

Vol. 13 No. 6

November/December 2019

THE

# WILDLIFE PROFESSIONAL

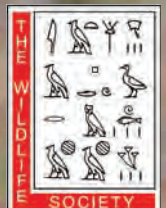
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# THE WILDLIFE PROFESSIONAL

November/December 2019 Vol. 13 No. 6

*The Wildlife Professional* is the flagship publication of The Wildlife Society and a benefit of membership. The magazine — published six times annually — presents timely research, news and analysis of trends in the wildlife profession.

## ABOUT

The Wildlife Society, founded in 1937, is an international nonprofit scientific and educational association dedicated to excellence in wildlife stewardship through science and education. Our mission is to inspire, empower and enable wildlife professionals to sustain wildlife populations and their habitat through science-based management and conservation. We encourage professional growth through certification, peer-reviewed publications, conferences and working groups. For more information, visit us at [www.wildlife.org](http://www.wildlife.org).

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Membership is open to wildlife professionals, students and anyone who is interested in wildlife science, management and conservation. To learn about the benefits of TWS membership or to join, go to [www.wildlife.org/join](http://www.wildlife.org/join).

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**A timber cruiser measures timber in the Kaibab National Forest for certification purposes. In order to be certified, landowners must meet their management goals, which are later graded by a third-party auditor.**

Credit: David Hercher, U.S. Forest Service, Southwestern Region, Kaibab National Forest

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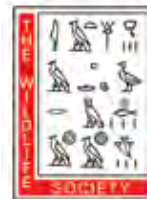
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## Contents November/December 2019

Vol. 13 No. 6

### FEATURES

- 28 Conservation through Collaboration**  
A novel partnership ensures a place for wildlife in private, working forests  
*By Darren A. Miller, James F. Bullock, Jr., William R. Murray, Cindy K. Dohner and Craig Czarnecki*
- 32 A CURE for the Common Course**  
Course-based undergraduate research experiences could benefit wildlife undergraduates  
*By Elizabeth A. Flaherty, Johanna Varner, Jennifer M. Duggan, Patrice K. Connors and Squirrel-Net*
- 36 Paying it Forward**  
North Carolina shares airport turkeys with East Texas  
*By James E. Capps and Christopher Coxen*
- 40 The Wildlife Society's Annual Awards**  
From the AFS & TWS Joint Annual Conference
- 43 Three Decades Protecting Wetlands**  
The North American Wetlands Conservation Act turns 30  
*By Charlotte R. Milling*
- 46 The Nature of Diversity**  
Diversity builds resiliency — in the wild and the workplace — but it isn't easy  
*By Brian F. Wakeling, Amanda W. Van Dellen, Kevin T. Shoemaker, Mitchell Gritts, John C. Tull and Kelley M. Stewart*
- 52 Lethal Ingestion**  
Non-lead ammunition is now required for hunting in California, so why are California condors still at risk of lead poisoning?  
*By Mike Stake*
- 56 Working Lands, Teaching Lands**  
The East Foundation shows youth the importance of private lands and conservation  
*By M. F. "Masi" Mejia and Tina Y. Buford*

### Departments

- |    |                               |    |                     |
|----|-------------------------------|----|---------------------|
| 6  | Editor's Note                 | 60 | Policy Perspectives |
| 7  | Leadership Letter             | 61 | Field Notes         |
| 8  | Science in Short              | 63 | In Memory           |
| 12 | State of Wildlife             | 64 | Gotcha!             |
| 16 | Today's Wildlife Professional |    |                     |

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## Certified to Conserve

Forest certification gives landowners a key role in wildlife conservation

*By Dana Kobilinsky*

18

Credit: Michigan State Forest certified to SFI, © Tom Haxby



43

Credit: G. Kramer/USFWS



52

Credit: Jessica French

### “The creation of a thousand forests is in one acorn.”

The first ever joint conference of The Wildlife Society and the American Fisheries Society concluded last month in Reno, Nevada. More than 4,200 fish and wildlife professionals and students gathered together for a week of educational workshops, technical sessions, networking events, insightful symposia, inspiring plenary presentations and wonderful camaraderie. It was a fantastic event, advancing science-based management and conservation by natural resource professionals around the globe. My thanks to TWS and AFS staff and the numerous volunteers that pulled together this unprecedented event.



This conference — like all of TWS' annual conferences and those of our organization units that I've been fortunate enough to attend — was motivational. Beyond the schedule of events that we scurry to and from at these meetings is the opportunity to connect with the people who constitute our profession. Being able to witness the dedication and passion that our members — you — have for our wildlife resources is inspiring.

I think particularly valuable at annual conferences is the chance to discuss and debate wildlife research, conservation and management approaches. They encourage us to challenge our thinking, develop new perspectives and dream big. It is through this sharing of our successes, challenges, failures and perspectives that new thoughts and ideas are generated and help propel the profession forward.

I hope this issue of the magazine also helps provide inspiration to challenge your thinking and develop new ideas you can share and discuss with your colleagues. Contributed articles in the following pages exemplify how connections and discussions among colleagues can build new ideas and advance conservation and our profession. Our cover feature may challenge your perspectives by taking a look at how forest management practices encouraged by certification programs can aid in conserving wildlife populations, particularly on private forest lands. As you read the following pages, I hope you are inspired to consider new perspectives and dream big of new ways you can further advance wildlife science and conservation.

As always, your feedback and input on this issue of *The Wildlife Professional* are welcome. ■



**Keith Norris, AWB®**

Director of Wildlife Policy & Communications

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The Wildlife Society wishes to thank the following organizations for their financial support of *The Wildlife Professional*.





## I LIKE Science

How many TWS members think of the Society as just for scientists? Maybe a few, but not many. Most of us got into this business because we liked the outdoors and nature. We subscribe to TWS' vision: "The Wildlife Society is a strong and effective voice in representing wildlife conservation and management, and ensuring sustainable wildlife populations in healthy ecosystems." We like wildlife and we want to make a difference — that sums up why most of us joined the profession.

Did you consider other ways to help wildlife before you pursued the college degree that makes you a wildlife professional? Why didn't you go into business, make big bucks and fund wildlife projects? Folks like Ted Turner went this route and make a big splash with their influence.

My guess is that you wanted a more hands-on approach; that you enjoyed studying wildlife; that you made leaf, flower or insect collections; that you liked figuring out the species of new birds you saw; that you wanted to touch and feel and not just admire at a distance.

These traits are what made you enjoy science, and even more, what made wildlife science appealing. For TWS members, wildlife science is at the core of all we do. TWS' mission is: "To inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through *science-based* management and conservation."

"Science-based" is the key phrase. TWS forms its position and issue statements on science. The first major activity of the newly created Society in 1937 was to begin publishing the *Journal of Wildlife Management*. The founders didn't waste any time getting into the business of publishing wildlife science. They knew what was needed at the time: practical information on the management of wildlife.

And publishing science continues to be one of the major roles of TWS today with the *Journal of Wildlife Management*, *Wildlife Society Bulletin*, and *Wildlife Monographs* providing the venues. What makes these outlets different from many

of the others is that there is more emphasis on practical information. Sure, the editors let some esoteric stuff get published, but mostly the articles are of value to managers and scientists working on management problems.

But this practicality does have its disadvantages. Academics complain about the low impact factor of TWS journals, a measure of how many times articles in a journal are cited by other published papers. The flip side of this criticism is that nobody measures how often TWS journal articles are used to make management decisions — no such published index exists. Supporting practical management decisions is part of the Society's vision and mission statements.

TWS journals also stress rigorous peer review, something that the publish-for-profit journals tend to ignore to generate high impact factors. In a 2013 article in *Science*, John Bohannon demonstrated how easily garbage can be published in some of these journals. TWS peer review will always have its challenges — that is just the nature of the peer review process. But professional societies like TWS stress rigorous peer review and are not so easily persuaded to go for material simply because it might go viral on the web.

TWS journals, technical reviews, policy statements and books provide the ammunition needed for our Government Relations staff, and our chapters and sections in the Conservation Affairs Network, to advance science-based policies that support wildlife conservation and wildlife professionals.

So join me in thanking the many reviewers, associate editors, editorial assistants and the editors-in-chief of our three journals for the thousands of hours contributed to the mission of The Wildlife Society. Science is the foundation of our Society, and it is appreciated by most of us even if we are not producers of science. TWS is a scientific society. ■



Gary C. White, PhD, CWB®, is a professor emeritus at Colorado State University and the current president of The Wildlife Society.

### Sandhill crane chicks do better in urban areas

After nearly being extirpated in parts of the Midwest, sandhill crane chicks appear to be adapting to city life.

“Birds in urban areas tended to do a bit better than birds in rural areas,” said Michael Ward, wildlife ecology professor at the University of Illinois and co-author of a [study](#) published in the *Journal of Wildlife Management*.

Co-author Jeff Fox attached color bands and transmitters to sandhill cranes (*Antigone canadensis*) and their chicks between 2009 and 2014 in Wisconsin and Illinois — the latter mostly in urban areas around Chicago.



Credit: Brad Semel

▲ Jeff Fox prepares to capture a young crane in Illinois.

less interest in raiding nests in cities since they can find human sources of food.

While nests survived better in Illinois, chick survival was better in Wisconsin, they found, but chicks in both states survived better near developed areas. Ward thinks protected urban wetland areas played a role. He also speculated that predators like coyotes (*Canis latrans*) and raccoons (*Procyon lotor*) may have



Credit: Steve Hillebrand/U.S. Fish and Wildlife Service

▲ Wild pigs quickly metabolize sodium nitrite.

### Swine bait poses little risk to coyotes

When developing toxic baits for use in wildlife damage management, one challenge is their effect on scavengers that eat treated carcasses. Testing a sodium nitrite bait, researchers found it was highly toxic to wild pigs (*Sus scrofa*), an invasive species throughout much of North America, but posed little secondary risk to coyotes (*Canis latrans*).

“We want to make sure we’re being good stewards of wildlife and really look at the downstream effects of using a toxic bait like this,” said TWS member Nathan Snow, a USDA-Wildlife Services research biologist and lead author of the [paper](#) published in the *Wildlife Society Bulletin*. “It needs to be effective for wild pigs, but also safe for other species. Those things are equally important.”

Commonly used as a meat preservative, sodium nitrite is toxic in high doses, particularly to swine, which lack enzymes to process it. Unlike anticoagulants, which can bioaccumulate and threaten nontarget animals, sodium nitrite is metabolized quickly by pigs, researchers found, making it far less hazardous for scavengers.

At the National Wildlife Research Center in Fort Collins, Colo., biologists fed sodium nitrite-treated pig carcasses to captive coyotes and found no signs of intoxication in the coyotes and little sodium nitrite in their tissues. Coyotes directly given sodium nitrite in meatballs vomited it and recovered quickly.

“To me, it’s a good indicator that if coyotes get into a carcass that for some reason does have a lot of sodium nitrite in it, they have that defense mechanism to protect themselves,” Snow said.

### Erratum



A caption in the July/August issue of *The Wildlife Professional* incorrectly identified the subject of the photo as a Mount Graham red squirrel. We regret the error.



## Development data help predict hunter access

Hunters in North Carolina depend on private lands, but as urbanization increases, their access decreases.

For wildlife managers, that could throw off the yardsticks they use to estimate populations, said TWS member Nils Peterson, a university faculty scholar at North Carolina State University.

Peterson co-authored a [study](#) published in the *Wildlife Society Bulletin* that sought to predict where hunting is allowed by using public data like property size and housing density.

These predictors were up to 96% accurate, researchers found, helping wildlife managers map where hunting occurs and better estimate wildlife populations.

“If the landscape where hunting is allowed is changing really fast, then harvest numbers might reflect changes in hunter access more than changes in wildlife populations,” Peterson said. “The decisions that private landowners make about whether or not to allow hunting and how much hunting to allow could have big impacts on how you conduct management and some of the assumptions you make.”

▼ A map shows property lines in Wilkes County, North Carolina.



Credit: North Carolina Wildlife Resources Commission

## Yellowstone elk avoid cougars more than wolves

Gray wolves get all the attention, but researchers found cougars may have a greater effect on elk habitat selection in Yellowstone National Park.

Examining GPS data collected from radio collars, they found elk avoided dense forests at night when cougars were most active, instead preferring open areas where wolves hunted mainly during daylight hours in the morning and at dusk.



Credit: National Park Service

▲ Researchers found elk in Yellowstone respond more strongly to cougars than wolves when selecting winter range.

After their reintroduction to the park, “there was a laser focus on the effects of wolves,” said Dan MacNulty, an associate professor of wildlife ecology at Utah State University. “Nobody was really thinking about how the elk might be responding to cougars.”

In a [study](#) recently published in *Ecology Letters*, MacNulty and his co-authors looked at how elk (*Cervus canadensis*) modified their winter habitat selection between 2001 and 2004 around Yellowstone, when gray wolves (*Canis lupus*) and cougars (*Puma concolor*) were at peak populations.

“When wolves were relatively inactive in the middle of the night or during the daytime, elk would use risky habitats,” MacNulty said. If elk encountered wolves, they could overcome them by running fast, grouping in herds and standing their ground and fighting back, MacNulty said.

He urged wildlife managers examining the effects of wolf reintroduction to keep multiple factors in mind, including how brown bears (*Ursus arctos*) and black bears (*Ursus americanus*) could affect elk habitat selection in the summer.

“In a system like Yellowstone where you have so many predators ... it’s silly to single out one predator,” he said. “It’s about drawing the right conclusions about who’s pushing the prey around.”



Credit: Tiomax80 via Flickr

▲ **Moose choose to forage on different plants than caribou.**

### Endangered caribou eat different plants than moose

As moose move north into alpine areas in Quebec, they compete little with an endangered caribou population, researchers found.

The growing moose population “is the result of a perfect storm,” said Laval University biology professor Jean-Pierre Tremblay, co-author of a [study](#) published in *Global Ecology and Conservation*. Moose (*Alces americanus*) took advantage of young forests created from logging as carnivores like coyotes (*Canis latrans*) and black bears (*Ursus americanus*) began preying on Atlantic-Gaspésie caribou (*Rangifer tarandus caribou*).

Since moose and caribou occupied the same areas, researchers wondered if they competed for food. Extracting DNA from feces, they found they ate different plants — balsam fir and birch for moose; moss and juniper for caribou.

“There was low potential for exploitative competition between the species,” Tremblay said.

More hunting pressure on moose and more predators can help the endangered caribou, he said, but habitat improvements may be most effective.

### Kirtland’s warblers don’t need cowbird removal

Although Kirtland’s warblers will likely always rely on people to sustain their populations, they may not always need cowbird management.

In a [study](#) published in the *Journal of Wildlife Management*, researchers tested what would happen if they first reduced and then eliminated the U.S. Fish and Wildlife Service’s program of trapping and removing brown-headed cowbirds (*Molothrus ater*), which parasitize warbler nests and outcompete the nestlings for food.

When the program started in the 1970s, only about 200 male Kirtland’s warblers (*Setophaga kirtlandii*) nested in a single, isolated area. “When we started the study in 2015, there were more than 2,000 male Kirtland’s warblers spread across Michigan,” said lead author Nathan Cooper, a post-doctoral fellow at the Smithsonian Migratory Bird Center.

With the recent delisting of the bird, funding for management projects like this could end. Cooper and his colleagues wondered if they could save money and reduce conservation reliance by halting cowbird removal, leaving more money for habitat protection and other programs.

The team tested what would happen if they reduced trapping during the first three years and ended it in the fourth.

“There was a shocking result,” he said. Only one out of 130 nests was parasitized in the final year. Across all four years of the study, only four of 514 nests were parasitized.

They plan to monitor if anything changes, but, for now, they believe state and federal agencies can redirect \$110,000 a year toward other efforts, like creating young jack pine forests the warblers rely on. ■



Credit: Nathan Cooper

▲ **Cowbird management appears unnecessary to sustain Kirtland’s warblers.**

Contributed by David Frey,  
Dana Kobilinsky and Joshua  
Rapp Learn



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# State of Wildlife

Regional news around The Wildlife Society's Sections

## CANADA

### Protected areas expanded in Prince Edward Island

Conservation organizations and the government of Prince Edward Island will acquire 18 new ecologically sensitive properties in an effort to nearly double the protected land in Canada's smallest province. Kathryn Morse, Atlantic director of communications at the Nature Conservancy of Canada — which is working with the federal and provincial government as well as Ducks Unlimited Canada and Island Nature Trust — said that the NCC is prioritizing salt marshes, coastal areas and the remaining mature forests on the island. These efforts will help protect small island mammals like foxes and rabbits as well as a number of bird species, including the piping plover (*Charadrius melodus melodus*), which is listed as **endangered** under Canada's Species at Risk Act. "PEI is a small province but it also has the smallest percentage of land set aside for conservation in Canada," Morse said. The new efforts are expected to bring the total protected area to about 7% of the island. *Source: Nature Conservancy of Canada*



Credit: Mike Dembeck

◀ Sites like the Nature Conservancy of Canada's nature reserve at Blooming Point protect small mammals and birds.

