complex endeavor. With funding through our Wildlife and Sport Fish Restoration Program, the Division of Forestry and Wildlife at Hawai'i's Department of Land and Natural Resources is using island-wide surveys to study what areas the game mammals are using, how to manage existing hunting areas, and even how hunting can protect sensitive species and ecosystems.

Each of the major Hawaiian Islands has one or more state-designated public hunting areas, which are open for hunting at certain times during the year. Hunting is also permitted on private land with a valid hunting license and landowner permission. "Game mammal hunting in Hawai'i is unique because all of the hunted species are non-native to the area," says Jason Omick, wildlife biologist for the division. "Our agency works not only to provide safe and accessible hunting, but also to understand what impact these game mammals can have on native species, including many listed plant and bird species."

Surveying Kaua'i

Kaua'i is the most recent island to complete one of the surveys of feral game species. The survey, in 2020 and 2021, used animal signs (droppings, tracks) and camera footage to estimate game mammal abundance. Survey locations were selected at random and included remote areas on both public and private land, some of which was only accessible via helicopter. "The random site selection and elevational coverage allowed us to take a holistic view of where game mammals were during different times of the year and if these species favor different habitat types, like native vegetation," says Derek Risch, at the University of Hawai'i's Price Lab. "By conducting a comprehensive survey of game mammal distribution, preferred habitat, and seasonal variation of these animals, state agencies, conservation groups, landowners, and hunters can see where these game mammals are, and this could have implications on how resources and species are managed."

These efforts have allowed Hawai'i to institute strategic changes to use hunting to control game mammals and lessen their impacts on native species. "We had anecdotal accounts that said that game species were increasing or expanding into certain areas, but these surveys provide an in-depth review of what is happening at an island scale," says Omick. "With this data, we have already made changes to hunting season length, bag limits, and areas open to hunting."

One such place that has seen this change is Kaua'i's Unit F along the island's Mokihana Ridge

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where the open hunting days » were increased to daily after the survey showed a high population of game species using the area. Real-time observations from local hunters supported these findings.

Kaua'i's approximately 2,000 licensed hunters now have more opportunities to hunt while contributing to island conservation for endangered species like the 'akikiki, a small Hawaiian honeycreeper, and rare native plants such as the aupaka.

A game survey researcher hikes rough terrain placing game cameras and conducting sign surveys.
(PHOTO BY DEREK RISCH)

Feral pigs and other introduced mammals can hurt the 'akikiki, found on only Kaua'i', because these invasives can increase mosquito populations. As these mammals forage, they knock over native tree ferns and hollow out troughs making rain-filled breeding habitats for mosquitoes. Increases in mosquito habitat can propel the avian malaria disease cycle. Avian malaria is deadly and a major concern for biologists working to save forest birds across the Hawaiian Islands. Introduced mammals also feed on Kaua'i's rare plant species like the aupaka, an endangered violet, and disturb the surrounding area, allowing invasive plants to take root and compete with native species.

Next Steps

Melissa Price, associate professor for the Department of Natural Resources & Environmental Management at the University of Hawai'i at Mānoa, points out that these surveys are also important for items not found on biological maps. "We can multitask, with challenges like food and economic insecurity, species conservation, landowner challenges, and hunters wanting access to the outdoors, this project can bring together everyone that needs to be talking," adds Price.

As the Pacific Islands face a changing climate, habitat loss, and challenges like disease outbreaks, the data from these surveys can highlight areas of high hunting value where hunters and increased hunting pressure could be a strategic resource for island stewardship. Risch and his team from the University of Hawai'i have begun work to conduct the next game mammal survey on the Island of Hawai'i. □

CINDY SANDOVAL, Wildlife and Sport Fish Restoration Program, Headquarters

Michigan Birding Hotspot Is Part of an Endangered Species Success Story

Decades of effort by dedicated partners improved the status of the Kirtland's warbler, a songbird that nests in jack pine stands in Michigan, Wisconsin, and Ontario, Canada.
(PHOTO BY JOEL TRICK/USFWS)

The lands and waters of the National Wildlife Refuge System offer a haven for species facing extinction.

Kirtland's Warbler Wildlife Management Area was established Sept. 3, 1980, in response to the need for more land dedicated to the recovery of the endangered Kirtland's warbler, which was protected under the Endangered Species Act from 1967 to 2019. The management area is made up of 125 tracts of land totaling more than 6,000 acres in eight counties in the northern Lower Peninsula of Michigan.

Even though we removed the Kirtland's warbler from the endangered species list in 2019 due to recovery, our work isn't done. Today, we aim to connect areas of habitat for Kirtland's warblers and other species in and around Michigan's jack pine forest and pine barren ecosystems. These islands of habitat are made stronger when we connect them. We manage this habitat to simulate the structure and composition of a recently burned jack pine forest. Kirtland's warblers build nests on the ground, only in young, dense stands of jack pine in Michigan, Wisconsin, and Ontario. This habitat was historically created by large wildfires. Today, wildfires are suppressed, and the nesting habitat is created by harvesting mature jack pine and planting jack pine seedlings in the logged areas. »

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Young jack pine stands are crucial habitat for the warbler and many other species. Because Kirtland's warblers prefer a very specific age group of jack pine trees, the forests are divided into three categories. Sort of like Goldilocks, the warbler is very picky about where it lives. Too young or too old and the warbler will not use the forest. Young jack pine forests between 4 and 15 years old are just right.

Each forest age is associated with a different wildlife community. Young jack pine forests are not only essential habitat for Kirtland's warblers, but they are home to other birds like Nashville warblers, eastern towhees, brown thrashers, and alder flycatchers. Jack pine forests 4 years or younger provide habitat for indigo buntings, eastern bluebirds, field and Lincoln's sparrows, and black-billed cuckoo. Jack pine forests 15 years and older provide habitat for black-backed woodpeckers, spruce grouse, olive-sided flycatchers, eastern wood-pewees, hermit thrushes, ovenbirds, rose-breasted grosbeaks, red-breasted nuthatches, red-eyed vireos, black-capped chickadees, chipping sparrows, and mourning doves.

Endangered species recovery is complex work, often requiring substantial time and resources. Species today face ongoing threats like habitat loss as well as climate change and wildlife trafficking. We have a continued commitment as a nation to protect imperiled species.

Each of these species is a part of the web of life, each with a unique cultural and biological community, performing services essential to our combined well-being. By conserving them, we help ensure the benefits that accrue from them — healthy air, land, and water — on which we depend.

Every four years, biologists survey the Kirtland's warbler population as a measure of species health. At the lowest points, populations had dipped to 167 pairs in 1974 and 1987. As of the last survey in 2021, the Kirtland's warbler global population is estimated at 2,245 pairs — more than double the recovery goal. Goals have been exceeded every year since the early 2000s!

Work isn't over for the Kirtland's warbler, even though it was delisted due to recovery. Referred to as conservation-reliant, species like it require active management from biologists and land managers even after Endangered Species Act protections are removed. That's partly because their habitat was traditionally regenerated by wildfire, which has largely been removed from the equation. That said, we'll continue to adjust specialty habitats as conditions warrant. In doing so, we'll collaborate with the U.S. Forest Service, Michigan Department of Natural Resources, and other partners to ensure enough suitable nesting habitat is available for the Kirtland's warbler. □

TINA SHAW, Office of Communications, Midwest Region

The Road to Recovering the Endangered James Spinymussel

James spinymussels returned to the mainstem of the James River — where the species hadn't been seen for over 60 years — in 2022. Biologists stocked about 1,300 mussels into the James, a major milestone in the recovery of the species.

James spinymussels have been protected under the Endangered Species Act since 1988. Loss of habitat and water quality issues stemming from industrial and municipal discharges and runoff from towns and farms led to the bivalve disappearing from nearly 95% of its historic range. Small remnant populations remained in the upper reaches of the James River watershed in West Virginia and Virginia and in parts of the Dan River watershed in North Carolina near the Virginia border.

To help recover the species, we recommended protecting the habitat of existing populations, restoring habitat to help populations recolonize where they had been eliminated, and using the newly developed tool of propagating mussels in hatcheries to reestablish populations within its historical range. Here is where the road to recovery runs through Harrison Lake National Fish Hatchery in Virginia, taking advantage of the expertise of hatchery manager Rachel Mair and Brian Watson with the Virginia Department of Wildlife Resources.

A Recovery Recipe for Success

In 2007, the hatchery partnered with Virginia to establish the Virginia Fisheries and Aquatic Wildlife Center at the hatchery. The center's mission – restore species of freshwater mussels that were disappearing from Atlantic slope rivers, especially federally endangered species like the James spinymussel.

Mussels in general provide valuable ecoservices, like filtering water. »

Biologists with the Harrison Lake National Fish Hatchery and the Virginia Department of Wildlife Resources stocked James spinymussels into the James River where the mussel hasn't been seen in over 60 years. (PHOTO BY MEGHAN MARCHETTI/VADWR)

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Mair was the first to propagate James spinymussels and release them back into the wild in 2013. Her careful techniques for putting mussel larvae on small host fish like the rosyside dace and for improving the feeding and care of rare mussels made the recovery program successful.

Since 2017, the interagency team has propagated and stocked more than 3,000 spinymussels into eight populations in the James River and Dan River watersheds, expanding the size of existing populations and helping reestablish populations.

In 2022, biologists released about 1,300 mussels in the James River, all tagged with a unique number so they can monitor the population's recovery in the coming years. Half of those released into the James River (650) also received a passive integrated transponder (PIT) tag that can be detected by a special antennae or PIT tag reader. Biologists will search for mussels following the "pings" detected by the reader in the coming years, and then they will snorkel or dive in hopes of finding more mussels. They will evaluate survival, growth, and whether the mussels are reproducing.

(Top) The riverbanks were showing significant erosion in the Cowpasture River. (PHOTO BY DAVID BYRD/USFWS) (Bottom) Our Virginia Ecological Services Field Office worked with landowners and FishAmerica Foundation to regrade and restore stability to the riverbanks on the Cowpasture River. (PHOTO BY DAVID BYRD/USFWS)

The Importance of Habitat

Our recipe for recovery also includes restoring places for the species to thrive. Following the recommendations in the James spinymussel recovery plan, we, through our Appalachian Fish and Wildlife Conservation Office, Virginia Ecological Services Field Office, Virginia Fish and Wildlife Conservation Office, have been working for over a decade with partners to protect and restore habitats in the James River watershed.

Dam removals help mussels, too. We worked with the Virginia Department of Wildlife Resources, the owner of the Jordan Point Dam, and the city of Lexington to restore river flows and habitat in the Maury River, a tributary to the James River. The dam removal has improved the distribution of sediments through the river, created better habitat for fish and mussels downstream, and has allowed fish (and their hitch-hiking mussels) to recolonize upstream of the former dam. It also improved public safety and reduced impacts of flooding.

"What we've been seeing with freshwater mussels in the James River, primarily from Lynchburg downstream to about Richmond, has given us an indication that conditions are good for the reintroduction of rare species like the James spinymussel," says Virginia's Watson.

"If the causes of harm and degradation are removed, the environment can heal as long as the seeds for getting started are still there" he adds. "In the case of freshwater mussels with their complicated life cycle, it would take decades for a bed of mussels to rebuild itself. That's why they need a little assistance to jumpstart the process and boost their numbers."

The Clean Water Act of 1972 and ongoing habitat restoration efforts have all played key roles in helping improve water quality and habitat in the James River. The Harrison Lake Hatchery and Virginia Fisheries and Aquatic Wildlife Center staff are stocking freshwater mussels into these restored habitats.

"To date we have released around 320,000 mussels into rivers that feed into the Chesapeake Bay and Albemarle Sound," says Mair. "It's very gratifying to see our mussel conservation and restoration efforts are working, not only for the James spinymussel, but for the other dozen species we are raising to restore both species and the services mussels provide." □

CATHERINE GATENBY, Fish and Aquatic Conservation, Northeast Region

Prairie Conservation Continues to Blossom in the Pacific Northwest as Nelson's Checker-mallow Recovers

PORTLAND, Ore. — The Pacific Northwest has another cause for celebration during the 50th anniversary of the Endangered Species Act. In mid-October 2023, we announced the removal of Nelson's checker-mallow, a perennial flower with spectacular pink blooms, from the federal list of endangered and threatened species due to recovery.

The delisting of Nelson's checker-mallow is the latest in a string of recoveries for federally protected Pacific Northwest plants. Golden paintbrush was delisted in July after a remarkable comeback, and Bradshaw's lomatium was delisted due to recovery in 2022.

When Nelson's checker-mallow was protected in 1993, most known populations were small and threatened by habitat loss, encroachment by invasive and woody plant species, and roadside management activities. Thanks to a diverse network of partners, this species is now found at more than 50 locations and 38 independent populations have management plans, protecting this plant and its habitat into the future.

"Recovering species is difficult but rewarding work, and we are fortunate to have dedicated partners who…rose to the challenge to save the Nelson's checker-mallow," says Hugh Morrison, our Pacific Regional Director. "We are thrilled to announce the delisting of a second prairie plant during the 50th anniversary of the Endangered Species Act. This success story highlights the power of partnerships when it comes to conservation in the Pacific Northwest."

