

THE WILDLIFE PROFESSIONAL

HELLBENT ON CONSERVATION

Biologists wade a 'never-ending stream of challenges' to conserve at-risk hellbenders

Conference plenary to take on public mistrust of science

On the front lines of wildlife disease

Navigating the profession through changing times



DON'T BE THE GUINEA PIG.
USE LOTEK SOLAR COLLARS.

*This ad costs \$\$\$\$

Lotek



advancing wildlife science

+1 905 836 6680 biotelemetry@lotek.com www.lotek.com

SCAN TO
SEE WHY



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.

BECOME A MEMBER

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.

CONTRIBUTOR GUIDELINES

All members are encouraged to submit ideas for articles to *The Wildlife Professional*. For more information, go to www.wildlife.org/publications.

ADVERTISING

For information about advertising and our media kit, contact advertising@wildlife.org or visit www.wildlife.org/advertising.

COPYRIGHT AND PERMISSIONS

Permission to make digital or hard copies of part or all of any article published by The Wildlife Society for limited personal or educational use within one's home institution is hereby granted without fee, provided that the first page or initial screen of a display includes the notice "Copyright © 2023 by The Wildlife Society," along with the full citation, including the name(s) of the author(s). Copyright for components of this work owned by persons or organizations other than TWS must be honored. Instructors may use articles for educational purposes only. **Copying, republishing in part or whole, posting on an Internet website or using it for commercial or promotional purposes is prohibited under copyright laws and requires permission of the publisher. For permission, please contact editor@wildlife.org.**

The views expressed in this publication are not necessarily those of The Wildlife Society.

Periodical postage for *The Wildlife Professional* (ISSN 1933-2866) is paid at Bethesda, MD, and at an additional mailing office. The *Wildlife Professional* is published bimonthly, producing six issues each calendar year.

Postmaster: Send address changes to The Wildlife Society, 25 Century Blvd. Suite 505, Nashville, TN 37214



TWS STAFF

Ed Arnett Chief Executive Officer

Wildlife Policy & Communications

Keith Norris Director
 David Frey Managing Editor
 Dana Kobilinsky Associate Editor
 Joshua Learn Science Writer
 Kelly O'Connor Conservation Affairs Network Fellow
 Allison Cox Content Editor, TWS Journals
 Anna Knipps Editorial Assistant, TWS Journals
 Tom Klein Wildlife Policy Intern

Operations

Cameron Kovach Director
 Aniket Gajare Software Developer
 Mariah Beyers Member Engagement Manager
 Jennifer Lynch Murphy Certification and Outreach Manager

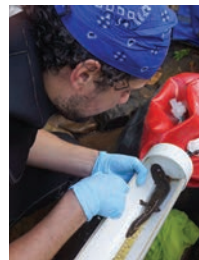
Finance and Human Resources

Maranda Jones-Anderson Director

TWS GOVERNING COUNCIL

Don Yasuda President
 Bob Lanka President-Elect
 Arthur Rodgers Vice President
 Gordon Batcheller Immediate Past President
 Evelyn Merrill Canadian Representative
 Kathy Granillo Southwest Representative
 Andrew Kroll Northwest Representative
 Jason Riddle North Central Representative
 Duane Diefenbach Northeast Representative
 Lisa Muller Southeastern Representative
 Andrea Orabona Central Mountains and Plains Representative
 Jim Sedinger Western Representative
 Morgan Register Student Liaison to Council

Graphic design by Lynn Riley Design.



Credit: Gary Peoples/U.S. Fish and Wildlife Service

A biologist measures an eastern hellbender as part of an effort to maintain the salamanders in the wild.

EDITORIAL ADVISORY BOARD

Chair Samara Trusso, Pennsylvania Game Commission

Section Representatives

Western Matthew P. Bettelheim, AECOM
 Central Mountains & Plains Elmer Finck, Fort Hays State University
 Canadian Mike Gillingham, University of Northern British Columbia
 Northwest Nancy Lee, U.S. Geological Survey, retired
 Southeastern Matthew Chopp, U.S. Forest Service
 Southwest Misty Sumner, MLS Consulting
 North Central Lowell Suring, Northern Ecologic, LLC
 Northeast Dee Blanton, U.S. Fish and Wildlife Service

Working Group Representatives

Invasive Species Tessie Offner
 Drone Rick Spaulding, ManTech Advanced Systems International, Inc.
 Forestry & Wildlife Melissa Starking, Michigan State University
 Nutritional Ecology Jennifer Merems, University of Wisconsin-Madison

At-Large Representatives

Barb Hill, Bureau of Land Management, retired
 Charles Nilon, University of Missouri
 Celina Gray, Blackfeet/Métis, University of Montana
 Lauren D. Pharr, North Carolina State University
 Adam Janke, Iowa State University
 Geriann Albers, Indiana Department of Natural Resources
 Matt Dyson, Ducks Unlimited Canada
 Christine E. Wilkinson, University of California-Berkeley
 Adam Rohnke, Mississippi State University



The Wildlife Society

Headquarters

425 Barlow Place, Suite 200
 Bethesda, MD 20814-2144
 301.897.9770 phone
tws@wildlife.org
www.wildlife.org

Mailing Address

25 Century Blvd., Suite 505
 Nashville, TN 37214

facebook.com/thewildlifesociety
 @wildlifesociety
 youtube.com/user/WildlifeSociety
 linkedin.com/groups/1704017
 @thewildlifesociety

TR-8 Handheld Scanning Receiver

Full coverage from
138MHz to 235MHz



Can store over 2000 scannable frequencies,
custom labeled and organized in up to 25
independent lists

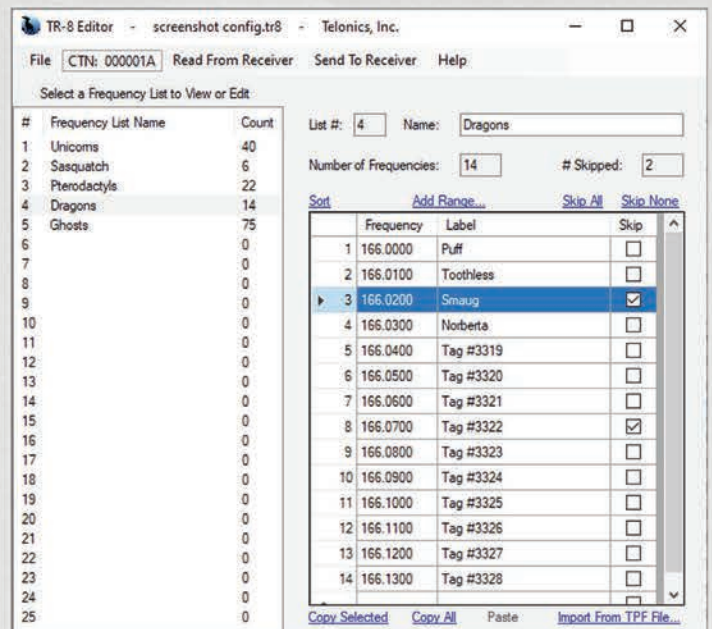
Full 177dB gain control lets you completely
turn down the gain for high signal levels –
ideal for recovering transmitters

**15-hour operational life (typical)
with Li-Ion rechargeable battery**

Backlit display and keypad

**Easily programmable, with or
without a PC**

Available Now!



TR-8 Editor Software

Email info@telonics.com or visit www.telonics.com/tr-8



TELONICS

Telephone: (480) 892-4444
<http://www.telonics.com>

Providing telemetry equipment since 1978
GPS · VHF · ARGOS · IRIDIUM · GLOBALSTAR

FEATURES

SPECIAL FOCUS + CAREER TRAJECTORIES

- 26 **So Many Paths to Follow**
Sharing our stories can inspire us and remind us that we're not alone
By Geriann Albers
- 28 **Navigating the Ups and Downs**
A dream job awaited, but only after lots of rejections
By Ashley Hobbs
- 30 **A Life of Reinvention**
Sometimes following a career path means starting over—and over—again
By Cheryl A. Clark
- 34 **Staying Honest and True**
For a person of color, raised in Appalachia, the path to becoming a wildlife professional can be a winding one
By Jesse L. De La Cruz
- 38 **Following my Passion**
A love of waterfowl led to a dream career
By Karla Guyn
- 41 **The First Step Down Many Different Paths**
A wildlife degree is just the start—the end is up to you
By Michael S. Fishman
- 46 **Some Challenges Shouldn't be Part of the Job**
What should early-career professionals consider when applying for seasonal work?
By Olivia Anderson
-
- 50 **On the Front Lines of Wildlife Disease**
Wildlife rehabilitators play important roles in avian flu surveillance
By Giselle Kalnins and Sherri Cox
- 53 **Bridging the Gap between Science and the Public**
Plenary speakers at the Annual Conference in Louisville will take on mistrust of science
By Joshua Rapp Learn

Departments

- | | |
|----------------------|----------------------------------|
| 4 Editor's Note | 14 Today's Wildlife Professional |
| 5 Leadership Letter | 57 Policy Perspectives |
| 6 Science in Short | 58 Field Notes |
| 10 State of Wildlife | 60 Gotcha! |

COVER STORY >>



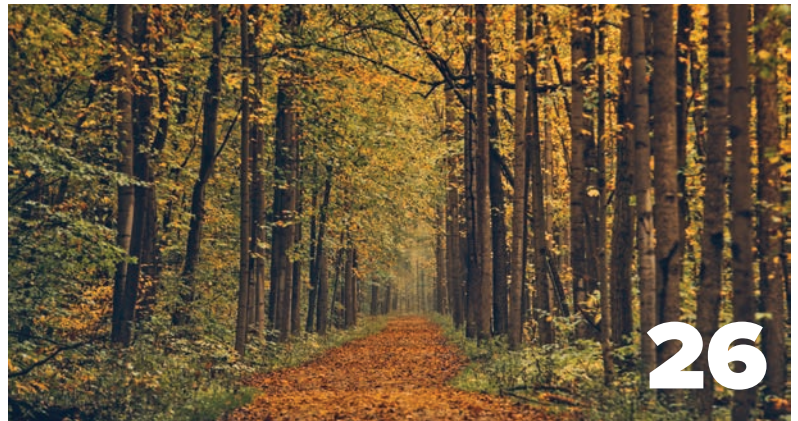
Hellbent on conservation

Biologists wade a 'never-ending stream of challenges' to conserve at-risk hellbenders

By Joshua Rapp Learn

16

Credit: Andrew Zimmerman



Credit: Zach Frailey



Credit: Louisville Tourism

>> **Log On for More**

This publication is available online to TWS members on wildlife.org. References printed in blue indicate links in the online version of the magazine.

The twists and turns in our careers

I have now been on The Wildlife Society's staff for over nine years, working on policy, publications and other program administration and implementation efforts. Is this where I expected I would be when I started out pursuing a degree in wildlife? Not exactly. But, I'm certainly glad to be here.

Many wildlifers have unexpected twists and turns in their careers, and that is what our special focus in this issue aims to highlight. Authors from across the wildlife profession share what their journeys have looked like. Our goal with this series of articles is not to define certain specific pathways you should follow or to define what a successful career in the wildlife field looks like. Our hope is simply that you are inspired by these stories, that you are comforted by them—knowing that others have also faced challenges along their journey, that you take a moment to reflect on your own career and the people who helped shape it, and that you count yourself as lucky to have the opportunity to advance wildlife conservation every day.

I have in my memory bank a few key moments that helped shape my career. My grandmother saying to me at a young age while I held some binoculars gazing out our kitchen window, "I'm not sure what you are going to be when you grow up, but I think it is going to involve birds." A college advisor suggesting that I look at Purdue's wildlife program rather than the biology program I'd been accepted to (before I even started classes). A classmate suggesting I join him at the student chapter of The Wildlife Society meeting on Purdue's campus. Purdue's summer practicum courses in the Upper Peninsula of Michigan. A colleague recommending me for a job, which connected me to my graduate research assistantship (studying birds, as my grandma predicted!), and, ultimately, to my TWS career.

Part of my career journey included taking herpetology classes with Dr. Rod Williams, who is a source for our cover story. I'm glad to have the opportunity for us to highlight the passionate work he and others are doing to conserve hellbenders. It isn't often that we focus our cover story on a specific species, and I hope you enjoy the in-depth look at the challenging, multifaceted effort being put toward hellbender conservation.

Our cover story in this issue is written by our staff science writer, Joshua Rapp Learn, who recently received an APEX Award for Publication Excellence for his cover story on seabird die-offs in the July/August 2022 issue of the magazine. Congratulations to Josh! I'm very proud to have such a gifted writing team that ensures our magazine delivers high-quality, engaging and informing stories that inspire, empower and enable you to continue your important work of wildlife conservation and management.



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



Keith Norris

Keith Norris, AWB® (he/him/his)
Director of Wildlife Policy
& Communications
keith.norris@wildlife.org

The Wildlife Society thanks the following organizations for their financial support of *The Wildlife Professional*.



Taking time to plan means more time for action

Where does the time go? Time is a funny thing. There are moments where it seems to go by so slowly—sometimes painfully slowly—and yet at other moments you look back and are amazed at how quickly the days turned into weeks and months and years.

Time has certainly gone quickly this past year during my tenure as the president of The Wildlife Society. Writing each of these six columns for *The Wildlife Professional* has served as a constant reminder of the quick passage of time. I mentally know I have two months between them but it's always a surprise when I get the "gentle reminder" from Keith that the next one is due! I am confident this resonates with you, as I've yet to meet someone who can't relate. If you're the exception, I'd love to talk with you about your time management magic or to take a trip on your time machine.

The quick passage of time serves as a great reminder of the value of planning and purposefully shaping our future. Planning allows us to be more intentional about the use of our time. By taking the time to plan, we can help ensure that we use our time well—before it slips by.

This is not a new concept to the world of wildlife professionals. We write lots of plans. We write plans to manage wildlife areas and public lands for multiple values over the short and long term. We write plans to conserve important resources and recover species. From my years of planning, I've come to realize the greatest value of plans is not the actions they prescribe but rather the vision they lay out and the assumptions and strategies they pursue to move towards or achieve desired outcomes. The most successful plans strive to have interested parties agree on the vision and desired outcomes and turn assumptions and strategies into testable hypotheses. Working this way allows us to use our time more efficiently and respond quickly to changing conditions and new information with better results for wildlife, resources and people.

For these reasons, I continue to be excited about TWS' strategic planning effort. Our new strategic

plan will help ensure that TWS can focus on the important work we will need to do over the next three to five years to become the Society we want to be in 10 to 15 years. This plan will help us use our time and resources more effectively to benefit our members and the wildlife profession and be nimble to adapt to new opportunities while purposefully moving toward our long-term vision.

Alongside our planning, Council has done a lot of work behind the scenes to improve our governance policies and procedures. While this may seem mundane and not interesting to many, it positions Council to work with our CEO and staff to implement our upcoming strategic plan, developing and delivering the programs and services that benefit all TWS members.