## SOUTHEAST

### State officials track spread of crippling Florida panther disorder



Credit: Bransilver, Connie, USFWS

▲ **Biologists wonder what's causing nerve damage to Florida panthers and bobcats.**

Florida wildlife managers are soliciting help from the public to track the spread of a disorder that appears to cripple Florida panthers and bobcats. Florida Fish and Wildlife Conservation Commission

biologists first noticed the problem while viewing a video of an affected kitten taken in the spring of 2018. Including that case, eight apparently affected panthers (*Puma concolor coryi*) and one bobcat (*Lynx rufus*) have been sighted on trail cameras in Collier, Lee, Charlotte and Sarasota counties as of August 2019. The FWC confirmed one bobcat and one panther had neurological damage. Biologists have looked at possible causes including distemper, cerebellar hypoplasia, degenerative myelopathy and toxins like rat poison, but they have been unable to determine the cause. "The number of animals exhibiting these symptoms is relatively few, however, any disease or condition impacting multiple animals is cause for concern," said FWC spokesperson Carli Segelson. The agency is increasing monitoring for other possible cases and is asking the public to report big cats that might have been affected. About 120 to 230 panthers are believed to occupy Florida. Panther numbers have recovered since the 1990s, but the population remains isolated. *Source: FWC*

### Alabama opens sandhill crane hunting season

For the first time since 1916, Alabama will hold a sandhill crane (*Antigone canadensis*) hunting season, following

years of sandhill crane population gains. Aerial surveys conducted since 2010 have shown a 16% annual increase in the crane population, to a current average wintering population of 15,029. Following the lead of states such as Tennessee and Kentucky, Alabama plans to open a hunting season in December. "It's pretty amazing that this population has made such a miraculous comeback," said Seth Maddox, migratory game bird coordinator for the Alabama Department of Conservation and Natural Resources. Alabama will provide 1,200 tags — less than 10% of the cranes' five-year average — to 400 hunters. The season will run from Dec. 3 to Jan. 5, then resume from Jan. 16 to Jan. 31. Prior to hunting, tag holders will be required



Credit: USFWS

▲ **Alabama will open its first sandhill crane hunting season since 1916.**



to take an identification test in an effort to avoid the taking of nontarget species, Maddox said. *Source: Alabama Department of Conservation and Natural Resources*

## CENTRAL MOUNTAINS & PLAINS

### Use of cyanide traps to manage predators halted

USDA Wildlife Service is suspending its use of cyanide traps to manage predators on federal land in Wyoming while it conducts an environmental analysis of the practice. The action is part of a legal settlement with environmental groups that sought to end the use of cyanide traps to control predators like coyotes (*Canis latrans*) and wolves (*Canis lupus*) that prey on livestock. The agency has agreed to conduct an environmental analysis of the management technique, which uses M-44s — spring-loaded traps buried in the ground that deliver cyanide to predators that attempt to take the attached bait. A U.S. District Court approved the deal between Wildlife Services and the Center for Biological Diversity, Western Watersheds Project and WildEarth Guardians. The groups had protested that the traps can kill or injure nontarget animals like grizzly bears (*Ursus arctos horribilis*), skunks, foxes and even humans. The U.S. Environmental Protection Agency has reauthorized the continued use of M-44s in other states, with certain restrictions, until a final decision is made in 2021. *Source: District Court for the District of Wyoming*

### Tribes receive 55 Yellowstone bison

A wild herd of American bison (*Bison bison*) on tribal lands gained 55 bulls relocated from Yellowstone that would have otherwise been culled. The relocation to Fort Peck's Assiniboine and Sioux tribes is the result of a partnership between Yellowstone National Park, the Fort Peck Assiniboine and Sioux Tribes, Montana Gov. Steve Bullock, the InterTribal Buffalo Council and several conservation groups. The additional bison will bring the herd size on the Fort Peck Indian Reservation



*Credit: Cassi Gurell*

◀ Yellowstone bison are being relocated to tribal lands.

to about 350 individuals roaming 17,000 acres, said Robbie Magnan, bison manager for the Fort Peck Tribes. "I'm glad we're actually seeing the fruits of our labors maturing," he said. The partners plan to continue to share animals with other tribes and organizations and expand the area available for bison. Establishing a free-ranging herd in the area is an "impossible dream," Magnan said, due to surrounding private land, but he hopes the efforts will eventually help establish a wide-ranging herd and lead to healthier bison genetics. A relocation of cows is planned for 2020. *Source: Fort Peck Tribes*

## SOUTHWEST

### AZGFD studies mule deer migration corridors

The Arizona Game and Fish Department is conducting a three-year mule deer movement study in an effort to identify corridors for mule deer conservation efforts and inform projects that reduce vehicle collisions. This study is one of many funded through Department of the Interior Secretarial Order 3362, which focuses on wildlife migration corridors and winter range for elk (*Cervus canadensis*), pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) across the western United States. "Studies such as these are instrumental for us to learn where local wildlife populations move within their natural habitat," Jeff Gagnon,



*Credit: Danielle Brigida, USFWS*

▲ A three-year mule deer movement study will help guide deer-vehicle collision mitigation in Arizona.

an AZGFD statewide research biologist who is leading the study, said in a release. "This data will guide management decisions to help us conserve and protect local deer populations and enhance the safety of motorists throughout northern Arizona." Researchers with the department, along with other partners, captured and collared 20 mule deer west of the San Francisco Peaks, north of Flagstaff. The GPS collars will transmit data on their daily and seasonal movements, which traffic engineers and wildlife biologists can use to help mitigate habitat fragmentation and reduce wildlife collisions for future road projects. "One challenge in managing wildlife is working to address the impacts that roads, highways, railroad tracks and even fences have on wildlife," Gagnon said. "All of these essentially serve as boundaries that can lead to habitat fragmentation. Finding

solutions to address such issues benefits Arizona's wildlife and helps us to make informed decisions to ensure they are around for future generations." *Source: Arizona Game and Fish Department*

## NORTHEAST

### Hundreds of puffins pair up to nest in Gulf of Maine



Credit: Billtaclar via Flickr

▲ Puffins have benefited from improved fish stocks.

Small islands off the coast of Maine saw one of the largest numbers of Atlantic puffin (*Fratercula arctica*) mating pairs in years. Biologists attribute the boom to cooler water temperatures, which encourage the fish they prey on to come closer to the surface where the puffins can scoop them up. "The take-home message is, rebuilding the diversity of fish stocks and the healthiness of fish stocks is good news for puffins," said Stephen Kress, founder of the Audubon Seabird Restoration Program, who has been working with Maine puffins for 46 years. "It's a good year this year but the future is still uncertain," said Kress, who worries warmer temperatures due to climate change could mean less fish for the Maine colony, which is at the southern edge of the puffins' range. Still, research has shown that puffins can adapt to different prey items, he said, so recovering fish diversity in the Gulf of Maine will give the birds options. "Depleted fish stocks are good for no one," he said. (*Source: Audubon Seabird Restoration Program*)

### Pennsylvania game agency seeks to ban turkey, deer feeding

The Pennsylvania Game Commission is proposing a ban on feeding wild turkey (*Meleagris gallopavo*) and deer (*Odocoileus virginianus*) in an effort to control the spread of wildlife maladies like chronic wasting disease, mange and avian pox. The state agency sought public input on the proposal, which would expand the current ban for feeding bears (*Ursus americanus*) and elk (*Cervus canadensis*). While these wildlife diseases often spread naturally, the agency noted, their spread is "significantly increased when wildlife is unnaturally concentrated" by feeding. "It is unlawful to intentionally lay or place food, fruit, hay, grain, chemical, salt or other minerals anywhere in this Commonwealth for the purpose of feeding big game to include elk, deer, bear and turkey, or to intentionally lay or place food, fruit, hay, grain, chemical, salt or other minerals that may cause big game to congregate or habituate an area," the proposed rule language states. *Source: Pennsylvania Game Commission*



Credit: Thomas via Flickr

▲ A new Pennsylvania state rule would ban deer and turkey feeding.



Credit: Don Debold

▲ Tule elk are interfering with Point Reyes ranching operations.

## WEST

### Point Reyes plans to cull tule elk

The National Park Service is considering limiting the Drakes Beach tule elk (*Cervus canadensis nannodes*) herd at Point Reyes National Seashore in order to stop the animals from interfering with beef and dairy cattle ranches. The Park Service is proposing a population threshold of 120 adult elk for this herd, which is one of three tule elk herds within the park. That will mean culling 10 to 15 elk per year, said Melanie Gunn, an outreach coordinator with the Point Reyes National Seashore. Cattle ranchers have voiced concerns about the tule elk population knocking down fences, intermixing with cattle and eating forage that's part of their agricultural lease/permit. When the elk were translocated into a wilderness area in 1998, the Service hadn't considered they might move into the ranchland areas of the park, Gunn said. "What we're proposing is an alternative, which is a kind of middle path, where we feel both ranching and tule elk can work well together within Point Reyes National Seashore," she said. The Park Service plans to release a final general management plan amendment addressing this issue by spring 2020, which will take public comments into account. "We think both ranching and native wildlife can coexist at Point Reyes National Seashore, as they have the last 57 years," Gunn said. *Source: National Park Service*



## NORTHWEST

### Walrus make early appearance on Alaska shore

As many as 40,000 walrus in northwest Alaska took to shore this year at the earliest date ever recorded in the area. Pacific walrus (*Odobenus rosmarus*) females and their offspring have historically spent their summers in small groups on ice floes in the Chukchi Sea, where they have easy access to prey and are protected from predators before they begin their southward migration. But sea ice in northern Alaska has been melting earlier in recent years, driving more and more females and their young onto shore. This year, thousands of walrus appeared near Point Lay, Alaska, where human activity can scare them into stampeding into the water, causing deaths and injuries, said Andrea Medeiros, public affairs specialist for the Alaska region of the U.S. Fish and Wildlife Service. “The native village of Point Lay, the Eskimo Walrus Commission and the U.S. Fish and Wildlife Service are asking people to keep their distance from walrus haul outs to prevent disturbances,” she said. Hauling out on the shore can also put additional pressure on female walrus and their offspring, sometimes causing them to swim out much farther to access feeding grounds.

Source: *Alaska Region of the U.S. Fish and Wildlife Service*



Credit: USFWS

▲ Pacific walrus rest on shore near Point Lay, Alaska.



◀ Michigan Department of Natural Resources lab technician Julie Melotti studies a hunter-collected sample of a ruffed grouse.

Credit: Michigan DNR

## NORTH CENTRAL

### Hunters send ruffed grouse for West Nile detection

The Michigan Department of Natural Resources is working with Minnesota and Wisconsin wildlife departments to collect information from hunter samples regarding West Nile virus infection and exposure in ruffed grouse. After Pennsylvania biologists began studying fluctuations in ruffed grouse (*Bonasa umbellus*) populations they were seeing in relation to the virus, Michigan wanted

to see if there was a correlation with their own grouse, said Julie Melotti, a lab technician in the Michigan DNR wildlife disease lab. After detecting 19 cases of the virus in ruffed grouse in Michigan since 2017, they decided to work with Minnesota and Wisconsin to study West Nile virus in the upper Great Lakes region. They were seeing high ruffed grouse drumming counts in the spring, but that wasn't reflected in the fall harvest, Melotti said. The three states have collected over 700 samples from hunters. Researchers will use blood strips to survey the prevalence of the virus in grouse that may have recovered and look at the birds' hearts for indications of active infection. Michigan has sent over 600 kits to hunters to test for the virus. The state plans to continue the study next season. “Using this multi-year approach, we can then account for any changes that might occur with the virus,” Melotti said. “I’m hoping that this will help us determine if West Nile virus is having an impact on grouse or not.” Source: Michigan Department of Natural Resources ■

Contributed by David Frey, Dana Kobilinsky and Joshua Rapp Learn

## Seeking diversity in the forest — and the workplace

### JESSICA HOMYACK'S CAREER PATH LEADS THROUGH THE FOREST

By David Frey

**A**s a master's student at the University of Maine, TWS member and Certified Wildlife Biologist® Jessica Homyack found herself far from civilization trying to gauge how forestry practices in northern Maine might affect snowshoe hares. The hares (*Lepus americanus*) are the primary prey for Canada lynx (*Lynx canadensis*), and as the U.S. Fish and Wildlife was considering the listing status of the lynx, biologists were trying to home in on potential threats it might face in the wild.

“About the northern third of Maine is mostly privately owned timberland,” Homyack said. “We were probably about 30 miles from a paved road, living in a single-wide trailer in a logging camp — no running water, no electricity — kind of working side by side.”

Homyack didn't know then that her career path would bring her back to working with the timber industry, but the experience opened her eyes to the potential of private forests.

“What I saw on a day-to-day basis was a landscape filled with diversity,” Homyack said. “Seeing bears and moose and songbirds and spruce grouse — these are not landscapes that are devoid of wildlife. They're incredibly productive. That really gave me a new perspective on private forest lands.”

Homyack is now a wildlife scientist and the manager of western environmental research for Weyerhaeuser Company, one of the world's largest owners of private timberland. For the past three years, she's been based in Centralia, Washington, after seven years as a wildlife scientist in Vanceboro, North Carolina.

The forest has always called her. Growing up in Lancaster County, Pennsylvania, she learned to hunt and fish with her father and brother. As an undergraduate at West Virginia University, her first summer field job had her traipsing across the Monongahela National Forest mist-netting bats. Field courses sent her into the woods to capture and mark species from salamanders to turtles to bears. Pursuing her doctorate at Virginia Tech, she studied the effects of oak regeneration on salamanders.

#### An overlooked field

The species she studied changed over the years, but she always found herself among the trees. So maybe it's no surprise that Homyack would end up as a biologist for the forest industry, but it wasn't something she had thought about until getting her doctorate.

“I was a brand new mom in graduate school trying to figure out what my next steps were,” she said. A friend suggested the job, and when she interviewed for it, she brought her 6-week-old baby along.

“That was actually really meaningful to me,” Homyack said, “because I was pretty nervous about trying to figure out work-life balance and what it's going to be like to be a working mother. To have that experience as part of the interview gave me some perspective that probably this could be a place that I could find that balance and have people working with me who understand the demands that come with young children.”

Working in the private sector is a path many wildlife biologists — who tend to envision careers with state or federal agencies — don't think about. But as conservation on private land gains more attention, the timber industry is an area of wildlife biology that is becoming increasingly important, said TWS Past President Darren Miller.

“Since the late '60s and early '70s, there's been a history of high-quality, informative research looking at the topics of the day,” said Miller, who is vice



Courtesy Jessica Homyack

▲ TWS member Jessica Homyack stands in the Wind River Mountains near DuBois, Wyoming, where she was participating in the National Conservation Leadership Institute's Adaptive Leadership Program.



president for forestry programs at the National Council for Air and Stream Improvement, Inc., a scientific association that serves the forest products industry. “It’s always frustrating to meet with different agencies or NGOs, and they have no idea all that research is out there.”

It was Miller who first hired Homyack at Weyerhaeuser. At the time, he was manager of southern environmental research for the company, and Homyack’s background with reptiles and amphibians caught his attention.

“That was an area we needed more information on,” Miller said. “She really has done — and continues to do — a lot of really good work around those species and their interactions with forestry.”

### ‘Just a rock star’

In earlier years, timber companies focused mainly on game species, he said, but since then, they’ve begun paying closer attention to often overlooked species, including — most recently — invertebrates. “Jessica has really been a leader in bringing those issues to the forefront,” Miller said.

Since then, he has watched Homyack grow into more of a leadership role, managing the company’s environmental research program for the West.

“She would be an asset whatever she does and wherever she goes,” he said, “not only for her employer but for wildlife conservation in general. She’s got all of those soft skills you need to be successful. She’s got the strong technical base. She’s just a rock star.”

Always drawn to research, Homyack found her work at Weyerhaeuser to be a good fit. In the Southeast, she continued her work with amphibians and reptiles. She’s looked at the impacts of biofuels production — from wood pellets to switchgrass — on wildlife communities. She’s researched small mammals and salamanders and studied broader questions, like how timber harvesting may affect water quality.

“You wear a lot of different hats,” she said.

### A bigger voice

Homyack has been a member of TWS since her undergraduate days. She served as an officer in the student chapter, worked to invigorate the student chapters as a graduate student and helped build



Courtesy Jessica Homyack

bridges between graduate and undergraduate students. She’s been associate editor for *The Wildlife Bulletin* and served on various working groups.

“It was provided to me early on that being a professional means giving back to your profession as well,” she said. “I’ve always been somebody who likes to be able to give back to the community. For me, The Wildlife Society is my professional community, so it’s given me a way to do that. Being involved helps give you a broader, bigger voice for your profession, too.”

A recent chair of the Ethnic and Gender Diversity Working Group, Homyack worked to use that bigger voice to speak out for more inclusion in the Society and in the profession.

“Something that’s really been a guiding principle for me as I’ve gone into the mid-career stage is how important diversity and inclusion are,” she said. Although diversity is increasing in the field, that’s less true in leadership positions, Homyack said.

“We’ve got quite a long way to go before we’re at parity, but we’re moving in the right direction — slowly,” she said. “I think once we get to a point where gender and other aspects of diversity are part of every decision that we make, we’ll be in a good place.” ■

▲ Much of Jessica Homyack’s role as a scientist in the forestry industry is providing technical support and information to other parts of the business. Here, she leads a tour with forest hydrologist Cliff Tyson on reptiles and amphibians in forested wetlands.



David Frey is the managing editor for The Wildlife Society.