This recovery and delisting of Nelson's checker-mallow was possible due to the extensive efforts of partners committed to this plant's conservation, including the Confederated Tribes of the Grand Ronde, private landowners, Institute for Applied Ecology, The Nature Conservancy, Greenbelt Land Trust, Native Plant Society, Oregon State University, Portland State University's Rae Selling Berry Seed Bank, county and city governments, Oregon Department of Agriculture, Oregon Department of Fish and Wildlife, Oregon Department of Transportation, Oregon Department of Forestry, U.S. Army Corps of Engineers, Bureau of Land Management, and the Natural Resources Conservation Service.

Prairies are transient plant communities, requiring continued disturbance to prevent them from turning into woodlands. Prairie habitat loss and degradation in Oregon and Washington has been significantly reduced through years of habitat management and by the ongoing commitments from our conservation partners.

Landowners are actively maintaining prairies through mowing and prescribed burning, practices that mimic the natural disturbance processes needed to prevent native plant communities from turning into a forest or sea of annual invasive grasses. Many landowners are working with our Partners for Fish and Wildlife Program and local national wildlife refuges to improve and maintain prairie habitat on their lands.

Other native plants and pollinators are also benefitting from the extensive network of prairie partnerships in the Pacific Northwest. This includes the other two recently delisted plants, golden paintbrush and Bradsha,.w's lomatium, and currently ESA-protected species, such as Willamette daisy, Kincaid's lupine, Taylor's checkerspot butterfly, and Fender's blue butterfly, the latter having other recently been downlisted from endangered to threatened. □

The Sound of Science: Using Acoustic Monitoring to Locate California Spotted Owls

Many people head into the mountains to find some peace and quiet. But research from the Peery Wildlife Ecology and Conservation Lab at the University of Wisconsin proves that forests are anything but quiet. A project, now in its third year, is using recording devices placed in California's national forests to collect millions of hours of forest sounds in the hope of capturing the hoot of a California spotted owl.

In 2023, we proposed to protect the California spotted owl as a threatened species in the Sierra Nevada. The owl faces multiple threats, including large, »

A California spotted owl perches on a snag in a California forest. (PHOTO BY RICK KUYPER/USFWS)

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extremely hot wildfires that char the bird's preferred habitat and non-native barred owls that outcompete the spotted owl for territory and food. The study will help determine how quickly these threats are impacting spotted owl populations.

"We're working with our partners to develop a strategy that will help California spotted owls thrive in the Sierra Nevada, but we need more high-quality science on how the owls use forest habitat, especially as wildfires continue to change the landscape," says Stephanie Eyes, senior fish and wildlife biologist at our Sacramento Field Office.

Kevin Kelly, a program manager working for the Peery Wildlife Ecology and Conservation Lab, is leading research we partially funded to answer how the owl uses areas devastated by wildfire and if barred owls are taking over areas once used by spotted owls by listening for hoots.

"Traditional monitoring requires going out into the forest and hooting for the owl. If they hoot back, you know they're nearby, and you can find them," Kelly says.

It can be a time-consuming process, so his team is taking a different approach.

Starting in April, Kelly and his team spend a few months traveling the backroads of California's national forests, stopping every few miles to install a recording device that captures the sounds of the forest. The recording units are placed in burned and unburned parts of national forests. The team installs about 1,700 recording units and returns about six weeks later to collect them. This method enables researchers to monitor for spotted owls in more locations for longer periods of time.

Acoustic monitoring units are placed in forests that have experienced high-severity fire. The information gathered by these units in these locations helps biologists learn if owls are returning to the forests they once called home. (PHOTO BY KEVIN KELLY/PEERY WILDLIFE ECOLOGY AND CONSERVATION LAB)

"The owls are the most vocal from April until June when mating pairs are talking to each other and warning off any neighbors from intruding on their territory. They get quieter later in the summer to avoid drawing attention to chicks in nests," Kelly says.

Once back at the lab in Wisconsin, the researchers analyze about 1 million hours of sounds collected from the forests. A computer program finds and pulls out any sounds that match the vocal signatures of the California spotted owl and barred owl.

Preliminary results reveal that the owls are not hooting in areas impacted by high-severity wildfires, even if that was their home territory in previous years. While the owls could be using the area for hunting and foraging, they are not hooting in the open spaces. Doing so could expose them to predators.

These findings align with what Eyes has seen. Eyes spent several years studying wildfire in the Sierra Nevada and monitoring for California spotted owls in Yosemite National Park and nearby national forests. California spotted owls need large trees that create a high canopy with lots of cover. They also like old trees for making nests.

"If a fire removes those elements of a forest, the owls will leave. It's like if we don't have a roof over our heads, we won't stay in our house," she says.

Kelly aims to continue this research for several years to identify changes in owl locations year-over-year and determine how long the owls stay out of areas impacted by high-severity wildfire. We'll be working alongside partner organizations to use the information to map the changing habitat in the Sierra Nevada and the owl's shifting presence in those places.

"These recording devices provide a lot of valuable data. In addition to recording the presence of an owl, the data can tell us how many owls are in the forests and how well the populations are doing. Additionally, there's the potential for detecting other species that share the forest with the spotted owl," Eyes says. □

MEGHAN SNOW, Office of Communications, Pacific Southwest Region

Healthy Wetlands Are Vital to Protecting Endangered Species

Habitat loss is the biggest threat to the ‘alae ‘ula, or Hawaiian moorhen. (PHOTO BY GARY KRAMER/USFWS)

> “Nothing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed. It is a many-faceted treasure, of value to scholars, scientists, and nature lovers alike, and it forms a vital part of the heritage we all share as Americans [and] which we hold in trust to countless future generations of our fellow citizens.”
>
> **— Statement of President Richard Nixon upon signing the Endangered Species Act, Dec. 28, 1973**

Wetlands are one of the most productive and biodiverse habitats in the world. Although they cover only 6% of the Earth’s land surface, 40% of all plant and animal species live or breed in wetlands. Threatened and endangered species are no exception, with approximately half of all federally protected species in the United States being wetland dependent.

There are many different types of wetlands, and they provide important breeding, nesting, feeding, and overwintering habitat for a wide range of species. These habitats are composed of both fresh water and salt water, as well as brackish areas at the coastal boundary. Freshwater wetlands include open water habitats commonly referred to as ponds, as well as vegetated habitats such as bogs, fens, swamps, and wet prairies. Saltwater wetlands include salt marshes, shoals, and mangroves.

Threatened and endangered wetland dependent species are as diverse as the habitats they call home. They include highly specialized plants whose roots have adapted to live in wet soils, such as the meadow sweet pitcher plant found in the bogs of North and South Carolina. The ‘alae ‘ula, or Hawaiian moorhen, lives in freshwater marshes, reservoirs, and wet meadows where they nest and feed on insects, mollusks, and grasses. Amphibians such as the California tiger salamander depend on freshwater ephemeral ponds to lay their eggs and begin their complex lifecycle. Mammals that need wetlands range from California’s tiny salt marsh harvest mouse to the Florida key deer that forages among mangrove forests.

Wetland-dependent threatened and endangered species must compete for resources as their habitat quickly shrinks. According to the National Wetlands Inventory Program, the United States has lost more than 50% of its original wetland area since European colonization. Recent Status and Trends studies show a trend toward a gain of open water habitats, such as ponds and lakes, and loss of vegetated wetlands. New ponds often associated with developments and farming activities can help species that prefer open water habitats, such as ducks and other waterfowl. However, the loss of vegetated wetlands imperils all species that rely on those habitats for survival.

The Endangered Species Act is more important now than ever, as species face continued threats from habitat destruction due to development, pollution, and climate change. The historic loss of wetlands and their importance to a wide range of species highlights the importance of preserving or restoring the remaining 50% of wetland habitats to make them viable habitat for the species that depend on them. □

ESA TURNS 50

The Endangered Species Act, which became law Dec. 28, 1973, recognizes that endangered and threatened species of wildlife and plants "are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." And it has done a standout job of ensuring their survival. One of the world's most effective wildlife conservation laws, the ESA is credited with saving 99% of the species it protects. More than just protection of ESA-covered species, the act encourages partners to come together and work toward recovery of all imperiled species. Read about our successes and challenges. ››

Clockwise from top: A black-footed ferret under a night sky at UL Bend National Wildlife Refuge. (PHOTO BY JOHNASHLEY.COM) A young Mexican wolf pup licks the muzzle of an adult to encourage it to regurgitate food. (PHOTO BY JACQUELYN M. FALLON) A pair of American burying beetles.
(PHOTO BY SCOTT COMINGS/THE NATURE CONSERVANCY)

SLOW AND STEADY

Recovering the Mojave desert tortoise in the face of climate and landscape change.

By KRISTINA DRAKE *and* COREY MITCHELL

(Above) Mojave desert tortoises use their elephantine limbs to dig burrows to escape temperature extremes. (PHOTO BY KRISTINA DRAKE/USFWS) (Left) For desert tortoises, the sex of their offspring is dependent on the temperature in which the eggs are incubated. (PHOTO BY KRISTINA DRAKE/USFWS)

The Mojave Desert contains some of the driest and hottest landscapes in North America and represents one the most unique geological and ecological bioregions in the country. However, many factors including utility-scale renewable energy development, urbanization, recreation, and climate change are transforming this ecoregion and impacting endemic species such as the federally threatened Mojave desert tortoise.

Mojave desert tortoises are resilient long-lived organisms that have occupied habitats in California, Nevada, Arizona, and Utah for thousands of years. Ancestors of the modern tortoise date back to the late Pleistocene epoch. They use their elephantine limbs to dig burrows to escape temperature extremes—creating habitats and refuges for species such as the sidewinder, black-tailed jackrabbit, kangaroo rat, Gila monster, and many others.

Beyond their burrows, these tortoises have developed a range of adaptations to survive in the arid desert environment, including their ability to store and conserve water and consume limited food by regulating metabolic processes. They forage on a diversity of annual forbs and grasses that generally arrive in the spring and late summer depending on the timing and amount of rainfall. However, recent landscape use changes and habitat degradation have resulted in tortoise food plants being intermixed or replaced by invasive Mediterranean grasses with less nutritional value.

Increased urban expansion and infrastructure development, such as utility-scale solar farms, have also exerted pressures on Mojave Desert ecosystems, resulting in fragmented and degraded habitats in some areas with complex land management and stewardship challenges. Cumulative and persistent climate and landscape-scale changes and threats are contributing to the decline of the Mojave desert tortoise throughout much of its range.

Recent changes and habitat degradation have resulted in Mojave desert tortoise food plants being intermixed or replaced by invasive grasses with less nutritional value. (PHOTO BY TODD ESQUE/USGS)

Climate change is having profound impacts on ecosystems and species across the planet, driven by rising global temperatures, changing precipitation patterns, and increasing frequency of extreme weather events. These changes are leading to shifts in species distributions, disruptions to breeding and feeding behaviors, and potential changes in reproductive outputs.

For desert tortoises, changing climates are particularly concerning as the sex of their offspring is dependent on the temperature in which the eggs are incubated. Additionally, prolonged drought can cause localized tortoise mortality events and changes in pollination synchronies for many important plant communities. It can also disrupt predator-prey dynamics, making tortoises the target of many subsidized predators, or predators whose populations have increased because of human food and water subsidies across the desert.

Can tortoises adapt behaviorally and adjust to rapidly changing climates?

Much like tortoises, efforts to protect and recover this species have been slow and steady for more than 30 years. In 1990, most Mojave desert tortoises were protected as threatened under the Endangered Species Act with additional state protections. Recovery efforts for tortoises have been extensive and multifaceted, aiming to address the numerous threats that are contributing to decline while increasing habitat preservation and restoration.

Recovery of the species has been challenged by an incomplete understanding of the threats most responsible for its decline, insufficient information on the effectiveness of management actions as well as the vast geographic and jurisdictional management involved. In recent years, recovery programs such as head-starting and strategically adding tortoises to populations, reducing the numbers of subsidized predators, and installing desert tortoise fencing along roadsides have been initiated simultaneously to bolster wild populations. Effective recovery efforts for Mojave desert tortoises will likely require finding creative solutions to both climate and landscape change as well as prioritizing the conservation of a functioning desert ecosystem, which will also benefit other protected or sensitive species within the region. □

KRISTINA DRAKE and COREY MITCHELL, Desert Tortoise Recovery Office, Ecological Services, Pacific Southwest Region

VOICES OF THE FUTURE

Old growth forest at Willapa National Wildlife Refuge.
(PHOTO BY BEN NEWMAN)

Fostering the next generation of conservation practitioners: the Civilian Climate Corps.

By GABRIEL VAN PRAAG, DANIEL ASYN, ASHLEY GARCIA, LANE LOPEZ, DENNA MARTINEZ, *and* BEN NEWMAN

Going forward, climate change presents a growing threat not just to species protected by the Endangered Species Act but to all fish, wildlife, plants, and their habitats. The fellows of the new Civilian Climate Corps Fellowship saw these threats as they worked and lived at Aransas National Wildlife Refuge, Big Oaks National Wildlife Refuge, Bosque del Apache National Wildlife Refuge, Santee National Wildlife Refuge, Willapa National Wildlife Refuge, and Yukon Flats National Wildlife Refuge. And they developed strategies to help land managers adapt to the changing climate.

Jimmy Fox, project leader at Yukon Flats National Wildlife Refuge, is a fan.

"It's been very helpful to have a Civilian Climate Corps fellow working with refuge staff to help us understand how natural features of the refuge are changing and what the future may hold for this place. This work gives us something to bring to conversations with Tribes who are concerned about the future."