We are keenly aware that our ability to grow, adapt and deliver programs and services depends on the strength of our financial foundation. CEO Ed Arnett has been working to strengthen our partnerships and work with others to provide greater services and benefits to TWS' members. We will also soon embark on a membership drive to make all wildlife professionals aware of the opportunity to benefit from what TWS provides, both personally and professionally. I hope you will help spread the word and encourage your colleagues to join your professional society so we can reach all current and future wildlife professionals.

In closing, it has been a great honor to serve as president and to expand the practice of shared leadership on the Executive Committee where we openly and equally offer our perspectives to ensure we make the best decisions on behalf of TWS and all our members. Your Council brings a tremendous wealth of knowledge, experience and passion, and we are strengthening our relationships with chapters, sections and working groups to better lead TWS into the future. I am humbled to have served alongside these dedicated leaders, and I know the future of the Society is bright. Thank you for allowing me to serve as your president. ■



Don Yasuda, CWB®, is a senior analyst for the USDA Forest Service, a TWS Fellow and the current president of The Wildlife Society. He has previously served on TWS Council and as president of the Western Section of TWS.

Good forage helps bighorn herds recover from die-offs

Pneumonia can take a huge toll on bighorn sheep herds, but good forage can help them recover.

In [research](#) published in the *Journal of Wildlife Management*, biologists looked at two Wyoming bighorn (*Ovis canadensis*) herds. The Jackson herd experienced two pneumonia die-offs in the 2000s but recovered its population. The Whiskey Mountain herd still hadn't recovered from a 1990s die-off.

Using GPS collars, the team tracked where the herds foraged and recorded the vegetation they found.

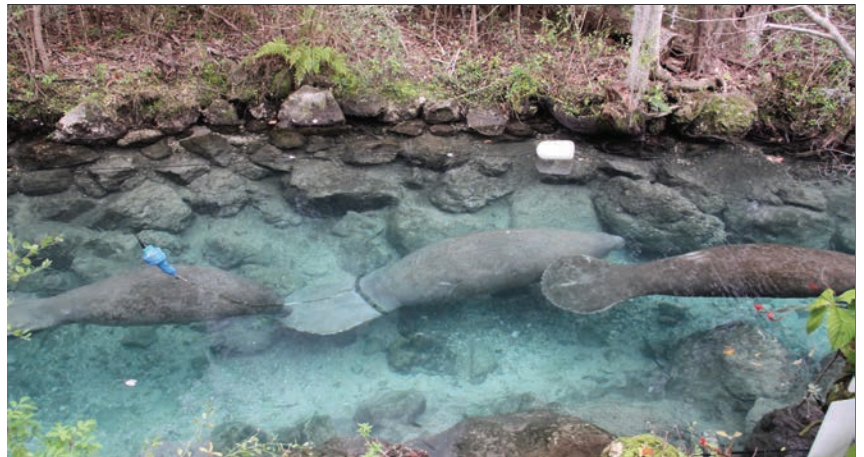
"The Jackson herd has over double the biomass in their core foraging range," said TWS member Brittany Wagler, the study's lead author. A research scientist at the University of Wyoming, she was a master's student at the university at the time of the study.

The Jackson herd's forage was also more nutritious. Since fighting off pneumonia comes with a cost to animals that survive the pathogen, Wagler said, the herd's better forage likely helped them rebound.

▼ **Quality forage can help bighorn herds rebound after disease die-offs.**



Credit: Brittany Wagler



Credit: Susan Butler/U.S. Geological Survey

▲ **Florida manatees navigate a choke point that leads to a spring at the Crystal River National Wildlife Refuge.**

Choice is key for Crystal River manatees

The choice of multiple sanctuaries helps Florida manatees at the Crystal River National Wildlife Refuge minimize human contact and reach the warm springs they need to survive the winter.

The refuge in northwestern Florida is a unique place for the threatened species. While other large populations congregate at industrial outflows in the winter, these Florida manatees (*Trichechus manatus latirostris*) rely on natural springs to escape the cold. That makes the refuge home to the state's largest natural aggregation of manatees, and it is the only place where people can legally swim with them.

The presence of humans could create a problem, but researchers say the manatees can work around it.

In a [study](#) published in the *Journal of Wildlife Management*, biologists tracked 32 manatees in the area with GPS tags from 2006 to 2018 and combined the information with counts from observers. The study showed that manatees generally avoided human contact. Their counts increased when springs were closed to visitors and at times of day when people were less likely to be around.

The manatees also face other obstacles, including tight access at low tide in some areas.

But because managers ensure that some springs are always closed to the public, manatees have options to reach the warm waters and minimize the human contact, said lead author Daniel Slone, research ecologist with the U.S. Geological Survey's Wetland and Aquatic Research Center.

"There's always a place manatees can go—get their warmer water, get their habitat needs taken care of—without interacting with people," Slone said.

Abandoned mines can benefit bats

Some old mines have sat unused on the Nevada landscape for decades—abandoned and no longer being used for industrial production. While abandoned mines can pose safety hazards for people, they often provide valuable havens for bats.

In a [study](#) published in *Wildlife Society Bulletin*, researchers determined ways to evaluate which mines might be worth keeping open with bat-friendly gates rather than plugging them.

The team examined features from outside the mines to determine their potential suitability for bats, then explored a few safe mines to evaluate their predictions. They found that environmental features, like nearby water, made bat presence likelier. Infrastructure like rails and old ore carts provided hints that big mines more suitable for large roosts lay below. But even small mines may be used by bats.

“Caves are seen as these valuable commodities,” said lead author Rick Sherwin, a biology professor at Christopher Newport University in Virginia. Managers may want to consider mines’ conservation value prior to deciding to plug their openings, he said.

▼ Abandoned mines can be dangerous to people but valuable to bats.



Credit: Rick Sherwin

Models show managers where to find feral pigs

Invasive pigs are known for damaging crops, but they can also harm ecosystems. At Great Smoky Mountains National Park, straddling North Carolina and Tennessee, researchers developed a method to help managers find them.

Using GPS collars, they tracked 16 feral pigs (*Sus scrofa*) to determine where they went. Knowing that helped them develop predictive models—both for broad-scale home ranges and fine-scale habitat preferences.

“We think of pig damage in agricultural systems, but in addition to that, there’s damage to biological resilience and biodiversity,” said TWS member Frances Buderman, an assistant professor at Penn State and lead author of the [study](#) published in *Biological Invasions*.

Pigs’ wallowing behavior can cause stream siltation, which affects native trout and other aquatic species. Rooting through vegetation can harm endemic plants. Their acorn diet puts them in conflict with black bears (*Ursus americanus*) and other native wildlife. They can also spread disease. Managers try to remove the pigs—hybrid descendants of swine brought for farming and wild boars for hunting—but they have to know where to look.

Buderman’s team found their home ranges covered lower elevations with lots of oaks. In the winter, though, when acorns are harder to find, oaks were less important. While their home ranges were at lower elevations, they sought higher elevations in daily, fine-scale movement.

The different findings at different scales may seem confusing, but they can help managers know where the pigs are, Buderman said.

“We have to think like a pig,” she said. “Where they are is the product of decisions at multiple scales.”



Credit: Meredith Boatman

▲ Feral pigs are abundant in Great Smoky Mountains National Park.



Courtesy Krysten Schuler

▲ Biologists perform a necropsy on a bald eagle that ingested lead ammunition.

Lead ammunition slowed recovery of N.Y. bald eagles

Nearly 30 years of lead ingestion has slowed the recovery of bald eagles in New York state.

Researchers compared population surveys of bald eagles (*Haliaeetus leucocephalus*) with estimated lead-related deaths from 1990, when only 13 breeding pairs were in the state, to 2018, when recovery efforts had boosted those numbers to 369 pairs.

The effect was like accelerating a car with a foot on the brake, said TWS member Krysten Schuler, director of the wildlife health lab at Cornell University and first author on the [study](#) published in the *Wildlife Society Bulletin*.

“Having lead in the environment has detracted from that recovery,” she said.

Eagles often scavenge the carcasses and gut piles left behind by hunters, which can contain fragments of the lead ammunition used to harvest the animal. The harmful material accumulates in eagles’ bodies over time and can eventually cause death.

Modeling what today’s population would be without the effects of lead poisoning, Schuler’s team found lead decreased the eagles’ long-term growth rate by 3%.

As temperatures rise, so do snakebites

The impacts of climate change could pack a serious bite. Researchers found that hospital visits due to snakebites were higher in Georgia on hotter days.

“There’s a whole range of health outcomes that we worry about in the context of climate change that we probably would never have thought about in the past,” said Noah Scovronick, senior author of the [study](#) published in *GeoHealth*.

An assistant professor of environmental health at Emory University’s Rollins School of Public Health, Scovronick usually focuses on how climate change may affect maladies like kidney disease or cardiovascular problems. But snakebites are a serious concern. The World Health Organization [estimates](#) that some 100,000 people die of snakebites around the world each year. Even nonvenomous bites can be dangerous.



Credit: Lawrence Wilson

“Although it’s not necessarily on the radar of public health concerns in the U.S., snakebites are a serious issue in other parts of the world,” Scovronick said.

▲ The eastern diamondback (*Crotalus adamanteus*) is one of seven species of venomous snakes found in Georgia.

Comparing hospital records with weather data from 2014 to 2020, Scovronick and his team found hospital visits for snakebites—both venomous and nonvenomous—rose about 6% for each one-degree Celsius rise in temperature. That’s likely due to both people and snakes being more active on warmer days, he said. The correlation was sharpest in the spring, when snakes are emerging and reproducing.

Incidents involving other venomous species, like spiders and scorpions, also rose with higher temperatures.

Education is key to reducing negative encounters, said coauthor Lawrence Wilson, an Emory herpetologist and TWS member. “Be aware that we share habitat with many species in urban environments.” ■

Contributed by David Frey
and Joshua Rapp Learn



Recent Most-Read Articles on [wildlife.org](#).

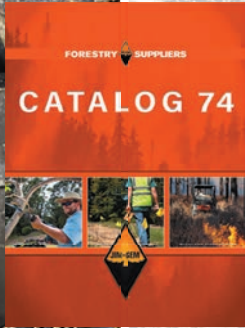
- [As the climate changes, wild turkeys aren't keeping up](#)
- [10 years later, translocated turtles find their way home](#)
- [JWM: Why has elk recruitment declined in New Mexico?](#)



THE TOOLS THAT YOU NEED WHEN YOU NEED THEM

Whatever your discipline. Whatever your skill. We've been there, and we know what it takes to get the job done right—without compromise. And that's just what you'll find in our catalog and on our website. Thousands of professional quality products, each backed with our world class customer service and technical know-how.

See for yourself. Scan the code, visit us online, or call us at 800-360-7788 to get your **FREE** catalog today.



FORESTRY  SUPPLIERS

www.forestry-suppliers.com
Sales 800-647-5368



©2023 Forestry Suppliers, Inc. All rights reserved.

CANADA

B.C. revamps grizzly strategies

British Columbia's Ministry of Forests is updating a pair of strategies meant to improve conservation of grizzlies (*Ursus arctos horribilis*) in the province. "Grizzly bears have special cultural significance in British Columbia," the ministry said in a call for public feedback on the plans. "They play an important role in many First Nations cultures, as well as tourism and recreational activities." The [Grizzly Bear Stewardship Framework](#) is intended to conserve bears and their habitats. The [Commercial Bear Viewing Strategy](#) provides guidance on bear viewing throughout the province, encouraging ways to reduce viewers' impact on the bears and the development of area-based viewing plans. After gathering public feedback, the ministry plans to begin formal consultation on the documents with First Nations. The current documents received feedback from about 85 First Nations and 17 wildlife organizations.



Credit: Province of British Columbia

▲ Grizzly viewing is a popular activity in British Columbia.



Credit: Ryan Haggerty/U.S. Fish and Wildlife Service

◀ Annual quotas limit the harvest of trumpeter swans.

CENTRAL MOUNTAINS & PLAINS

Utah bans trumpeter swan hunting

The Utah Wildlife Board voted to end the hunting of trumpeter swans due to national harvest quotas. Because of the low population size of trumpeter swans in the Greater Yellowstone area, the U.S. Fish and Wildlife Service sets an annual harvest

quota—currently 20 birds in Utah. For the past four years, Utah has closed its swan hunting season early due to that quota being met. In an effort to prevent another early closure, the board voted to prohibit trumpeter swan (*Cygnus buccinator*) hunting altogether, allowing tundra swan (*C. columbianus*) hunting to continue. Hunters must check in any harvested swans at a Division of Wildlife Resources office. Before the ban, Utah was one of only nine states to allow trumpeter swan hunting. "We are hopeful that this change will prevent hunting opportunities from being taken away due to the early-season closures," Utah Division of Wildlife Resources Migratory Game Bird Program Coordinator Jason Jones said in a press release.

SOUTHWEST

Texas rule targets movement of breeder deer

The Texas Parks and Wildlife Department has adopted an emergency rule implementing additional movement and testing restrictions for white-tailed deer (*Odocoileus virginianus*) in deer-breeding facilities. The rule comes in response to continued positive detections of chronic wasting disease in these facilities. Fourteen counties have had positive detections since March 2021, including nine deer-

breeding facilities in 2023. “Since 2021, we have seen an increase in CWD detections from breeder deer at an unprecedented rate,” said TPWD Wildlife Division Director John Silovsky, in a press release. “It’s our hope that these emergency rules will strengthen our surveillance and reduce the number of CWD-positive detections across the state.” This emergency order requires all breeder deer to be live-tested for CWD before moving to another facility or release site. It also restricts the removal of identification tags. The 120-day temporary order went into effect July 24 and may be extended an additional 60 days. CWD is a fatal prion disease that can spread between captive and wild populations of deer and other cervids.



Credit: Texas Parks and Wildlife

▲ Chronic wasting disease can spread easily between captive and wild deer populations.

NORTH CENTRAL

Michigan moose numbers dip slightly

The Michigan Department of Natural Resources is recommending against conducting a hunting season for moose this year after a survey found a slight dip in the western Upper Peninsula population. “This continues the trend of plateauing abundance where population growth over the last 12 years is now less than 1%,” said Tyler Petroelje, northern Michigan wildlife research specialist with the Michigan Department of Natural Resources, in a press release. In the first



Credit: Ray Dumas

◀ Moose numbers in Michigan’s western Upper Peninsula have failed to grow.

survey conducted since the beginning of the COVID-19 pandemic, researchers estimated 426 moose (*Alces alces*) in the area, down from the 509 estimated in 2019. The western U.P. moose core range covers about 1,400 square miles. Moose were translocated there from Canada in two separate efforts in 1985 and 1987. Michigan’s Moose Hunting Advisory Council recommends moose hunting only if the growth rate is greater than 3%.