# Certified to Conserve

FOREST CERTIFICATION GIVES LANDOWNERS  
A KEY ROLE IN WILDLIFE CONSERVATION

By Dana Kobilinsky





The Louisiana black bear holds a special place in Americans' hearts — even if most people don't realize it. It was likely the inspiration for the teddy bear, the toy named after Theodore Roosevelt, who refused to shoot a Louisiana black bear (*Ursus americanus luteolus*) tied to a tree. With a skull that's longer than the average black bear and large molar teeth, it historically roamed southern Mississippi, Louisiana and eastern Texas, but since the days of Roosevelt, much of the bottomland hardwood forests it relied on were cut down, and the bear numbers declined. Twenty-four million acres of forest dwindled to 400,000 acres. By 1992, when the subspecies was listed under the Endangered Species Act, only about 300 individuals remained.

▲ The American Tree Farm System certifies many forests owned by families, who often prioritize having wildlife on their properties.

Credit: Caryn Stein



▶ Louisiana black bears were once abundant in parts of the South, but the loss of the forests they inhabited caused them to decline. Their recovery is thanks largely to conservation measures by private landowners.

▼ A U.S. Fish and Wildlife Service wildlife biologist uses a monitoring device to track Louisiana black bears.



Credit: USFWS



Credit: Steve Hillebrand, USFWS

Restoring the bear was a challenge. Its historical range lies mostly on private lands, which lack the protections federal and state lands can provide. Working with the U.S. Fish and Wildlife Service, private landowners sought to protect their timber businesses amid efforts to restore the bears. The U.S. Fish and Wildlife Service agreed timber harvest wouldn't be considered "take" of a bear, since it could be carried out compatibly with the bear's habitat needs. It also agreed that agricultural lands would not be designated critical habitat for the bear. By 2016, after the population increased to between 700 and 1,000 individuals, the Louisiana black bear was delisted.

Its return was credited in large part to private landowners, who helped create forested corridors connecting areas used by bears. Maintaining landscapes beneficial to bears is now credited to forest certification, a process in which private timber companies and other landowners manage their wooded acreage under standards meant to encourage sustainable forestry practices — practices that also benefit wildlife conservation and biodiversity. Third-party auditors measure if those standards are met, in an effort to create forests that are both commercially viable and beneficial to wildlife.

The Louisiana black bear is one of several wildlife success stories that point to the importance of sustainable forest management. "The stories happen every day," said Tom Martin, president and CEO of the American Forest Foundation, which administers the American Tree Farm System certification program.

In recent years, a push from consumers wanting greener products — and from corporations wanting to make sure they could provide them — has made certification a necessity for timber companies to sell wood pulp to major brands like Procter & Gamble and Kleenex, which insist on forest certification from their suppliers. A certification label shows buyers that the products came from sustainably managed forests, which are important for preventing further declines in biodiversity.

"Forest certification can provide a social license to conduct timber management, as well as a set of operational guidelines for ecologically-based forest management," said Kirk Hanson, director of forestry with the Northwest Natural Resource Group,





Credit: Northwest Natural Resource Group

◀ In Washington and Oregon, the Northwest Natural Resource Group helps private landowners, smaller forest product companies, governmental agencies, Indian tribes and nonprofit organizations become certified under the Forest Stewardship Council.

a nonprofit organization that helps certify private landowners in the Pacific Northwest through the Forest Stewardship Council.

### A social license

Certification is “not required by any means,” said TWS member Jenniffer Bakke, but it does offer a sort of social license to operate. Bakke is manager of environmental services for Hancock Forest Management, a company that manages nearly 6.5 million acres of timberland globally for large investment corporations and institutional investors. The company has enrolled their timberlands into third-party certification programs that support the company’s principles related to sustainable forest management.

“Our clients expect that we will manage their land in a sustainable fashion,” she said, “and being certified is one way to demonstrate that.”

Getting smaller forest owners to sign on to certification can be trickier. “The majority of private forests owned in this country are not owned by giant companies. They’re small- and medium-size forests owned by families,” said Healy Hamilton, Chief Scientist of NatureServe, a nonprofit orga-

nization that provides biodiversity data, tools and decision-support services. Often, the landowners who inherited the properties have little interest in harvesting the trees and little capacity for actively managing the land. “The default is to do nothing,” she said, and that may not be best for the forests.

“Social research on what family landowners care about shows making money off of timber is low on the list, and wildlife is very high on their list,” Martin said. In a recent [survey](#), 70% of landowners said they cared about the beauty of wildlife and the land and the scenery. Only 10% named timber production as their primary reason for owning land.

“Even though those are big financial drivers for how they manage their land, they often have goals for wildlife as well,” Martin said.

### ‘Doing right by their land’

To receive certification, forest owners must follow certain procedures designed to — among other things — protect air, water and soil quality and promote biodiversity. Landowners wanting to manage for gopher tortoises (*Gopherus polyphemus*), for instance, could include strategies like prescribed fire to thin dense

canopies and changing to a more turtle-friendly mowing regime.

During auditing, their management efforts are assessed by a third party, but it's up to the landowners to decide their approach. The third party goes through a set of standards to grade

the forests, making sure the owners comply with federal, state and county laws and ensuring that harvest, removal or other management complies with their originally approved objectives.

"Standards are not prescriptive and don't tell you what practice you use where. But when

### Transforming a forest on tribal land

The 2,500 acres of forest land the Skokomish Tribe owns in Washington were dense with 60- to 90-year-old trees. Douglas fir dominated the forest, with little additional biodiversity.

"They had not had any active timber management for at least 30 years," said Kirk Hanson, director of forestry with the Northwest Natural Resource Group. With little diversity in either wildlife or ecosystems, the tribe recognized it needed active management to enhance the biodiversity potential of the forest.

The Skokomish reached out to the Northwest Natural Resource Group to become certified with the Forestry Stewardship Council and to help them develop a conservation-based forest management plan that complied with federal laws such as the National Environmental Policy Act and the Endangered Species Act.

NNRG is now overseeing the first timber harvesting for the tribe in over a generation, and along with generating important revenue for the tribe, logging crews are using equipment to create snags that helped cavity-dependent wildlife like woodpeckers and squirrels. They're opening up the canopy by selectively thinning the forest, allowing more sunlight through and creating greater shrub diversity in the understory. Western red cedar, maple and other vegetation will be able to take root, increasing biodiversity. The forest ecology will be transformed, and the tribe will benefit economically as well, Hanson said. The certification allows low value pulp-grade logs harvested during the thinning to be sold at a higher price to a local FSC-certified paper company.

"FSC certification can provide access to higher value markets," he said.

► The Skokomish Tribe reached out to the Northwest Natural Resource Group to certify their forests. Logging equipment created snags that helped cavity-dependent wildlife like woodpeckers and squirrels.



Credit: Kirk Hanson



you use a practice, it must meet a standard or rigor,” said Steve Koehn, director of cooperative forestry with the U.S. Forest Service.

Those standards are meant to be adaptable to anywhere in the country. Paul Trianosky is chief conservation officer of the Sustainable Forestry Initiative, which certifies a range of lands, from state forests to land owned by nonprofits to large, institutional landowners. At SFI, he said, “land managers can interpret the standards and apply them to southern pine forests or Pacific Northwest Douglas fir, or whatever it might be.”

Covering around 360 million acres, SFI is the largest of three organizations that provide forest certification in the United States and Canada. The oldest organization, the Forest Stewardship Council, has a global focus, providing certification for 250 million acres of certified forests around the world since its founding in 1993, from Argentina to Zimbabwe, including over 160,000 acres in the U.S. and Canada. The third organization, the American Tree Farm System, specializes in nonindustrial forests and smaller, family lands. Created by the American Forestry Foundation, it covers about 20 million acres.

“Most people join the system because they want to have an affirmation that they’re doing right by their land,” Martin said. “The second thing is they want to be part of a community of like-minded landowners who are thinking about their land every day and what they get off of it. Wildlife is near the top of that list.”

While certification is mostly aimed at private landowners, state and tribal forests have also been certified, and a recent Forest Stewardship Council process allows national forests to gain certification. SFI also offers to certify state and federal lands.

### A ‘phenomenal’ recovery

It can be hard to measure how effective forest certification has been in protecting species, but supporters point to some successes. Fifty years ago, the Kirtland’s warbler (*Setophaga kirtlandii*) had nearly disappeared from the Michigan jack pine forests it historically occupied. Always rare, the species



Credit: Peter Pattavina, USFWS

teetered on the verge of extinction, due in part to the impacts of logging. But its recovery — which led to its removal from the Endangered Species List in October — can be partly credited to forest certification, said Jad Daley, president and CEO of American Forests, a nonprofit focusing on forest conservation and sustainability.

“The recovery for the warblers has been phenomenal,” he said.

Since the warblers require young forests, the Michigan Department of Natural Resources, U.S.

▲ Forest certification has benefited gopher tortoises, which prefer to use burrows in young, open forests.

▼ A timber cruiser records data on tree measurements as part of certification in the Kaibab National Forest.



Credit: David Hercher, U.S. Forest Service, Southwest Region, Kaibab National Forest



▶ The Kirtland's warbler had nearly disappeared from Michigan jack pine forests, but its recovery is partly credited to forest certification.



Credit: Eric Sprague

▼ In the Southeast, thinning on certified forests has benefited gopher tortoises and helps provide landowners a source of income.

Forest Service and other land managers have been working on Michigan state forest lands certified by both SFI and the Forestry Stewardship Council to thin the trees. The wood is sold for paper, wood chips for fuel and particle board. American Forests and its partners replanted the land with young jack pines, helping the birds to thrive again.

“There’s an interesting tradeoff/conflict between managing forests for optimal timber production and creating the habitat that Kirtland’s warblers need,” said Austin Rempel, forest restoration manager with American Forests. Maintaining young jack pine forests doesn’t result in much valuable timber anymore, he said, but it does allow for some pulp wood and paper product production, as well as chips used for burning as a renewable energy source, while creating habitat for the birds.



Credit: Randy Browning

### Conservation on private lands

In Georgia, management efforts on certified forests have created young, open canopies needed by gopher tortoises. The USFWS is currently evaluating the species’ status in the eastern part of its range, although it is federally listed as threatened in the western part of its range from Alabama across Mississippi and into southeastern Louisiana. The tortoises are a candidate for ESA listing in parts of Alabama, Florida, Georgia and South Carolina. Preliminary results from a Georgia Department of Natural Resources survey found working forests provide much of the habitat the tortoises need, helping sustain the species. Forest thinning helps provide landowners a source of income, but it can also help create habitat for the tortoise.



The gopher tortoise may be just one of many species benefiting from forest certification in the Southeast. Throughout the region, many landowners lease their forests for hunting deer (*Odocoileus virginianus*), quail (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*) and other wildlife. The leases provide an extra incentive for certification, as well as funds to pay for it, Martin said. “Those folks also want to make sure their land is managed well for all of its uses,” he said.

In 2010, the USFWS Southeast Region received a petition to evaluate around 450 species to see if they needed Endangered Species Act protections. “When that happened, we realized we needed to work a different way with states, under state regulatory authority, and also more closely with private landowners,” said Cindy Dohner, a former southeast regional director for the USFWS who now works as a contractor with the National Alliance of Forest Owners.

In the Southeast, about 95% of land is private, she said. The USFWS wanted to work collaboratively with private landowners to protect species on the endangered species list, prevent unlisted species from landing on it and keep working lands working. “One thing we talked to landowners about was the certification process and the certainty and conservation benefits it provides,” she said. Since 2010, the at-risk species conservation effort has had about 200 wildlife wins — including delistings and species precluded from listing — and has kept more than 150 species off the list.

### Measuring success

While anecdotal evidence points to plenty of success stories, land managers have lacked a way to actually measure how much certification has impacted conservation. Species successes often cannot be solely credited to certified forests, Hamilton said, and biodiversity challenges can’t always be attributed to forest management. Gopher tortoises, for example, may find plenty of habitat, she said, but what if an incursion of invasive fire ants eats all their eggs? “There’s little that Weyerhaeuser or Georgia-Pacific can do about that,” Hamilton said.

With leadership and funding support from the Sustainable Forestry Initiative, she and her



Credit: Jordan Benner

◀ Students learn the art of tree estimating during the annual Envirothon high school competition in The Oregon Garden's Rediscovery Forest, a demonstration forest certified by the Sustainable Forestry Initiative.

▼ Many landowners lease their forest lands for hunting quail and other species, which provides an extra incentive for certification as well as funds to help pay for it.



Credit: Randy Browning

## Guidelines for Sustainability

Each certification organization has its own guidelines and principles for landowners to follow. Here are a few. >>

### Sustainable Forestry Initiative

**Species of concern:** Develop a program to address conservation of sites with species of concern.

**Water quality:** Use best management practices that go well beyond legal requirements to protect rivers, streams, lakes and wetlands.

**Forestry research, science and technology:** Invest in forestry research, science and technology.

**Forest conversion:** Don't convert forest cover type except to deal with disease or special circumstances.

**Chemicals:** Minimize chemical use and use only government-approved chemicals.

### Forest Stewardship Council

**Indigenous rights:** Recognize and respect the rights of indigenous peoples to own, use and manage their lands.

**Forest benefits:** Encourage efficient use of forest products and services.

**Environmental impact:** Conserve biological diversity, water resources, soils and unique and fragile ecosystems and landscapes.

**Management plans:** Keep a management plan with long-term objectives and how to achieve them.

**Monitoring:** Assess the condition of the forest, yields, chain of custody, management activities and social and environmental impacts.

### American Tree Farm System

**Sustainable forestry:** Develop a forest management plan and implement sustainable practices to promote forest health and sustainability.

**Reforestation:** Maintain desired species on harvested sites and non-stocked areas.

**Air, water and soil:** Maintain or enhance air, water, soil and site quality.

**Biodiversity and forest health:** Contribute to the conservation of biodiversity.

**Special sites:** Protect their unique cultural, geological, biological or ecological characteristics.

Sources: SFI, FSC, ATFS

colleagues are working to develop a suite of metrics to assess if certification is working for biodiversity. Together, they developed eight measures to assess species, ecosystems, landscapes and regional conservation priorities to find out how much certification is contributing to conserving species and ecosystems. So far, they have applied these metrics to certified forests in several counties of Florida and Washington.

“We can say that there is confirmed habitat for multiple species at risk occurring on forest lands managed to the SFI standard,” she said. “So we know the species are there.” Since sustainably certified forests are required to manage for the persistence of species at risk, “these forests are likely making important contributions to conserving vulnerable biodiversity.”

### A push from the public

Over the past 10 years, certified forest acreage has grown rapidly, with SFI certification alone now covering over 300 million acres, Dale said, and interest continues to grow.

“Certification strength is driven by consumer care,” he said, and consumers’ interest continues to rise. “We are in an internet age with better information about products we purchase, and it’s only going to increase.”

While much of the work has been concentrated in the Southeast, observers say certification projects are becoming more popular elsewhere in the country as demand for products from sustainable forests increases and improved technologies — from drones to LIDAR — give managers more insight into what’s happening on their land.

“Society is realizing the multiple benefits of forests — more than just the economic return on timber,” Hamilton said. ■



Dana Kobilinsky is associate editor for The Wildlife Society.





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# Conservation through Collaboration

A NOVEL PARTNERSHIP ENSURES A PLACE FOR WILDLIFE IN PRIVATE, WORKING FORESTS

By Darren A. Miller, James F. Bullock, Jr., William R. Murray, Cindy K. Dohner and Craig Czarnecki



Credit: Darren Miller

▲ Conservation efforts on private lands are critically important for conservation of at-risk species. This loblolly pine stand in Louisiana, on land owned and managed by Weyerhaeuser Company, is being managed for the federally endangered red-cockaded woodpecker under a safe harbor agreement. This photo was taken in late winter after a prescribed fire.

**F**orests provide critical ecosystem services. They offer clean water and carbon storage. They provide wildlife habitat and renewable forest products. They also provide recreational opportunities, spiritual renewal and cultural values for tens of millions of people.

For the past century, forest cover has remained stable in the United States — thanks largely to private landowners. About 180 million hectares — 58% of the nation’s forests — are in private hands (Oswalt, et al. 2014). Income from forest management helps forestall conversion to other uses, allowing landowners to keep the land forested (National Commission on Science for Sustainable Forestry 2005) while providing conservation benefits (Demarais et al. 2017, Miller et al. 2009).

These working forests are vital for the conservation of biological diversity, including at-risk and listed species, including 60% of species listed under the Endangered Species Act (Robles, et al. 2008). Building trust and understanding among government agencies, conservation stakeholders and forest owners will improve collaboration and conservation outcomes for at-risk species. This includes an understanding of species’ conservation needs by landowners and an appreciation by public agencies and conservation stakeholders of how active forest management facilitates conservation.

Today, private landowners are collaborating to conserve at-risk and listed species under an approach called “Conservation Without Conflict.” Stakeholders have

established a national coalition of the same name comprised of landowners, state and federal agencies, NGOs, industry representatives and others to work together on innovative, nonregulatory approaches to conservation. Its cornerstones are trust between the public and private sectors and a commitment both to conservation and to keeping working lands working.

There are examples of success from such collaborations. The first example — a 1,505-hectare conservation easement on property managed by Resource Management Service, LLC (RMS) — is a step toward the U.S. Fish and Wildlife Service goal of conserving 3.2 million hectares of longleaf pine (*Pinus palustris*) by 2025. This easement will benefit multiple species adapted to open pine forest conditions





such as the gopher tortoise (*Gopherus polyphemus*) and reticulated flatwoods salamander (*Ambystoma bishopi*). As another example, the Kirtland's warbler (*Setophaga kirtlandii*) has recently been delisted due in large part to a public-private collaboration.