Seeing the Problems

Aransas, along the mid-Texas coast, provides habitat for migratory waterfowl and for the endangered whooping crane. There, projected increases in sea level rise are expected to impact low-lying marshes by increasing saltwater intrusion and exacerbating storm surge, especially during tropical storm events.

Also along the coast, though in southwestern Washington, Willapa encompasses tidal wetlands, coniferous old-growth forests, coastal dunes, and coastal prairies. The increases in temperature from climate change will likely cause fire frequency to rise, putting many sensitive rainforest species at risk.

In the northeast interior of Alaska, Yukon Flats Refuge, the third largest of the Refuge System, is on the forefront of climate changes. Yedoma, an old ice rich permafrost, underlies parts of the refuge. The effects from warming temperatures and wildfire can influence permafrost thaw, which can alter the landscape and release carbon. The refuge's brackish wetlands have some of the highest densities and diversity of waterbirds on the refuge, but they are vulnerable to warming temperatures.

Civilian Climate Corps Fellow Ashley Garcia holds a northern Aplomado falcon chick at Aransas National Wildlife Refuge. (PHOTO BY USFWS)

Sitting alongside the Rio Grande in New Mexico, Bosque del Apache manages its wetlands, riparian forest, semi-arid grassland, and desert scrub habitat for migratory and wintering waterfowl and for four federally protected species. The increasingly arid climate of the region is of great concern. The changing climate's warming trend is also exacerbating droughts and reducing water availability, thus creating problems for the creation of wetland habitat for the waterfowl.

Also providing habitat for wintering waterfowl, Santee is in the coastal plains of South Carolina. Higher temperatures and changing precipitation regimes may affect the timing of migration, and of optimal emergence of needed resources and breeding conditions for migratory and residential species.

Farther north and inland, Big Oaks, in southeastern Indiana, is a globally important bird area thanks to its large grassland habitat while also protecting one of the largest continuous blocks of forest in the state. These grasslands will continue to depend on the use of prescribed fire to keep back woody encroachment, though it is uncertain how the use of fire will be affected by the higher temperatures and increases in precipitation caused by climate change. The climatic stress from these extreme heat and rainfall events, as well as increasing invasive plant pressure, could also lead refuge forests to face changing understory composition.

To put together this list of potential and current problems, fellows gathered projections of management and locally relevant climate variables such as temperature, precipitation, extreme rainfall events, and sea level rise. To understand the plausible range of future climatic conditions, they selected values from several timeframes (mid-century, late century) and from differing greenhouse gas emission scenarios. Fellows performed extensive literature reviews and consulted with subject matter experts to determine the potential impacts of the previously selected climate variables under several climate scenarios. ››

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Potential Solutions

The fellows took this climate change data and research and applied it to natural resource management and decision-making. They assessed the vulnerability of priority resources on refuges, identified plausible trajectories of ecosystem change, and provided adaptation recommendations.

Their project looked beyond traditional management strategies that consider baseline conditions as the ideal state. Climate change is causing ecosystems to shift away from historical baselines, resulting in changes in unexpected ways. Species may shift their ranges or change their migration timing. Habitats may transform gradually or undergo rapid transitions into novel systems. Therefore, fellows guided the development of adaptation strategies using the Resist-Accept-Direct decision-support tool. Strategies explicitly state whether their objective is to "resist" and maintain or restore historical conditions, "accept" ecosystem transformation, or "direct" change toward a desirable new state. These drafted strategies are not prescriptive, as managers could choose different approaches across space and time as the change unfolds.

Fellows' assessments provided an array of strategies and actions managers will be able to choose from to adapt to localized climate change impacts. Active management, such as increasing structural and compositional diversity, could be chosen to mitigate climate threats and resist changes whenever feasible. Low-risk planting of future-adapted seeds of important plant species could be performed to increase a site's adaptability to the future climate.

Fellows also developed monitoring recommendations as changes to species and habitats will unfold in unexpected ways. For instance, they recommended implementing Surface Elevation Tables to monitor marsh accretion rates, surveying for new invasive species, and using remote sensing to track structural ecosystem changes.

Civilian Climate Corps Fellow Daniel Asyn (left) and the Surface Elevation Table team take measurements in the tidal marshes of Ernest F. Hollings ACE Basin National Wildlife Refuge. (PHOTO BY EDWARD TUPACZ/USFWS)

The National Wildlife Refuge System's Natural Resource Program Center, which provides scientific support to national wildlife refuges throughout the nation, developed the Civilian Climate Corps Fellowship with the Hispanic Access Foundation Mano project.

Although just the first program of its kind, fellows hope their work can serve as a model for Service managers seeking to use climate science to inform local decision-making. Even though these assessments were tailored toward specific refuges, some of the compiled climate projections and literature reviews may be of use at other field stations. Additionally, the methodology followed and lessons learned from the work could help inform the project design and implementation of future climate assessments. Helping bridge the gap between climate change research and local implementation, these assessments highlight practices that will aid in further progressing local climate change adaptation. □

BY GABRIEL VAN PRAAG, DANIEL ASYN, ASHLEY GARCIA, LANE LOPEZ, DENNA MARTINEZ, and BEN NEWMAN, Civilian Climate Corps Fellows

(Top Left) The first Civilian Climate Corps Fellow cohort during their inaugural meeting at Big Oaks National Wildlife Refuge. From left to right: Lane Lopez, Ashley Garcia, Denna Martinez, Daniel Asyn, Gabriel Van Praag, and Ben Newman. (PHOTO BY USFWS)

(Top Right) Civilian Climate Corps Fellow Denna Martinez holds a recently banded northern pintail in a boat at Canvasback Lake on Yukon Flats National Wildlife Refuge. (PHOTO BY GEORGE GELETA)

(Right) Grassland in the fall following a spring prescribed burn at Big Oaks National Wildlife Refuge. (PHOTO BY GABRIEL VAN PRAAG)

DEVELOPING FUTURE CONSERVATION LEADERS

The Native Youth Climate Adaptation Leadership Congress gives Indigenous voices a chance to discuss conservation challenges.

By GINA CORAL

Every summer since 2015 high school students from federally recognized Tribes across the continental United States, Alaska, Hawai'i, American Samoa, and Saipan gather at the National Conservation Training Center in Shepherdstown, W.Va., for the Native Youth Climate Adaptation Leadership Congress. For one week, the students network; explore culture, tradition, and science; and engage in leadership and conservation training. The mission is to develop future conservation leaders with the skills, knowledge, and tools to address environmental change and conservation challenges, thus better serving their schools and communities.

Created through a partnership with the Service, multiple other federal agencies, New Mexico Wildlife Federation, Aspen Institute, Tribes, and Indigenous communities, the Congress has engaged more than 656 youth and 170 mentors. It not only provides an opportunity for Indigenous youth to come together for leadership development but also empowers them to work on the conservation challenges their communities face. Through teamwork, participants in the Congress create solutions to issues they are passionate about.

Endangered species conservation and recovery are uniquely tied to Tribal, Alaska Native, Native Hawaiian, and Pacific Island communities, and Indigenous organizations are important partners.

Many threatened and endangered species have significant cultural and ecological value to Indigenous communities. For instance, the threatened Humboldt marten has been part of the Yurok Tribe's ceremonial regalia since time immemorial.

Ancestral lands and traditional ecological knowledge have played a vital role in conservation, and Tribes and Indigenous communities have been integral in the recovery of numerous species, including the bald eagle.

As we celebrate the Endangered Species Act 50th anniversary and look to the next 50 years of species conservation, the voices of Indigenous youth are more important than ever.

Bainivalu Davetawalu is American Samoan and attended the Congress as a junior faculty member. Junior faculty are college-age Indigenous youth who serve as mentors to the high school students. They participate in leadership and career training during the Congress to grow leadership capacity for Indigenous communities. The junior faculty serve an integral role in supporting the students in the Congress.

Davetawalu got involved in conservation through work with an environmental nonprofit, Finafinau, named for the Samoan term for resilience, focusing on development, conservation, and sustainability. He also interned with American Samoa Climate Network Action, where he focused on invasive species removal. At the Congress, Davetawalu supported students in their work to develop a project that would establish mangroves in a specific location on American Samoa to address sea level rise and provide wildlife habitat. Davetawalu highlighted that his community has already been a victim of climate change and the use of natural resources to combat climate change effects was a way to honor the cultural practices of his people and avoid infrastructure such as seawalls that further break the land.

When looking to the future of conservation, Davetawalu shares that "most of the world depends on wildlife and natural resources, and with the status quo and where we're at right now it's hard to envision getting back to a place where everything is stable." He wonders, "How are we going to combat the challenges? And who are we going to turn to? Are they going to help us? The support. Is it going to be there? Will it be enough to sustain and conserve our wildlife and our natural resources?"

Davetawalu sees the way forward through education. He feels that amplifying wildlife education is key to returning to healthy ecosystems and sustainable species populations. He mentions the value of programs like the Congress in providing a platform for deep, meaningful conversations across cultures and an opportunity to better understand the state of wildlife and natural resources in many areas. He feels a focus on what can be done right now and how younger generations can support conservation is essential.

Davetawalu looks forward to a future where Indigenous voices are at the table. "It gets me excited and gives me hope that there will very soon be a table filled with Indigenous voices and that we as a collective are going to combat the challenges and build a better future for our generation."

He adds, "I'm excited to see an environment where traditional practices are being used again to help benefit natural resources and wildlife."

Asa Samuels is from the Choctaw Nation of Oklahoma and a citizen of the Cheyenne and Arapaho Tribes. He also served as a junior faculty member at the 2023 Congress. Samuels has always had an appreciation for wildlife. When he was ››

Previous page: (Top) Kainoa Azama, Kānaka Maoli, plays a flute during a cultural gathering at the Congress. (PHOTO BY MELISSA GONZALEZ/USFWS) (Bottom) Future leaders represent American Samoa with a traditional dance at the Congress. (PHOTO BY USFWS)

Participants of the Congress relax after working at a plant nursery. (PHOTO BY ALEJANDRO MORALES/USFWS)

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younger, he visited Joseph H. Williams Tallgrass Prairie Preserve, saw wildlife roaming freely, and learned about the role of the Tribe in the preserve. "It was really inspiring to see and it's something that will stick with me forever."

After this experience, Samuels enrolled in a biology program at Seminole State College and has followed that path forward to the University of Oklahoma. Samuels is passionate about pursuing conservation through an Indigenous lens and considering the cultural importance and meaning of natural resources and the environment.

He chose to participate in the Congress for the opportunity to work with Indigenous youth. "We're talking about our future leaders, who are going to be there after we're gone to keep our efforts going." And he was more than impressed with the students at the summit, stating, "They had that fire in them to go into action." Samuels emphasizes that they didn't shy away from tough issues but used their experiences from their communities to speak openly about climate change and climate justice.

For Samuels, future conservation success hinges on education, funding initiatives, and recognition and inclusion of unique Indigenous perspectives in the development of conservation programs. ››

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He notes, "All Tribes, we are all one people, but we're all different at the same time. We all have different cultures. We have different values. We look at things differently."

If given the chance to create a program in their own way, Samuels notes that Indigenous communities could make a positive impact on species conservation. He also sees opportunity in education. He suggests starting wildlife conservation programs younger and ensuring colleges and universities have Native American programs. He underscores the importance of ensuring individuals from Indigenous communities can attend and graduate from institutions of higher education.

Samuels feels that the time is now to make a difference on large environmental issues such as climate change. He's ready to get into the field, get his hands dirty, and start making an impact. He shares, "My vision for the future is bright. It's promising. When I talk to other Native people about this, it's something that they see and believe in."

The inclusion of these important perspectives will be essential to the next 50 years of the Endangered Species Act and the conservation work ahead. And the future could not be more promising with many young minds already at work on the issues we face. □

GINA CORAL, Ecological Services Program, Headquarters

(Top) A participant of the Congress canoes on the Potomac River. (PHOTO BY MELISSA GONZALEZ/USFWS)

(Left) Asa Samuels, in traditional Pow-Wow regalia, and Bainivalu Davetawalu (above) served as mentors at the 2023 Native Youth Climate Adaptation Leadership Congress. (PHOTOS COURTESY OF ASA SAMUELS AND BAINIVALU DAVETAWALU)

TALKING ENDANGERED SPECIES

Staff from across the Service weigh in on their start in conservation and its future.

Pacific lamprey

U.S. Fish and Wildlife Service employees perform a wide range of jobs, and as Mara Koenig, with our Office of Communications in the Midwest Region, says, "Every employee is involved in endangered species in some form." Hear from a select few:

Vicki Finn

Conservation Coordinator, Science Applications, Pacific Region

How did you get involved with endangered species conservation?

I have always loved animals and grew up fishing on our family pond, catching fireflies on summer nights, and watching *Mutual of Omaha's Wild Kingdom*. In college I took an ornithology class from a Dr. Byrd (yes, the name is real), which introduced me to at-risk raptors that were finally rebounding post banning of DDT. And that changed my career trajectory from medicine to wildlife.

In 1989, I was fortunate to land a job at Service Headquarters in the Division of Endangered Species at a time when the Service was revamping the recovery program. I was working with amazing visionary leaders like Jamie Clark, Mike Spear, LaVerne Smith, and Gary Frazer. We were focused on innovating and incentivizing the Endangered Species Act not only for listed species but at-risk candidates as well.