SOUTHEAST

New red wolf pups born in wild

A pack of red wolves on the Alligator River National Wildlife Refuge in North Carolina is on the rise. Five pups were born to a pair in the Milltail pack in April. It’s the second year in a row this pair has added to the pack. The newest litter consists of three females and two males. Because of the pair’s success, the Red Wolf Recovery Program added a male pup



Credit: Red Wolf Recovery Program

▲ Five red wolf pups were born in the Milltail pack last spring.

born at Point Defiance Zoo and Aquarium in Tacoma, Washington, to be cross-fostered in the same litter. Last year, the pair also produced five pups—the first red wolves (*Canis rufus*) to be born in the wild since 2018. The new additions bring the Milltail Pack in Alligator River National Wildlife Refuge to 13 wolves. “A cause for joy and celebration in 2023, much like we experienced in 2022—every generation yields a newborn hope for recovery of the Red Wolf!” the Red Wolf Recovery program wrote on Facebook. Following the release of 14 individuals last spring, biologists estimate 32 to 34 red wolves are now in the wild. Another 278 are in the captive breeding program.

NORTHWEST

USFWS gathers input on sea otter reintroduction

The U.S. Fish and Wildlife Service is asking residents of Oregon and Northern California to weigh in on a proposal to reintroduce sea otters to their historical range. The agency held a series of 16 open houses to gather input on the plan to



Credit: Lilian Carswell/U.S. Fish and Wildlife Service

◀ The U.S. Fish and Wildlife Service is considering a plan to reintroduce sea otters in Oregon and Northern California.

reintroduce southern sea otters (*Enhydra lutris nereis*) to the region. One of three subspecies of sea otter, the southern sea otter is federally listed as threatened. The open houses follow a feasibility study conducted last year. “The reintroduction of sea otters to Northern California and Oregon would result in significant conservation benefits to the species, in particular to the threatened southern sea otter and to the nearshore marine ecosystem,” the study concluded. The unregulated fur trade of the 1700s and 1800s nearly brought sea

otters to extinction. Biologists believe reintroducing them to the region would help reconnect southern and northern (*E. l. kenyon*) subspecies. The waters off the coast of northern California and Oregon represent the largest remaining gap in their historical range.

WEST

Second wolverine confirmed in California in a century

California biologists have confirmed sightings of a wolverine in the Sierra Nevada. Several people have captured images and video footage of what appeared to be a wolverine in the Inyo National Forest and Yosemite National Park. Experts from the California Department of Fish and Wildlife and the U.S. Forest Service confirmed they showed a wolverine (*Gulo gulo*)—likely the same individual. “Wolverines can travel great distances, making it likely that the recent sightings are all of the same animal,” CDFW Senior Environmental Scientist Daniel Gammons said in a press release. This is only the second wolverine confirmed in California since the 1920s. Another wolverine was first documented in the Tahoe National Forest in 2008, but it was likely a different individual. Wolverines are listed as threatened under the California Endangered Species Act. The CDFW hopes to collect genetic samples from the animal via scat, hair or saliva at feeding sites.



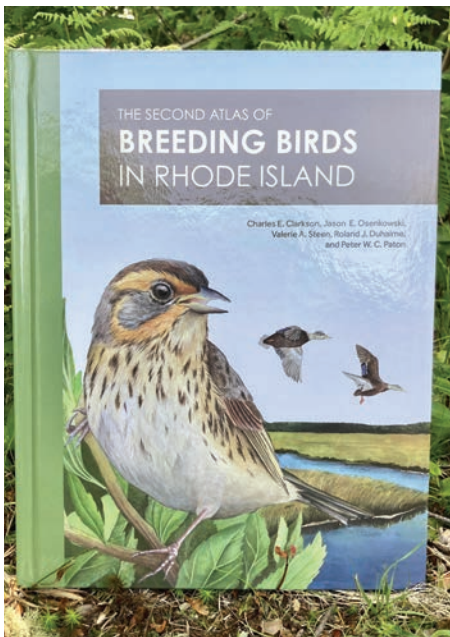
Credit: California Department of Fish and Wildlife

▲ A wolverine has been spotted in the Sierra Nevada—one of only two in the past century.

NORTHEAST

New Rhode Island breeding bird atlas released

The Rhode Island Division of Fish and Wildlife has released a new atlas of breeding birds in the state. The new book, *The Second Atlas of Breeding Birds in Rhode Island*, was created through a citizen-science survey of birds from 2015 to 2019 in collaboration with the University of Rhode Island. Over 200 volunteers took part in the effort, detecting 173 species. The 480-page book includes the life history, breeding ecology, migration phenology, distribution, abundance, management recommendations and climate vulnerability for each species. “Rhode Island’s birds can often serve as important indicators of our environment and how it’s changing,” said Department of Environmental Management Director Terry Gray, in a press release. The cover depicts the saltmarsh sparrow (*Ammodramus caudacutus*) and American black duck (*Anas rubripes*), two species that state biologists say have habitats threatened by sea level rise.



Credit: Rhode Island Department of Environmental Management

▲ A new breeding bird atlas documents 173 species in Rhode Island.



Credit: Douglas Cavener

▲ Masai giraffe genetics in Kenya and Tanzania are split down the middle by the Great Rift Valley.

INTERNATIONAL

Masai giraffe face inbreeding risk

Giraffe populations in eastern Africa have been falling, but recent research suggests they may be even more endangered than previously thought. Biologists found that populations of Masai giraffes (*Giraffa camelopardalis tippelskirchi*) split by the Great Rift Valley don't interbreed, resulting in two smaller, genetically distinct populations. “This study raises all kinds of alarm bells about the future of the Masai giraffe,” said Douglas Cavener, a biology professor at Pennsylvania State University. Illegal hunting and habitat loss have cut Masai giraffe numbers in half over the past 30 years. The International Union for Conservation of Nature considers them endangered. Only about 35,000 remain in the wild in Kenya and Tanzania, where they are divided about evenly by the Rift. Unlike elephants, which occasionally cross the steep Rift

escarpment, giraffes don't. “Elephants are like all-terrain vehicles but giraffes—they aren't built for climbing,” Cavener said. For a [study](#) published in *Ecology and Evolution* analyzing giraffe DNA, Cavener and his colleagues found it had been more than 200,000 years since a female giraffe crossed, and a few thousand years since males have, resulting in two genetically different populations with high rates of inbreeding. “They are on their way to be separate species,” Cavener said. Each population faces unique challenges. The eastern population is more fragmented due to human development. The western population may still be recovering from an 80-year rinderpest pandemic that ended in 1960. “Given the genetic separation of western and eastern Masai giraffe, they need to be managed separately,” Cavener said. ■

Contributed by David Frey and Joshua Rapp Learn

Capping a Career in Conservation

STEVE WILLIAMS HAS HELPED THE WILDLIFE PROFESSION NAVIGATE CHANGING TIMES

By David Frey

The Wildlife Management Institute's George Bird Grinnell Memorial Award is an honor for anyone who receives the distinction. But for this year's prize winner, the award was especially poignant.

The 2023 recipient was Steve Williams, who retired in March after 18 years as the organization's president. Williams' retirement capped a 38-year career that ranged from on-the-ground biology to high-profile leadership to behind-the-scenes strategy. He came to WMI, which he ran out of his home office in rural Pennsylvania, after maneuvering the currents of D.C. politics while directing the U.S. Fish and Wildlife Service.

Over his career, Williams has seen the wildlife profession change significantly. As he steered WMI, navigating those changes was his mission.

"I've been afforded the opportunity to realize that fish and wildlife conservation starts with biologists—it starts with the science," Williams said. "But to really experience the whole wildlife profession, you need to have a good understanding of the social aspects of conservation, the economic aspects of conservation and the politics that are involved. I've been lucky enough to see it from all sides."

'A strategic thinker'

Williams was involved in key efforts to help the profession keep up with changing dynamics. As wildlife agencies became concerned that their traditional constituency of hunters and anglers was dwindling, Williams helped create what would become the R3 movement—an effort to develop programs to recruit, reactivate and retain sportspeople.

When wildlife officials worried about limited conservation funds, he helped craft the Relevancy Roadmap—a set of strategies to help agencies make themselves more pertinent to a broader spectrum of the public.

"Steve recognized the need for conservation relevancy more broadly early on and was a great and effective advocate—a



Courtesy Steve Williams

▲ Steve Williams retired in March after 18 years as president of the Wildlife Management Institute and 38 years in wildlife conservation and management.

strategic thinker," said Tony Wasley, who served with Williams as co-chair of the Relevancy Roadmap effort and succeeded him as WMI's director.

"Steve wasn't someone who wanted to grandstand," Wasley said. "He didn't need or want credit. He was, I would say, in it for the right reason—to move the needle—and he didn't care about credit or accolades."

Williams's work with the Association of Fish and Wildlife Agencies' Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources—a coalition of conservation and outdoor industry leaders—led to the drafting of the Recovering America's Wildlife Act. The ambitious bill, if passed, would become the most significant conservation

legislation since Congress passed the Endangered Species Act 50 years ago. At a time when partisan rancor has left Congress divided, RAWA has received bipartisan support. Supporters are pushing for its passage this year after the legislation narrowly failed at the end of the last congressional session due to wrangling over the funding mechanism.

"Some of the biggest challenges are the political challenges—working with state legislators and Congress, trying to get them to understand how important conservation is," Williams said. By the nature of their jobs, if you're in a legislative position—state or federal—you're thinking about all your constituents and the economy and polls and getting reelected. The biggest challenge, I think, is trying to relate to a legislator how conservation benefits their constituents and compromising at times to figure out how to get where you want to get sometimes, in spite of overwhelming opposition. People say compromise is a dirty word. I don't see that at all."

From the field to the forefront

These lessons have been a career in the making. A TWS member since 1978, Williams started out as a deer biologist with the Massachusetts Division of Fisheries and Wildlife in 1985. Over time, though, his career path brought greater and greater responsibility and less time in the field. He went on to serve as the state's assistant director for wildlife before

heading to Pennsylvania to serve as deputy executive director of the Pennsylvania Game Commission.

He went on to serve as secretary of the Kansas Department of Wildlife and Parks, where his reputation for bringing diverse stakeholders together led to his nomination to direct the U.S. Fish and Wildlife Service under President George W. Bush in 2002.

Leading the USFWS put Williams in a position of overseeing wildlife management across the country, with a budget of nearly \$2 billion. For a longtime wildlifer, dealing with Congress and the bureaucracy of the federal government was a challenge, Williams said, but visiting agency staff at work across the U.S. renewed him.

“Everywhere I went, it was always a wonderful welcome and a great learning experience for me,” Williams said. “Those people do incredible work out there on the landscape.”

When Bush left office, Williams knew he would be out of a job. That’s when he came to WMI, an organization he would devote nearly half of his career to. The organization was created in 1911 to recognize the conservation contributions of hunters and anglers, but he could see the picture was changing. Those traditional constituencies were aging, and their numbers were thinning. That was a growing concern for state agencies, which traditionally relied on them for conservation support and funding.

“We started surveying state agencies and NGOs to see what types of programs they had for the recruitment of hunters and anglers,” Williams said.

Recruit, retain and reactivate

The R3 movement gained steam, involving agencies and organizations around the U.S. with a vision of reinvigorating hunting and fishing.

“Now almost every state agency has at least one person focused on recruiting, retaining and reactivating the traditional constituents of hunters and anglers,” Williams said.

That ability to tune in to agency needs has set Williams apart, said Matt Dunfee, WMI’s director of special programs. Williams hired Dunfee early on to help steer the organization’s projects, including its annual conference.

“Steve’s default position was always really understanding where the community of natural resources managers was—what they thought, what they believed—and he would reflect that and uphold that,” Dunfee said.



Courtesy Steve Williams

▲ Steve Williams’s career led from on-the-ground biologist to high-profile leader to behind-the-scenes strategist, always with conservation in mind.

Increasing relevancy

But the profession needed to do more than bolster its traditional constituencies, Williams realized. To maintain funding and support for conservation, agencies would need more than hunters and anglers. They would need birdwatchers, hikers, kayakers—even people who cared about nature but didn’t interact much with state wildlife agencies.

On the Blue Ribbon Panel, he worked with the late Steve Kellert, a professor of social ecology at the Yale School of Forestry & Environmental Studies. Kellert argued that state agencies would need to change to make themselves more relevant to more people. The message resonated with Williams and others on the panel, leading to both RAWA and the Relevancy Roadmap.

“That has resulted in a number of states focusing people—their time and their effort—on engaging a broader constituency,” Williams said. “It’s so essential to wildlife conservation.”

The work was the culmination of a career that led from focusing on wildlife to understanding the human dimensions that surround conservation decisions—from the Kansas farmer whose wheat stubble supports game birds through the winter to the city dweller looking for a weekend escape into nature.

“It’s not just about the animals,” he said. “It’s about the people that are involved in those landscapes.” ■



TWS MEMBER David Frey is the managing editor for The Wildlife Society.



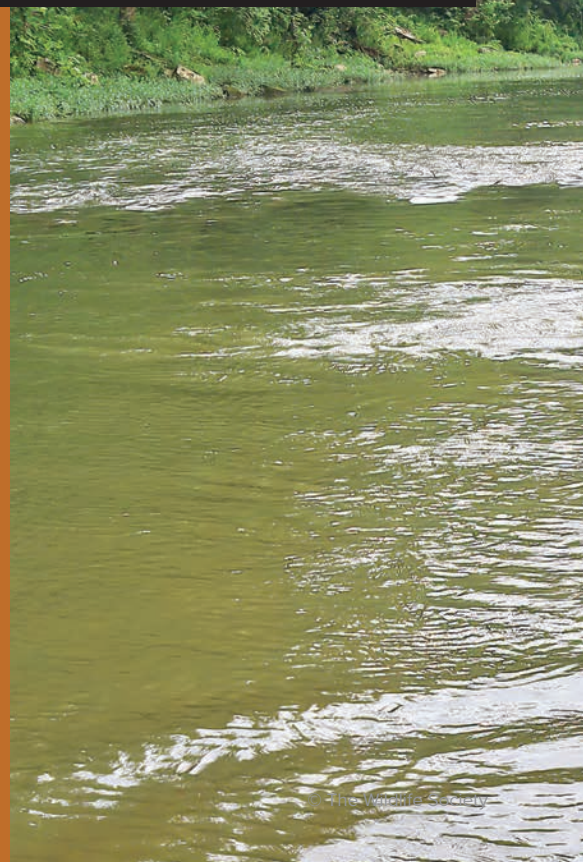
Hellbent on Conservation

BIOLOGISTS WADE A 'NEVER-ENDING STREAM OF CHALLENGES' TO CONSERVE AT-RISK HELLBENDERS

By Joshua Rapp Learn

▲ Hellbenders are declining due to habitat loss, but their cryptic nature makes these large salamanders difficult to monitor.

Credit: [evangrimes](#) via iNaturalist



The sky was gray as a team of biologists in wetsuits picked their way down a southern Indiana ravine. For 10 minutes, they followed an overgrown path thick with ticks until they emerged from the foliage at the banks of the Blue River. A light drizzle began to fall, but the stones at the bottom of the waterway—never more than a couple feet deep—were still clearly visible as the five wildlifers waded in.