Successes like these explain why tenets of Conservation Without Conflict underpin a novel partnership established by the National Alliance of Forest Owners (NAFO), a national advocacy organization for large forest owners across the country. Called the Wildlife Conservation Initiative (WCI), it includes NAFO members, the U.S. Fish and Wildlife Service and other federal agencies, state wildlife and forestry agencies and private organizations such as the Wildlife Management Institute, the National Council for Air and Stream Improvement, Inc. (NCASI) and the Sustainable Forestry Initiative. Owning and managing more than 18 million hectares of working forests across the nation, NAFO members bring their collective landscape scale, a commitment to conservation and the assurance of sustainable management.

### A common vision

The partnership is built upon trust and around a common vision for collaborative wildlife conservation revolving around three shared tenets. Privately owned working forests are critical for conservation success. Science will guide the effort. And active forest management is a proven conservation tool.

The Service has acknowledged the importance of private forest management for the conservation of several species, including the Louisiana black bear (*Ursus americanus luteolus*), northern long-eared bat (*Myotis septentrionalis*) and Pacific fisher (*Pekania pennanti*). It has also acknowledged the valuable role of forestry best management practices (Cristan, et al. 2018) to conserve aquatic species in recent proposed and final rules in the South Atlantic-Gulf region, including the trispot darter (*Etheostoma trisella*), candy darter (*Etheostoma osburni*), Black Warrior waterdog (*Necturus alabamensis*) and Atlantic pigtoe (*Fusconaia masoni*).

Building on a successful history of collaborative conservation, WCI provides an opportunity to coordinate this approach across multiple Service regions. Implementing candidate conservation plans with assurances for Pacific fishers in Washington, Oregon and California is one collaborative approach that can achieve real success. In Alabama, the Service is working with private landowners to increase



Credit: Darren Miller

surveys for aquatic and terrestrial species, improve stream crossings and obtain information for species status assessments for both at-risk and listed species. Private forest owner RMS is working with the Service to reintroduce the Alabama pearlshell mussel (*Margaritifera marrianae*), allowing access to its lands to identify habitat and reintroduce the mussel in waters bounded by private land. Other WCI efforts include a project on mammals and riparian-associated species in Maine and on avian species in the Great Lakes region.

▲ Gopher tortoises are associated with open pine forests in the southeastern U.S. and are proposed for listing under the Endangered Species Act. Private, working pine forests can be managed to provide appropriate conditions for gopher tortoises.

### Showing our work

Over the past year, NAFO member companies and WCI external partners have met with the Service to collaboratively develop a framework to strengthen the science behind at-risk and listed species conservation

▼ This loblolly pine stand is being managed for gopher tortoises in southeastern Mississippi.



Credit: Darren Miller





Credit: Jami Nettles

▲ Forestry best management practices are implemented at high rates on private lands and are designed to protect water quality. Streamside management zones, pictured here in Mississippi, not only protect water quality but conserve riparian areas and benefit aquatic biodiversity.

▼ Working forest landscapes, such as this one in West Virginia, provide multiple ecological, environmental, recreational and economic benefits.

on private forests, including setting up research and demonstration sites in multiple Service regions.

The partners agreed to work toward efforts to help inform decisions around potential Endangered Species Act actions on mutually selected species. These efforts incorporate sustainability and economic considerations and can apply to a suite of forest conditions and landscapes. Research sites will serve as demonstration areas, with outreach and education programs to show the value of managing forests for wildlife on working forests. Partners have also agreed this work needs to be fully collaborative, ensure a better understanding of the conservation benefits of working forests, help forest landowners understand the Service's constraints and responsibilities and foster trust between the Service and private forest landowners.

Participants in WCI have identified species of interest in the North Atlantic-Appalachian, South Atlantic-Gulf, Mississippi Basin and Great Lakes regions and will overlay known distributions with working forest landscapes to select research landscapes. Potential North Atlantic-Appalachian species include the Canada lynx (*Lynx canadensis*), golden-winged warbler (*Vermivora chrysoptera*), wood turtle (*Glyptemys insculpta*) and small-whorled pogonia (*Isotria medeoloides*). Great Lakes species of interest include the Canada lynx, Blanding's turtle (*Emys blandingii*), wood turtle, golden-winged warbler, Kirtland's warbler and state and federally listed mussel species in Michigan, Minnesota and Wisconsin. In the South Atlantic-Gulf and Mississippi-Basin regions, the focus will be on the gopher tortoise (*Gopherus polyphemus*) and associated at-risk forest species such as the Carolina gopher frog (*Lithobates capito*), eastern diamond-back rattlesnake (*Crotalus adamanteus*), southern hognose snake (*Heterodon simus*) and Florida pine snake (*Pituophis melanoleucus mugitus*). NAFO members are additionally working with the Service's Ecological Services Field Office in Daphne, Alabama, to identify conservation opportunities for numerous aquatic species.

### An expanding effort

We believe this effort will continue to expand conservation in forests across the United States. All of us engaged in sustainable forest management have common objectives — maintaining forested landscapes and helping conserve species that use these landscapes. Formalizing a collaborative framework to understand the value of private, working forests for conservation and to facilitate and maintain cooperation between the Service and private landowners is needed everywhere.

Conservation Without Conflict and WCI are interrelated, collaborative efforts, much like past efforts that have successfully conserved at-risk and recovered species, including the Louisiana black bear, which was delisted thanks to partnerships to create forest corridors on private lands connecting critical areas.

The large-scale conservation possible under WCI provides an opportunity for collaborative conservation across millions of hectares of private, working forests. We believe this offers one of the greatest opportunities for species conservation since sportspersons came together a century ago to



Credit: Darren Miller





conserve iconic species including white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), pronghorn antelope (*Antilocapra americana*), bison (*Bison bison*) and wild turkey (*Meleagris gallopavo*).

### Benefiting stakeholders

While the focus is on benefiting at-risk species and communities, collaborative conservation benefits stakeholders as well. By approaching conservation in partnership with them, the Service's policies and ESA actions are better informed, more effective and provide incentives for other stakeholders to be proactive in conservation actions.

When science supports benefits of active forest management for at-risk and listed species, including the value of forestry BMPs and forest certification, the Service can provide private landowners greater management and regulatory flexibility for actively managed forests. As better relationships develop among stakeholder organizations on projects across the country, communication and information sharing improves, long-term commitments provide certainty for conservation strategies and collaboration produces more effective conservation outcomes.

This success means that we all win — the private forest community, natural resource professionals, the public that uses and enjoys our wildlife resources and, of course, the diverse wildlife communities that call forests home. ■

*The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.*



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# A CURE for the Common Course

## COURSE-BASED UNDERGRADUATE RESEARCH EXPERIENCES COULD BENEFIT WILDLIFE UNDERGRADUATES

By Elizabeth A. Flaherty, Johanna Varner, Jennifer M. Duggan, Patrice K. Connors, Laurie Dizney and members of the Squirrel-Net Consortium



Credit: Hayley Lanier

▲ A University of Oklahoma student collects behavioral data from a campus fox squirrel (*Sciurus niger*).

**W**hen wildlife professionals hire recent college graduates, they often complain about the graduates' lack of real-world science experience. They may have a solid grasp of content, but many struggle with problem solving, critical thinking, applying quantitative and statistical skills and communicating professionally (Kroll 2010).

The students who participated in undergraduate research, however, are more likely to possess these professional skills, as well as have more confidence

and self-efficacy — the belief that they're able to perform a task successfully (Robnett et al. 2015). They've also had opportunities to build important relationships with scientists, professionals and their peers (Hunter et al. 2007, Seymour et al. 2004, Thiry et al. 2011, Flaherty et al. 2017).

Unfortunately, in spite of these clear benefits, few undergraduates have opportunities to engage in meaningful, authentic research experiences. Many opportunities exist, including research experiences for undergraduates funded by the National Science Foundation or other competitive grant programs, or opportunities working with faculty or graduate students outside of a formal program. But these opportunities are typically competitive and are generally offered to higher-performing students who already have foundational skills and experience (Linn et al. 2015).

In contrast, course-based undergraduate research experiences (CUREs) are becoming a strategic way to introduce more students to authentic research experiences (Banger and Bronwell 2014). CUREs are in-course activities that involve students in scientific practice and the discovery of new information. Both relevant and important, they incorporate collaboration and involve iteration and replication (Auchincloss et al. 2014).

### A taste of research

CUREs provide an opportunity to engage in authentic scientific research and discovery within the structured framework of a course. Similar to research opportunities outside of class, CUREs can help students gain practical knowledge and research skills, but also motivation, self-efficacy and persistence in science (Auchincloss et al. 2014). They can also help students develop "soft skills" — such as communication and tolerance for obstacles — that will prepare them to succeed in the STEM workforce.

Because CUREs take place in a classroom without a rigorous selection process, they create equal opportu-





nities for students to explore independent research, whether or not they have prior experience. Early CURE interventions that provide equal access to research opportunities may help combat structural barriers that reduce the numbers of women and minorities in science (Grogan 2018, Rainey et al. 2018).

Despite the benefits of CUREs, developing new research courses like these can be challenging. Instructors have time limitations. Institutions often cap undergraduate programs at 120 credits. Developing and testing inquiry-based activities can involve a tremendous amount of preparation. Because open-ended research activities can be “messier” than traditional, cookbook-type labs, they make instructors who prefer more control when teaching uncomfortable. Finally, most existing CUREs have been developed for benchwork-focused labs with few resources for field-based sciences.

### CUREs in the field

Ecology and field-based biology CUREs have lagged behind those based on benchwork, for good reason. Institutional Animal Care and Use Committee (IACUC) requirements for any kind of manipulative study with animals make field-based CUREs challenging, as do institutional limitations on risk and liability associated with working with wildlife in the field. At some institutions, instructors may be unable to observe wildlife as part of a lab, and many wildlife species have limited geographic ranges or habitat availability near the classroom.

But CUREs have been implemented successfully in wildlife courses (McCleery et al. 2010, Edelman and Edelman 2017, Flaherty et al. 2017). In spite of the challenges, we advocate strongly for incorporating them into existing courses to provide authentic research opportunities for a greater diversity of students. One way to do that is to focus on a ubiquitous and easily identified taxon: squirrels.

Squirrels are extremely accessible for observation by students across the country. They can be found on or around most college campuses, and their broad distribution across diverse landscapes allows for a wide range of student-generated questions about their ecology (McCleery et al. 2010).

In 2017, a team of instructors from a variety of institutions and programs began a collaboration to



Credit: Johanna Varner

integrate research on squirrels into undergraduate education through a set of field-based CURE modules. Calling ourselves the “Squirrel-Net Consortium,” we hope to provide the opportunity for other instructors to either incorporate our modules into their own wildlife courses or to use them as an example to create similar field-based modules.

▲ Students collect behavioral observations of prairie dogs outside Grand Junction, Colorado.

### Opportunities for all

One of our primary goals is to help instructors provide equitable access to authentic research opportunities for all students. These experiences provide students with opportunities to develop their own questions, collect and analyze large datasets and participate in a broader community of scientists. We are carefully developing modules that can be modified for both lower-level and upper-level courses.

▼ A gray squirrel (*Sciurus carolinensis*) visits a giving-up density CURE experiment in a University of Wisconsin-Stevens Point course.



Credit: Chris Yahnke





Credit: Jennifer Duggan

▲ Students from California State University, Monterey Bay, measure a squirrel's body mass during CURE data collection.

Field-based CUREs in introductory courses introduce all undergraduates — including those from under-represented minority groups that have historically felt excluded and not retained well in STEM disciplines (Koenig 2009) — to ecology and environmental sciences. As students progress to upper-level electives, repeated exposure to a research topic can solidify their knowledge, hone the skills they'll need in wildlife careers and support the confidence and self-efficacy to pursue competitive positions.

We are developing and piloting four CURE modules that allow students to investigate different aspects of squirrel ecology and contribute data to network-wide datasets. The first module, which asks students to use behavioral observations to investigate trade-

▼ Students from Colorado Mesa University conduct a scat count survey.

Credit: Johanna Varner



offs between vigilance and foraging behaviors, has been piloted across nine institutions with over 550 students in the last year.

At each institution, students use standardized datasheets and ethograms to record observations of squirrel behavior, then submit data to the Squirrel-Net via Google Forms. Students develop hypotheses about the factors influencing squirrel behavior (such as urbanization, species sociality and presence of potential predators) and test these hypotheses using the national dataset. In many classes, students also present results via oral presentations, posters or final papers.

### Piloting modules

This pilot effort demonstrated that our standardized protocols were easy for students and instructors to implement across a range of species and landscapes, as well as within a variety of courses and institutions. It also showed that the datasets are amenable to a wide range of student-developed questions. Because behavioral observations pose little risk to students or wildlife, the module has served as a tractable entry into field-based CUREs that avoids complications with institutional risk and liability and IACUC approval. Another on-campus CURE used camera traps because they are easy to learn to use and require minimal risk to the students or wildlife (Edelman and Edelman 2017).

We are now piloting three additional CURE modules. Our giving-up density (GUD) module allows students to investigate foraging behaviors by measuring the resource level at which animals “give up” foraging in experimental foraging patches under conditions varying in perceived risk. Piloting the module is almost complete, and standardized protocols will soon be available for instructors interested in integrating it into their courses.

In our telemetry module, students use radio telemetry equipment to collect location data on radio-collared squirrels and examine factors such as urbanization that could affect space use (such as home range size and dispersal distance). While many classes have limited access to the telemetry equipment necessary to implement this module, our long-term plan is to create an equipment loan system that will allow a greater diversity of students the opportunity to collect and analyze telemetry data — skills that are important to many wildlife positions.





Lastly, our population estimation and habitat use module has students compare estimates of population sizes using a combination of strip censuses, scat counts and camera traps. In this module, students consider the biases introduced by model assumptions, as well as how the most appropriate method varies with species and habitat.

All four modules will be submitted together this fall for publication in an open-access, peer-reviewed lesson-plan repository.

As a network implementing several CURE modules across multiple and varied institutions, the Squirrel-Net Consortium is well positioned to lead research examining how the design and implementation of CUREs can be modified to maximize benefits to students. One of our goals is to use assessment surveys to investigate how the timing, duration and conceptual similarities shared among CUREs affect student gains in knowledge and skills, how these gains are linked with confidence and self-efficacy, and how the networking of CURE modules influences student sense of belonging to a scientific community. We ask all instructors implementing Squirrel-Net modules in classes to encourage or incentivize student participation in assessment surveys administered both before and after implementing a module. Such data will help us disentangle changes in student learning and engagement due to a CURE module versus a course itself.

### More CUREs, more opportunities

Based on our combined experiences using CUREs in the classroom and our research on the success of CUREs in increasing diversity in STEM, we strongly advocate for adopting them in wildlife courses. Students build important research skills as well as experience less tangible — but highly desirable — professional skills such as self-confidence, the ability to work successfully in a team and self-identifying as a scientist or wildlife professional. The creation of CUREs similar to the ones we have described above will also benefit instructors by reducing the initial time cost associated with lesson-plan preparation and may result in wildlife data suitable for peer-reviewed publication (e.g. McCleery et al. 2007).

Our ecology-based CUREs include standardized protocols and supporting teaching materials. Additional support is available through lesson-plan

### Squirrel-Net Consortium

The Squirrel-Net Consortium was formed in 2017 after a team of instructors from a variety of institutions and programs came together to find ways to integrate research into undergraduate curriculums. The group's goal is to provide instructors with CURE modules that can be implemented in courses to provide equitable access to authentic research opportunities for all students. The Squirrel-Net Consortium is composed of instructors from institutions across the United States:

- Patrice K. Connors, Ph.D. — Colorado Mesa University
- Laurie Dizney, Ph.D. — University of Portland
- Jennifer M. Duggan, Ph.D. — California State University, Monterey Bay
- Liesl Erb, Ph.D. — Warren Wilson College
- Elizabeth A. Flaherty, Ph.D., CWB® — Purdue University
- Hayley C. Lanier, Ph.D. — University of Oklahoma
- John D. Hanson, Ph.D. — Columbus State University
- Johanna Varner, Ph.D. — Colorado Mesa University
- Christopher J. Yahnke, Ph.D. — University of Wisconsin-Stevens Point

trainings at national conferences and a national network of accessible instructors, easing the implementation of the CUREs into a diversity of undergraduate courses.

More CUREs in wildlife programs will provide more opportunities for students to reap the benefits of research experiences, which are often available only to a small and select student population. We believe CUREs will increase the diversity and retention of under-represented minorities in wildlife programs while increasing our graduates' success in their first professional wildlife jobs. ■



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Other members of the Squirrel-Net Consortium contributed to the article.



# Paying it Forward

## NORTH CAROLINA SHARES AIRPORT TURKEYS WITH EAST TEXAS

By James E. Capps and Christopher Coxen

Credit: USDA Wildlife Services

▲ Turkeys pose a threat to aviation safety when they are present in large numbers close to aircraft movement areas.

**M**any Americans were surprised that a collision with geese could force an airliner to make an emergency landing in New York's Hudson River. After seeing birds bring down a commercial jet taking off from a major airport, imagine the thoughts of a small aircraft pilot watching multiple turkeys strut and peck alongside a basic airstrip.