I moved to the Pacific Region shortly after the Northern spotted owl was listed, which was a very challenging time in the Pacific Northwest. While I have been in other programs since 2001, I have stayed committed to addressing at-risk species needs with the goals of addressing their threats and providing enough conservation, so listing is not needed under the ESA. One of my proudest moments was working in Fish and Aquatic Conservation on Pacific lamprey conservation. Through collaboration with stakeholders, we helped stabilize the species. Today my pride and joy are our work on at-risk pollinators. My hope is our pollinator work in Science Applications can do the same for many of our at-risk pollinators.

What are you most excited for in the future regarding endangered species conservation work?

Our new employees! Their skills, passion, and energy bring me hope. They are starting their careers with amazing technical skill and global awareness of what's at stake not only for our endangered species but for humans as well. With the new cadre of social scientists we are hiring in Science Applications, we are poised to continue to work more effectively with our publics to create more durable conservation solutions. Our future is bright because of our people.

Mara Koenig

Communications Lead for the Center for Pollinator Conservation, Office of Communications, Midwest Region

How did you get involved with endangered species conservation?

It's part of the foundation of our agency. I believe every employee is involved in endangered species in some form, whether it's habitat restoration, outreach and education, or building and maintaining partnerships. ››

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Why is the work that you do important for future generations?

People will not know, will not care, and will not act to conserve wildlife and plants unless we communicate well and often with them. We need to be a voice, a role model, and to welcome all people to explore, learn, and ask questions about the natural world.

Eric Prowell

Fish and Wildlife Biologist (Transportation Liaison), Ecological Services, Southeast Region

How did you get involved with endangered species conservation?

I was working on my master's degree in hydrology at the University of Georgia when I had the opportunity to intern with the Service's Georgia Ecological Services. That is when I was first introduced to endangered species conservation. My master's research was focused on maintaining natural hydrologic regimes in developing landscapes, and Georgia Ecological Services was charged with the protection and recovery of imperiled aquatic species in developing regions of North Georgia. The opportunity to not only apply my skillset but improve both policy and on-the-ground, actions was too great a match to pass up. I have been with Georgia Ecological Services ever since (20 years).

Why is the work that you do important for future generations?

The progress we have made the last 25 years wouldn't have happened without the hard work and progress of the previous 25 years. That constant incremental progress toward improving what we know and implementing it on the ground is paramount in the progress that will be made in the next 25 years or 50 years. My supervisor and mentor (Dr. Robin Goodloe) would always remind me progress in conservation happens through "baby steps." Those incremental steps through time are how we move toward what Aldo Leopold described as "harmony" with the natural world and the critters that it supports.

Nancy Pau

Wildlife Biologist, National Wildlife Refuge System, Northeast Region

How did you get involved with endangered species conservation?

I grew up in New York City watching *Wild America* with Marty Stouffer on PBS. As a high school student, I got an opportunity to do research at Iowa State and Cornell universities during the summer. When I learned that wildlife conservation was a career choice, that was it for me. In the last month of my senior year at Cornell, I was at the right place at the right time, and was recruited by a refuge biologist. Since then, I've worked as an endangered species biologist at the Sacramento Field Office, and now work to recover several endangered species (piping plovers, northern long-eared bats, red knots, and Atlantic sturgeon) as a wildlife biologist at Parker River National Wildlife Refuge.

Why is the work that you do important for future generations?

We have a responsibility to ensure that future generations will be able to enjoy the full diversity of wildlife. This was reinforced for me recently when I met a young family who made a special trip to Parker River from Brooklyn because their 7-year-old wanted to see a peregrine falcon. Similarly, we made a special trip to California a few years back so that my son could see a California condor in real life. The work we do ensures that future kids don't have to learn about these species in a book or Wikipedia but can experience the magic of seeing them in the wild for themselves.

Cassie Powell

Native American Liaison, Office of Communications, Mountain-Prairie Region

How did you get involved with endangered species conservation?

I was born and raised on the Blackfeet Reservation on the family ranch and grew up learning the connection that Native Americans have with the land and animals. I was raised to co-exist with everything present and appreciate what was given from the land and to take nothing for granted as future generations would be dependent on how we took care of the land and animals. I knew at an early age what I wanted as a career, and eventually I graduated with my bachelor's in fish and wildlife biology. I was one of the first Native American women to graduate on my reservation in this line of work and have since then worked in many positions in the federal and Tribal sectors to gain valuable knowledge furthering my skills. ››

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Why is the work that you do important for future generations?

The work I'm currently doing will be of value for future generations by connecting Tribes and the Service and other entities together to bridge gaps, identify needs and solutions, and build relationships to collaborate to protect mother earth and all that inhabit it.

Jared Laufenberg

Refuge Biometrician, National Wildlife Refuge System, Alaska Region

How did you get involved with endangered species conservation?

The focus of my Ph.D. research beginning in 2008 was to evaluate the recovery status of federally threatened Louisiana black bears in Louisiana. My field research involved working with numerous partners including several national wildlife refuges, multiple state agencies, and many private landowners. Results from that research provided evidence used by the Service in its decision to remove Louisiana black bears from the threatened species list in 2016. My Ph.D. research led directly to a postdoctoral fellowship focusing on developing and evaluating new monitoring strategies for the Louisiana black bear post-delisting monitoring plan.

Why is the work that you do important for future generations?

A key element of the work I do as a biometrician within the National Wildlife Refuge System is to build and share scientific knowledge about how our nation's natural resources will respond to change. [It's] knowledge that current and future generations need to make conscientious conservation decisions in ever-changing environments.

Kitti Jensen

Grant Management Specialist, Ecological Services, Pacific Southwest Region

How did you get involved with endangered species conservation?

I spent a lot of time outdoors exploring as I was growing up. In the summers, I would go to my grandparents' cattle ranch in eastern Oregon. We rode horses, went on cattle roundups, caught frogs, lots of camping and fishing—everything was outdoors. I was obsessed with animals and being outside. Having that outdoor connection was critical in forming my attachment to conservation.

When I started college, my intention was to make documentaries for conservation. I wanted to capture moments in time to educate others and increase public awareness of wildlife and nature. In my sophomore year, I was recruited by the Army Corps of Engineers to work on a large habitat restoration project. I changed my major from film to zoology and began my 38-year conservation career.

Why is the work that you do important for future generations?

Part of our role as FWS biologists is working to recover and delist species. Our recovery plans provide a framework, but we need partners to help implement recovery actions. The FWS provides incentives for conservation partners through financial assistance (grants and cooperative agreements). Working on the FWS' endangered species grants, such as Cooperative Endangered Species Conservation Fund and Recovery Challenge, has been one of the most rewarding aspects of my career. There is satisfaction when we see a large land acquisition grant close and know those lands are conserved in perpetuity. I have an active role in conserving diverse, healthy ecosystems and open space for future generations to experience and develop their own connection to the outdoors.

Pete Diaz

Fisheries Biologist, Fish and Aquatic Conservation, Southwest Region

How did you get involved with endangered species conservation?

I started working with the Service in college through one of the entry programs as a paid intern. I learned valuable lessons in biology and got to see how the Service works. I ended up staying with the Service after I got my master's degree.

Why is the work that you do important for future generations?

The work we are doing today has weight as measured by the past. Many places and species are still here because a few biologists working on them cared enough to fight for them and provide data to protect habitat and the overall ecosystem. In Texas, an argument could be made that some of our favorite swimming holes might be dry if it weren't for the presence and persistence of species listed under the Endangered Species Act. ››

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Matthew Luizza

Program Officer (Biologist), African Elephant Conservation Fund, International Affairs, Headquarters

How did you get involved with endangered species conservation?

For me, like I imagine for many others in the field of conservation, my interest started at a young age. I've had a strong affinity for the outdoors and wildlife for as long as I can remember, and the added good fortune of growing up in the Front Range of Colorado provided ample opportunities to cultivate this passion. If I wasn't absorbing all I could about charismatic species (especially gray wolves and African elephants), I was outside exploring. I have vivid memories, as an elementary school-aged kid, of very purpose-driven rescue operations to save barred tiger salamanders trapped in our window wells after heavy rains. Although not an "endangered" species, to me, in those moments, they were imminently "in danger," regardless of whether they truly needed my help or not.

Fast forward, and my conservation journey has followed varied streams that have afforded me the chance of working in diverse, shared landscapes that are home to an array of threatened and endangered wildlife and a diversity of communities that are intimately connected to the land and water. This has spanned operating as a wildland firefighter in Colorado to working as a budding interdisciplinary ecologist, conducting research in Alaska and Ethiopia. All of which fostered a strong appreciation and sustained curiosity for better understanding different ways of knowing a given landscape, spanning conventional science and traditional wisdom. Now, I have the privilege of working with amazing colleagues across the Service and conservation partners on the ground, through management of the African Elephant Conservation Fund, the goal of which is to ensure healthy African elephant populations in the wild, while improving pathways for human-elephant coexistence.

Why is the work that you do important for future generations?

I would first emphasize that it's the work (the real heavy lifting) of dedicated, trusted conservation partners on the ground that is so critical right now and for future generations. I feel very honored and humbled to be able to play some role in elevating and facilitating their tireless efforts and supporting the capacity development of African conservation champions, through management of the African Elephant Conservation Fund, which provides financial and technical assistance to projects across Africa's 37 elephant range states. Without this work, we run the risk of losing both species of African elephants (forest and savanna), with forest elephants at especially high risk, being critically endangered, or one step removed from extinction. I have two kids (both under 5), and I don't want them or anyone else in their generation to grow up in a world without African elephants. Like many other threatened and endangered species, they are essential to the health and resilience of the landscapes they inhabit, as "forest gardeners" and "ecosystem engineers," and they continue to teach us valuable lessons about ourselves and our humanity—the importance of community and empathy and how our fates are intertwined. This work increasingly requires more holistic approaches to conservation that empower and amplify co-creation and different ways of knowing, emphasizing our role as stewards and caretakers of the Earth and each other.

For many (including myself), the draw of working in the field of conservation is the wildlife (protecting, conserving, and preserving species and their habitats). However, at the end of the day, conservation is about people. Navigating distinct and shared values, managing conflict, building or re-gaining trust, fostering relationships, and forging a path forward, together, with the shared vision of a sustainable future that provides space, security, and dignity for people and wildlife. □

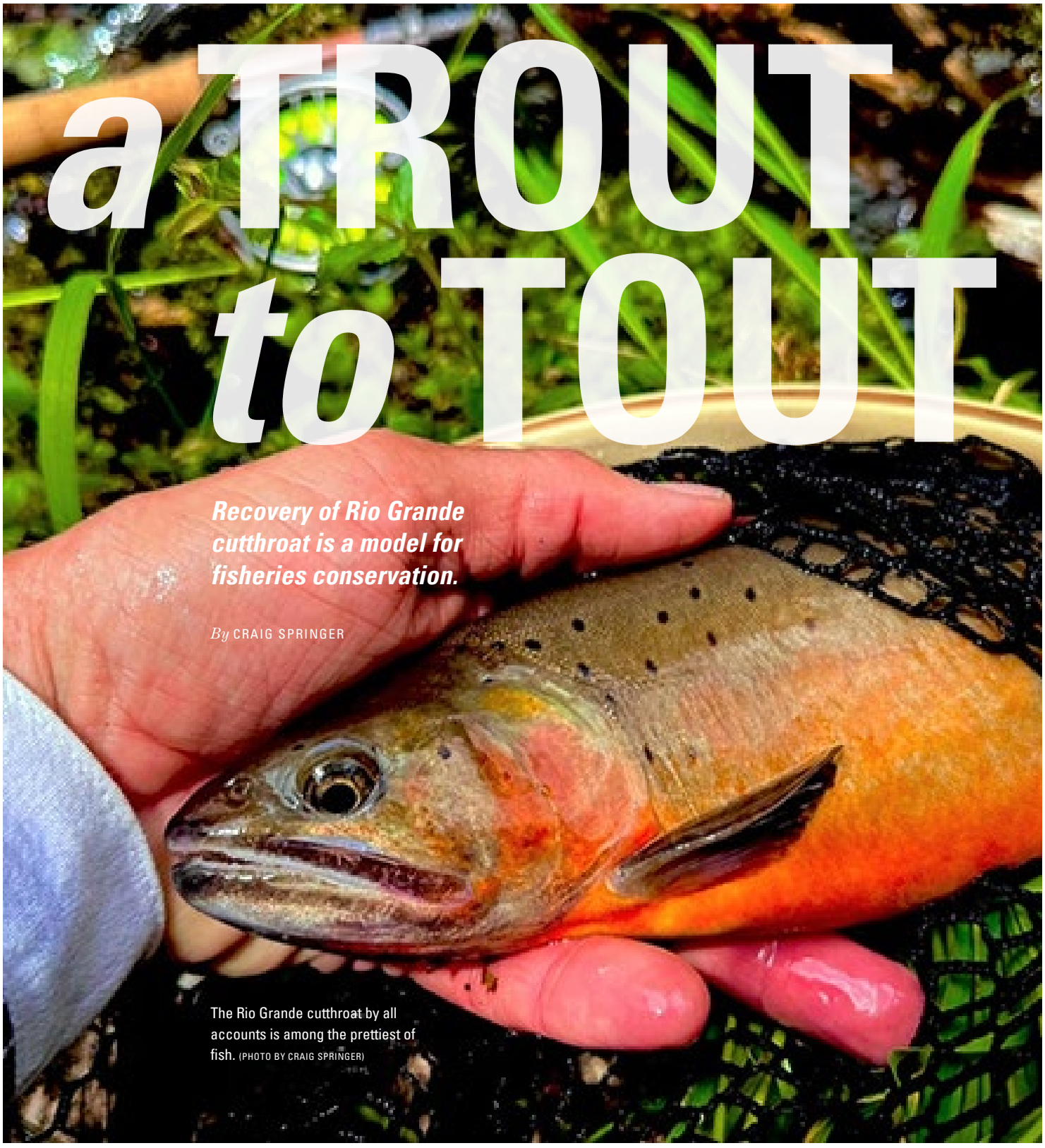
Celebrating the ESA

The first Amphibian Week celebration on the National Mall in 2023 was celebrated by passers-by of all kinds. (PHOTO BY KIM WINTER/ USDA FOREST SERVICE)

a TROUT to TOUT

Recovery of Rio Grande cutthroat is a model for fisheries conservation.