▲ Wildlife biologists with Purdue University and the Indiana Department of Natural Resources prepare to conduct a hellbender survey in the Blue River in southern Indiana.

Credit: Joshua Learn



Credit: Ryan Haggerty/U.S. Fish and Wildlife Service

▲ Much about the life history of hellbenders has been shrouded in mystery, in part because of their frightening appearance.

Donning masks and snorkels, they formed a line across the river, pressed their faces into the water and got to work flipping rocks. Foggy snorkel masks and clouds of sediment temporarily blocked the view, but the team slowly worked their way upstream, rock after painstaking rock.

This stretch of the Blue River, about 25 miles west of Louisville, Kentucky, probably has the best conditions in the state for hellbenders—the massive, endangered salamander endemic to these waters. No one has seen a young hellbender in the wild in Indiana since the 1980s. If these researchers from Purdue University and the Indiana Department of Natural Resources were going to find them anywhere, this would be the place.

The team moved only about a foot a minute, but the slow-moving water was peaceful, and the light rain added to the Zen-like calm. “It’s meditative,” said TWS member Emily McCallen, a biometrician at the Indiana DNR who conducted her PhD on these creatures.

Hellbenders are the largest North America amphibian—close cousins to the world record holder on amphibian size, the Chinese giant salamander (*Andrias davidianus*). While hellbenders used to be found more widely in Indiana, their range is now relatively small, living only here in the Blue River near the Kentucky border. Habitat degradation is the major cause for their decline in Indiana and elsewhere. But other factors, like waterway pollution and climate change, are also imperiling these animals.

“It’s a never-ending stream of challenges,” said TWS member Gregory Lipps, amphibian and reptile conservation coordinator at Ohio State University.

But biologists across hellbenders’ range have been working to restore quality habitat, reintroduce captive-bred individuals to the wild to boost populations and identify the needs and challenges of these unique animals. By protecting hellbenders, they hope to conserve a whole host of other

species that also benefit from stream conservation in Appalachia, the Ozarks and other places where the amphibians are found.

“Their health is indicative of our water’s health,” said Justin Elden, curator of the herpetology department at the Saint Louis Zoo.

Cryptic ‘monsters’

Much about the life history of hellbenders has been shrouded in mystery, in part because of their unsavory appearance. Fishermen would often kill them when they ended up on their lines. While nobody is sure exactly where the name “hellbender” comes from, it isn’t a term of endearment. Neither is another of its nicknames: “snot otter.”

“For the general public, the thing is a monster,” Elden said.

Hellbenders are split into two recognized subspecies. Eastern hellbenders (*Cryptobranchus alleganiensis alleganiensis*) mostly range from Alabama to Indiana and New York, with another distinct population in parts of Missouri. Their slightly smaller relatives, Ozark hellbenders (*C. a. bishopi*), are found only in the Ozarks of Missouri and Arkansas. Both the Ozark hellbender and Missouri’s population of eastern hellbenders are considered endangered by the U.S. Fish and Wildlife Service. Hellbenders elsewhere are currently under review for listing.

Every breeding season, eligible males find themselves a den—usually a space under a large rock at the bottom of a clear, fast-moving stream. When a passing female enters the den and breeds, she deposits a clutch of 300 to 500 eggs before taking off. The male—at this point known as a “den master”—keeps watch for the next eight months, long enough for the eggs to hatch and the larvae to grow big enough to set out on their own.

“It’s this weird crazy animal that only a mother would love,” Elden said.

Hellbenders’ cryptic nature is part of the reasons scientists have had a hard time determining their life history. Just finding

their dens involves a lot of work. Wildlife managers used to look for adults by flipping rocks in streams, but they discovered that exposing a den is a fast way to ruin the nest—the male will never use it again. (In the Blue River, researchers flipped only smaller rocks in search of juveniles and larvae.) Extracting environmental DNA from water samples has helped, but even that only indicates if a hellbender is present upstream. Finding the source of the DNA involves a lot of searching through moving water.

Hellbenders are long lived. Eating crayfish and small river fish, they can live up to 20 or 25 years and take five to seven years to reach sexual maturity. In captivity they can make it to 40 years. Before reaching adulthood, they pass through two distinct life stages. As hatchlings, they have gills, but these are absorbed in juveniles as they grow older and begin to breathe through their skin, like most amphibians. The flaps lining the sides of their bodies help them breathe and are probably the inspiration for yet another of their nicknames: “lasagna lizards.” Hellbenders also have lungs, which they may use for buoyancy rather than breathing.

“They have gill, skin and minimal lung respiration all at some point in their life,” said Bill

▼ Female hellbenders may lay up to 500 eggs, like this one, in a male’s den before leaving the male to care for them.



Credit: Pete and Noe Woods via iNaturalist

Sutton, an associate professor of wildlife biology who works with hellbenders at Tennessee State University.

Troubled waters

Habitat changes can affect hellbenders in many forms. Dams and locks used by barges to move goods alter the flow of rivers. That blocks hellbenders' ability to move, resulting in small, unconnected populations that can eventually die out. That's what happened when the Tellico Dam was built on the Little Tennessee River in 1973, and it is likely what happened on major rivers like the Ohio, where records from the early 1800s show a lot of hellbenders.

"We've pretty much eliminated that habitat," Lipps said.

Lipps was among the researchers involved in putting together the 2018 species assessment for the U.S. Fish and Wildlife Service ([U.S. Fish and Wildlife Service 2018](#)). They found that good hellbender conditions involve more than hydraulics. The land around the streams and creeks is critical—particularly the vegetation.

"Basically, everybody agreed that the single greatest threat to hellbenders was degradation of stream habitat, the most prominent of which is attributable to the loss of upstream forest cover," said William Hopkins, an ecology professor at Virginia Tech who was also involved in the assessment.

Once forest cover disappears, hellbenders downstream disappear, Lipps said. It likely has to do with sedimentation. Without tree roots to hold soil along streambanks, the creeks silt up. Researchers still aren't sure why this affects hellbenders so severely. It's possible the silt literally fills the crevices where they create their dens. Sutton said researchers observed one adult in Tennessee buried in its den in six inches of sediment after a storm. Some biologists wonder if increased sedimentation may affect the water chemistry in ways that harm hellbenders.

The loss of trees also opens the rivers to cattle, which bring other problems. Their hooves can trample hellbender dens, and their manure boosts nitrogen levels, leading to eutrophication—an increase in cyanobacteria that can choke out the water's oxygen.



► Ozark hellbender larvae at roughly two months old.

Credit: Saint Louis Zoo

In Ohio, where 95% of the land is privately owned, Lipps and his team work with property owners to find ways to build fences near rivers and regrow tree cover around waterways upstream from hellbender habitat. This means helping landowners access state wildlife conservation grant programs or U.S. Department of Agriculture's Farm Bill programs (See Policy Perspectives on page 57).

Researchers are trying to determine just how much tree cover is needed to protect hellbender populations downstream. By focusing reintroduction efforts and land conservation farther upstream in rivers, Hopkins said, cumulative benefits may eventually flow downstream.

A hellish diet

While researchers don't know exactly why tree cover is so important, a surprising new finding by Hopkins and his colleagues has unveiled a reason why hellbenders are declining in areas with low upstream forest cover. The den masters charged with caring for their young are eating them (Hopkins et al. 2023).

Researchers knew that most hellbender eggs and larvae never reach adulthood due to predation, and some cannibalism probably isn't unusual. "We don't think it's abnormal for them to eat their babies on occasion," Hopkins said.

The problem is the rate at which it is occurring. In their 10 years of research at three rivers in southwestern Virginia, Hopkins and his team monitored 275 artificial nests, some of which they'd fitted with cameras. The cannibalism rate was nearly 100% in areas with low forest cover within two months of the females laying the eggs. "That's not sustainable," he said.

Cannibalism was happening all the time in areas downstream of deforested banksides, the researchers discovered. Adult hellbenders remained in these degraded sites, but despite plenty of breeding and nests, there was next to no recruitment.



Credit: Brome McCreary/U.S. Geological Service

The researchers still aren't sure why this is happening, but they've ruled out a couple of possibilities. It doesn't seem to be hunger—a comparison of body size and condition between males who ate their young and those who didn't revealed very little difference. Researchers thought males might sense that water conditions weren't appropriate for larvae and made a meal of their young. "It would make sense to say, 'Forget it, these are going to die, just eat them and try again next year,'" Hopkins said. But in research yet to be published, they took water and eggs from these degraded streams and successfully hatched larvae in the lab without cannibalism—so that doesn't seem a likely reason, either.

It's still possible that the changes in water chemistry may directly stimulate the adult to make these diet choices, but more research is needed to determine the exact mechanism that prompts filial cannibalism. While Hopkins conducted his study in Virginia, eastern hellbenders all over their range suffer from low recruitment, and cannibalism has been observed in several other states.

"This could be the smoking-gun paper in terms of hellbender decline," said Lipps, who was not an author on Hopkins' paper.

▲ Wildlife biologists swab a rough-skinned newt (*Taricha granulosa*) near Portland, Oregon, for *Batrachochytrium salamandrivorans*, the salamander chytrid fungus that some biologists fear might arrive in North America.



Credit: Brian Case

▲ A male hellbender in southwestern Virginia is observed in the midst of cannibalizing eggs.

Looming threats

The Ozark hellbender may face an additional threat from the chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*). While most eastern hellbenders in Missouri don't suffer the kind of lethal

effects that many amphibians do due to the warmer temperatures they prefer, Ozark hellbenders usually live in cooler water, which is more suitable for *Bd*. Chytridiomycosis—the disease caused by *Bd*—invades the keratin skin layers, especially in the feet, and weakens the salamanders' immunity. As a result, naturally occurring microbes destroy their foot tissue, sometimes taking toes or limbs, and in the worst cases, causing death. The infection was first discovered in this subspecies in 2006 when researchers working on developing a captive breeding program brought a number of wild Ozark hellbender eggs infected with *Bd* into tanks at the Saint Louis Zoo.

“We lost a lot of animals in a short period,” said Jeff Briggler, state herpetologist at the Missouri Department of Conservation.



▲ The Blue River is home to Indiana's only remnant population of hellbenders.

Credit: Joshua Learn



Credit: Joshua Learn

Experience in Missouri shows that hellbenders have some resistance to chytrid if they survive exposures in their first couple years of life. “We would like to research a few of the early life stages to see what impacts *Bd* has on those animals, and if it kills them outright,” Briggler said. They have tracked some adult hellbenders in the wild, for example, that have had chytrid for years.

But Briggler, as well as researchers who work predominantly with eastern hellbenders, is concerned about another threat on the horizon. *Batrachochytrium salamandrivorans* (*Bsal*) is a different type of chytrid sometimes known as the salamander chytrid. So far, it has only been detected across the ocean. But herpetologists around the Americas are worried that it will make a jump from Europe or Asia via the pet trade at some point and affect a whole host of North American amphibians (Gray et al. 2023).

Part of the problem with conserving the species is getting the public to take an interest in a creature that has been maligned for so long. “We can care as much as we want about these animals, but if the general public doesn’t care, and isn’t invested in their conservation, then it doesn’t make too much of a difference how we feel or what we want to do,” said Justin Elden, curator of herpetology and aquatics at the Saint Louis Zoo, which has been instrumental in hellbender recovery efforts.

Life in captivity

Indiana’s biggest concentration of hellbenders doesn’t actually dwell in the Blue River. It lies three hours north, amid mile after mile of row crops, inside Purdue University’s Aquaculture Research Lab. Far from the Appalachian Mountains, little more than water towers break the horizon. The lab could be mistaken for another farm building, except for the upturned kayak

▲ Hellbender husbandry coordinator Shelby Royal-Roberts looks over a “raceway” that houses captive hellbenders at Purdue University’s Aquaculture Research Lab.

leaning against the building and a pickup truck parked in the gravel lot with a decal plugging HelptheHellbender.org—part of a national joint venture to aid the species.

Inside, a long hallway becomes increasingly stinky as it leads past offices to a large, open lab filled with artificial streams. “There are days when I come home and my husband is like, ‘Oh, Shelby, that’s bad,’” says Shelby Royal-Roberts, the hellbender husbandry coordinator at the lab and a member of TWS.

As Royal-Roberts lifts the lid off one stream, she prompts a flurry of dark movement inside. The stream is part of a 9-meter hellbender “raceway,” filled with river rocks and flowing water kept at 15 degrees Celsius. The conditions are meant to mimic the Blue River, to give juveniles raised here a better chance when they are introduced into the wild. Purdue researchers found that 74% of those raised in flowing water were still alive about a year after they were released, compared to only about 50% of those raised in still water.

“Those hellbenders reared in currents did much better. They acted like hellbenders,” said Purdue herpetology professor Rod Williams, a member of TWS.

The team is also trying to condition captive-reared hellbenders to recognize threats from potential predators by putting bass in a tank with tiger salamander (*Ambystoma tigrinum*) larvae. As the fish preyed on the larvae, the salamanders released chemical alarm cues. When the water flowed into other tanks containing hellbenders, the hellbenders seemed to pick up on the warnings. They were more cautious, staying on the bottom of their tank, while a control group without predators upstream swam around unconcerned, Williams said.

Soft releases also help their survival in the wild. Biologists put a big cage over a group of rocks where the juveniles can hide and acclimate to local conditions for a few days, until the cage is removed.

Groundbreaking work

The Purdue lab is just one of several across the country that specialize in breeding hellbenders for reintroduction. Similar efforts are taking place throughout their range, returning thousands of hellbenders to the wild. But none of it might have happened if it wasn’t for the achievements of the Saint Louis Zoo.

Back in 2007, Elden was working as a zookeeper there just after its hellbender program began. Wildlife managers were bringing hellbenders into captivity to hatch, but they had zero success with their coupling.

“There were a lot of people saying it was impossible to breed hellbenders under human care,” Elden said. They tried all kinds of things to mimic conditions in the wild, including using water with just the right amount of acidity and dissolved minerals. They even replicated a 30-foot section of stream outdoors, complete with river rocks and different water depths. Eventually, these changes boosted the success of their breeding program.

“This isn’t a species you can breed in a fish tank,” Elden said.

They had their first success with the hatching of eggs in 2011. Over the past 25 years, they have

▼ Ozark hellbender embryos developing at the Saint Louis Zoo, which has been at the forefront of captive breeding efforts for hellbenders.



Credit: Saint Louis Zoo



Credit: Joshua Learn

released more than 10,000 Ozark and eastern hellbenders into the wild. Determining the success of these reintroductions is difficult, but in October 2022, Briggler and his colleagues had the first confirmation that a captive-bred Ozark hellbender had reproduced. They found a tagged den master that had been raised at the Saint Louis Zoo guarding a clutch of 128 eggs, many of which were beginning to hatch. Wildlife managers hope this kind of thing will become increasingly common.