When a 12-pound bird strikes an aircraft traveling 150 mph at takeoff, it generates the force of a 1,000-pound weight dropped from a height of 10 feet. One of our largest native birds, the wild turkey (*Meleagris gallopavo*), averages 16 pounds, and its size, flocking behavior and erratic flight pattern place it in the top 29 of 79 hazardous bird species for aviation (Devault et al 2018). Body mass is a good predictor of relative hazard, and strong correlations exist between mean body mass and the likelihood of a strike causing damage to an aircraft (Dolbeer et al 2019).

So when managers at several central and eastern North Carolina civil airports raised concerns about the presence of turkeys, it demanded serious attention. Following conversations at the 2017 North Carolina Airports Association's Annual Conference, Wildlife Services in North Carolina began considering the best way to address the issue.

As we investigated, we observed anywhere from a pair to a score of turkeys at multiple civil airports, and we knew action was needed.

### Turkey trouble

Turkeys were present at several airports, including some where they posed a legitimate safety issue. With just 87 turkey-aircraft strikes reported since 1990, some people might dismiss the risk. But more than half of those strikes caused damage or a negative effect on an airplane's flight, and 16% involved multiple birds. Despite a low number of incidents, about 30% of wild turkey strikes cause aircraft damage. Where they are present in large numbers and close to areas where aircraft are moving, turkeys pose a threat to aviation safety.

Reported damaging strikes between wildlife and aircraft have declined since 2000, primarily for commercial aviation in the airport environment — less than 1,500 feet above ground level. However, damaging strikes have not declined at general aviation airports — public-use fields without scheduled passenger service and less than 2,500 annual boardings. Damaging strike reports tend to fluctuate annually at general aviation airports, which often are located in rural areas and have fencing inadequate to exclude terrestrial risks like deer.





Historically 59% of strikes that destroyed an aircraft occurred at these smaller airports, and 64% involved general aviation aircraft. North Carolina's 62 general aviation airports are important for business, freight, medical services and other functions.

The large number of turkeys we saw on the state's airfields made us reluctant to use lethal control, especially due to the species' value as a game bird. Since they show persistence in places where food and shelter are relatively abundant, and they can be unresponsive to typical dispersal methods, harassment seemed unlikely as a long-term solution. As with many general aviation airports, financial resources were limited, ruling out exclusion and habitat management techniques that could be beneficial.

Because of the North Carolina Wildlife Resources Commission's management role and our cooperative history with it, USDA's Wildlife Services approached the agency with a proposal to capture turkeys using rocket nets and relocate them.

### Efforts at restoration

Turkeys once were universal in North Carolina but historical liberal hunting regulations, exacerbated by rapid deforestation and habitat destruction, saw the population decline. The NCWRC initiated seasons, bag limits and a massive turkey restoration program. Between the 1950s and 2005, 6,031 birds were live-captured and released at 358 sites, including 1,985 birds from 12 other states. From about 2,000 birds in 1970, North Carolina turkey populations have grown to approximately 265,000 today.

Now found in all of North Carolina's 100 counties, expanding turkey populations continue to seek out new areas. In late 2018, no restoration sites in the state met the specific requirements or had completed the thorough evaluation process for accepting relocated turkeys. In-state release would not be expected to boost turkey numbers in the long term. NCWRC recognized, however, an opportunity to pay forward the assistance it had received from other states.

Texas had experienced similar declining turkey populations in its three native subspecies. Prior to European settlement, East Texas supported a robust turkey population, but unregulated harvest and habitat destruction led to a decline to an estimated 100 birds by 1940. Restocking programs have made an impact and counts are reaching an

estimated 300,000 birds, with success varying by subspecies. A few hundred Merriam's (*M.g. merriami*) turkeys exist in small isolated pockets in West Texas and the Panhandle. The Rio Grande (*M.g. intermedia*) turkey has been most successful, with abundant numbers in the center of the state from the Panhandle to South Texas.



Credit: USDA Wildlife Services

The eastern wild turkey population (*M.g. silvestris*), had been common to East Texas. Starting in the 1950s early restocking efforts used pen-raised eastern turkeys and Rio Grande wild turkeys, which were readily available in the state. The effort was unsuccessful. In the mid-1980s, the Texas Parks and Wildlife Department initiated a program using wild-trapped turkeys from other states using a block-stocking system in which 15 to 20 birds were released in five to 10 separate locations in a county. Some sites became established, and today they provide hunting opportunities in 13 East Texas counties. However, the first year after release often had high mortality and low reproductive effort. Many sites that historically supported wild turkeys remain unoccupied. After 7,000 birds had been released, the program was stopped in 2003.

TPWD reinstated stocking in 2007 based on a methodology developed by Roel Lopez (Lopez 2000) that offered better chances for success even in less than ideal conditions. Known as super-stocking, the program releases 70 to 80 birds (20 toms plus hens)

▲ During takeoff from a major Mid-Atlantic airport, a commercial airliner collided with multiple wild turkeys, sustaining damage to the engine, windshield and fuselage. Time out of service exceeded two weeks, with repairs costing \$200,000.

▼ The rocket net is an efficient and effective capture method for flocking birds such as wild turkeys.



Credit: USDA Wildlife Services



Credit: USDA Wildlife Services

the program. Currently about 10,000 eastern wild turkey are found in East Texas.

### Flying south

The NCWRC suggested that North Carolina turkeys might help TPWD, which had a target of 80 turkeys for their winter 2018-19 restoration project. Wildlife Services observations at several airports suggested North Carolina airfields might be able to fill a large part of that goal, although Missouri, Iowa and West Virginia were also seeking to supply birds. The NCWRC evaluated the appropriateness of the project and issued the necessary permits. Field staff provided some assistance during trapping efforts. As efforts proceeded, the National Wild Turkey Federation and its volunteers became valuable assets.

The NWTF was founded in 1973 with a charter of restoring wild turkey populations across the country. It spent decades assisting partner agencies with trap and transfer programs that grew wild turkey populations from 1.5 million to almost 7 million birds across North America. Its current effort is an initiative combining wildlife habitat conservation, hunter recruitment and hunter access called “Save the Habitat. Save the Hunt.” NWTF still helps with turkey restoration projects, and its North Carolina and Texas chapters provided funding and volunteer support critical in helping this project succeed.

Pre-baiting and camera surveillance identified four airfields that showed sufficient evidence of risk to aircraft to warrant deploying rocket nets. However, all trapping activities had to be conducted on Mondays or Tuesdays to allow for blood sample processing by the Texas A&M Veterinary Medical Diagnostic Laboratory.

Between Dec. 3, 2018 and Jan. 7, 2019, we spent seven full days and three half days in blinds at four airports, successfully capturing 25 turkeys — a total of 9 male and 16 female birds — from three airfields. Most were hatched that year or were juveniles, important to the super-stocking regime. No adult males were captured.

A lot of moving pieces made up this project. We quickly recognized the real work did not begin until the birds were caught. Released from the net, each bird was examined and blood was drawn to make sure they were healthy and wouldn't take diseases along with them. After the birds were fitted with TPWD aluminum leg bands, project participants

▲ Each bird was banded and given blood tests and health checks.

at one location, with equal portions of adult and juvenile birds when possible.

Subsequent state research suggested habitat features most conducive to success (Conway et al 2010). TPWD seeks properties with nesting cover, brood-rearing habitat and usable space. Lands must have native grasses and forbs covering 20 to 30% of at least 10,000 acres of contiguous habitat containing 5- to 30-acre openings distributed across the area. Private landowners, who hold almost all appropriate property in East Texas, are crucial to restoration. Government agencies and private organizations provide advice and guidance to landowners to manage their properties to participate in

▼ Federal, state and private cooperation enabled the safe and successful relocation of 25 North Carolina wild turkeys to Texas within 60 to 72 hours of capture.



Credit: Texas Parks and Wildlife Department





placed them in specialized NWTF transport boxes and moved them to an airport for Delta Cargo air flights to Dallas/Fort Worth.

### Scratching the surface

Within 72 hours of capture, all were released within the Trinity River watershed restocking site in Henderson County, Texas, with NWTF providing critical help at each step. Historically a transition zone between the eastern and Rio Grande subspecies, this part of Texas was completely unoccupied by wild turkeys when local restocking efforts began in 2014, so TPWD felt hybridization was unlikely.

Since the release, TPWD surveys have shown strong site fidelity. During the spring and summer of 2019, multiple broods were observed and documented at the release site. Time will be the ultimate judge of success, but nest success and poult survival have resulted in population recruitment, with TPWD staff regularly receiving public reports of turkey presence.

Texas is looking again for birds during the 2019-2020 trapping period. We scratched the surface in relocating some turkeys last year and identified additional airports to assist. Wildlife Services in North

Carolina will be training eight additional staff to use the cannon and rocket nets to capture wildlife, including translocation turkeys.

With additional nets and funds for bait, we and our partners will be ready to supply Texas with more turkeys this winter and should be in good shape to improve upon our efforts.

To learn more, watch NWTF's "Trap and Transfer efforts in North Carolina." ■



**James E. Capps**, USDA Wildlife Services-North Carolina, is an FAA-qualified airport biologist.



**Christopher Coxen, MS**, is a National Wild Turkey Federation district biologist in North Carolina.

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&

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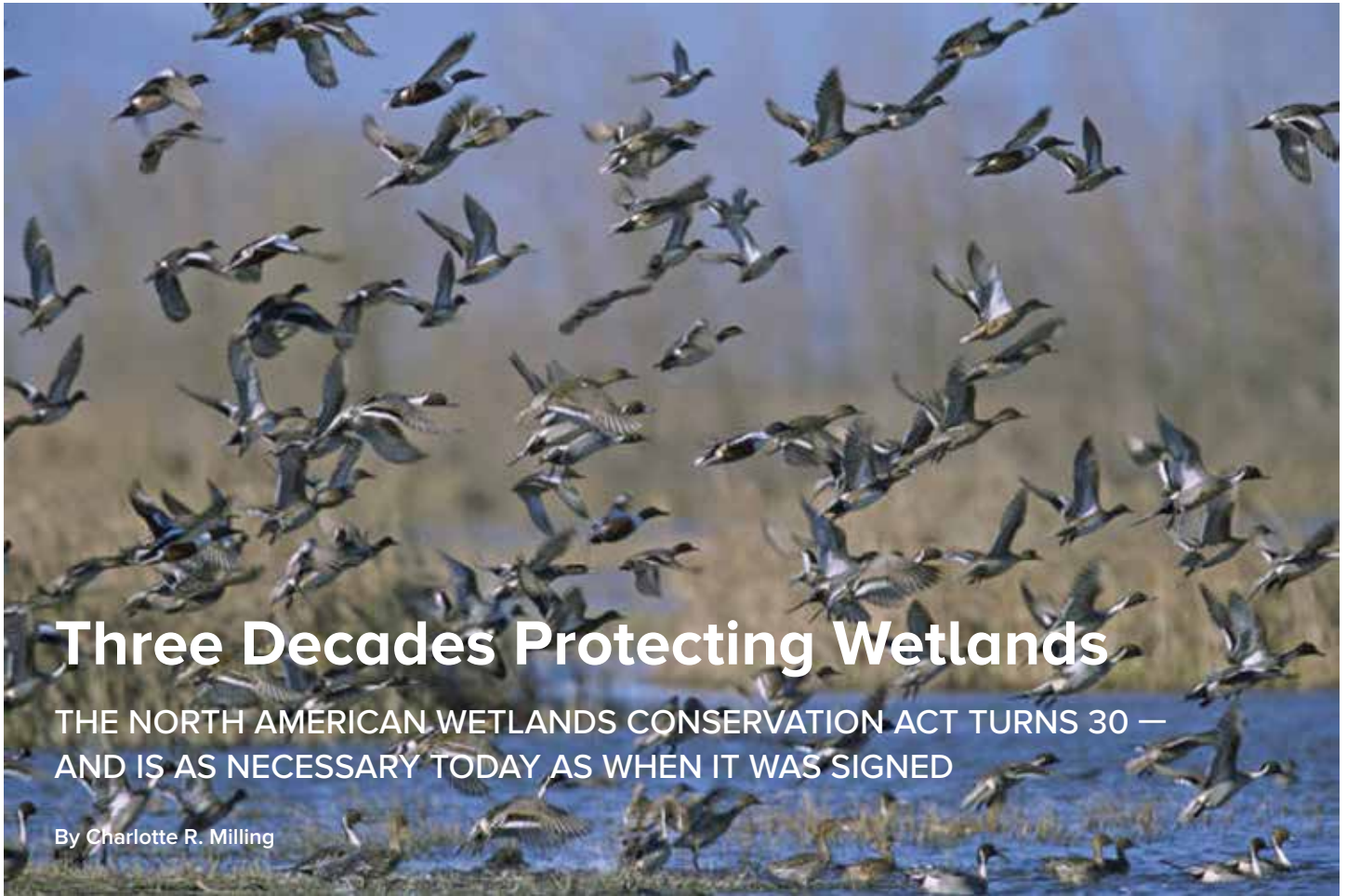
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# Three Decades Protecting Wetlands

THE NORTH AMERICAN WETLANDS CONSERVATION ACT TURNS 30 — AND IS AS NECESSARY TODAY AS WHEN IT WAS SIGNED

By Charlotte R. Milling

Credit: G. Kramer/USFWS

**O**n Dec. 13, 1989, the North American Wetlands Conservation Act — one of the most successful and impactful pieces of non-regulatory conservation legislation in the United States — became law. In the three decades since it took effect, more than \$5 billion has been spent on nearly 3,000 projects in the U.S., Canada and Mexico. Through protection, restoration and capacity building, these grants have influenced 30 million acres, benefiting wetland-associated fish and wildlife species across an entire continent.

Written by Sen. George Mitchell of Maine, and introduced in the Senate on April 17, 1989, it had wide bipartisan support and was signed into law by President George H.W. Bush eight months later. Mitchell would go on to be awarded the International Canvasback Award by the U.S. Fish and Wildlife Service for his contribution to the international conservation of waterfowl and wetlands.

NAWCA provides the financial resources for partnerships of public and private entities to “protect,

enhance, restore and manage an appropriate distribution and diversity of wetland ecosystems” for the long-term conservation of waterfowl, migratory birds and other wetland-dependent species ([Public Law 101-233](#)). Initially conceived as the funding mechanism for the North American Waterfowl Management Plan, the act now supports the full complement of federal bird conservation plans.

## How it works

The law outlines how funds are collected and how they are disbursed. Sources of federal funding to carry out NAWCA include the interest generated on the Pittman-Robertson account, federal appropriations as decided by Congress, coastal funds and fines and penalties levied under the Migratory Bird Treaty Act. NAWCA also established the North American Wetlands Conservation Council, a nine-member panel of professionals from the waterfowl and migratory bird community. The council reviews NAWCA grant applications and selects the proposals that are presented to the Migratory Bird Conservation Commission for funding.

▲ Populations of several species of waterfowl have been at or above management objective levels for the past decade due in part to wetland and associated upland conservation and restoration funded by the North American Wetlands Conservation Act.



▼ A 2007 North American Wetlands Conservation Act grant was used to permanently protect more than 2,000 acres in the Bull River watershed in Western Montana. In addition to providing habitats for migratory birds, the Bull River and its tributaries support a population of bull trout (*Salvelinus confluentus*) listed under the Endangered Species Act. The secured parcels also provide permanent habitat connectivity for other native species of conservation concern, such as the grizzly bear (*Ursus arctos*), in a matrix of state, federal and private land.

Credit: C. Milling

The framework for NAWCA-funded conservation is unique in that federal money is awarded as grants to organizations that operate under self-directed partnerships known as joint ventures. Joint venture partners are diverse and reflect a common appreciation of waterfowl and other wildlife among entities often perceived as disparate. Governmental agencies (including federal, state and provincial agencies) and nongovernmental conservation organizations (such as Ducks Unlimited and The Nature Conservancy) have been joined by less obvious parties — oil companies, timber companies, cattlemen's associations and others — to protect wetlands and associated uplands. Therein lies NAWCA's strength: conservation through collaboration. This mutually beneficial collaboration is epitomized in a recent grant awarded to Ducks Unlimited and others for wetland and grassland conservation on northeastern Montana's Hi-Line (USFWS 2019a). Here, \$2.2 million will be spent to acquire conservation easements and implement grazing systems that benefit NAWCA priority species, such as mallard (*Anas platyrhynchos*) and northern pintail (*Anas acuta*), while also providing income to producers facing low commodities prices and challenging climate conditions.

The public-private structure of the joint venture system permits expenditure of U.S. federal dollars on conservation actions continent-wide. Between 30 and 60% of annual NAWCA funding is allocated by law to conservation projects carried out in Mexico and Canada, with the balance used to fund wetland conservation in the United States. U.S. federal

funding must be no less than equally matched by nonfederal contributions. That match can be monetary (such as contributions from state wildlife agencies and charitable organizations), and fair market value of donated land, loaned equipment and dedicated stewardship and endowment costs can also be leveraged (USFWS 2018a, USFWS 2019b).