By CRAIG SPRINGER



The Rio Grande cutthroat by all accounts is among the prettiest of fish. (PHOTO BY CRAIG SPRINGER)

In this the 50th anniversary year of the Endangered Species Act, it is worth noting that Rio Grande cutthroat trout a decade ago were considered for listing — and potential restricted angling. Thanks to fishery management endeavors already underway, that didn't happen. A conservation strategy backed with much data guides work today and into the future.

Anglers are the archetypal optimists and there is much to look forward to in Colorado and New Mexico if you like to catch Rio Grande cutthroat trout. That's thanks to conservation endeavors by biologists with Colorado Parks and Wildlife and the New Mexico Department of Game and Fish, and their diligent work funded by federal excise taxes paid by fishing tackle manufacturers. Sport Fish Restoration dollars partly pay the way to conserve this gem with fins with a natural distribution that lies over the artificial state line in the upper Rio Grande and Canadian River drainages.

This cutthroat by all accounts is among the prettiest of fish. Their colors reflect the high-elevation southern Rocky Mountain forests and valleys where they dwell. The olive of conifer needles. The cream of a faded alder leaf. The smudge of carmine on the cheek and throat and a belly that carries the flush of crimson like the swollen rose hips or ripe raspberries that grow along cutthroat creeks when the trout have procreation in mind. Their spotting varies a bit from place to place, like freshly milled pepper flakes in the upper Rio Grande watershed of Colorado to large peppercorns in the upper Pecos River in New Mexico. In most all cases, the black spots are concentrated toward the tail.

They are really something to behold.

They caught the attention of a Spanish explorer. Rio Grande cutthroat trout hold the distinction of being the first trout documented in the New World. In 1541, the Coronado Entrada tarried near Pecos Pueblo 15 miles from today's Santa Fe where chronicler Pedro Castañeda noted *truchas* swimming in a Pecos River tributary. *Trucha* is Spanish for trout, but also implies a particular persona of alertness. *El esta bien trucha.* One can imagine the impression made in the encounter with America's first trout, a foot-long fish finning in the tail of a crystal glide, dashing upstream to the cover of a fallen tree at the sight of the European.

Much has changed in the intervening 482 years. The creek flowing into the Pecos River where the first trout was seen is now a sandy arroyo. Habitat loss, competition with non-native fishes that hybridize with the native cutthroat or outcompete it for the limited spaces and food in streams, they all caused the Rio Grande cutthroat trout to retreat to headwater streams in the southern Rockies. And there they persist, and due to conservation work for the last few decades, their numbers are growing — by coordinated endeavors between the two states, sharing data and expertise and certainly a thirst for the work.

A recent public event in northern New Mexico near the state line in upper Costilla Creek must have been thirst-quenching. New Mexico Game and Fish celebrated the restoration of 120 miles of stream now occupied by Rio Grande cutthroat.

Costilla Creek begins in Colorado and flows partly through Vermejo Park Ranch whose managers have taken genuine interests in conserving Rio Grande cutthroats. Costilla Creek and its tributaries vein ››

Trees, living and dead, make habitat for Rio Grande cutthroat. An angler pays out a bow cast in a tunnel of alders. (PHOTO BY CRAIG SPRINGER)

Continued from previous page.

the 160-square-mile Valle Vidal, where the native trout shares the soft immensity of the high-elevation vale with elk and deer, bear and mountain lion, pronghorn and dusky grouse. What's more, Colorado Parks and Wildlife's Native Aquatic Species Hatchery in Alamosa supplied the New Mexico biologists with Rio Grande chub and Rio Grande sucker—a colorful fish in its own right—that now co-occur with the native trout as Castañeda probably observed himself in the upper Pecos. Sport Fish Restoration dollars paid for substantial concrete barriers to keep downstream non-native fish at bay; they paid for staff time, the data analysis, the report writing, and for all the gear and accoutrements to ready the watershed to receive native fish over a great span of time. The excise taxes pay for the operation of Seven Springs Hatchery near Los Alamos, New Mexico, where the culturists wade deep in managing Rio Grande cutthroat brood stocks at the genetic level to ensure purity of the populations that go back out into the wild.

"The Costilla project started many years ago and is really quite valuable for Rio Grande cutthroat conservation," says Kirk Patten, chief of Fisheries for the New Mexico Department of Game and Fish. "It's big, the waters are interconnected, and that's important for robust genetics of wild native trout. And it's open to fishing."

John Alves, a senior aquatic biologist with Colorado Parks and Wildlife, says the Costilla project was quite gratifying to see come to fruition. Alves worked early in the project on the Colorado side, going back decades. He was on the front edge, gathering data on the distribution and composition of Colorado's Rio Grande cutthroats in the 1990s. Forty-three streams and many lakes harbor native Rio Grande cutthroat trout in southern Colorado, where mountain snowmelt gives birth to the Rio Grande. ››

(Top) Anglers and the fishing industry help pay the way to conserve the Rio Grande cutthroat.
(PHOTO BY CRAIG SPRINGER)

(Left) Biologist Estevan Vigil of Colorado Parks and Wildlife oversees cutthroat trout conservation in the San Luis Valley. He is holding a Rio Grande cutthroat.
(PHOTO BY JOHN ALVES/CPW)

Continued from previous page.

Alves and his Parks and Wildlife colleagues have their own successes to tout. Medano Creek on the east side of the Great Sand Dunes National Monument near Alamosa has a restored population of Rio Grande cutthroat trout, the result of much sweat equity, where anglers can enjoy catching colorful trout in a most pristine setting. It only takes four-wheel-drive to get to it. Rio Grande cutthroat trout were restored to three and half miles of the adjacent upper Sand Creek in 2020. Restoration of the lower section of Sand Creek is up next for Alves and his colleagues.

Colorado's state fish hatcheries turn out good numbers of Rio Grande cutthroat trout, operations again funded in part by Sport Fish Restoration dollars. In 2022, 59,000 Rio Grandes went into 26 Colorado waters.

Native trout, such as Rio Grande cutthroats, have a certain cache about them. Forty percent of New Mexico's nearly 280,000 licensed anglers declared cutthroat among their preferred cold-water quarry last year.

"A growing number of anglers seek native trout, they seek opportunity and adventure," says Patten. "Sport Fish Restoration funding is critical to our mission — our role of conserving a natural heritage and preventing restrictions on fishing. Conservation also sustains an industry." □

CRAIG SPRINGER, Wildlife and Sport Fish Restoration Program, Headquarters

Happy Anniversary

(From left to right) Staff from the Carlsbad Fish and Wildlife Office: fish and wildlife biologist Brendan Himelright, field supervisor Scott Sobiech, fish and wildlife biologist Julie Simonsen, and listing and recovery division supervisor Bradd Bridges, with a poster depicting five fully recovered species on San Clemente Island. (PHOTO BY MIKE SENN/USFWS)

Palisade High School students in Palisade, Colo., celebrated the 50th anniversary of the Endangered Species Act by releasing 250 endangered razorback suckers into their native habitat in the Colorado River. (PHOTO BY MIKAELA OLES/USFWS)

the VALUE *of* PARTNERSHIPS

Recovering our at-risk species requires collaborative conservation.

By CHRISTINE SCHULDHEISZ

(Above) The U.S. Navy administers San Clemente Island and successfully removed non-native grazing species from the island, which contributed to re-establishment of shrub communities the San Clemente Bell's sparrow needs. (PHOTO BY NICOLE DESNOYERS/ INSTITUTE FOR WILDLIFE STUDIES)

(Right) At the time the golden paintbrush was federally protected, fewer than 20,000 plants remained. Today, the species has now rebounded to over 325,000 plants. (PHOTO BY MOSA NEIS/PACIFIC RIM INSTITUTE)

The Endangered Species Act wasn't designed to be a solo mission for us to carry out alone. Working collaboratively with others is a critical component of our mission and something relied on daily for the ESA to be successful—it is key to the progress we're making in protecting, recovering, and delisting species under the ESA. Hundreds of species are stable, recovering, or recovered.

During this golden anniversary of the ESA, we're celebrating the species we have recovered with our dedicated, hardworking employees and committed partners. Here are some species success stories we celebrated across the country in 2023 with some of our partners.

In the Pacific Northwest, prairies are once again colored with a bright yellow golden paintbrush—a recovery success that prompted its delisting. This vibrant perennial plant is native to the prairies of Washington, Oregon, and southern British Columbia. As those prairie ecosystems were dramatically fractured and reduced in size by development, agriculture, and fire suppression, golden paintbrush became increasingly rare. However, public and private partners, including the Washington Department of Natural Resources Natural Heritage Program, Washington State Parks, and Oregon Department of Fish and Wildlife, worked hard to help populations rebound in recent years. At the time the species was federally protected as threatened in 1997, fewer than 20,000 plants remained at just 10 sites. By 2018, hundreds of thousands of plants could be found at 48 sites. Today, the species has rebounded to over 325,000 plants at 48 locations from the Puget Trough of southwestern British Columbia and western Washington into Oregon's Willamette Valley. Another Pacific Northwest prairie success in 2023: Nelson's Checker-mallow (p. 7).

In Florida, more than 30 years of best management practices of species recovery demonstrate the strength of partnerships that led to the recovery and ultimately the delisting of Florida's Okaloosa darter. The U.S. Air Force's commitment to improving the species' aquatic habitat on Eglin Air Force Base prompted us to delist the darter in June. More than 90% of Okaloosa darters occupy six streams on land managed by Eglin Air Force Base. Since the fish was protected as endangered in 1973, habitat restoration efforts on 480 acres of land have reduced erosion into streams, removed barriers to fish passage, and reconnected streams. A population that once numbered fewer than 10,000 fish has grown to more than 600,000 individuals.

Speaking of fish, collaborative conservation was key to saving Arizona's state fish and prompted us to propose delisting it in August. Apache trout populations are rebounding because of conservation efforts led by the White Mountain Apache Tribe in collaboration with the U.S. Forest Service, the Arizona Game and Fish Department, and Trout Unlimited. Arizona's state fish, the Apache trout is native exclusively to the streams in and around the White Mountains in the eastern part of the state.

In 1973, the Apache trout gained protection under the ESA and was subsequently downlisted to threatened in 1975. A major threat to the Apache trout populations has been the introduction of non-native trout. The gene pool was threatened by hybridization with non-native rainbow and cutthroat trout. Additionally, non-native brook and brown trout pose threats through competition and predation. Much of the collaborative conservation work has involved removing these introduced trout from Apache trout habitat and constructing barriers to block further non-native invasions. (The Perfect Cast, p. 34).

On Valentine's Day, we proposed delisting Florida's beloved wood stork—a major conservation milestone for these hefty wading birds with football-shaped bodies perched atop long legs. The species faced extinction when protected in 1984 under the ESA. The recovery of the wood stork is a success story demonstrating that through partnerships working to restore wetland habitats, a species can be brought back from the brink of extinction.

The population decreased from 20,000 nesting pairs to less than 5,000 pairs, primarily nesting in south Florida's Everglades and Big Cypress ecosystems. Today, the wood stork breeding population has doubled to 10,000 or more nesting pairs and increased its range, including the coastal plains of Mississippi, Alabama, Florida, Georgia, South Carolina, and North Carolina. These birds more than tripled their number of nesting colonies from 29 to 99 in their expanded range. They've adapted to new nesting areas, moving north into coastal salt marshes, old, flooded rice fields, floodplain forest wetlands, and human-created wetlands. ››

San Clemente Island larkspur can survive below ground when conditions are unfavorable and may not appear above-ground for a year or more. (PHOTO BY BRADD BRIDGES/USFWS)

The wood stork breeding population has doubled to 10,000 or more nesting pairs and increased its range, including the coastal plains of Mississippi, Alabama, Florida, Georgia, South Carolina, and North Carolina.
(PHOTO BY SUSAN YOUNG)

Apache trout populations are rebounding because of conservation efforts led by the White Mountain Apache Tribe.
(PHOTO BY USFWS)

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We started the anniversary year by announcing the full recovery and delisting of five species on San Clemente Island. Decades of collaborative conservation efforts on U.S. Navy-owned San Clemente Island resulted in the delisting of five species – San Clemente Island paintbrush, lotus, larkspur and bush-mallow plants, and San Clemente Bell's sparrow. The Navy prioritized removing non-native herbivores from the island, allowing the habitat to recover. What was once a largely barren landscape now supports numerous endemic species of plants and animals, including the five species removed from the federal lists of threatened and endangered species. ››

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San Clemente Island is one of eight islands that make up the Channel Islands off the coast of Southern California. The successful recovery of four plants and one bird adds to the list of species that have now successfully recovered across the islands, including the island night lizard, island fox, and the Santa Cruz Island dudleya and island bedstraw. Bald eagle and peregrine falcon populations decimated by impacts from harmful insecticides have also rebounded nationally and are successfully breeding on the Channel Islands.