Rock and roll

Back in the Blue River, every rock the searchers flipped over turned up a cloud of sediment. Flashes of movement brought momentary excitement until they realized it was just a crayfish or a darter. Occasionally, a bent, blackened leaf would spiral past, suggesting the undulations of a salamander tail, but never an actual hellbender.

When asked if the job ever gets monotonous, Nicholas Burgmeier, extension wildlife specialist and hellbender program coordinator at Purdue, just laughed and nodded. Since the 1980s, a lot of rocks have been flipped with little reward. But the team didn't give up. Adjusting his wetsuit and snorkel, Nate Engbrecht, the state herpetologist at the IDNR, called it the most "immersive" work he does.

Just after lunch, as the rock flipping was getting routine, the team made a wonderful discovery. Under a small triangular rock, they spotted a hellbender and managed to capture it. It was still gilled, meaning it was young enough that it must have hatched in the wild. Whether it was the product of two wild adults or a pair of captive-bred hellbenders or one of each wasn't clear, but it seemed to answer one question. Biologists in Indiana had wondered if hellbenders there were able to raise eggs to development or if something might be preventing it, Burgmeier said by text message after the discovery.

No juvenile hellbender had been seen here since the 1980s and no larvae had ever been seen in Indiana. Discovering this larva, he said, "was a nice injection of hope." ■

▲ To survey hellbenders in the Blue River, wildlifers spread out and flipped underwater rocks for days.



Joshua Rapp Learn is a science writer for The Wildlife Society.



So Many Paths to Follow

SHARING OUR STORIES CAN INSPIRE US
AND REMIND US THAT WE'RE NOT ALONE

By Geriann Albers

Credit: Zach Frailey

▲ For many wildlifers, the path they find themselves on may not be the one they expected, but that doesn't mean it's the wrong path.

*“Two roads diverged in a yellow wood ... and I—
I took the one less traveled by, and that has made
all the difference.”* —Robert Frost

Maybe you remember the first time you were exposed to the Robert Frost poem “The Road Not Taken.” Was it in a high school English class? A parent saying some bit of it in reference to a memory? Or maybe it was that bastion of my youth, the movie *Dead Poets Society*, where Robin Williams’ character uses it to inspire his students to nonconformity. I don’t remember where I heard it first, but fragments of those lines keep reverberating around my mind.

They were the words that came to mind last October when I agreed to help put this special focus together. I had joined the Editorial Advisory Board of *The Wildlife Professional* less than a year before, so I still felt like a noob. Every summer, board members send in story ideas for the next year and decide who will take the lead to coordinate special focus sections. I had just finished wrangling my first, about how hunters contribute to conservation, and we

were reviewing the proposed list for 2023. Another board member had suggested “career trajectories of wildlifers” as a special focus topic. We talked about several different avenues we could pursue, but as I stared at the title, I felt a whispering breeze of Robert Frost blow over me.

I volunteered to coordinate this special focus you are reading now. It’s a subject that resonated with me. Mentoring students and new professionals has been a growing interest of mine—especially as I reflect on my college days. Back then, I thought I’d just pick a species, get a master’s degree, then a PhD, then do field research on that one species forever.

That’s how it works, right? That’s how I thought it worked, and it’s how many people I talk to thought it would work as well. At age 21, I figured I would study caracals (*Caracal caracal*) for the rest of my life.

But this profession of ours is much more than that. It’s so much bigger and messier. There’s so much more space, variety, barriers and ceilings to break through. This field is not just one thing, and it



seems to me like it's constantly growing into more and more prospects. Natural resources economics, conservation marketing, clean energy, technology—so many spaces are growing in the profession, with new opportunities for wildlife careers.

What did that all mean for this special focus?

After I volunteered to take it on, I was sitting in my office, staring at a fox poster designed by modernist wildlife artist Charley Harper (the poster is in my designated deep-thinking staring corner—everyone should have one) and thinking about what the issue could look like. I let Robert Frost's whispering get a bit louder.

"Two roads diverged in a yellow wood..."

It just felt like so many career stories I knew. So many people I know worry—or have worried—"Am I taking the right job? Will this lead to what I want to do? Am I doing this right?"

For many, there is no one straight road. There are diverging paths through the woods, fields, lakes and oceans to our careers. Some are defined, well-traveled roads. Some are scatter wildlife trails. Some people take a machete and bushwhack their

own. No path is the wrong path. There's only the path we each choose to walk.

With that in my head, and the thumbs up from the magazine staff, I asked people to share what their career path looked like. People who have faced different diverging points where they made a choice to go in a direction. People who might have faced challenges or are at a point to reflect and offer advice based upon their time on their career road. That's what you'll read in this issue: personal stories of roads less traveled, because everyone's road is their own in the end.

I hope we keep sharing our stories in various forms, whether it's here in the magazine, or through personal mentorships, or through events like the storytelling event at the Spokane conference. I think it's a way to share the wonderful and the hard about our profession. It can help bring us together. It can help us feel like we're not alone during the struggles, and it can inspire us and help us look forward to the future. I hope you enjoy these personal stories our authors share in this issue. ■

▼ The wildlifera profiled in the essays included in this special focus have all pursued various career paths and learned a lot of lessons along the way.



TWS MEMBER Geriann Albers, CWB® is the furbearer biologist for Indiana Department of Natural Resources and a member of The Wildlife Professional Editorial Advisory Board.



Credit: Clockwise from top left: Courtesy Michael Fishman; Michelle Rivard/Parks Canada DFO Permit #SINP-2020-37578; Courtesy Ashley Hobbs; Jim Devries; Courtesy Jesse De La Cruz; Courtesy Olivia Anderson

Navigating the Ups and Downs

A DREAM JOB AWAITED, BUT ONLY AFTER LOTS OF REJECTIONS

By Ashley Hobbs

When I set out to be a wildlife biologist, I thought I'd end up in Africa. I planned to join a master's program right out of undergrad studying human-lion conflict. I told friends and family I'd see what opportunities were available once I wrapped up my thesis. I wanted to keep my options open.

Today, I recount my naivety tongue-in-cheek. I did make it to Africa, but only to study abroad for a summer. I did not join a master's program right out of undergrad.



► When Ashley Hobbs became the assistant black bear and furbearer biologist for the North Carolina Wildlife Resources Commission, it opened up unexpected career opportunities.

Courtesy Ashley Hobbs

The closer I got to graduation, the more panic set in. I thought the only path forward in this field was from undergrad to grad school, then maybe a seasonal job after school to get some experience, then I'd find a permanent job somewhere. I wasn't making the right connections in the field to find an open grad position right out of school, though. I got a lot of responses like, "I'll keep you in mind if something opens up."

I took a wildlife damage management class my senior year that I managed to leverage into a summer internship. That was a start, but I didn't know that I should start applying for the next seasonal position several months in advance. Once my internship ended, I had no plan for what would come next. I started applying for seasonal and temporary positions, not knowing that 100 other applicants also had their names in the hat. I didn't have a realistic impression of the imbalance between early-career biologists and available positions. I struggled to get interviews or even feedback as to how I could have been a more competitive candidate. After more than 20 failed applications, I gave up. I didn't know this at the time, but my experience wasn't uncommon.

Time to reassess

Only a handful of students in my graduating class were able to stay in the fish and wildlife field, it turned out. As time passed, I saw my friends take jobs in unrelated professions. I had been working at a restaurant while applying for seasonal jobs just to make ends meet. At that point, I had been out of school for a little over a year. I felt, like so many of my peers, that I had failed to make it in the wildlife field.

So, I reassessed. All my life family and friends have told me I should be a teacher. I work great with kids, I'm well spoken, and I have a knack for finding common ground with people. Environmental education seemed like a viable option that would keep me close to wildlife biology.

Before pursuing another degree or certificate, I wanted to see if education was a good fit. There



weren't any opportunities available in my area, so I opted for a position with a local elementary school working as an educator in its after-school program. I tutored elementary-age kids in a variety of subjects, and sometimes, I could conduct wildlife programs for them. Meanwhile, I kept working nights at the restaurant to make ends meet. I gave this a shot for a couple years, but I was miserable. I knew that even in a formal environmental-based education setting, I'd still be unfulfilled.

Reconnecting

So I went back to the drawing board. I reached out to many of my former professors and other connections I had in the wildlife world, and I started applying for seasonal positions again. I finally found a professor with an upcoming seasonal research position who was willing to give me a shot. This time, I started looking for the next job as soon as possible. I continued to leverage connections between fieldwork until I found my next opportunity. A former coworker had a friend who knew a colleague looking for a temporary biologist. As I now know, a friend of a friend is a very common way to get a job in this field.

In 2019, I became the assistant black bear and furbearer biologist for the North Carolina Wildlife Resources Commission. It was an 11-month, temporary biologist position with decent pay. I loved the job. I had a ton of responsibilities and even more opportunities to build skills and knowledge with a variety of species.

I hadn't ever considered working with black bears (*Ursus americanus*), but I quickly fell in love with the species and the human-bear interactions aspect of the job. I still had intentions to join a grad program, but I accepted the offer to come back in 2020. COVID had hit, grad programs were closed and seasonal positions were postponed, so I stayed on with the commission. Even when the world opened back up, I continued as the temporary biologist for a few years. I loved my job, the pay was fine and I was able to build upon statewide programs like BearWise. I applied for a handful of permanent positions during that time and, although I had gained enough credibility and experience to get an interview, I still didn't have success.

A dream job

Then the commission created a new position in 2023. It was for a permanent biologist, managing human-wildlife interactions for the county I lived in and coordinating the statewide BearWise



Courtesy Ashley Hobbs

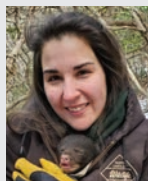
program. It was my dream job and in the realm of my original career goals in undergrad. I applied and prepared for weeks for the interview. I got a call from the hiring committee a few weeks later offering me the position.

▲ For Ashley Hobbs, coordinating North Carolina's BearWise program has been a dream job, but it came after some unexpected twists and turns.

The sense of relief was overwhelming. The job offered benefits, a pension and most important, stability. I didn't take the path of least resistance to this position, and I still haven't made it to grad school, but I wonder where I would be if I had given up completely.

Looking back, I wish mentors had told me how difficult the path to a permanent biologist position can be. I think when dealing with young people, we try not to dampen their enthusiasm. We show them all the possibilities for jobs in this field but tend to skip over the ups and downs of getting there.

We have lots of students coming into the field each year but not enough jobs to accommodate them all. A gap in your resume used to be a career killer. I suspect it will be more common now as early-career professionals find themselves juggling economic realities with the difficulty of pursuing the job we dream of. ■



Ashley Hobbs is special projects biologist for the North Carolina Wildlife Resources Commission.

A Life of Reinvention

SOMETIMES FOLLOWING A CAREER PATH MEANS STARTING OVER—AND OVER—AGAIN

By Cheryl A. Clark



Credit: Cheryl Clark

▲ Cheryl Clark's work as a zookeeper gave her experience working with animals—and a valuable moment of clarity.

Sometimes our purpose in life becomes clear in the most unexpected ways. I was 26 years old and working as a zookeeper when I had a life-changing revelation. I had started my work routine as usual, feeding animals and cleaning enclosures. I began in the rhino exhibit, shoveling a massive communal dung pile into a trash can secured to a dolly. As I pulled the dolly backward, I slipped and fell. The dolly came crashing down, spilling its entire contents of dung on top of me and pinning me beneath it.

As I lay there, looking up at the sky, I had a moment of clarity. I was not happy with where I was in my life, and I needed to make a change—quickly. After cleaning myself up, I marched to the head zookeeper's office to let him know. Instead of showing me the door, he offered me a job in rhino conservation, monitoring the behavior of the same rhinos whose droppings had buried me earlier. No matter what barriers life presents, I learned, resiliency is key to staying true to myself.

Although my wildlife career started over 29 years ago, my passion for nature began much earlier. Exploring my family's 40-acre farm in Michigan, camping, canoeing and fishing all contributed to nurturing my childhood curiosity about the natural world. As I grew older, I became increasingly aware of my insatiable desire to immerse myself in nature, exploring different landscapes and studying the animals that inhabit them.

If I wanted to satisfy this thirst for knowledge, I knew that I needed to chart my own course. That was especially true as a Midwestern girl who dreamed of working with marine mammals. I did not have much in the way of resources—just my mother's meager teacher's salary, a small scholarship and a part-time job—but I was determined to earn a degree in biology.

I knew that hands-on experience would be essential to complement my studies. I worked with a professor who was studying the larval development of wood frogs (*Lithobates sylvaticus*) and attended a four-week research-based summer course in Mexico on marine mammal conservation. These immersive experiences helped me appreciate the significance of environmental conservation and fieldwork, which further intensified my drive to work with marine mammals.

Finding purpose in fieldwork

After earning my bachelor's degree, I worked in various positions in the marine mammal industry. I trained dolphins and sea lions in Mississippi, and I worked as an education coordinator for a marine mammal stranding network in Texas. These jobs helped me grow professionally and connected me with exceptional people, but I craved a more intellectually stimulating challenge.

I decided to move to Alaska and enroll in graduate school. I admit, I was a little nervous. It had been seven years since I sat in a classroom. But it turned out to be the best career move I could have made. My field research project on harbor seals (*Phoca*



vitulina) in Quebec, Canada, gave me valuable hands-on experience. I also volunteered on fellow graduate students' field research projects in Alaska and assisted with the state's marine mammal program—work that eventually led to a position as a wildlife biologist at the Alaska Department of Fish and Game's Steller sea lion (*Eumetopias jubatus*) program.

The work was deeply meaningful, and I felt a strong sense of belonging among like-minded people who shared my dedication to protecting the environment and preserving wildlife. I enjoyed working closely with animals in their natural habitats, coordinating field research trips, collaborating with local and federal agencies and maintaining effective communication among biologists. I felt like I was living my dream job, setting out for weeks at a time for research trips on chartered vessels and remote islands.

I also became a wife and mother. After taking three months off for family leave, I returned to work while my husband stayed home with our son and pursued his own graduate degree. As a working mother, I often felt torn between my responsibilities at work and my desire to be present for my child's milestones and needs. I worried about missing important moments with my son while in the office, and about neglecting my professional duties while at home.

It was difficult to adapt to this emotional pain and stress as part of life. Working with wildlife, though, gave me a sense of peace and purpose that helped alleviate the tension. People might have seen my focus on fieldwork as selfish, but it was a source of comfort and belonging for me. Those cherished experiences were only possible with the support of my husband and extended family, who understood the importance of my career and helped with childcare.

Time for reinvention

My life took an unexpected turn when we moved back to Texas for my husband to pursue his career and be closer to family. It was hard to leave my dream job and become a stay-at-home mom. My husband and I view our marriage as a partnership, and we support each other's goals. But it was tough to come to terms with giving up my own career aspirations. The day I resigned was one of the hardest days of my life. Changing my role from a working mom to a stay-at-home mom was a significant transition. I had no idea how it would play out, but I embraced this new chapter in my life. I learned that with great sacrifice, in time, comes great reward.