NAWCA grants and match funding can only be spent on projects that contribute to the long-term conservation of wetlands and associated uplands, and eligible activities vary by country. Securement, both temporary and permanent, of private property for the purpose of waterfowl habitat conservation is a critical function of NAWCA grants, and this is often accomplished using conservation easements. Conservation easements are more cost-effective than purchase, but limitations on future use typically remain with the land, regardless of ownership. Incidentally, the first permanent conservation easements in Manitoba were secured using a NAWCA grant. The project, administered by Delta Waterfowl Foundation, permanently protected 767 acres of critical waterfowl breeding habitat on nine properties in the Prairie Potholes Region. Restoration, enhancement and management of wetlands are also NAWCA-eligible activities in the United States, Canada and Mexico.

In Mexico, NAWCA grants and match funding also can be used for technical training, education and other social programming necessary to improve the country's capacity for wetland conservation and management (USFWS 2018b). A 2019 grant awarded to Ducks Unlimited of Mexico will provide habitat enhancement of Lake Cuitzeo, Mexico's second-largest freshwater wetland, as well as environmental education to teachers and training to area farmers on agricultural best practices (DBHC 2019). This integration of public welfare and conservation empowers local communities to retain and protect wetland resources despite inconsistent enforcement of federal regulations to prohibit degradation and draining (Wilson and Ryan 1997, Morzaria-Luna et al. 2014).

### Political challenges

NAWCA generally receives widespread support in Washington, D.C., but it is still subject to political turmoil. The act requires annual congressional appropriations and periodic reauthorization,







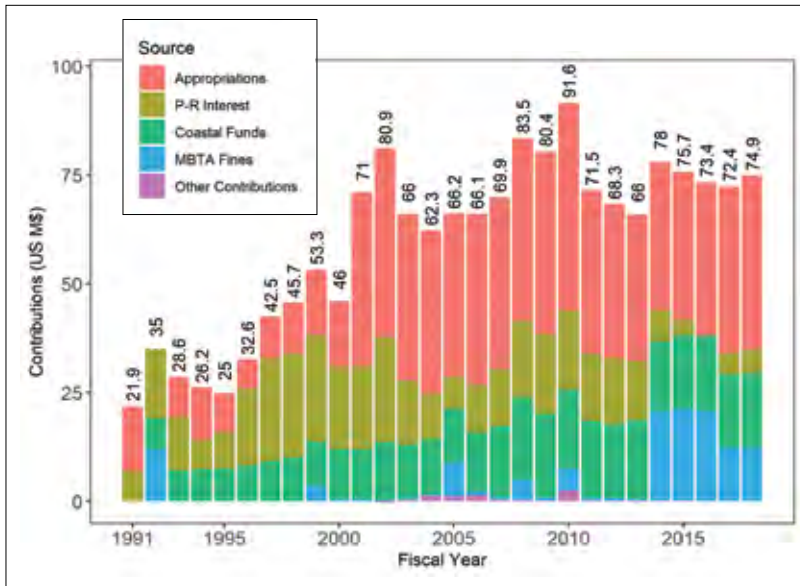
and it is financially linked to other federal laws, including Pittman-Robertson and the MBTA. These attributes can result in inconsistent funding for wetland conservation from year to year.

Attempts to reauthorize NAWCA have failed to move through Congress in recent years, and NAWCA has been receiving unauthorized appropriations since 2013. This problem is not unique to NAWCA. There are more than 970 expired authorizations of appropriation contained in 257 laws as of March 2019 (Congressional Budget Office 2019). Perhaps the pervasiveness of unauthorized federal spending contributes to a lack of congressional motivation to reauthorize NAWCA, but it would be remiss to take the law for granted. Authorization sets the upper limit of appropriated funding from year to year, allows for policy corrections when needed and provides the legal authority for the continuation of a program. There are currently three bills in Congress (two in the House, one in the Senate) proposing to reauthorize NAWCA through fiscal year 2024. The Wildlife Society recently expressed support for reauthorization efforts (TWS 2019).

In December 2017, the Department of the Interior’s solicitor’s office opined that take of a migratory bird or its nest incidental to other lawful activities is not a violation of the MBTA (Jorjani 2017). This could prove to be a consequential policy change for NAWCA because MBTA fines can make up a substantial portion of annual NAWCA funding. For example, from 2014 to 2018, fines and penalties that were assessed for incidental take resulting from the BP Deepwater Horizon oil spill amounted to 16 to 28% of the money used to fund NAWCA in those years. The House Subcommittee on Water, Oceans and Wildlife is considering draft legislation to address the matter of incidental take in the MBTA (House Natural Resources Committee 2019).

The issue of funding aside, the recent changes to the MBTA and other federal environmental laws underscores the necessity of continuing support for NAWCA. Policy interpretations can change with administrations, and regulations that prevent habitat loss and degradation can be weakened. But programs like NAWCA, being nonregulatory in nature, are more insulated from tampering from the executive branch. As long as they are authorized and funded, voluntary, incentive-based programs like NAWCA continue to protect critical wildlife habitats even when regulatory safeguards fail.

## Funding from all sources to the North American Wetlands Conservation Act from 1991 to 2018



Credit: C. Milling

## Many happy returns

More than 4,000 partners have collaborated to secure, restore and manage wetlands from the Canadian Arctic to the Yucatan Peninsula to perpetuate healthy populations of wetland-associated species. Beyond the benefits reaped by fish and wildlife, the wetlands and associated uplands protected by NAWCA provide flood abatement, clean water, carbon sequestration and protection from erosion. This legislation directly and indirectly influences the lives of all North Americans in a positive way.

Future success under NAWCA is not assured, however. Political discord threatens to chip away at the vitality of the program, and ongoing wetland loss and changes to existing water policy threaten to negate the gains of the past three decades. The next 30 years will undoubtedly bring unique conservation challenges, including climate change and food insecurity. Continued collaboration and the forging of novel partnerships that represent the diverse interests of all North Americans will be essential to ensuring NAWCA remains effective in a changing world. ■



**Charlotte R. Milling, PhD**, is a postdoctoral researcher in the School of Environment and Natural Resources, The Ohio State University and the Max McGraw Wildlife Foundation postdoctoral fellow.



# The Nature of Diversity

DIVERSITY BUILDS RESILIENCY — IN THE WILD AND THE WORKPLACE — BUT IT ISN'T EASY

By Brian F. Wakeling, Amanda W. Van Dellen, Kevin T. Shoemaker, Mitchell Gritts, John C. Tull and Kelley M. Stewart

**N**atural history is replete with stories of how diversity builds stability and resiliency. Here in the Great Basin, wildfires often replace diverse, sagebrush-dominated ecosystems with monotypic stands of nonnative cheatgrass, supporting fewer wildlife species and succumbing more readily to intense fires. Dense, young ponderosa pine forests, which lack the perennial grasses and forbs found in older, open stands of well-managed forests, succumb to catastrophic wildfires and support far less species richness.

Aldo Leopold started teaching the importance of diversity in natural systems in 1933. It took 31 more years, however, to pass the Civil Rights Act, addressing diversity in society. While we are increasingly reminded that our professional lives can benefit from diversity, half a century after this

landmark legislation, our workplaces still fall short of being as inclusive as they should be. Why?

Part of our challenge is that diversity itself is ill-defined. Conventionally, it tends to refer to gender, race and ethnicity, but it can also include age, religion, cultural background, sexual orientation, birthplace, residence, even immigration status. In our profession, it can include the orientation of our wildlife values, as well as aspects of personal history that shape our perspectives. Some of these are rarely considered in discussions on diversity. Others are only recently gaining attention.

In July 2018, the Nevada Chapter of The Wildlife Society began hosting “Conservation Conversations,” inviting TWS members and friends to enjoy a meal, make professional connections and engage



► A volunteer teaches teens about vegetative communities and wildlife habitats in the Buenos Aires National Wildlife Refuge in Arizona.

Credit: Steve Hillebrand





in a structured discussion about a critical conservation challenge and its potential solutions. During our first conversation, we discussed the structural and sociological barriers that limit workplace diversity in the wildlife profession, including barriers we may not realize we have erected. Our conversation evolved into a critical self-examination. Together we identified several key barriers to diversity in our profession that should be at the forefront as we engage with colleagues, make hiring decisions and work to improve wildlife conservation.

### A foot in the door

The cost of education is one key barrier. Universities and colleges have achieved greater diversity in graduates than state and federal wildlife agencies in hiring (Lopez and Brown 2011, Ceci et al. 2014), yet educational costs may still present a barrier to achieving greater diversity in our field. As higher education becomes more and more expensive, few entry-level positions in natural resource fields are available to someone without at least a bachelor's degree. A 2002 study found that fewer than 5% of employed TWS members lacked a bachelor's degree, while over 60% held a postgraduate degree (Schmutz 2002).

That means that students of lower economic standing face steep challenges getting a foot in the door. A student interested in a natural resource career must have sufficient resources, qualify for grants or scholarships or be willing to incur substantial debt to obtain an education.

The problem doesn't end with graduation. Since employers generally seek employees with the most experience, many applicants have to accrue substantial volunteer hours before their first job. One graduate, whom we'll call KTS, had very little field work experience and was able to obtain a paid position in wildlife conservation only after completing two months of volunteer field work. Obtaining sufficient volunteer experience is difficult for low-income students, however, who must provide their own food and housing while volunteering. If a natural resources job doesn't materialize fast enough, they may end up seeking work in a different field altogether.

Low-income students may also have to repay high education debt, yet they can expect low earnings early on. Wages from entry-level natural resource



Credit: Brett Billings

jobs can be substantially below other fields. The first seasonal wildlife job held by BFW in 1982 paid \$10 a day from the state wildlife agency's petty cash account — \$5 less than the agency allotted for daily horse rental. Although the situation has improved since then, early jobs still limit hours and salaries. Many organizations continue to rely heavily on volunteers. To obtain a position with an adequate salary, new hires must be financially able to hold out as they move up the ladder.

▲ A U.S. Fish and Wildlife Service employee teaches young adults in the field.

### Identifying Barriers

The efforts of the Nevada Chapter of The Wildlife Society to identify barriers to workforce diversity helped us to see some root causes that may influence our personal decisions. This exercise did not identify every barrier, but it provided a framework for us to begin:

1. Promoting awareness and interest in wildlife management and conservation, and about the wildlife profession, which may be influenced by bias in how we treat ethnic or economic classes;
2. Recognizing and working to address the relatively low or lack of wages in entry-level positions;
3. Recognizing the cost and inherent bias of our education system;
4. Recognizing internal biases that result in recruiting and hiring only others that think like us; and
5. Sincerely focusing our efforts on increasing diversity in the workplace.



► Members of the Nevada Chapter of The Wildlife Society Executive Board during a Conservation Conversation in 2018 discussing Diversity in the Workplace. From left to right, Mitch Gritts, Professional Development Committee chair; Amanda Van Dellen, newsletter editor; Cody Schroeder, Conservation Affairs Committee chair; Brian Wakeling, president; Kevin Shoemaker, president-elect; John Tull, immediate past president; and Kelley Stewart, past president and representative to the Western Section.



Photo courtesy Nevada Chapter of The Wildlife Society

Less obvious, our higher education system may unintentionally erect barriers to cultural, ethnic and socioeconomic diversity by failing to provide sufficient training to the educators themselves. Higher education produces world-class research scientists, but university professors are rarely trained in how to teach, and they often lack rigorous training in recognizing and countering implicit and explicit biases. Professors, administrators and supervisors are likely to unconsciously perpetuate longstanding biases, and the next generation of natural resource professionals may do the same, letting their biases influence the students they choose to collaborate with or hire.

### A value proposition

An important sociological barrier we identified was a desire to hire people who share our core values, goals and beliefs. A wildlife professional may preferentially employ individuals who enjoy hunting, for instance, or share their views about conservation legislation, but this bias can limit workforce diversity.

In Nevada, a recent survey of wildlife values looked at “traditionalists” — people who hold a view of wildlife that prioritizes human wellbeing over wildlife

and treats wildlife in more utilitarian terms — and compared them to “mutualists,” who view wildlife as capable of relationships of trust with humans and desire companionship with wildlife. Among Nevada’s public, researchers with the [America’s Wildlife Values Research Team](#) found, 22% were categorized as traditionalists, while 44% were mutualists. At the Nevada Department of Wildlife, however, researchers reported that 61.6% of the employees were traditionalists, and just 7.6% were mutualists. They found a similar disconnect nationwide.

Wildlife value orientations also differ by ethnicity the team found, with white Americans most closely emulating the value orientations held by most wildlife agency employees. As employers make hiring decisions that support their views, they introduce bias into the hiring process that can influence several aspects of workplace diversity, including ethnic recruitment.

### Reaching out

Even our outreach efforts can introduce bias. Many agencies pursue recruitment, retention and reactivation in hunting and angling because they see R3 activities as increasing relevance and funding for wildlife management.





These efforts, however, tend to recruit more traditionalists than mutualists. The classifications are based on core values, and core values influence our choice of activities. Recruit hunters and our customer base is likely to skew toward traditionalists. That in turn can influence our workforce as we hire employees who effectively interact with our customers. While many agencies recognize that our constituency is shifting, vocal segments among our customers can still have an undue influence on agency composition.

This does not mean that R3 efforts are inappropriate. They may effectively bring in more hunters and anglers. If we want to widen our customer base, though, we need to create new relationships in ways that resonate with diverse communities rather than with the agency.

### Ethnicity and culture

Differences in how various ethnicities and cultures view nature and outdoor recreation can also present a barrier. White Americans select remote, undeveloped settings for recreation to a greater degree than other ethnicities. African Americans tend to choose more developed settings with facilities for outdoor recreation (Ho et al. 2005). These differences can influence not only how people recreate but how they perceive natural resources careers.

Multiple factors influence how cultures interact with natural resources. People with greater disposable income can afford to recreate farther from urban settings than those with less disposable income, suggesting that income influences recreation. Yet preferences may exist for recreational activities regardless of prior participation (Virden and Walker 1999). White Americans, for example, perceived forests to be safer than did African Americans or Hispanics.

And ethnicity can be complex. While many Hmong immigrants, for example, have a deep connection with the natural world and subsistence hunting and gathering is central to their heritage, they represent an often overlooked group, with cultural traditions that differ from other Asian communities (Bengston et al. 2008).

### Are we committed?

Finally, we have to ask ourselves if we have a true commitment to workplace diversity. In our efforts to further our missions, values and goals, we are

often unwilling to embrace the challenges that increased diversity can bring to the workplace. Those challenges may make us uncomfortable.

Maybe we do not give enough attention to differences in age, gender or sexual orientation (e.g., Booms 2019). Or maybe we are insincere in our efforts, whether we are conscious of it or not. Sometimes we choose to hire known entities over individuals who may challenge existing working relationships.

Increased diversity may require increased debate on policy recommendations. It may require a change in how we behave in the workplace. Evaluating competency, fit and diversity during interviews may be challenging, subjective and influenced by decision fatigue (e.g., Vohs et al. 2008).

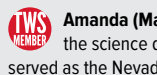
Initially, commitments to diversity must be deliberate. As efforts like these become more common and organizational culture changes, however, it may become as natural as sagebrush in the desert. ■

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*The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.*



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**Amanda (Mandy) Van Dellen, PhD**, is an adjunct professor in the science department at Sierra Nevada College and previously served as the Nevada Chapter Newsletter Editor.



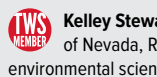
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**John Tull, PhD**, is the Nevada Science Coordinator for the Pacific Southwest Region of the U.S. Fish and Wildlife Service, and is a past president of the Nevada Chapter.



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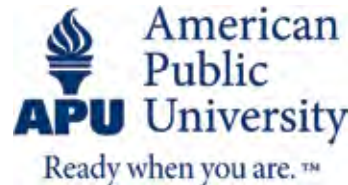
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# Lethal Ingestion

NON-LEAD AMMUNITION IS NOW REQUIRED FOR HUNTING IN CALIFORNIA, SO WHY ARE CALIFORNIA CONDORS STILL AT RISK OF LEAD POISONING?

By Mike Stake

▼ California condors are at risk of lead exposure when feeding on carcasses of animals shot with lead bullets. Ground squirrel carcasses are of particular concern, because availability of non-lead ammunition for small non-game shooting has been inconsistent, and these carcasses are not typically collected by the shooter.

**I** pull up to a ranch gate, where three generations of hunters wait with their dogs around the family pickup. We have never met, and the condor decal stretched across the back window of my company truck will probably not win them over. But I brought something that will, and they give me a friendly welcome.

This is an ammunition delivery. Since 2012, Ventana Wildlife Society, a California nonprofit (not affiliated with The Wildlife Society), has been giving away free non-lead ammunition to hunters and ranchers to reduce the risk of exposing California condors (*Gymnogyps californianus*) and other scavengers to lead. With Pinnacles National Park, Ventana Wildlife Society co-manages the central California condor population, so it's familiar with the risk lead poses. While recognizing the conservation tradition of hunters, it has seen how condors may consume fragments of lead ammunition

embedded in animal carcasses. Lead poisoning is still the greatest threat to the self-sustainability of the population. The hunters I am meeting today are among the 2,000-plus in the condor's range that have received free non-lead ammunition through this program.

We sort through the ammunition I brought, and their questions turn to condors. The wild population has increased to more than 300 birds, I explain, with management playing a key role in that trend. The outlook wasn't always so rosy. Down to an all-time low of just 22 birds in 1982, and gone from the wild by 1987, condor populations have been restored thanks to a captive breeding program and releases by the U.S. Fish and Wildlife Service, Ventana Wildlife Society and the National Park Service in California; the Peregrine Fund in Arizona; and the Mexican Government and San Diego Zoo in Baja California.