While we and partners across the country have much to celebrate this year, many more accomplishments have been celebrated in the last 50 years. The ESA has been highly effective and credited with saving 99% of listed species from extinction. Through the ESA, we have recovered our national symbol, the bald eagle. We have also recovered the American alligator, which after surviving for millions of years, became endangered due to market hunting and loss of habitat and required protection under the ESA.

The ESA gave these species and many other species a chance to survive. Because of partners, these species have a future. □

CHRISTINE SCHULDHEISZ, Office of Communications, Headquarters

(Top) The U.S. Air Force's commitment to improving the Okaloosa darter's aquatic habitat on Eglin Air Force Base was key to the darter's recovery. (PHOTO BY BILL TATE/USFWS)

(Above) At its listing, non-native herbivores (since removed) were the primary threat to San Clemente Island lotus. (PHOTO BY ANNA BRASWELL/USFWS)

The Perfect Cast

Casting a fly rod to Apache trout is a testament to perseverance and the species' recovery.

By CRAIG SPRINGER

A major threat to Apache trout populations has been the introduction of non-native trout. The gene pool was threatened by hybridization with non-native rainbow and cutthroat trout. Additionally, non-native brook and brown trout pose threats through competition and predation. (PHOTO BY FRESHWATERS ILLUSTRATED)

I'm standing knee deep in the cold crystalline water of a narrow gravelly stream in the highest headwaters of the White Mountains of Arizona. Apache trout live here.

A spindly 2-weight fly rod and a barbless hook ornamented with fur and feather are the ligaments to the object of my affections. Fresh lime-green fronds of streamside grasses arc over the water pooled behind a downed ponderosa, its cooling shade make a lair for the pretty trout. A short cast lands my elk-hair caddis along a seam of flow. The fly wafts downstream toward trout who face upstream waiting for the groceries to come to them. A darting flash and a splash, and the trout is transmogrified in the tug I feel in my forearm through the bent rod.

It's exhilarating. An eight-inch lemony-yellow Apache trout peppered with haloed black spots lying in my net is really something to witness. It's a trophy, but not for its size. Catching an Apache trout on a fly rod is a testament to the diligence of a good many people who cared about this rare trout over the span of decades. Without their conservation work, this experience would not be possible.

On Aug. 10, we proposed to delist the Apache trout at an event with the White Mountain Apache Tribe, the U.S. Forest Service, the Arizona Game and Fish Department, and Trout Unlimited at Williams Creek National Fish Hatchery. The Apache trout stands to be the first sport fish species to be recovered and removed from the federal list of threatened and endangered species. And what a path it has wended to get here. The Apache trout went from anonymity to misidentification to an endangered species and the official state fish of Arizona over the span of a century.

While the Apache people traditionally eschewed the trout as a food source for cultural reasons, the fish had been familiar to anglers for quite some time. Local Hispanic and Anglo farmers and ranchers made forays into the high country in summer to catch them. One correspondent, simply "J.H." from Show Low, Arizona, wrote in a July 1886 issue of the *St. John's Herald*: "I speak truly when I say it was the most enjoyable period of my life." He recounted how he and his pals caught scads of Apache trout from the White River during a prolonged and enviable summer outing.

The Apache trout had become known to science only a few years earlier in 1873, when it was collected by members of the U.S. Geographical Survey, though it was wrongly identified as a Colorado River cutthroat trout. The fish naturally occurred only in the high-elevation streams that vein off the White Mountains, like fingers palming a softball, all flowing eventually to the Pacific Ocean if not soaked up by sun and sand beforehand.

Renowned conservationist, Aldo Leopold, started his forestry career in Apache National Forest and wrote to his father back in Iowa in 1909, inviting him to come catch the "very succulent trout" that abounded in the White Mountains. ››

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It wasn't until 1972 that the trout was properly recognized as a unique species and assigned its current common name. A year later—50 years ago—it was placed on the endangered species list, by then reduced to a mere 30 miles of streams all within the confines of the Fort Apache Indian Reservation.

The Apache trout is named for the people and the place that are intertwined with one another. The White Mountain Apache Tribe were the first conservators of their namesake fish, having closed off streams to angling on the reservation in 1955. Their prescient act set the stage for a comeback.

Places everywhere have their scars, and the White Mountains are no exception, both on the Apache National Forest and Fort Apache Indian Reservation. The loss of habitat from excessive timbering and grazing and the introduction of non-native trout species proved detrimental to the native Apache trout. Over-stocked cattle trampled stream banks and reduced shrubs that would cool trout waters in their shade. Accelerated topsoil erosion during the spring run-off affected trout reproduction; fine sediments clogged porous gravel beds where oxygen-rich water would otherwise percolate over incubating Apache trout eggs. Wildfires have taken a toll.

Over the last 70 years, through the actions of the White Mountain Apache Tribe, followed by work with the U.S. Fish and Wildlife Service, U.S. Forest Service, Arizona Game and Fish Department, and Trout Unlimited, Apache trout populations have rallied through habitat restoration, brood stock development, and stream-to-stream transfers. It's been a long slog, and it's been successful.

Through the consistent funding via the Federal Aid in Sport Fish Restoration derived from excised taxes paid by tackle manufacturers and congressionally appropriated Tribal Wildlife Grants, both administered by the Service, the Arizona Game and Fish Department and the White Mountain Apache Tribe have reliable financial backing for essential Apache trout conservation work—benefiting trout and people and the local economies.

A headwater stream in White Mountains of Arizona. (PHOTO BY FRESHWATERS ILLUSTRATED)

Alchesay-Williams Creek National Fish Hatchery Complex, located on the Indian reservation, continues to raise Apache trout for angling on the Fort Apache Indian Reservation, and trout and eggs are shared with the Arizona Game and Fish Department to be stocked in neighboring national forest waters.

The proposed delisting for Apache trout has been a long time coming. The handsome yellow trout that lies for a few moments in my net gives me cause to reflect upon the nature of conservation. Conservation is always, it seems, an investment in the future; sowing today what you may reap tomorrow. Conservation is often slow and arduous and suggests the oxymoronic motto of Roman emperor Octavian: *Festina lente*, to make haste slowly, that is, to be deliberate in purpose.

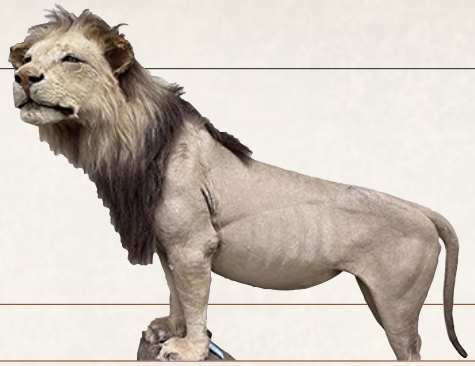
Today, Apache trout swim in the purposefully targeted benchmark of 30 populations in 174 miles of streams as outlined in a recovery plan created by scientists many years ago.

Sending my elk-hair caddis to Apache trout while standing knee deep in a cold creek is fully immersive and calming. With the flick of its tail, my fish darts back to dark water. I marvel over the trout's natural rarity in a sky island high above the Sonoran Desert, the path taken by conservationists to improve its lot, and the great cast of people that one would have to thank for it all. □

CRAIG SPRINGER, Wildlife and Sport Fish Restoration Program, Headquarters

MUSEUM OBJECTS COME TO LIFE

In this series we highlight the "Treasures of the Service" from the museum collections of the U.S. Fish & Wildlife Service Museum and Archives, the Service's National Fish and Aquatic Conservation Archives, the National Wildlife Property Repository, and the collection at DeSoto National Wildlife Refuge, containing over 250,000 artifacts excavated from the 1865 wreck of the Steamboat Bertrand.



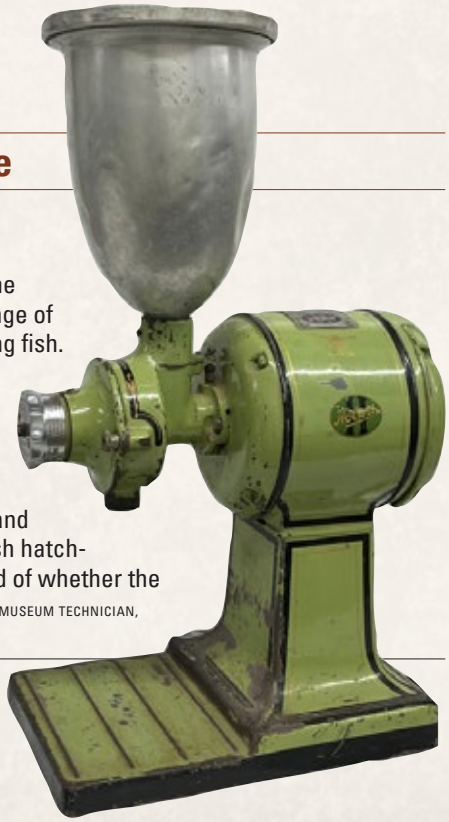
Breaking Laws for Lion Claws

This taxidermy mount of an adult male African lion was purchased at auction. The claws of the lion and other big cats fetch a high price in the jewelry and traditional medicine trade, and the buyer intended to sell the mount's claws to make a profit.

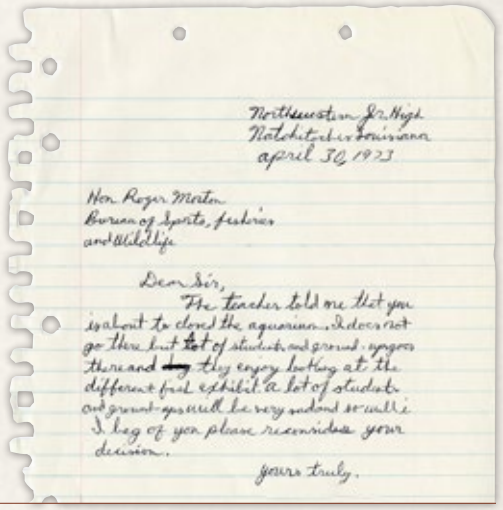
After the auction, the original buyer removed the mount's 18 claws with a chisel and met up with a party interested in buying the set—Service Special Agents working undercover.

The survival of cat species worldwide is threatened by demand for claws, bones, organs, and hides for traditional medicines, fashion products, rugs, novelties, and more. African and Asiatic lions are protected in the United States by the Endangered Species Act of 1973 and the Big Cat Public Safety Act of 2022. The commercial trade and transport of lions and lion products within the United States are prohibited. Lions are also protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). All African lions are included on Appendix II, meaning that their international trade is regulated. The populations of Asiatic lion in India are included in Appendix I, which prohibits international commercial trade. (ELISA L. DAHLBERG, COLLECTIONS MANAGER, NATIONAL WILDLIFE PROPERTY REPOSITORY)

Not Your Average Cup of Joe



This large, commercial coffee mill from D.C. Booth Historic National Fish Hatchery in Spearfish, S.D., was not used to caffeinate the staff. Instead of coffee beans, it ground a range of ingredients for feeding the hatchery's growing fish. The mill was believed to have been bought by Harvey Willoughby, who conducted research on trout nutrition in Spearfish during the 1950s and 1960s. The feeding methods and equipment that Willoughby developed spread across the United States and internationally, improving the efficiency of fish hatchery operations. Regretfully, there is no record of whether the fish prefer regular or decaf. (MIRANDA ZWINGELBERG, MUSEUM TECHNICIAN, NATIONAL FISH & AQUATIC CONSERVATION ARCHIVES)



Northwestern Jr. High
Natchitoches Louisiana
april 30, 1973

Hon. Roger Morton
Bureau of Sports, fisheries
and Wildlife

Dear Sir,
The teacher told me that you
is about to close the aquarium. I does not
go there but lot of students and ground. ogers
there and they enjoy looking at the
different fish exhibit. a lot of students
and ground-ers will be very sadend so will i
I beg of you please reconsidea your
decision.

yours truly.

Plea for Fish

This letter was written regarding the aquarium being closed at Natchitoches National Fish Hatchery in the 1970s. Children from Northwestern Junior High in Natchitoches, La., wrote many more, too. This student expressed his concern for the closure of the aquarium and urged Rogers Morton to "reconsider the decision." Unfortunately, the aquarium at Natchitoches National Fish Hatchery was shut down on Nov. 30, 1973. After the closure of the aquarium, the Director of the Service urged our Southeast Regional Director to contact the congressional delegation who expressed interest in keeping the aquarium open. Today, Natchitoches National Fish Hatchery does have an aquarium. It features a variety of aquatic wildlife and has displays of the Caddo people, who once occupied the area where the hatchery was built. (TAYLA BAHR, MUSEUM TECHNICIAN, NATIONAL FISH & AQUATIC CONSERVATION ARCHIVES)

transitions

Headquarters

Amy Coffman, former Native American Liaison of the Mountain-Prairie Region, has begun as Co-Stewardship Coordinator for the National Wildlife Refuge System. This new position leads our coordination across the Refuge System as we increase collaboration with Tribes, Alaska Native Corporations, Alaska Native Organizations, and the Native Hawaiian Community. Coffman helps lead the way as we fulfill the agency's Trust Responsibilities with the Indigenous community. She provides expertise on government-to-government relations, communication, and education to help the Refuge System and Indigenous communities work effectively together.