Credit: Alaska Department of Fish and Game NOAA Fisheries Permit #358-1888

Moving to Galveston gave our family a fresh start, but three weeks later, a hurricane hit the island, flooding our home and destroying most of our belongings. The hurricane also put an end to my husband's job—the reason we came to Texas in the first place. We were now without a home and without a job.

Determined to be resilient, we reinvented ourselves as chicken farmers. We joined the family farm in central Texas, had a second son, built a small business and reflected on what really mattered in this new chapter of our lives—nurturing our growing family. Daily walks around the pastures fulfilled my need to connect with nature and allowed me to teach our boys about creatures big

▲ Cheryl Clark and colleagues perform brand-resight surveys of Steller sea lions off Lowrie Island in southeastern Alaska.

▼ Just three weeks after crossing the country from Alaska to Galveston, Texas, Hurricane Ike devastated the island. Cheryl Clark and her husband lost most of their possessions and the job they moved for.



Credit: Skip Clark



Credit: Cheryl Clark

▲ In Texas, Cheryl Clark and her family reinvented themselves as chicken farmers.

and small, the natural environment, animal care and the importance of the great outdoors—just as I learned as a young child. Little did they know I was giving them the gift of observation and appreciating the world around them. They still get thrilled, at ages 13 and 16, when they identify a new bird, lizard or flower as we camp, hike, fish and explore the great outdoors.



Credit: Michelle Rivard/Parks Canada DFO Permit #SINP-2020-37578

► Cheryl Clark joined biologists to conduct research during the winter breeding season for the over 400,000 grey seals on Sable Island in Nova Scotia.

Unexpected changes

More changes awaited us. Focused on our family's financial wellbeing, we moved to West Virginia while my husband enrolled in graduate school. I raised our two young boys while he endured two years of intense training, often leaving for weeks at a time to complete hospital rotations for his pathologist's assistant program. Raising two young boys during this time presented great challenges alone, however we all persevered and after graduation, we returned to Texas to be closer to our extended family once again.

It was now time for me to focus on my own career. I hoped to find a job that aligned with my wildlife qualifications and offered me enough flexibility to be available for my boys, but central Texas offered few options. I ended up a substitute librarian at our boys' elementary school.

Life abruptly changed again. My mother had a terrible accident and had to move in with us to recuperate. I found myself sandwiched between caring for my mother and for my children. It was a challenging time, and I struggled to find a way to balance everything while yet again putting my career ambitions on hold.

After my mother returned to her home, I accepted a part-time teaching position at the same elementary school. I put all my energy into the job, but it never gave me the sense of fulfillment or belonging that my wildlife work in Alaska had. A year later, a longtime friend and mentor invited me to attend a Celebration of Women in Conservation event hosted by the Texas Parks and Wildlife Department. Mingling with wildlife biologists, technicians and conservation managers, I immediately felt a sense of belonging that I thought I had lost.

Back to the field

With the boys now old enough, I had a renewed eagerness to return to the wildlife field. I resigned from my teaching job and applied for a position at the TPWD. Unfortunately, I did not get the job. Nothing seemed to pan out. Even volunteering at a national wildlife refuge was unrealistic. The cost of commuting was just too much to be worthwhile.

Then a job offer came out of nowhere. My former graduate advisor was transitioning to a new position at Texas Tech University and needed someone with my background. It was too good to pass up. I could work remotely and start part-time, letting me



balance family responsibilities while utilizing my hard-earned skills in a profession I loved.

A year later, I was able to put my skills to the test. An opportunity arose through colleagues at Fisheries and Oceans Canada, and I found myself back in Canada on Sable Island, Nova Scotia, performing field research on grey seals (*Halichoerus grypus*). It had been 13 years since my last data collection, and I was nervous about my long absence from fieldwork. Working with young researchers and some who never left the profession, I quickly felt like I was an integral member of the team. I had animal handling skills, outdoor capabilities, observational skills and a willingness to lend a hand.

Fieldwork was still my place of solace, I realized. The next year, despite recovering from a broken hip and other hurdles that life sent, I joined the grey seal program for a second field season. It was only possible thanks to the unwavering support of my loving husband and teenage boys. They encouraged my return to the work that makes me happiest and even stepped up to take on more household responsibilities. I consider myself incredibly lucky to have them by my side. I also feel fortunate to have crossed paths with

incredible individuals in the wildlife community and will forever appreciate their support and assistance, even when I did not know how much I needed it.

Unexpected rewards

I hope sharing my career journey motivates aspiring wildlife professionals to establish personal and professional networks, acquire expertise, stay authentic and have confidence in your ability to be effective in conservation. For those who can relate to gap years from wildlife work, I encourage you to explore organizations and events that ignite your enthusiasm and reignite your true passions.

As I look to the future, I still feel eager to embrace new wildlife endeavors, whatever they may entail. Although I faced obstacles when attempting to reenter the incredible field of wildlife conservation, I recognized the significance of being receptive, connecting with my longstanding colleagues and discovering fresh opportunities. Resiliency has always allowed me to forge ahead in the face of adversity.

By keeping an open mind to novel experiences while remaining authentic to myself, life has rewarded me in unexpected ways. ■



Credit: Laura Atkins-Hoosier

TWS MEMBER Cheryl A. Clark, MS, is a freelance wildlife biologist.

HOLOHIL

YOUR MOST TRUSTED WILDLIFE TRACKING SOLUTIONS



Responsive, comprehensive assistance to meet your specific tracking needs.

www.holohil.com info@holohil.com

Staying Honest and True

FOR A PERSON OF COLOR, RAISED IN APPALACHIA, THE PATH TO BECOMING A WILDLIFE PROFESSIONAL CAN BE A WINDING ONE

By Jesse L. De La Cruz

For a budding naturalist, growing up in the Appalachian Mountains was a gift. Like other kids of the 1990s, I grew up watching nature documentaries, learning about faraway places and exotic animals from celebrity conservationists of the era. But as a latchkey kid raised in a low-income, single-parent household in rural West Virginia, I also had a lot of unsupervised time roaming the surrounding forests and streams. Animal viewing was part of my life.

Like many in Appalachia, I was introduced to hunting and fishing by family and friends, and that, more than anything, honed my early naturalist skillset. As I explored the forest, I would wonder about the things I saw. What kind of tree is this? Where do turkeys roost? Would a deer eat this plant?

My upbringing had its challenges. A transplant from Southern California to my mother's hometown of Lumberport, I was born to interracial parents, and

I did not look like the other kids in my racially homogeneous town. From grade school through college, my peers constantly reminded me of my background. But I remain a proud West Virginian. It was my home for 30 years. I met my wife there. My family and friends still reside there. In some ways, I think I am a double minority in academia—a person of color and a person from Appalachia.

First to college

I was fortunate in high school to be able to take a forestry class. It was there that I received my first lessons in dendrology and forest mensuration. It was also where I discovered that these skills were part of an entire profession. People actually studied these subjects in college!

Thanks to my mother's strong will, it was a foregone conclusion that I would be the first in my family to attend college, despite our lack of financial resources. Through my passion for the outdoors; the influence of teachers, mentors and family members; and because of the state's forward-thinking Promise scholarship, which at the time covered 100% of in-state tuition, I was off to major in forestry and natural resources at Glenville State University.

▼ Jesse De La Cruz's early work with endangered bats led to his first peer-reviewed papers.



Credit: Bobby Clontz



Glennville State was in another small town an hour or so away. Its small class sizes meant that I received one-on-one guidance, while its small-town living provided affordability. I was driven to be a good student, in part by fear of a continued life of social and economic immobility. It was a difficult time to be starting out, though. I tried to secure an internship with the forest industry, but it was crippled by the housing crisis resulting from the Great Recession.

I soon discovered there were other paths to a career in natural resources. My success at Glennville State helped me secure a research assistant role on a forest ecology project funded by NASA. My poster based on that research won the West Virginia Academy of Science's Best Student Presentation, marking a turning point in my academic career. Capping off my undergraduate experience as an intern with the U.S. Forest Service's nearby Fernow Experimental Forest, I graduated at the top of my forestry class.

Driven to succeed

If I wanted to continue working in research, though, I knew I would need to pursue graduate school. I was offered graduate positions in forestry in the Southeast, but I lacked the confidence to tackle an unfamiliar ecosystem. Perhaps more importantly, I started to recognize my passion was wildlife.

West Virginia University's Wildlife and Fisheries Resources program was open to accepting me, but I lacked the funding to make it work. That was where the Southern Regional Education Board came in. The organization works with states to improve public education at every level, and it had a goal of securing more people of color as faculty in higher education. The SREB provided the initial funding I needed to pursue graduate studies.

I initially planned to pursue a doctorate, but my plans soon changed. Overconfident from my undergraduate success, I struggled to juggle my class load and the research requirements of a PhD student. On top of that, I had to shoulder the burden of securing the funding to continue my studies. My transition from forestry to wildlife left me behind the other students in terms of foundational knowledge and field experience, and I had to take undergraduate courses to catch up. Putting my PhD plans on hold, I ended up defending a master's thesis on wild turkey (*Meleagris gallopavo*) habitat use. The experience was hard, but I view my time at WVU as a valuable lesson



Courtesy Jesse De La Cruz

◀ Growing up in West Virginia, Jesse De La Cruz was introduced to hunting and fishing at an early age.

in more than just wildlife research. It taught me how to overcome challenges with dogged perseverance.

It also led to my first job. While at WVU, I was fortunate to have met graduate students who had founded a local environmental consulting firm. Due to my background in forestry, I was assigned the firm's habitat assessment and conservation plans for endangered bats and consultation between our clientele and the U.S. Fish and Wildlife Service. My work at the firm led me to my first peer-reviewed papers, rekindling my interest in academia.

In some circles, private environmental consulting is viewed suspiciously, but I think that is unfair. These jobs provide important opportunities for wildlifers, and they are critical for developers to comply with the requirements of legislation such as the Clean Water Act and Endangered Species Act.

Back to research

Private practice provided me, for the first time in my life, financial stability and a gratifying career, but my interest in research had not waned. During my tenure in consulting, I discovered how important it was to remain engaged in the profession—to attend professional meetings, participate in working



Credit: Bobby Clontz

▲ Jesse De La Cruz's work has taken him throughout the eastern U.S. conducting research on rare, threatened and endangered bats.

groups and publish my work. I began presenting our research at both the midwestern and northeastern bat working groups.

At a 2014 meeting of the Northeastern Bat Working Group, I met the man who would become my current mentor and academic advisor. Mark Ford leads the U.S. Geological Survey Cooperative Fish and Wildlife Research Unit at Virginia Tech, and his lab's research on bats' Appalachian habitats greatly influenced my early work. He urged our team to publish our findings. Those publications aided me in securing a research faculty position at Virginia Tech's Conservation Management Institute and being accepted into the school's interdisciplinary Geospatial Environmental Analysis PhD program concentrating in Fish and Wildlife Conservation.

Now, the timing is right. It was a difficult lesson for me, but I strongly advise prospective graduate students to soberly evaluate their abilities and motivations, identify well-funded programs and critically assess mentorship qualities prior to committing to graduate school.

I have now worked throughout the East—from North Carolina to Maine—with numerous state and federal agencies, NGOs and other academic institutions to conduct biological surveys, analyze data, publish original works and establish conservation practices for rare, threatened and endangered bats—including much work in my home state of West Virginia.

Importantly, and thanks in no small part to participation in both local and national meetings of The Wildlife Society, I have also greatly improved as a scientific communicator to a variety of audiences. The unparalleled mentorship, resources and sense of community made available to me at Virginia Tech have made me the scientist I am today, and for that I am eternally grateful.

Staying true

My journey is not over. As a research faculty member with PhD completion in sight, I have tried my best to fulfill the vision of the SREB program to increase the representation of people of color in higher education. It took hard work, but I did not do it alone. I have to constantly acknowledge all those along the way—from Lincoln High to Virginia Tech—who provided opportunities for my success.

My professional future is still unwritten. I have yet to decide if I will return to consulting, pursue an agency career or remain in academia. But I am confident my journey has prepared me for my next direction. I know I will encounter additional social, cultural and institutional obstacles, but I'll continue on, and so should you.

To others from rural and economically depressed areas—particularly people of color—I encourage you to be aware that true support and understanding, mentorship and community are invariably lacking. Even if you are successful, your career may not provide financial stability or win the appreciation of your community. It can, however, be personally fulfilling and impactful.

This journey will not be easy. More importantly, it will probably be very different than that of our more affluent peers and of many of our predecessors in the field. It will be important to seek out willing and supportive partners, do the unglamorous and tedious work and understand and adapt. Most importantly, though, stay honest and true to your passions and to yourself. You, like me, will be glad you did. ■



Jesse L. De La Cruz is a research associate at Virginia Polytechnic Institute and State University's Conservation Management Institute.



Publish in the
Wildlife Society Bulletin

Now Open Access!

Publish your research in an open-access journal

Share your knowledge with the world

Support science-based management and The Wildlife Society



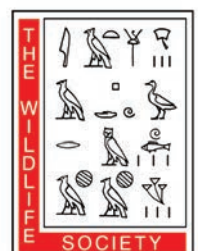
Credit: Natalie McNear

Publishing your research in the *Wildlife Society Bulletin*—a fully open-access, peer-reviewed journal—means your scientific findings can advance wildlife conservation and management by reaching a large, global audience of fellow scientists and decision makers. Plus, publishing with The Wildlife Society helps support your professional organization.

Visit wildlife.org/publications to start your submission.



Read TWS' journals with the
Wiley Online Library App.
Download from your mobile app store.



Following my Passion

A LOVE OF WATERFOWL LED TO A DREAM CAREER

By Karla Guyn

From a young age, I knew I was meant to be a biologist. My love for nature and the environment was something that had always been a part of me. I thought I knew the pathway that would take me there, but as I began my university journey, I quickly became disillusioned. The traditional academic route just didn't seem to fit me, and I found myself struggling to find my place.

And so, I took a chance and transferred to a technical college. It was there that I finally found my home. The mix of theory and hands-on training rebuilt my self-confidence. I fit right in, and my passion for biology began to flourish.



Credit: Jim Devries

▲ Karla Guyn holds a mallard duckling at the Delta Waterfowl Research Station in Delta, Manitoba, in 1988.

My education at Lethbridge College in Alberta opened the door for my first summer field jobs. Those first few summer wildlife jobs paid minimum wage, but the experiences they gave me were invaluable. They reestablished my confidence and inspired me to pursue my dream of finishing my degree.

At the time, Canada had very few universities offering undergraduate degrees in wildlife. So, I transferred to the University of Montana which had (and still has!) a wonderful wildlife program. I loved my time there, and although my advisors suggested I go on to graduate school, I wasn't quite ready. But I did learn of a research station in Manitoba that was hiring summer students. I saw this as an opportunity to work in a new province, conduct research and explore a new ecosystem. Little did I know that this decision would be one of the most pivotal moments in my life.