Credit: Jessica French

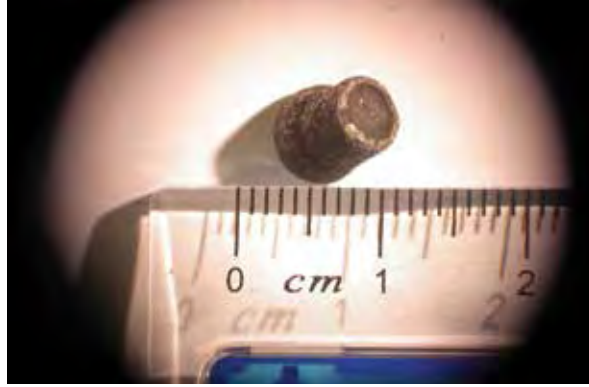
The grandson stops me. "Are condors still dying from lead poisoning?" he asks. The words imply concern, but I detect a certain edge to his voice. We have observed fewer condor deaths from lead in the last few years here in central California, I reply. But, I am quick to add, lead poisoning still occurs and remains a threat to condor recovery.

This update doesn't settle well with many. It has been more than 10 years since the Ridley-Tree Condor Preservation Act required the use of non-lead ammunition for taking wildlife in the condor range in California. The requirement was extended statewide more recently, with full implementation on July 1. Some interpret the continued lead threat as an indication that hunters are not complying with





Credit: Ventana Wildlife Society



Credit: Ventana Wildlife Society

◀ Following the death of Condor #318 due to lead toxicosis, a radiograph (left) reveals a spent lead .22-caliber bullet (right) in its digestive tract.

regulations. Some hunters point to the persistence of a lead threat as reason to think there might be lead sources other than spent ammunition. These hunters have suggested lead paint or natural resources like soil, air and water as alternate sources of lead.

What is really happening here? With condor recovery at stake, it is important to understand why there is still a lead threat for condors even after the legislation mandated the use of non-lead ammunition.

### Small but deadly

The biggest reason might come from one of the smallest bullets. The .22 long rifle (LR) is a small round widely used by hunters and ranchers in the condor range to control ground squirrels and other small non-game animals. Because these carcasses are not typically collected by the shooter and are readily scavenged by condors, the switch to non-lead ammunition must include .22 LR to reduce lead exposure. This realization hit home for Ventana Wildlife Society several years after the ban in 2012, when its biologists found Condor #318 dying of lead poisoning. A post-mortem X-ray revealed an object in its stomach, which was extracted and identified as a lead .22 bullet. Ventana Wildlife Society does not discount the threat of larger-caliber hunting rounds, but there are reasons to be especially concerned with the continued persistence of lead .22 LR in the condor range.

It is not surprising that a condor might still find a lead .22 bullet when scavenging. I surveyed

more than 200 local hunters and found that 83% regularly shoot .22 LR. But even though they are regularly shooting .22 LR, 74% of these hunters said that they “usually can’t find” or “can never find” a non-lead version available for purchase. My hosts are glad to receive the 500-round brick of .22 LR that I hand them. They examine the box and pull out a few rounds, eager to try it out on the ground squirrels peppering the surrounding grassland hills. These ranchers have waited a long time for non-lead .22 LR, but others might be unwilling to wait if they have already invested in a supply of lead .22 LR. Rather than disposing of their lead stores at target ranges, where it is still permitted, some might be tempted to use it up on the ranch as they originally intended when the ammunition was purchased.

Although there are dozens of types of .22 LR ammunition, only two non-lead brands have been available in recent years. One of them (Winchester Varmint LF) disappeared from the shelves in 2015. The other (CCI Short Range Green) disappeared shortly thereafter. For much of 2016, there was not a single non-lead .22 LR option available for purchase, until CCI released a new non-lead version, called Copper-22. Availability of Copper-22 has since improved, but we still do not always find it on the shelves at local gun stores. Local availability is particularly important after California passed the Safety for All Act in 2016, requiring face-to-face ammunition transfers. California residents accustomed to ordering ammunition online and receiving the shipments at home must now either shop at local stores or have their internet purchases picked up at a licensed vendor willing to complete the transaction. If most local hunters and ranchers regularly shoot .22 LR but are not consistently able to purchase non-lead versions, product availability might be having a substantial impact on ban compliance, and by extension, on condor exposure to lead.

Hunters are quick to add that the quality of non-lead .22 LR ammunition has lagged. While 90% of



Credit: Mike Stake

▲ California condor populations in the wild have made a remarkable recovery, thanks to releases of captive-bred birds and intensive management. Long-term self-sustainability of these populations still depends on a reduction in lead exposure, a leading source of mortality.

▼ Although non-lead ammunition is required for taking wildlife in California, it is not always easy to identify which is which behind the counter at the local store. For example, the Hornady Superformance product line makes little distinction between the lead version SST (top) and the non-lead GMX (bottom), either in name or packaging.

my surveyed recipients of free non-lead ammunition have expressed satisfaction with the big-game rounds they have received, the reception has been lukewarm for .22 LR. The very name of the original non-lead CCI product, Short Range Green, had little appeal to hunters. CCI's lead brands attracted hunters with names like the Stinger and Velocitor, while their non-lead marketing was almost apologetic. Reviews of the Short Range Green were unimpressive, sometimes describing a failure of the ammunition to cycle properly in firearms. The newer Copper-22 has received better performance reviews, but some shooters still base their opinions of non-lead .22 LR ammunition on their disappointing experience with the Short Range Green. Their experience has led more than a few ranchers to set aside their .22 LR in favor of the .17 HMR, because non-lead ammunition for the latter is widely considered to be exceptional and more reliable at longer ranges.

### Adjusting to new rules

For hunters, the switch to non-lead ammunition has been an adjustment. The first adjustment for many has been the higher cost of non-lead ammunition. A few extra dollars per box might seem inconsequential to a deer hunter discharging just a couple of rounds per season. But, for a rancher dispatching

several hundred rounds a month, the extra cost adds up. Initially, hunters might test multiple non-lead products to determine which is best for their firearm, and that trial process can be expensive.

Another adjustment for hunters has been gaining familiarity with new

regulations, not all of which have been clear. In the original text of the Ridley-Tree Condor Preservation Act, the use of lead for controlling small non-game mammals was not expressly forbidden, prompting many to wonder if their use of .22 LR for ground squirrel shooting was regulated. Some erroneously do not think of ground squirrels like the California ground squirrel (*Otospermophilus beecheyi*) as wildlife, and they don't think of controlling them as hunting. The California Fish and Game Commission later ruled that non-lead ammunition was required for shooting ground squirrels, but the decision was separate from the Ridley-Tree Condor Preservation Act.

Perhaps lacking clear guidance on the requirements, some were still using lead .22 LR long after they made the switch to non-lead for their big-game hunting rounds. The majority of my new contacts asking to receive free non-lead .22 LR ammunition in 2019 have indicated that they had not yet tried the Copper-22 brand — still the only non-lead .22 LR brand currently available. This slow transition to non-lead .22 LR is likely responsible for continued exposure of condors to lead poisoning.

Whatever legal uncertainty there has been, full implementation of the statewide ban in July 2019 brings more clarity by requiring non-lead ammunition for taking any wildlife — for any reason — with any firearm anywhere in California. As we meet with hunters and ranchers, we reinforce that ground squirrels are wildlife and are included in the non-lead regulations.

Even for hunters aware of the laws, it can be difficult to determine which ammunition products are lead-free. The Copper-22 behind the shelf at the local gun shop looks the same to me as the half-dozen lead .22 LR choices offered by CCI in their dark blue boxes. If shopping for the Hornady Superformance line of ammunition, in their attractive red boxes, a California hunter must be sure that it is loaded with the non-lead Gilding Metal Expanding bullet (or GMX for short) instead of the lead Super Shock Tip bullet (or SST). Both types are labeled as Superformance, and the boxes look the same. In this case, the key is distinguishing between two acronyms that say nothing about the lead content. Some manufacturers have begun adding a symbol on the box to more clearly identify California-certified non-lead ammunition, and this practice should help hunters make the right choices.



Credit: Mike Stake





### The key to recovery

Hunters and ranchers are the solution to condor recovery. Ranchers protect rural land, and these lands provide areas for condors and other wildlife to find food, water, and shelter. By switching to non-lead ammunition, hunters and ranchers are ensuring that scavengers, including bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), can benefit from healthy food resources.

But, solutions often take time. The higher cost of non-lead ammunition, the inconsistent availability of some non-lead ammunition, the uninformative labeling of non-lead products and the recent restrictions on ammunition shipping in California have all worked against hunters and ranchers making the switch.

With these hurdles, it is no small wonder that the lead threat still lingers following the non-lead regulations — at least for now. Hunters and ranchers are on the right path, though, and positive collaboration is becoming more frequent. The U.S. Fish and Wildlife Service, the National Park Service, the Institute For Wildlife Studies, The Peregrine Fund, the Oregon Zoo and the Yurok Tribe are just a few groups other than Ventana Wildlife Society that are devoting staff time toward non-lead ammunition outreach. This emphasis on non-lead outreach and

collaboration promises to help condors inch closer toward full recovery.

After 20 minutes on the ranch, our conversation has ranged from condors, to a little good-natured ribbing, to some of their recent hunts. “My son here could sure tell you some stories,” the grandfather tells me.

I smile. “I’m sure you have a few of your own,” I tell him.

They thank me for the ammunition and promise to tell their neighbors about our program. Perhaps their message will be that we really can work together for a solution, even if we do not always agree on everything. And while there is still work to do, teamwork on this issue is proof that we have come a long way. ■



Mike M. Stake, M.S., is a wildlife biologist with Ventana Wildlife Society in Monterey, California.

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# Working Lands, Teaching Lands

THE EAST FOUNDATION SHOWS YOUTH THE IMPORTANCE OF PRIVATE LANDS AND CONSERVATION

By M. F. “Masi” Mejia and Tina Y. Buford

**H**ow do you connect children, often far removed from the land and living in urban centers, to understand the relevance of private land stewardship in their life? Students may believe their basic needs to be iPhones and video games, but their real basic needs tie directly to the land: food, water, shelter and space.

▼ Students from United High School in Laredo, Texas, work alongside cowboys where they had the opportunity to ultrasound, vaccinate and discuss careers in cattle management.

Credit: East Foundation

Showing students how private land stewardship is relevant to their lives is important. About 62% of the nation’s land is managed by private land-owners. Here in Texas, 95% of the land is in private hands.

The East Foundation runs an education program that recognizes the value of a multifaceted system.

We start with delivering the message of natural resource conservation in schools and continue with involving students in land stewardship practices on our working lands.

## A ranching legacy

The East Foundation is the legacy of a 100-year-long South Texas ranching heritage that followed the marriage of Tom T. East and Alice Kleberg East. (For more information, check out the book *Horses to Ride, Cattle to Cut: The San Antonio Viejo Ranch of Texas* by Wyman Meinzer and Henry Chappell.) A bequest at the passing of their son, Robert Claude East, in 2007, the foundation was created with a mission to promote the advancement of land stewardship through ranching, science and education.







The lands are to be used as a living laboratory, which includes cattle ranching as an integral part of the overall operations of the foundation.

The foundation's charitable activities are achieved through a coordinated program of research, education and outreach. The program priorities are:

- **Conducting research that makes a difference.** We develop research programs that intentionally focus on those factors that most threaten the productivity of native rangelands.
- **Improving university programs.** We engage with universities to develop changes in undergraduate experiences, graduate curricula and faculty focus.
- **Expanding education opportunities in South Texas.** We deliver programming, knowledge and leadership skills to the youth of South Texas, including underserved communities, benefiting the region now and in the future.
- **Leading effective outreach efforts.** We deliberately engage like-minded partners at the local, state and federal levels, allowing us to leverage existing resources, while sharing our research and successful education strategies, enhancing conservation around the state and across the nation.

## Reaching future generations

The foundation's educational program is based on the idea that an educated public will do right by the land and the life that depends on it. Situated in South Texas, we recognize the importance of including and educating a changing demographic within the United States. Our approach is to empower the future generation with the necessary tools to make educated decisions, which can be broken down into three components: in the classroom, on the land and expanding our reach with partnerships.

The first step to instilling appreciation of our natural resources is to create awareness. By taking natural resource education into the classrooms, the East Foundation and its partners can begin to build a foundation of knowledge that creates a sense of familiarity.

Careful not to reinvent the wheel, the East Foundation entered into a partnership with the Texas Wildlife Association to work together to promote



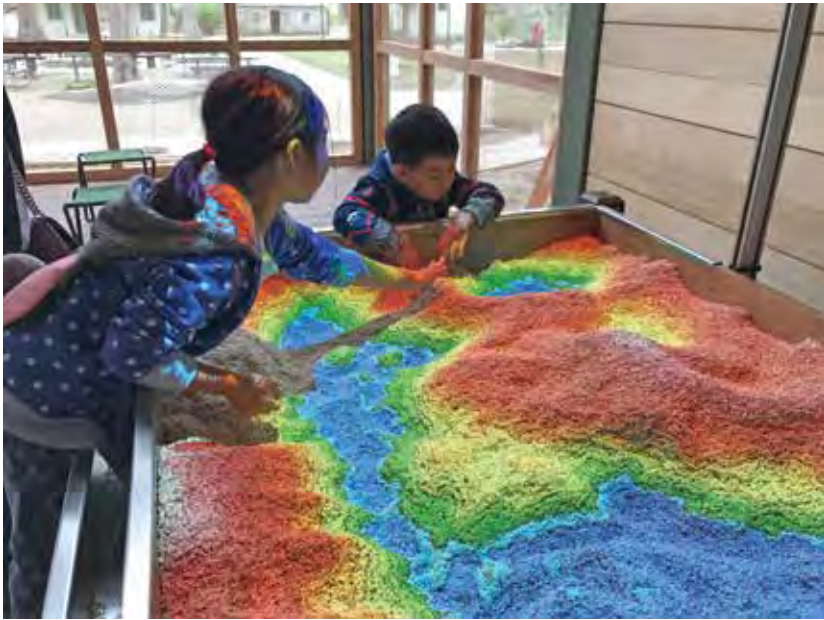
Credit: East Foundation

and deploy L.A.N.D.S. (Learning Across New Dimensions in Science) curricula in classrooms across South Texas. The Texas Wildlife Association is a statewide membership organization that serves Texas wildlife and its habitat while protecting property rights, hunting heritage and the conservation efforts of those who value and steward wildlife resources.

There are five pre-designed "Wildlife by Design" programs deployed by East Foundation-supported educators from which a teacher can choose: "Skins and Skulls," "Birds of a Feather," "Investigating Life Cycles," "Stewarding Soil" and "Where is our Water?" Within the 2018-2019 school year, we impacted 15,076 students in classrooms across South Texas.

To emphasize the land stewardship message, the East Foundation and the Texas Wildlife Association developed "Stewarding Texas — A Scientific Exploration." The program is a compilation of lessons designed to develop an understanding of land stewardship within our youth, focusing on students in kindergarten through 8<sup>th</sup> grade. The integration of these lessons into the classroom statewide engages students and teachers, with the purpose of achieving natural resource awareness, instilling a stewardship ethic and inspiring them to take action. During 2018, over 5,000 students utilized the "Stewarding Texas" program to supplement their classroom studies.

▲ Students from IDEA Public Schools get hands on during East Foundation's "Behind the Gates" program on the El Sauz Ranch.



Credit: Witte Museum

▲ Students visiting the East Foundation Land Stewardship Lab at the Witte Museum in San Antonio, Texas, investigate rainfall effects on different topographies.

## On the land

Recognizing that students learn better when inspired by the outdoors, we bring classrooms to the Foundation's ranchlands for firsthand learning experiences. The programs help students gain a better understanding of how natural systems work. We get students onto our land through field lessons and an intensive "Behind the Gates" learning experience.

In the spring of 2019 we hosted close to 2,000 students from the communities surrounding East Foundation's San Antonio Viejo and El Sauz ranches. The schools benefit from the opportunity to reserve their own field lesson at no charge to the schools.

A field lesson is a tailor-made educational experience built by working with teachers to develop an agenda that will include science topics taught in their classrooms, along with activities that focus on natural resource and land stewardship concepts. Field lessons bring to life how a working cattle ranch provides them with food, fiber and water, as well as providing native habitat for wildlife.

Over a five-day period, "Behind the Gates" is an intensive learning experience for students to rotate through six stations led by both East Foundation staff and our partners, including representatives from IDEA Public Schools, the Texas Zoo, Master Naturalists, the Texas Parks and Wildlife Department, the Caesar Kleberg Wildlife Research Institute, the Museum of South Texas History and the Texas Wildlife Association.

The entire week is focused on what happens behind the gates of a working ranch and how it positively influences their lives. Each station has an interactive component related to native Texas wildlife, endangered species conservation, proper land management's impact on water quality, cattle management, the settlement history of South Texas lands and the various technologies used in ranching.

In 2019, our data analysis showed that students who participated had statistically significant improvement on their post-test scores. The East Foundation hosts 3,400 regional high school students in two sessions. By connecting the dots between proper land management and quality of life, the East Foundation and our partners strive to bring relevance to conserving open space.

## Expanding our reach

The East Foundation is committed to expanding natural resource education opportunities across Texas by deliberately engaging in partnerships that allow for maximum impact. Creating partnerships from outside the natural resource community encourages innovation by applying proven models of success from within the formal and informal education realms.