Coffman brings extensive experience to the position, including more than 16 years in the Refuge System, most recently as the refuge manager at the National Bison Range. She also has experience with the Bureau of Indian Affairs as acting superintendent of the Flathead Reservation. "Focusing my education and work to gain information in areas that would most impact my future work," Coffman says, "I have been selective on the positions and types of work duties that I have taken on to further my skills while contributing to the mission of the USFWS. I have had the opportunity to work at/with several refuges, wetland management districts, fire programs, DOI working groups, Tribes, states, and multiple partnering agencies. The diverse experience has enriched my work qualifications, while also further developing my areas of expertise to bring forward in any position I may hold for the Service. My heart has been with collaborative management and the important role that USFWS programs and lands play." □

Eric Alvarez has been named Deputy Chief of the National Wildlife Refuge System.

Alvarez has been a part of the Service and Refuge System since 1991, when he joined as a co-op student. He started in the Atlanta Regional Office working as a real estate appraiser and after five years transferred to the Midwest Region to take a promotion as a senior appraiser. In 1997, Alvarez joined the HQ team as a senior realty specialist and worked his way up as a Branch Chief for Operations, then Deputy Chief of Realty. In 2001, he became Chief of Realty and Secretary to the Migratory Bird Conservation Commission.

From March 2018 through April 2020, Alvarez brought his leadership to International Affairs for a two-year assignment into the SES position of Assistant Director. Returning to the Refuge System, Alvarez, in November 2021, began leading the Refuge System's Division of Budget, Performance, and Workforce in addition to the Division of Realty. Over the years, he has also tackled multiple natural resource related challenges, both on the acquisition side and the management side.

Alvarez was born in Havana, Cuba, and immigrated to the United States at the age of 7, after living in Spain for a couple of years. He grew up in the Atlanta area and graduated from Georgia State University with a degree in business administration. While still in his youth, Alvarez realized that he had a calling for conservation and pursued a career with the Service.

Alvarez lives in Alexandria, Virginia, with husband Jorge and their 9-year-old Shiba Inu, Aiko. The couple enjoys traveling internationally with two of his bucket list trips being, going to the Galapagos Islands and to Antarctica to see penguins in the wild. □

Pacific Region

Dr. Sean Macduff is the new superintendent for Mariana Trench Marine National Monument.

Mariana Trench Marine National Monument protects the submerged lands and waters around the three northernmost Mariana Islands, an arc of 18 undersea volcanoes and thermal vents west of the Marianas, and the trench itself. The Mariana Trench is the deepest trench on Earth, deeper than the height of Mount Everest above sea level. Macduff oversees this natural area, which includes Mariana Trench National Wildlife Refuge and Mariana Arc of Fire National Wildlife Refuge.

Macduff was raised in the Mariana Islands where resource sustainability and environmental stewardship were a constant life lesson. Macduff started his conservation career in Hawai'i as a graduate research fellow with the National Science Foundation from 2008 to 2013. He also studied coral reefs in Hawai'i and Saipan for the University of Hawai'i at Mānoa, where he earned his Bachelor of Science degree in marine biology and biological oceanography. He went on to earn his doctorate in zoology from there. »

"I am excited about returning home to Saipan and being the loudest (and deepest) advocate for the Mariana Trench Marine National Monument," says Macduff. "As a native Chamorro who was raised in the Mariana Islands, I understand the importance of 'getting it right' for the local community. I'm passionate about science and applying a collaborative and informed management approach to solve issues important to ecosystem health and the communities who depend on them."

Macduff has more than 15 years of experience in science and management of marine ecosystems. He joins the Service from the U.S. Environmental Protection Agency where he implemented Clean Water Act provisions for the restoration and recovery of the Puget Sound ecosystem, on the U.S. northwest Pacific Coast. For two years, Macduff served as the assistant director for community engagement under Sea Grant in Seattle where he led a team of researchers, outreach, and extension staff charged with connecting relevant research to communities. Before his work with the EPA, Macduff served as a fisheries biologist for the Commonwealth of the Northern Mariana Islands — Division of Fish and Wildlife — on Saipan, where he helped manage nearshore and offshore fishery resources. Macduff was also an aquatic biologist working on Saipan with the U.S. Army Corps of Engineers.

Macduff leads all monument program operations from Garapan, where Service ranger Jihan Younis now coordinates with partners and leading education and outreach activities. In this new position, Macduff is responsible for all supervisory and operational elements of the conservation management of the monument.

Macduff enjoys photography and being immersed in the environment. Macduff and family are thrilled about their new journey and the return to their ancestral home. □

Northeast Region

Former Deputy Director **Wendi Weber** has returned to her previous job: Regional Director in the Northeast Region.

She spent over 15 years working the Northeast Region before joining the Director's Office in 2022.

Over the past year as Deputy Director, Weber has provided critical leadership on the overall development, planning, management, and coordination of strategic goals. In addition, she worked on a host of complex issues, particularly those related to creating a welcoming workplace, environmental justice, and co-stewardship. She has been an outspoken advocate for building a more diverse and inclusive workforce.

In total, Weber has spent over 25 years working for the Service since beginning her career as a biologist in our International Affairs Program. Her collaborative work with Congress, the states, Tribes, and other partners to conserve at-risk species and achieve landscape-level conservation have been hallmarks of her leadership both at headquarters and the region.

Weber is from Rochester, N.Y., and has a bachelor's degree in zoology from the University of Rhode Island and a master's degree in fisheries from the University of Georgia. Before joining the Service, Weber worked for the states of Florida and Georgia as a field biologist. In 2018, she was awarded the Robert McDowell Award for Conservation Management Excellence, which is the Northeast Association of Fish and Wildlife Agencies' highest honor. She also received the Theodore Roosevelt Government Leadership Award in 2019, recognizing her excellence in management of programs and policy implementation. □

honors

Midwest Region

Brad Pendley, a wildlife biologist at Mingo National Wildlife Refuge in Missouri, has been named the 2023 Refuge Employee of the Year by the National Wildlife Refuge Association for his work fighting the invasion of feral hogs at the refuge.

The non-native species is a problem at the refuge, and elsewhere, because:

- As omnivores, feral hogs eat native grasses and forbs, roots, the eggs of ground nesting birds, reptiles, amphibians, and small mammals.
- They compete with native species like deer and turkey for important food sources such as acorns.
- Their rooting and wallowing behavior heavily alter the native habitats of the refuge. »

As early as 2015, the Mingo National Wildlife Refuge annual report says, "Feral hogs have become a concern and have taken priority in exotic animal control on the refuge in the past several years."

Pendley, who has been at the refuge since 2009, has worked to "eliminate the hog threat to secure the refuge's future for generations to come," the Refuge Association says.

"Brad literally saved the refuge from the threat of feral hogs through innovative and impactful mitigation methods that eradicated this nuisance and threat to local conservation efforts," says Sabrina Chandler, Pendley's area supervisor at Mingo.

The Refuge Association recognized Pendley for:

- An extensive feral hog trapping program with the U.S. Department of Agriculture. The program has removed approximately 4,000 feral hogs from the refuge, an average of over 500 per year.

- His work to receive two grants from the Midwest Region Invasive Strike Team. The money, totaling $120,000 over two years, was entirely dedicated to the feral hog program.

- His efforts to improve communication, transparency, and trust with stakeholders and neighboring communities. As Chandler says, "Brad works collaboratively with state, federal, nonprofit, private, and university partners on a variety of projects and has strong management skills and produces results."

Also in the Midwest Region, the Friends of Ottawa National Wildlife Refuge in Oak Harbor, Ohio, was named Friends Group of the Year by the National Wildlife Refuge Association.

Congratulations to all. □

Southeast Region

An article by **David Hewitt** and **Caylen Kelsey** was recognized by the American Fisheries Society as the Mercer Patriarche Best Paper in the North American Journal of Fisheries Management for 2022.

Hewitt, now a biologist with the Gulf Restoration Office in Fairhope, Ala., and Caylen Kelsey, now a data manager for the National Wildlife Refuge System in Anchorage, Alaska, were part of a collaborative effort that evaluated waterbird predation on endangered fish in the Upper Klamath Basin of Oregon and California.

The award-winning paper, "Avian Predation on Juvenile and Adult Lost River and Shortnose Suckers: An Updated Multi-Predator Species Evaluation," described the researchers' efforts to provide a better understanding of the magnitude and dynamics of fish-eating colonial waterbird predation on Lost River suckers and shortnose suckers.

The researchers hypothesized that previous studies may have underestimated the mortality caused by birds because those studies did not account for the number of passive integrated transponders (PIT tags) from consumed fish that were deposited outside of the bird breeding colonies.

For this investigation, the researchers fed PIT-tagged fish to American white pelicans and then looked at the probability that the tags were deposited within a breeding colony. To find the PIT tags, scans of the nesting areas were made using pole-mounted PIT tag antennas and portable receivers.

Ultimately, the researchers found that their new estimates of predation rates were approximately two times greater than those previously reported. Their paper documented how the team combined innovative field methods with existing long-term data sets on fish and colonial waterbirds in the region. □

Southeast Region

At first glance, it may seem as though it's simply a numbers game:

- 22 years with the Service.

- $27.25 million awarded from the Inflation Reduction Act.

- 400,000 acres of habitat with more than a dozen endangered or threatened species.

- Nine national wildlife refuges, 35 employees, more than 400 volunteers.

It all adds up for the National Wildlife Refuge Association, which selected **Rebekah Martin**, project leader of Coastal North Carolina National Wildlife Refuge Complex and the person behind those numbers, as the 2023 Paul Kroegel National Wildlife Refuge Manager of the Year.

"I am so proud of Rebekah," says Mike Oetker, acting Regional Director of our Southeast Region. "She is an incredible leader and collaborator of landscape-scale wildlife conservation."

Martin says two factors equate to any success she's achieved: relationships and collaboration.

She juggles a lot of responsibilities but invests time and energy into relationships. She routinely engages with leadership, peers, refuges' teams, civic and elected officials, community members, private landowners, partners, state and federal agencies, and, most importantly, the land and wildlife she's charged with protecting.

"Rebekah's ability to form unique partnerships, build relationships and communicate with others, especially the public, is where she excels," says Emery Hoyle, refuge supervisor for several states in the Southeast Region. "Her engagement with others comes in many forms and often includes issues deemed controversial. Her technical skills, in combination with her ability »

to build interpersonal relationships, makes her admired by not only her leadership but the team she supports and works beside daily. Rebekah encourages her team to think creatively to solve complex conservation challenges and support geographic stakeholder discussions."

Martin looks for opportunities to share her passion and enthusiasm for the lands, waters, and wildlife of northeastern North Carolina. She aims to take a thoughtful approach to conservation that includes pooling limited resources to benefit local communities and wildlife. She routinely reaches out to hear others' perspectives and explores innovative ways to collaborate.

"Rebekah understands that solid partnerships, cemented by trust and communication, are key to addressing the conservation challenges of today" Hoyle says. "She is purposeful, sincere, and authentic in her relationships. Rebekah strategically and proactively reaches out to build relationships with county and state government officials, non-governmental agencies, and private landowners to advance conservation in the Albemarle-Pamlico region."

Martin grew up on a farm in Warsaw, Va., which is where her love for the outdoors — and her appreciation for the natural world — began. Her relationship with the Service started 22 years ago as a student trainee. She has served in her current role at the Coastal North Carolina National Wildlife Refuge Complex since 2017.

During her tenure, the complex has garnered many conservation accomplishments. Of note, Martin works closely with community members and partners on the education and recovery of the endangered red wolf. Martin also creates partnerships to protect pollinators, bats, migratory birds, and at-risk species.

Partners and community members are also working with Martin to restore peat lands in the coastal North Carolina region. Over tens of thousands of years, carbon-rich peat soils have accumulated in the oxygen-poor wetlands, reaching depths of 15 feet in portions of the refuges. We have restored more than 37,000 acres of this pocosin habitat at Pocosin Lakes National Wildlife Refuge, one of the nine refuges in the complex.

"Rebekah understands the need to restore peat moisture to stop the loss of these combustible soils to oxidation and catastrophic wildfire," Hoyle says. "The cost of inaction in terms of carbon loss to the atmosphere and elevation loss in areas with high coastal inundation risk is too great."

The list of accomplishments is quite long. To Martin, though, most notable is the receipt of $27.25 million from the Inflation Reduction Act. This historic funding will be invested in climate-related and conservation projects throughout the Albemarle-Pamlico region in eastern North Carolina. The Albemarle-Pamlico Estuarine System is home to some of the most climate-vulnerable counties in the nation that face sea level rise, catastrophic fire risk, and changes in storm intensity and frequency.

Martin's leadership and commitment to working with others to further conservation priorities improved relationships and coordination at the federal level as well. She leads a coalition of Service employees and representatives from multiple federal agencies working in the Albemarle Pamlico Estuary as they explore ways to meet climate-induced challenges.

In addition to continuing her collaborative conservation efforts, Martin co-leads the Service's America the Beautiful Increased Access to Outdoor Recreation team. This group works to boost access to public lands for all Americans, especially diverse and underrepresented individuals and communities.