During my three seasons in Manitoba, I not only fell in love with wetlands and waterfowl—I also met my future husband. During my time at the research station, I was given the opportunity to work on a number of different research projects and interact with graduate students and their academic advisors. It was that experience that convinced me to pursue graduate school at the University of Saskatchewan.

I completed my master's program and went straight into a PhD studying pintail (*Anas acuta*) breeding ecology. Funded by Ducks Unlimited Canada, the pintail project marked the beginning of a long and meaningful relationship that shaped much of my career. When I was ready to start writing my dissertation, I moved from Saskatoon to Manitoba to finally live with my husband. Because DUC had funded my research, I was given a cubicle in the office to work in. One day, I was called upstairs to talk to one of the executives. He offered me a part-time conservation planning job, and that was how I landed my first real job with DUC. It was completely unexpected, but it was the perfect fit for me.



Taking the chance

For much of my career at DUC, I worked at national or regional levels on conservation planning. It was during that time I was presented with opportunities to lead working groups, chair business planning and strategy groups and to speak at national events. Although I often had self-doubt about whether I was up for these tasks, I took the chance. It was this risk taking (no matter how scary it was at the time) that prepared me for what was to come.

DUC, like many conservation organizations, has gone through some tough financial times. It was during one of these times that many of the senior staff took early retirement. As a result, the national director of conservation position became open—not something I had anticipated. I decided that I was far enough along in my career that I would apply, and if I was selected, I would end my career in this position.

I was successful. The position put me on the senior leadership team and had me guiding all DUC conservation activities across Canada. The job was literally all consuming, with extensive travel and often 14-hour workdays. But I loved what I was doing and saw firsthand the conservation impact the work was having. I enjoyed working with the senior leadership team and quickly learned about human relations, information technology, finances, fundraising, communications and board governance.

Two years in, I was enjoying the job and just starting to feel comfortable in it when the CEO announced his retirement. I had no interest in the position. I had my dream job and I was going to end my career here. But others thought differently.

The CEO encouraged me to apply. I said no. He encouraged me again. I said no. Then one day there was a knock on my office door and the president and chair of the board walked in. They asked me to reconsider. They thought I was the right person and they wanted me to apply.

I knew that if I took the job, I would be busier than ever and would have to make compromises in my personal life. So, I made a deal with them. If successful, I would only stay for five years. Then I would retire. Their arm twisting worked, and I applied. And yes, I was the successful candidate.



Credit: Ducks Unlimited Canada

My five years as CEO ended in October 2021. I kept my word and I retired. It was a challenging—and sometimes frustrating—position, but it was incredibly rewarding. I am honored to have been given the opportunity to lead such a wonderful organization. I don't regret taking that chance for one minute.

My career with DUC ended in a position I never imagined when I was a graduate student chasing pintails across the Alberta prairies.

Looking back

As I reflect back on my nearly 40-year career, this is the advice I would give to someone starting out:

Choose a career that you are passionate about. Life is way too short to do something that you are not passionate about and brings meaning to you.

Learn continuously. Continuous learning can help you to stay curious, engaged and motivated, and it can open new opportunities in your career.

▲ Karla Guyn speaks at the public announcement of the Ducks Unlimited Canada endowed chair in wetland and waterfowl conservation at the University of Saskatchewan in 2019.



Credit: Jim Devries

▲ Karla Guyn poses at the Ducks Unlimited Canada Byskal Project near Erickson, Manitoba, in 2021, the day after her retirement.

Network. Building a strong professional network can be a source of collaboration and support, help you stay informed and engaged in your field and allow you to connect with mentors and advisors.

Develop good communication skills. Having strong written and verbal communication skills is critical. Being able to convey your ideas clearly and with conviction is essential.

Build strong relationships. Relationships with your colleagues, managers and mentors will provide support, facilitate personal growth and help create a positive workplace culture.

Be proactive. Take initiative and be proactive in your career. Look for opportunities to take on new projects, learn new skills, and contribute to the organization. This will not go unnoticed.

Embrace feedback. Feedback is essential to growth and development. Look for opportunities to seek feedback and use it constructively.

Be patient. Success in your career takes time and effort and more than likely will not be a straightforward path.

Looking back on my career in wildlife, I can honestly say that I wouldn't change a single thing.

Every failure, every setback, every obstacle was a necessary step in my journey. I am grateful for those experiences because they gave me the chance to learn, grow, and become the person and professional I am today.

But I know that my success was not achieved alone. The people who believed in me, challenged me and inspired me made all the difference.

To anyone starting out on their own career journey, my advice is simple: listen to those people! They will push you to be your best self, and the rewards will be greater than anything you ever imagined. A career in wildlife was truly everything and more than I could have ever hoped for. I feel incredibly lucky to have been a part of it, and I know that the lessons I learned and the connections I made will stay with me for a lifetime. ■



Karla Guyn, PhD, is former chief executive officer of Ducks Unlimited Canada and a TWS Fellow.



The First Step Down Many Different Paths

A WILDLIFE DEGREE IS JUST THE START—THE END IS UP TO YOU

By Michael S. Fishman

Last June, six of my college friends and I returned to our campus in central New York to celebrate our 35th class reunion.

Paul, Linda, Lou, Kim, Deanna, Susan and I all focused our studies on wildlife, and as we prepared for the class of 1988 reunion, we started talking about the different directions our lives have taken since we graduated. We started from a variety of backgrounds. Some of us were the first in our families to attend college. Some of us came to wildlife studies from other majors. But we all shared a passion for wildlife and the natural world.

After graduation, our paths diverged. Some of us ended up in traditional sectors of the wildlife field—working in academia, natural resource agencies, nonprofits, consulting firms or environmental education. Others took some very different paths. Yet we all maintained connections to our wildlife roots.

The wildlife field has changed a lot since we graduated, and our college and life experiences don't necessarily reflect those of many aspiring professionals today. Still, many of the paths available to graduates with a wildlife or biology degree remain unchanged, and much of what we learned remains applicable to students today as they embark on their own careers in wildlife.

Undergraduate experience

Even as undergrads, each of us worked in natural resource-related jobs, taking seasonal summer positions or work-study jobs at school to help with tuition costs. Paul worked with a grad student trapping raccoons (*Procyon lotor*) on a rabies research project. That led to another trapping job, this time with woodchucks (*Marmota monax*), at Cornell Veterinary College.

► Author Michael Fishman is joined by colleagues at graduation and at their 35th reunion. Above, left to right: Paul, Susan, Michael, Linda, Lou. Below, left to right: Susan, Kim, Lou, Michael, Linda, Paul.



Courtesy Michael S. Fishman



Courtesy Michael S. Fishman



Kim landed a summer job monitoring common terns (*Sterna hirundo*) on Oneida Lake, where she observed some of the earliest signs of double-crested cormorants (*Nannopterum auritum*) expanding their range inland. Those observations yielded her first peer-reviewed publication and impressed her college advisor, who hired her for a research project the summer after graduation.

Lou worked in a campus research lab, maintaining captive voles for his advisor. During summers, he worked at a nearby state game farm raising pheasants (*Phasianus colchicus*) for hunting.

Deanna's start was in a work-study position banding birds in the Mississippi Flyway. The experience inspired her to change her major to biology and transfer to a new school, where she found positions assisting in research on voles and fossil fish.

▼ As an undergraduate, Kim got a summer job on Oneida Lake in New York. That work led to her first peer-reviewed publication and a research project.

Susan worked as a camp counselor for Maine Audubon in the summer of her sophomore year. She returned the following summer as a field biologist to walk Maine's coast banding and monitoring beach-nesting birds.

Linda had a summer job at Rensselaer Polytechnic Institute's Freshwater Institute on Lake George, conducting water quality sampling—she even got to water ski to work! At school, she became so interested in working on naked mole-rats (*Heterocephalus glaber*), she asked about openings four times before the professor hired her.

My first wildlife job was entering colonial waterbird survey data onto a desktop computer (relatively new equipment back then) at the Cornell Lab of Ornithology. It wasn't exciting, but I made contacts and learned about managing data. My connections at the lab helped me get a job there the following summer monitoring colonial waterbirds on Long Island. Getting paid to walk on the beach and count birds definitely made up for all the dull data entry work!

Today's undergrads have similar opportunities, which can provide excellent work experience and valuable contacts.

Beyond the bachelor's degree

As fledgling wildlifers, our group of friends flew in different directions after graduation, both professionally



Credit: Daniel Piraino



and geographically. We mostly took temporary gigs to get started—the sort of positions young professionals often find themselves starting in today.

Paul stayed at the veterinary research lab. Lou joined him for a while before going off to grad school in Illinois. Kim worked briefly on another project with her advisor, then joined an environmental consulting firm before moving to San Francisco to monitor waterfowl.

Susan worked on a Maine seabird project, then moved to Seattle, where she diverted to medical research. Eventually, she got back to her roots in Montana, where she collected trail use data for a software developer. Linda moved to England, walking dogs and running a cleaning business until she found a position at an environmental policy think tank and later at an environmental consulting firm. Deanna moved back to Wisconsin and took a job at a pharmaceutical lab doing biochemistry work.

I moved to Oregon to study northern spotted owls (*Strix occidentalis caurina*) for the cooperative wildlife research unit at Oregon State University, then back to New York to work as a wetland technician for the state environmental agency.

Most of us went on to pursue graduate degrees, some earlier than others. Susan, Kim, Lou and Linda all pursued master's degrees—and Deanna, a doctorate—within 10 years of graduation. I was mid-career when I got my master's degree, as was Lou when he got his PhD. In retrospect both of us would have done it sooner, but that isn't always an option. Pursuing an advanced degree while trying to hold down a full-time job and raise a family required discipline and focus. We did it, but it wasn't easy. Lou finished his doctorate in just four years. I took 11 years to finish my thesis. In the end, though, we all felt we benefited from the experience we gained.

Taking different paths

All of our paths led to work related to the environment. For most—but not all—of us, that meant traditional wildlife career tracks.

Lou's career has been largely agency based. He became a deer research biologist for the Indiana Department of Natural Resources, then a regional wildlife manager for the Utah Division of Wildlife Resources, then big game coordinator for the



Credit: Chris McCafferty/Oregon State University

Minnesota DNR, where he became more involved in policy, regulation and disease management. These efforts focused on the human dimensions side of the field, an aspect he taught to aspiring professionals as an adjunct professor.

▲ After graduation, Michael moved to Oregon to study northern spotted owls.

Kim has devoted most of her career to just one agency, working with wetlands and habitat restoration at the USDA Natural Resources Conservation Service. Starting as an area biologist in the late 1990s, she rose through the ranks. In her current role as assistant state conservationist for programs, she oversees the implementation of NRCS conservation programs in New York, using her technical expertise to guide funding opportunities and program implementation.

Susan went on a nonprofit path. After a series of short-term agency and industry jobs that required early morning point counts and mountain biking back roads in grizzly country, she landed at Maine Audubon. There, she spent 20 years as a wildlife biologist, working with volunteer citizen scientists who collected loon, owl and amphibian monitoring data. She also discovered a passion for policy work around renewable energy, wildlife health and bird-friendly forestry. She recently moved to become the executive director at the nonprofit Maine Lakes, where she still brings her love of wildlife to lake-centric projects and programming.

Deanna pursued a career in academia. After completing her doctorate, she discovered she enjoyed



Credit: Chris Bowman

▲ A white-tailed deer (*Odocoileus virginianus*) looks out from a field in Indiana. Lou began his career with state agencies as a deer research biologist for the Indiana Department of Natural Resources.

teaching. She taught at Lawrence University as a postdoc for two years before moving to Carthage College as a teaching professor. The management skills she learned at the pharmaceutical lab were noticed, and she rose to dean of professional studies, then to dean of natural and social sciences.

My path led in a number of different directions. I started out as a university research assistant, shifted to a state agency as a wildlife and wetlands technician, worked for a few years for a nonprofit in Washington, D.C., and wrote habitat management plans for major corporations before settling into environmental consulting. As a consultant, I still get to do wildlife surveys and wetland delineations, but I also get to assess environmental impacts of land use and help ensure development projects are built sustainably.

Linda and Paul took less traveled roads. Linda worked with numerous environmental consultants doing sustainability and environmental health and safety work. Interested in sustainable building design, she became a licensed architect and works in green building design. While she's not working with wildlife, she still feels her career is part of larger conservation efforts.

Paul describes his career as eclectic by necessity, and he has always insisted that work support his creativity, not interfere with it. While working at the veterinary research lab, he developed outdoor educational programs for the Cornell Cooperative Extension and volunteered as a sportfishing instructor. After 10 years at the lab, Paul and his fiancé taught school in China for two years before settling

in Colorado. There, Paul started an environmental education program for the Boulder Valley School District and launched a field archery club and camp.

Over the years, he has sold hand-carved stone teapots that he imported from China, worked as a freelance writer and took a job investigating unregulated financiers and hedge fund managers, where his wildlife experience working with large datasets paid off. After a two-year stint in the Philippines, he returned to Colorado to work as a wetland consultant and launched a fishing channel on YouTube. Paul says he's retired now, but it's hard to tell.

Lessons learned

Our collective 200-plus career years have taught us some valuable lessons. Below are some that we thought were particularly important.

Start early. Look for opportunities to work in the field as an undergrad. It will give you a taste for work you may do as a professional, help you build your professional network, show your commitment to the field and form the basis of your professional resume. It can also lead to opportunities after graduation.

Work your network. Professors, advisors, friends and classmates are your earliest network. Most recent graduates look for jobs on job boards and online forums, but far more job opportunities are never advertised. After our first few jobs, none of us responded to ads anymore. We learned about opportunities by reaching out to our networks.

Persistence pays. If you really want a particular job but aren't selected, don't give up. Ask again later (but don't be a pest). You can also look for similar opportunities elsewhere or gain experience at another job and try again.

Discover what you enjoy. The old saw, "If you find a job doing what you love, you'll never work a day in your life" is true. Keep in mind that what you enjoy may be called by many names, so if a job sounds like it might be fun, go for it!

Take the job you find. If you see an opportunity, but it isn't exactly what you are looking for, take it anyway. Many jobs lead to opportunities and learning experiences that will serve you later. A job you didn't know much about can become your new passion. If it really isn't your cup of tea, you can always move on.



Don't be afraid of dirty work. Early career wildlife jobs are rarely glamorous, and many are just plain dirty work. Several of us had jobs literally shoveling poop. Watching waterbirds on a beach all summer may sound like a dream job, but remember that a tern's number one defense is "number two!"

Publish. Writing is a vitally important skill, and publication demonstrates that skill. Sharing scientific findings in peer-reviewed journals or sharing ideas in lay publications is a great way to establish your reputation. This can be daunting for undergraduates, but professors and advisors can help you on your way.