Founded in 1926, the Witte Museum in San Antonio, Texas, is dedicated to promoting lifelong learning through innovative exhibitions, programs and collections in natural history, science and South Texas heritage. With the mutual goal of providing transformational experiences regarding land stewardship, the Witte Museum and the East Foundation collaborated to ensure that messages of land stewardship permeate all aspects of the Witte Museum's Texas Wild exhibit, labs and educational programs.

One example of our partnership is the East Foundation Land Stewardship Lab. Together, the East Foundation and the Witte Museum created a dedicated natural resource education classroom as part of the Texas Wild Gallery in the New Witte expansion in 2017. The purpose of this classroom is to provide a venue for delivering curricula on natural resources and land stewardship to the 40,000 school-age students that visit the museum annually.

Another example is the Land Stewardship Ambassadors program, cultivated to increase awareness





of land stewardship and promote civil engagement. The program is a 10-week course for high school students chosen through a rigorous review process. Two cohorts, one from San Antonio and another from Laredo, meet simultaneously, with a total of 30 students per year. Each week the students are assigned a topic related to natural resources and given different media, such as readings, videos and podcasts, to understand the subject.

Weekly curriculum topics include the history of conservation, principals of wildlife management, managing watersheds, human dimensions of land stewardship, the role politics play in natural resource management, the economic engine of natural resource management and the importance of gender and ethnic diversity within user groups.

Both cohorts interact with each other through site visits to the Witte Museum and the San Antonio Viejo Ranch. During each site visit, students engage in activities that relate to land stewardship and Aldo Leopold's land ethic. Concluding the course, students are challenged with relaying how land stewardship is relevant within their communities to a public audience.

### Back to school

IDEA Public Schools is an innovative charter school system that is tuition-free. An acronym for "Individuals Dedicated to Excellence and Achievement," IDEA is held accountable for improved student achievement, including increasing the number of college graduates from low-income communities. Since IDEA's first graduating class in 2007, all of its seniors from 39 campuses across the Rio Grande Valley have been accepted to colleges and universities nationwide. Recognizing its success in preparing students to excel in college and beyond, the East Foundation partnered with IDEA to develop future conservation leaders.

IDEA's 5<sup>th</sup> grade students learn about the process of living things, focus on natural resources and study how people use them. Recognizing the value of total immersion, IDEA Public Schools requires all 5<sup>th</sup> graders — roughly 1,700 students — to attend East Foundation's "Behind the Gates" field day. By exploring a working cattle ranch through hands-on activities, IDEA 5<sup>th</sup> grade students experience firsthand how people may use and affect our natural resources positively.

In 2015 IDEA purchased a historic natural site in Brownsville, Texas, with the vision of providing outdoor experiences to all its campuses across the Rio Grande Valley. With the goal of enhancing students learning experiences at IDEA's Camp RIO, the East Foundation partnered with IDEA to create natural resource, adventure-based programming with an emphasis on land stewardship. Utilizing the Association of Fish and Wildlife Agencies' Conservation Education Strategy as the framework, the East Foundation and IDEA Public Schools developed a course curriculum map for grades 1 to 12. We ask students to think about several questions along the way. How do we steward our natural resources? Who is responsible for stewarding them? What resources need stewarding? Why is this stewardship important?

Over 17,000 students participate in the adventure-based, stewardship programming at Camp RIO annually. Starting in 2020 we will conduct a longitudinal research and evaluation study measuring the impact of student participation in the stewardship programming on their academic performance, college enrollment, career development and the pursuit of interests aligned to land stewardship. This study will enable better understanding of the true impact of the program's outcomes and provide us with feedback on where improvement may be needed.

As our education program develops, we will continue to promote the advancement of land stewardship. Empowering the future generation with the tools to make educated decisions regarding our natural resources will help conserve the land and the life that depends on it. ■



**M. F. "Masi" Mejia, M.S.**, serves as the outreach chair for the Texas Chapter of The Wildlife Society and is an educator for the East Foundation.



**Tina Y. Buford, B.S.**, is director of education for the East Foundation.

## In tumultuous times, conservation work continues

By Caroline E. Murphy

The political landscape in Washington, D.C., continues to shift, but behind the scenes, work continues in the conservation community on priorities relevant to the wildlife profession.

Over the past couple months, The Wildlife Society has worked with partners to advance issues of importance to the profession. From working toward adequate funding for federal programming into the new fiscal year, to pushing for more grassroots engagement for the Recovering America's Wildlife Act, to working cooperatively on overhauls to invasive species prevention policy, there is plenty of work to do.

### Funding needs

Even in tumultuous times, Congress needs to work with the White House to pass funding bills that allow federal agencies to function. As demonstrated earlier this year, the inability to pass funding packages can result in a partial or complete government shutdown.

In September, Congress avoided a government shutdown at the start of Fiscal Year 2020 by passing a continuing resolution package that maintained agency funding level with FY2019 through Nov. 21. This new deadline provides space for each chamber to find a path forward on FY2020 funding bills currently making their way through the process.

While the Senate's version of the Department of the Interior, Environment, and Related Agencies funding bill would not provide the same across-the-board increases in funding as the version passed by the House of Representatives, both legislative packages broadly dismiss the funding requests put forward earlier this year by the administration. Both legislative packages acknowledge to varying degrees the need for increased conservation dollars (see table).

In order to reach a consensus on conservation program funding, a conference committee made up of

representatives and Senators will likely meet to hash out the differences between the two bills. These appointments will provide TWS with another opportunity to engage with members of Congress on the specific funding needs of the wildlife profession.

### Invasive species prevention

This time is also an opportunity for conservation organizations to regroup with one another to discuss steps towards longer lasting, fundamental change. Over the past few months, The Wildlife Society has worked alongside partners to reinvigorate the National Environmental Coalition on Invasive Species — a group of conservation organizations and professional societies focused on the advancement of invasive species prevention and eradication policies at the federal level.

This reinvigoration requires TWS and other member organizations — including the National Wildlife Federation, Environmental Defense Fund and American Bird Conservancy — to coordinate with one another and a suite of government and private stakeholders to ensure an understanding of what is possible with existing resources and political constraints.

To date, we have been utilizing stakeholder listening sessions, in-person coordination meetings, asset mapping exercises and frank discussions to determine what conservation policy improvements the coalition could most feasibly advance.

TWS has been pushing priorities of the profession throughout these discussions, including the need to modernize the injurious species provision of the Lacey Act to ensure streamlined risk assessments and adequate intervention in invasive species introductions, and the need to adequately fund federal invasive species coordination work performed by the [National Invasive Species Council](#).

As we move through the ever-changing political landscape, TWS staff continues to coordinate with our partners on behalf of the wildlife profession. Our staff looks forward to engaging with you — our members — and keeping you informed of policy changes that impact your ability to perform science-based management and conservation. ■



**Caroline E. Murphy, AWB®**, is the government relations manager for The Wildlife Society.

Program	FY 2020 Senate Funding Level	FY 2020 House Funding Level	FY 2020 Administration Request	FY 2020 TWS Appropriations Testimony Request	FY 2019 Funding Level (Continuing Resolution Funding)
State & Tribal Wildlife Grants	\$65.2 million	\$70.6 million	\$31.3 million	\$90.0 million	\$64.6 million
National Wildlife Refuge System	\$504.4	\$514 million	\$509.5 million	\$586 million	\$488.3 million
USGS Cooperative Research Units	\$18.4 million	\$24 million	\$0	\$24 million	\$18.4 million



## Field Notes

Tools and techniques for today's wildlife professional

### 3D printers help researchers develop wildlife tags

Researchers were having problems with the one-size-fits-all plastic tags they were using to attach tracking devices to seal flippers. Greg Frankfurter and his colleagues were in the Antarctic studying the energetic costs of motherhood and moult on Weddell seals (*Leptonychotes weddellii*), but the tags they were using weren't designed for seals, were single-use, and they sometimes fell off in the wild, taking the data they collected with them. When the tags did return, researchers had to cut them off the animals, and they couldn't reuse them.

So Frankfurter, a wildlife veterinarian at the University of California, Davis, and his colleagues decided to turn to a 3D printer in an effort to make more suitable tags for their research.

"It's really flexible — it allows us to make little tweaks," said Frankfurter, the lead author of a [study](#) about the technique published recently in the *Wildlife Society Bulletin*.

They made 10 different tags and first tested how they fit on seal carcasses and on one live animal in a rehabilitation center. They then deployed two of them on Weddell seals in McMurdo Sound in 2015.



Courtesy Greg Frankfurter

▲ An exploded view shows the custom flipper-tag assembly used to tag Weddell seal flippers in Antarctica.

◀ Keeping tags on Weddell seals in Antarctica can be a challenge. That prompted researchers to create their own tags using 3D printers.

"We deployed two of these, and at least one tag survived in that environment for a full year on a seal," Frankfurter said. The researchers used a nylon material to make the tags so they could withstand impacts and the cold, wet, Antarctic winters, but this could change in the future as more raw material becomes available to use in 3D printers.

The best thing about these devices, Frankfurter said, is that they can be customized for any number of uses.

"In wildlife studies we spend so much time to make things work," Frankfurter said, but 3D printing produces specific tools quickly and affordably. "Given the [small] number we need to make, it will probably be something we only ever 3D print."

Current he is using 3D printers to fashion custom hose nozzles to improve oiled wildlife washing.

—Contributed by Joshua Rapp Learn ■

Credit: William Link/U.S. Geological Survey



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## In Memory

The Wildlife Society pays tribute

### ■ Robert “Bob” Brian McAnally

Robert McAnally, a longtime member of The Wildlife Society, died March 30, 2019 at the age of 71.



Courtesy Michael Cartwright

McAnally was born on Aug. 2, 1947, and grew up in the Arkansas River Valley. He graduated from Arkansas Technical University with a bachelor's degree in fisheries and wildlife management in 1970 — one of the early graduates of the relatively new field at the university.

He spent summer months working for the U.S. Forest Service, including timber marking and building wildlife ponds — work that provided valuable field experience and knowledge of wildlife and forest management. After serving two years in the Army, he started a 35-year career at the Arkansas Game and Fish Commission in 1972 as a game and fish technician.

Throughout the 1970s and 1980s, he took on district biologist responsibilities, which included the development,

implementation and direction of wildlife management programs. In 1990, he was promoted to game and fish biologist supervisor for the western Ozarks, a position he held until his retirement in 2007.

Over the course of his career, McAnally served as turkey project leader, trapping and stocking turkeys throughout Arkansas. A member of the National Wild Turkey Federation, he served on the Arkansas state board from 1974 to 1989 and represented the state on NWTF's technical committee from 1974 to 2007. He also served on various AGFC committees, including the elk, turkey and ruffed grouse committees.

McAnally received numerous honors for his efforts in land stewardship and wildlife management, including the Penn's Woods Wild Turkey Management/Restoration Award, the Ozark/St. Francis National Forest Resource Management Award, the Outstanding Service Award from the Arkansas Elk Committee, the Special Service Award from the AGFC Wildlife Management Division, the Forest Steward of the Year Award, the Outstanding Tree Farmer of the Year Award and the Arkansas NWTF Arkansas Turkey Hunters Hall of Fame Award.

An active TWS member, he had been a certified wildlife biologist and served as Arkansas State Chapter president in 1979.

—Contributed by Michael Cartwright ■



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I certify that all information furnished above is true and complete.  
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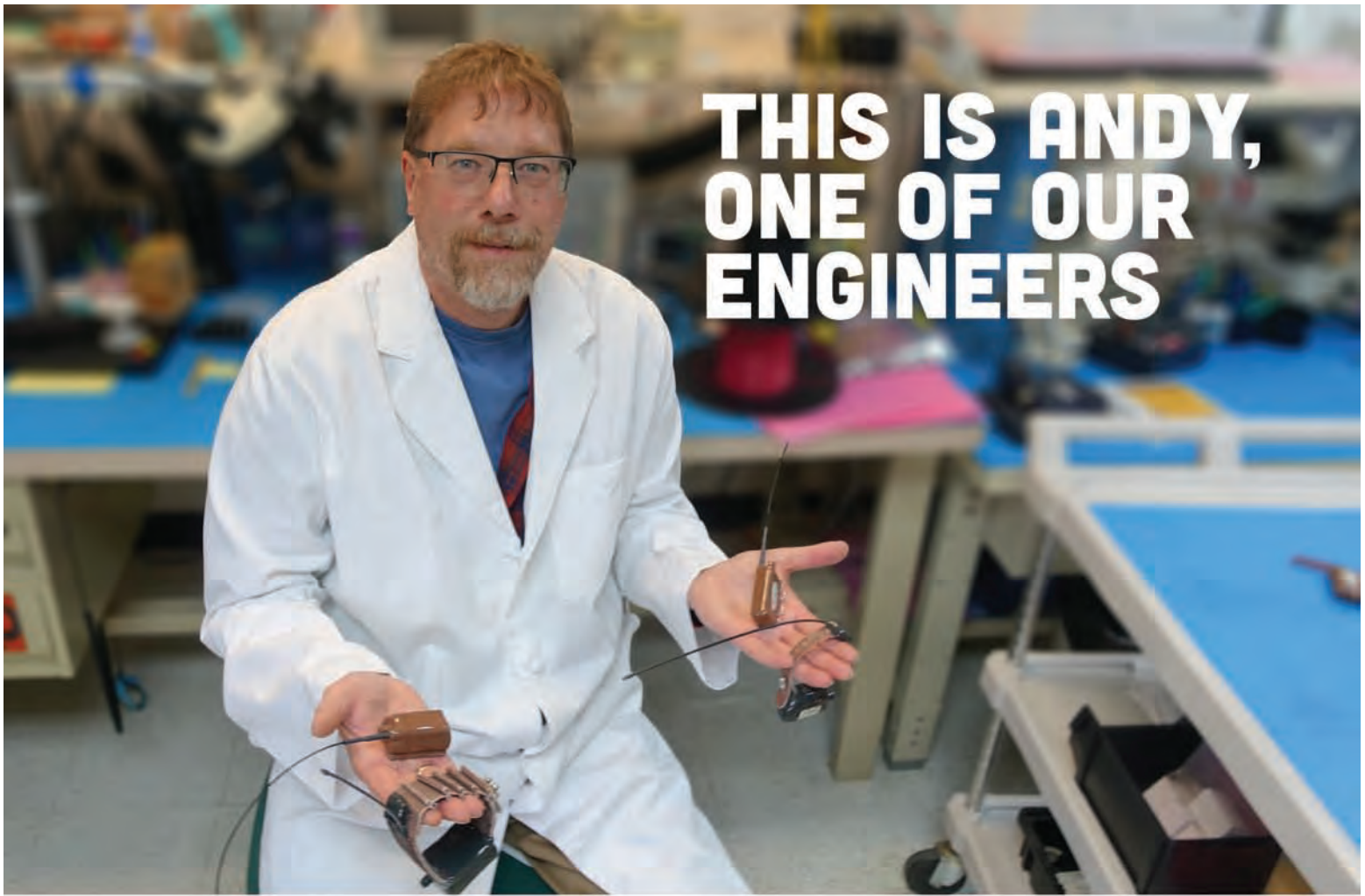
Photo by Brandon Palmer

## Gotcha!

Horned lizards are an iconic species in Texas, but although they were once common, their numbers have dramatically declined. TWS member Brandon Palmer captured this image of a Texas horned lizard (*Phrynosoma cornutum*) in La Salle County.

Want to share your photo here? Send it to [editor@wildlife.org](mailto:editor@wildlife.org).





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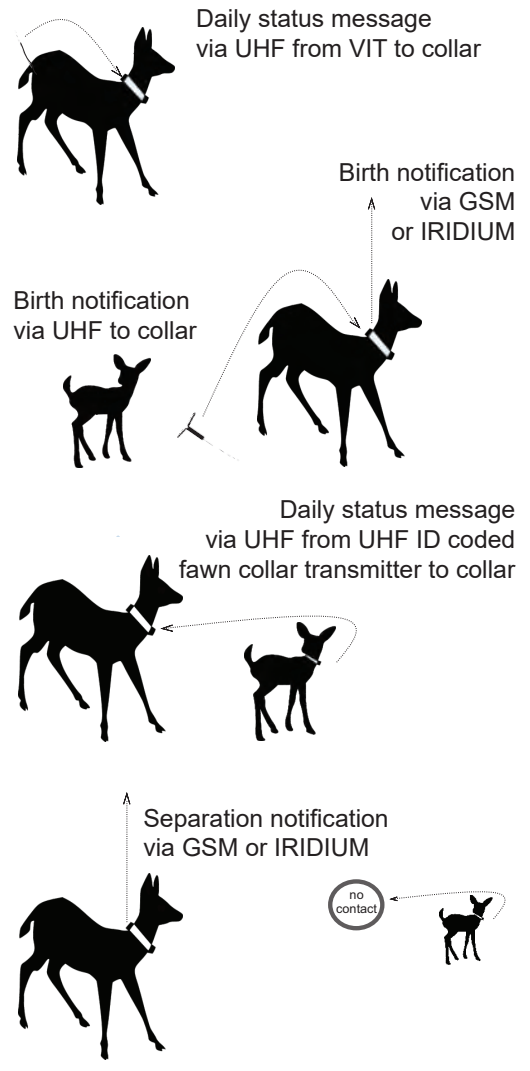


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