"We have so much important work to do in eastern North Carolina," Martin says. "We are all teaming up on conservation efforts to ensure our precious wildlife, our majestic landscape, our unique ecosystems, and our special way of life are protected for all people and future generations to enjoy." □

LESLIE HULL-RYDE, Office of Communications, Southeast Region

in memoriam

Mountain-Prairie Region

"Fall reminds me to seek solace in wild places. Packing, camping, fishing, hunting, bird watching, and enjoying the cool, crisp air and hoping for a good snowpack to prepare for next year. Take some time to experience the art of escape with family and friends. Step away from teleworking, collecting data, analyzing data, attending conference calls, and other work-related activities for even a few minutes but better yet for several days. Let the changing season colors, migrating birds, garden harvests, camp cooking, shoreline wave ripples, falling leaves, and full moons open your mind and build new memories. Stay active and engaged in life. Let your spirit ride on the thermal updrafts of hope. Obtain self-awareness, guidance, and clarity on positive paths moving forward. You are in charge of you. That gift brings a smile. Be strong, safe, and healthy this fall."

— GREG GERLICH

In August 2023, the Mountain-Prairie Region suffered an unexpected and profound loss with the sudden passing of beloved Fish and Aquatic Conservation Assistant Regional Director **Greg Gerlich**. The news of his passing shocked the region and has left a mark on the many people who knew him.

Known and loved around the Regional Office and throughout the FAC Program, Mr. Gerlich was one of those special people who touches the hearts of everyone around him. His pandemic baking shows will forever be fondly remembered as one of the bright spots during a dark time, and his great big smile and laugh always managed to light up any room.

We asked Mr. Gerlich's colleagues to share the words that come to mind when they think of him. One word rose above all others when his friends and colleagues paused to reflect — "warm."

"Warm." "Kind." "Thoughtful." "Empathetic." "Witty." "Supportive." "Genuine." "Gentle." "Sincere." "Compassionate." "Open." "Caring." "Provider." "Humble." "Resilient." "Welcoming." "Legendary." "Lover of the outdoors." "One of a kind."

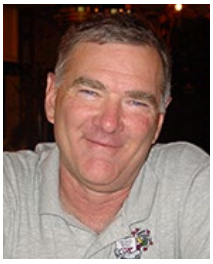
Mr. Gerlich was the embodiment of public service. A life-long conservationist and leader, he dedicated much of his life to fish and wildlife, serving honorably for 21 years with Colorado Parks and Wildlife before coming to the Service as the Assistant Regional Director for the Fish and Aquatic Conservation Program. Mr. Gerlich spent eight years with the Service, and we are grateful for the time we had with such a beautiful, compassionate person.

But Mr. Gerlich's work in conservation was only a fraction of who he was. Mr. Gerlich was a loving father and husband, a staunch Metallica fan, king of houseplants and gardening, an avid angler, a dedicated friend, role model, and so much more.

He will always be remembered for his warmth, kindness, and compassion for others.

Mr. Gerlich is survived by wife Donna, daughter Kaleigh and son Grayson. Mr. Gerlich's USFWS family shares in their loss, extending our heartfelt condolences as well as our fondest memories. May he forever live in our memories and continue to bring light to the lives of those he's touched. □

MIKAELA OLES and CHRISTINA STONE, Office of Communications, Mountain-Prairie Region



John Edgar Cornely, 77, who retired from the Service in 2006 after 28 years dedicated to conservation, died Oct. 13, 2023, after a long battle with cancer. He was born March 26, 1946, in Beloit, Kan., and was the oldest of four children. He graduated from Osborne High School, excelling in basketball, track, and American Legion baseball. In 1968, he received a B.A. in biology from Hastings State College and then served four years as a communications officer in the Air Force. He earned an M.S. in zoology at Texas Tech University followed by a Ph.D. in zology from Northern Arizona University, studying the ecology of coyotes in and around Joshua Tree National Monument.

Mr. Cornely began his Service career in 1978 as a refuge biologist at Malheur National Wildlife Refuge in Oregon, where he headed their biological monitoring effort. In 1981, he transferred to the Western Oregon Refuge Complex and supervised the region's dusky Canada goose program.

In 1988, Mr. Cornely moved to Lakewood, Colo., to become the Regional Migratory Bird Coordinator for the Mountain-Prairie Region. During his tenure, nongame and permit responsibilities were added to the growing Regional Migratory Bird Program. He was also a dedicated member of the Service's Heritage Committee and helped preserve the Service's rich history, recording oral histories of dozens of retired employees and videotaping key individuals instrumental in founding the North American Waterfowl Management Plan. He helped develop a training course, Migratory Bird Conservation — A Trust Responsibility, and served as an instructor. Mr. Cornely also worked with international migratory bird professionals in China during 1996 and 2000, and in Russia during 2001.

His leadership abilities, extensive ecological knowledge, and firm belief that resource management policies be based on sound scientific information were invaluable to the Service. Mr. Cornely received numerous awards throughout his career, culminating with the prestigious Meritorious Service Award from the Department of the Interior.

Mr. Cornely continued his wildlife conservation work in retirement, serving first as executive director (2007–13) and then as senior conservation adviser (2014–23) of The Trumpeter Swan Society; as a board member of the FWS Retirees Association (2016–21) and as chairperson of its Oral History Committee (2014–23); and as an emeritus member on the Board of Directors for the National Wildlife Refuge Association (2020–23).

Mr. Cornely loved sports, especially Minor and Major League baseball games. He and his son, Sean, attended games in almost all of the existing Major League baseball stadiums, and he was an avid Colorado Avalanche hockey fan. Mr. Cornely enjoyed hunting and fishing with his friends, particularly turkey hunting in Kansas and walleye fishing in Canada. He collected wildlife memorabilia, especially federal and state Duck Stamps. His fondness for finding new craft beers was legendary, and he became an accomplished home brewer.

Mr. Cornely, of Larkspur, Colo., is survived by his beloved wife of 52 years, Beatrice (Bea); two children, Erin and Sean; three grandchildren, Cassidy, Cameron, and Adriana; brothers Charles and Gary and sister Kathy; and stepmother, Janice (Jan). □

Headquarters

After nearly 45 years with the Service, you would think that **Hannibal Bolton**, who retired at the end of 2016, had a lot of co-workers. In fact, Mr. Bolton, who died in September 2023, had a lot of friends who happened to work with him.

As Paul Rauch, who succeeded Mr. Bolton as Assistant Director for Wildlife and Sport Fish Restoration, puts it: "Hannibal was a well-known and respected conservation leader, but that's only part of what made him special. To me, and I think to many others, it was Hannibal the person that was the most special. When I joined the Directorate team, Hannibal went out of his way to make me feel welcome and quickly became a friend. Hannibal had many friends, in and outside the Service, and in all of my time knowing Hannibal, I never met a person who didn't like him — he was just that kind of a person and he will be missed."

Former Southwest Regional Director Benjamin N. Tuggle served with Mr. Bolton on the Service's Directorate and says: "Hannibal Bolton was a friend, colleague, and Brother. He and his personality were made to engage and excite people about natural resource management and the environment. With his disarming personality, he would charm the heck out of friends and foe alike, always with robust sense of humor and charming smile."

Mike Oetker, acting Regional Director for the Southeast Region, recalls: "Most people never forgot their first encounter with Hannibal. His smile, his boisterous laugh captivated and welcomed everyone to become his friend."

"He was my first FWS supervisor and would mentor me for over two decades." More than that, Oetker adds, "He was also my friend."

Mr. Bolton was also a mentor/friend to Mamie Parker, whom Mr. Bolton recruited to a Service internship when she was a student at the University of Arkansas at Pine Bluff, his alma mater. Parker went on to a long and distinguished career with the Service, becoming Assistant Director of Fisheries and the Service's first African American Regional Director.

"Behind every passionate conservationist, there stands a guiding light, a mentor like Hannibal Bolton," Parker says. "With unwavering dedication and an unyielding spirit, he not only nurtured my dreams but ignited a fire within me to protect our precious wildlife."

Craig Czarnecki, Assistant Regional Director of Science Applications in the Midwest Region, worked with Mr. Bolton in Fisheries and says he "will be forever grateful for his friendship, sense of humor, and generosity."

In addition to WSFR, Mr. Bolton led our Diversity Retention and Recruitment efforts and held various leadership positions within the Fisheries and Refuge programs.

He made a large mark in Fisheries, for which he was elected into the National Fisheries Management Hall of Excellence in 2007 by the American Fisheries Society. Mr. Bolton played key roles in the creation of the Aquatic Invasive Species Program, the National Fish Passage Program, and the National Fish Habitat Action Plan and National Fish Habitat Partnerships that supported it.

Mr. Bolton's Hall of Excellence plaque continues reviewing his conservation successes: He worked on fisheries management on Native American reservations in Michigan, Wisconsin, and Minnesota, led efforts to control non-native species in the Great Lakes, and helped restore Lake Superior lake trout populations.

And wherever he was, he had a huge impact on colleagues.

Czarnecki says: "We encounter so many amazing people across a career, and if you're lucky, there's one or two that leave a lasting impact. That's Hannibal to me. I admired his commitment to conservation. … I have a thousand stories about Hannibal, and I'm glad to have joined him for one or two."

Tuggle says: "I will miss him because of his leadership, passion, and unwavering care for people. We have lost a conservation giant and a wonderful friend. I will miss him as a Brother in the profession and in spirit."

Despite his many physical achievements, Tuggle says, "His contribution to conservation can't be measured by acres or wildlife populations restored but by the people he got to care about the conservation of our natural treasures."

They were often young people.

Mr. Bolton once told Wayne Hubbard, the host/producer of Urban American Productions, "The future of conservation is in our youth," and he often worked to improve the diversity in the conservation world.

His Hall of Excellence plaque lauds Mr. Bolton for dedicating "much of his career to making the face of the fisheries profession reflect the image of the American people through his minority recruitment and mentoring efforts."

Parker says, "His legacy of hard work, diversity, and inclusion has not only transformed the lives of Black and Brown students but he paved the way for a brighter, more inclusive future."

In 2017 the Fisheries Society honored him with its Emmeline Moore Prize, which recognizes "efforts of an individual member in the promotion of demographic diversity in the [fisheries] society." »

As Oetker says, "Hannibal's legacy and influence lives on through the countless number of people he touched. I am lucky to be one of those people."

Parker sounds lucky, too: "I salute my conservation hero, Hannibal Bolton, for inspiring us to go work our dreams."

MATT TROTT, Office of Communications, Headquarters

Ronald "Ron" Wayne Kokel, 59, who retired in 2019 after 25 years with the Service, died unexpectedly on Oct. 5, 2023 while doing what he loved—bird hunting in the autumn woods of northern Minnesota with his cherished dogs and friends.

Mr. Kokel was born Sept. 9, 1964, in Waco, Texas, but spent most of his childhood in McKinney, Texas. He graduated in 1987 from Texas A&M University, receiving a Bachelor of Science degree in wildlife and fisheries sciences; followed by a Master of Science degree in wildlife and fisheries from Virginia Polytechnic Institute in 1991.

His career started with the Federal Energy Regulatory Commission, but in 1994 Mr. Kokel assumed the regulations specialist position in the Service's Office (now Division) of Migratory Bird Management, the same year he was diagnosed with lymphoma. Courageously overcoming this cancer, Mr. Kokel remained in this position until retirement in 2019. During his tenure, Mr. Kokel established himself as an expert in developing *Federal Register* documents and other materials, and was most closely associated with the annual regulations development process allowing the hunting of migratory game birds. He was widely known throughout the Service and the Flyways as a respected source of information on regulations and other migratory bird treaty matters at the state, national, and international level. His behind-the-scenes work throughout the years as a regulations specialist contributed to the development and successful implementation of many key migratory bird policies and programs, including Adaptive Harvest Management, regulated subsistence harvest in Alaska, cormorant management, light goose population control, and nontoxic shot alternatives, and he was the lead author of the Service's Environmental Impact Statement (EIS) on the control of resident Canada geese that has guided management of those birds nationwide for nearly 20 years.

Mr. Kokel was considered a miracle-worker in navigating the complex and ever-challenging approval process for final rules and regulations and other documents. His persistent determination in securing necessary signatures along the way always ensured that they would be published on time. Often, he was the point person for responding to congressional inquiries about various issues or just assisting the public in better understanding migratory birds.

Mr. Kokel had a passion for double-barreled shotguns, English setters, and fine bourbon. He was a true outdoorsman who loved being in the woods each fall with his dogs and friends, hunting ruffed grouse and American woodcock across Minnesota, Wisconsin, and Michigan. He was heavily involved with the Boy Scouts and was very proud that both his sons achieved the rank of Eagle Scout. He always had a book or magazine in his hand and loved reading about history, hunting, and wildlife conservation.

Upon retirement, he and his wife, Deidra, moved from Leesburg, Va., to Seabrook, S.C., where they loved fishing, crabbing, and exploring the coast in their boat, or sitting on the back porch taking in the beauty of the South Carolina saltmarsh.

Mr. Kokel had a way of making everyone feel welcome, and his presence will be sorely missed by his family and by his many friends and colleagues. Our deepest sympathies go out to Mr. Kokel's family for their loss. □

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parting shot

New Refuge

The Wyoming Toad Conservation Area, in the Laramie Plains of the Wyoming Basin, will support the protection of habitat critical for the survival of the Wyoming toad, one of the most endangered amphibians in North America. The area is also important for the conservation of other species including the white-tailed prairie dog, pronghorn, and migratory birds. We purchased 1,078 acres of land known as Bath Ranch from The Conservation Fund to officially establish the Conservation Area. (PHOTO BY USFWS)

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