Hone your people skills. Most wildlife students think they will spend their careers working with exotic wildlife, but many of us spend far more time working with people *about* wildlife issues. The human dimension side of wildlife work is important and continues to grow.

Skills are transferrable. Just because your degree is in wildlife doesn't mean you have to work

in wildlife. The skills and knowledge you gain in college can be used in lots of fields. Keeping an open mind about opportunities makes you that much more employable.

Make your own opportunities. If you aren't finding the opportunities you want, try creating your own. When Linda was working for a consulting firm, she saw the growing demand for green building design and persuaded her boss to let her change her role in the company. When I was threatened with a furlough from a big consulting firm during COVID, I quit to join my wife in starting our own company. The bottom line: Do what you have to do in order to do the work you want to do. ■



Michael S. Fishman, MS, CWB®, is co-founder and principal wildlife biologist, wetland scientist and regulatory specialist at Edgewood Environmental Consulting, LLC. He is a member of TWS' Renewable Energy Working Group, an instructor for the TWS Northeast Section Field Course at Castleton University and a TWS Fellow.

Wildlife Control Supplies

► Experience ► Knowledge ► Products for Professionals ► "One-Stop" Shopping

We know Wildlife!
Supplying Professionals For Over 20 Years



Full Line of Wildlife Capture and Handling Equipment

www.ShopWCS.com



Call toll-free 860-844-0101

Some Challenges Shouldn't be Part of the Job

WHAT SHOULD EARLY-CAREER PROFESSIONALS CONSIDER WHEN APPLYING FOR SEASONAL WORK?

By Olivia Anderson



“If you see someone, just hide.”

Courtesy Olivia Anderson

▲ Olivia Anderson conducts a bird count on Motuihe Island, New Zealand. Field work offers biologists a chance to immerse themselves in nature, but it can also involve unfair demands.

That was the “joke” that my supervisor told us that Monday morning. We were in a rural part of a western state, working as seasonal employees surveying endangered wildlife for a state agency when we ended up on private property. Any organization needs permission from the landowner to do this type of work. Ours was no exception, and we did not have it. In this part of the country, where many landowners take their property rights with deadly seriousness, it was particularly alarming.

My face turned ghost white, and as I glanced at my coworkers, I saw they were petrified, too. This was not a joke to us. Telling us to trespass was not just encouraging us to break the law. It may have

put our lives at risk. I spent the day hiding behind trees, hardly focusing on my work. With every crack of a twig, I looked around to see if someone was watching.

I wish I had had the confidence to speak up and tell my supervisor, “I am not doing this,” but I was reluctant. I did not want to jeopardize a reference for future employment opportunities.

Even though I am still early in my career, I understand the rigors—and the joys—that come with fieldwork. Toiling in the dewy bogs of Northern Minnesota, maneuvering through the dense forests of New England, traversing the remote hills of



northern Idaho, I have interacted with wildlife that I only dreamed of as a little girl. I feel fortunate to get paid to spend my time studying nature's many wonders, learning so much along the way. Through this work, I have met talented, enthusiastic, inspiring conservationists.

Yet, I have also faced difficulties and safety concerns working in this field that should not be part of the job. And while I do not regret the sacrifices I have made to move around the United States for work—often low-paying, “skills-gaining” jobs—I do have concerns about the effects that jobs like these may have on who gets to become a wildlife professional. Taking these jobs, I realize, was only possible due to my privilege, access to education and middle-class upbringing.

Important work

With the International Union for Conservation of Nature's [Red List](#) growing every day—some 8 million plants and animals are threatened with extinction—there is a lot of critical biodiversity conservation work to be done around the world. Fieldwork is a big part of that, and a great deal of fieldwork relies on young people like myself—a 24-year-old white American woman with a BS, on track for a master's degree.

Determined to get both feet firmly planted inside the conservation door, I have spent six years gathering field experience by accepting unpaid internships, working for stipends, taking jobs that offered no housing and enduring unsafe working conditions—all amid a rising cost of living. While I have been able to shoulder these conditions, it raises questions for the profession. Why should we encourage young professionals to follow their hearts and work in conservation?

These barriers and safety concerns disproportionately impact people of color. The conservation field has made efforts to increase workforce diversity, but there is still a long way to go. Despite being the most impacted by environmental problems and the impacts of climate change, people of color are the least represented in the environmental movement and in positions of power where they could effect change ([Morello-Frosch et al. 2023](#)). The organization [Green 2.0](#), a group that describes itself as “watchdogs for inequality in the environmental sector,” has documented the disparities within the field. Its annual [report card](#) has shown that in U.S.



Credit: Olivia Anderson

environmental organizations and foundations, white staff members far outnumber other races and ethnicities.

Similar disparities exist in government agencies. In the U.S. Forest Service, diversity levels have risen since 1980, but diversity is still lacking in jobs that lead to leadership positions. White male employees remained with the Forest Service more than two years longer than BIPOC female employees ([Sachdeva et al. 2022](#)).

Throughout the conservation field, entry-level positions are often unpaid or low-paying seasonal positions that make it difficult for people to support themselves, children or other people they need to care for ([Jones et al. 2020](#)).

Despite all this, I am deeply in love with this field. I want to encourage anyone to follow their hearts and excel in a conservation career. But the choices we make can have impacts not just on ourselves but on other early-career professionals.

Here are some considerations to take into account when applying for jobs, prioritizing both safety and useful experience. (I recently accepted a position that checked off all 10 on my list below!) There are so many incredible biologists, ecologists and conservationists who are working effortlessly to change the

▲ When taking a camping field job, ask what equipment is provided and what equipment you need to provide yourself.



► Olivia Anderson examines a deer mouse while collecting data in Massachusetts. For many early-career professionals, seasonal fieldwork is the entryway to a career in conservation.



Courtesy Olivia Anderson

field; increase diversity, equity and inclusion; and treat their seasonal employees right.

Avoid taking unpaid internships.

Working towards improving diversity, equity and inclusion in the workplace—including in the conservation field—improves innovation and creativity and leads to better decision making (Batavia 2020). One of the [first steps to improving DEI](#) is paying employees fair wages for their work. The increasing focus on social justice and equity in conservation could be extremely beneficial for both ecosystems and people (Bennett 2017), but the same focus is needed in the conservation work force. You deserve to be paid. Taking unpaid internships only encourages employers to keep offering them. While the conservation field is underfunded, allowing organizations to pay technicians little to nothing threatens to make it a career path accessible only to the privileged. If a position does end up being volunteer or an unpaid internship, or if it pays only a stipend, it should provide you with connections, valuable skills, certifications and mentorships.

Make sure the pay is posted on job listing.

Not every state requires employers to disclose the pay in job notices. If the pay is not posted, ask before interviewing. It is important to know upfront how much you are being paid, and posting the pay also helps fight against the gender pay gap. If you receive pushback for asking, you may not want to work for that organization anyway.

Does the position pay overtime?

Conservation jobs are full of long, exhausting days in the field. This can be rewarding, but it places a strain on relationships and other obligations. It is not unusual to clock in for nearly 60 hours a week during summer field jobs. Overtime pay can make low-paying jobs more accessible. “Comp time,” or compensatory time off, can also make up for long hours, but some employers limit its use, even if you have put in the hours.

Make sure seasonal positions provide housing (or at least affordable rent).

In some positions, I have struggled to find short-term, affordable housing. One of my jobs was just outside Boston, where rents were over \$1,500 a month. Now I only take seasonal jobs that provide housing or affordable rent. When taking a camping field job, ask about the equipment you are provided and what equipment you need to provide yourself.

Is the housing safe?

I woke up early for work one day as my neighboring coworker lumbered out of her cabin after a poor night’s sleep. It turned out her cabin’s heater had erupted in foot-high flames. When I checked my own heater, I saw the label warned, “Do not use in confined spaces.” At a bare minimum, housing needs to be safe. It’s also good to find out if there will be Wi-Fi or a phone to call emergency services. What about a carbon monoxide detector and a fire alarm? Shared housing situations also require diligence. Living with coworkers can be a wonderful part of seasonal field work and can lead to long-lasting friendships. However, some people have experienced discrimination, inappropriate situations and even assault in seasonal housing circumstances. Unfortunately, gender-based violence in conservation field jobs is all too common (Rinkus 2018) and something agencies do not always act on (Gilpin 2021).

Check if the position provides baseline equipment.

A seasonal technician job I recently saw posted said required technicians to provide their own laptop to handle robust data—“Chrome, Dell, MacBook not capable.” That ruled me out. Buying a new laptop for a three-month, low-paying job was out of the question. Working in the field often requires additional equipment—from GPS devices to GIS software, and from boots to bear spray. The items I usually purchase are for my own safety. I worked a job that had three radios for five people in an area without



service. Bear spray acts as a “person deterrent” too. I have been approached by men with unpleasant attitudes while working alone. As a young woman in the field, this is an unfortunate reality. Many people of color working field jobs have experienced even greater risks (Viglione 2020).

Does the job provide an appropriate vehicle?

Field jobs often require travel across technical terrain. Being able to explore untrammled areas is amazing, but it can create serious wear and tear on a personal vehicle. Using your own vehicle for seasonal conservation jobs can present a costly risk. If the organization does not offer a vehicle, does it compensate you for fuel and appropriate maintenance?

Is a per diem provided for travel?

When traveling, you often take on additional expenses. Positions should supplement this with a daily stipend for these expenditures.

Does the employer post scheduled hours in advance?

Working outdoors requires flexibility, but you want to avoid being overworked and underpaid.

Being uncertain of the next day you have off is exhausting, and it poses a huge burden on people in a caregiver role. Employers should do their best to keep employees updated on schedules and schedule changes, and they should abide by the days that are scheduled as off. A healthy work/life balance is required for longevity, happiness and success at work.

Ask as many questions as you need in an interview.

I have seen many peers—some of the brightest minds in conservation I have met—drop out of the sector due to poor housing, unsafe experiences and gear expenses. By asking the right questions in an interview, you can make sure the organization prioritizes the wellbeing and safety of its seasonal employees. ■



Olivia Anderson is a wildlife technician researching small mammals with the Colorado Natural Heritage Program and a master’s student in the Human Dimensions of Natural Resources Department of Conservation Leadership program at Colorado State University.

Titley
SCIENTIFIC

Acoustic Recorders



-  Record birds & bats
-  Long battery life
-  Built-in GPS
-  Record in stereo & mono

Visit our booth at The Wildlife Society’s Annual Conference for a chance to win a Chorus!





Ranger



Chorus



On the Front Lines of Wildlife Disease

WILDLIFE REHABILITATORS PLAY IMPORTANT ROLES IN AVIAN FLU SURVEILLANCE

By Giselle Kalnins and Sherri Cox

A silent killer has been lingering in the world of wild birds and domestic poultry—one that poses a threat to other wildlife as well. A gamut of wildlife professionals has responded, but wildlife rehabilitators usually are the first to get calls from the public about sick or injured wildlife, putting them on the front lines of this latest risk.

First detected in Newfoundland in November 2021, the highly pathogenic avian influenza (HPAI) virus has killed thousands of wild birds throughout Canada this year. Wildlife rehabilitators across the country have been working tirelessly to monitor the situation and respond, following the precautions necessary for such a grave threat to wildlife health.

▼ A snowy owl is treated with a wing wrap in a rehabilitation center. With highly pathogenic avian influenza affecting a variety of wild bird species, centers like these have become critical in providing surveillance for it.

Staff and volunteers at wildlife rehabilitation facilities have spent their days in biosecurity gowns, boots and gloves to protect both themselves and wildlife while providing lifesaving care to sick, injured or orphaned wild animals. Their work has also provided important information about the outbreak and provided an important interface with the public on this critical wildlife health issue.

HPAI is a highly contagious virus that spreads from infected animals. With a near 90% mortality rate for those infected, this recent HPAI wave has been devastating to some bird populations, particularly waterfowl, raptors, sea birds and corvids. Among the hardest hit have been northern gannets (*Morus bassanus*), which have been found dead and dying in eastern Canada by the tens of thousands. In Newfoundland, that has resulted in fewer chicks hatched this year, raising concerns about population impacts.

Signs of illness

Wildlife that has contracted the virus may present with any of the following clinical signs: lethargy, incoordination, facial swelling, diarrhea, coughing, sneezing—even sudden death. Most commonly, wildlife rehabilitators observed birds showing neurological signs.

But transmission of the virus does not stop at avian species. A few months after the first cases of HPAI were reported in Canada, wildlife rehabilitators from southern Ontario and veterinarians at the National Wildlife Centre suspected a group of young red fox kits (*Vulpes vulpes*) had contracted HPAI.

Wildlife veterinarians with the National Wildlife Centre suspect that the fox kits contracted HPAI by being fed a dead or dying infected bird by their vixens. In Canada and the United States, the virus has also reached other mammals, including black bears (*Ursus americanus*), river otters (*Lontra canadensis*), striped skunks (*Mephitis mephitis*), grizzlies (*Ursus arctos*), mountain lions (*Puma concolor*) and dozens of harbor seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in New England.

Birds that appear sick are being brought by members of the public to wildlife rehabilitation facilities, where they are quarantined or euthanized if they are believed to have HPAI. Wildlife rehabilitators generally follow the Canadian Wildlife Services' recommended guidelines for handling suspected HPAI



Credit: Sherri Cox



cases in birds. Many rehabilitators also follow similar protocols for mammals—quarantine, isolation, supportive care and, in extreme cases, euthanasia.

A spreading threat

Once HPAI reached wild birds along the east coast of Canada, routine waterfowl migration spread the virus west. In Manitoba, wildlife rehabilitation centers reported foxes with blindness and seizures, likely due to HPAI. All of the mammals presented to wildlife rehabilitation facilities with suspected HPAI clinical signs were juveniles. That supports the hypothesis that transmission from avian species to mammals is occurring by way of being fed HPAI-infected carcasses by their parents.

When the public calls a wildlife rehabilitator about a sick or injured wild animal, the wildlife rehabilitator helps educate the finder in terms of next steps. Since the outbreak was first realized in Canada, wildlife rehabilitation volunteers have been trained to ask the public not to interact with sick wild birds for their own safety. If the bird or mammal is not exhibiting neurological signs, the rehabilitator may direct the finder to use personal protective equipment, like disposable gloves and masks, to safely contain the animal in a box for transport.

When rehabilitators receive wildlife that may have contracted HPAI, they follow strict protocols and quarantine practices. Many rehabilitators have set up tents for wild bird triage assessments.

Though wildlife rehabilitators have served as front-line professionals for the 2021/2022 HPAI wave, they have not been dealing with the wave on their own. Federal and provincial regulatory agencies and the Canadian Wildlife Health Cooperative have worked with them to mitigate risk and maintain healthy wild birds.

More than bird flu

HPAI is not the only disease of concern. In 2022, wildlife rehabilitators were also on alert for SARS CoV-2, which has been found in some wild animals. Rabbit hemorrhagic fever is another disease of concern for which wildlife rehabilitators are on the lookout.

Wildlife rehabilitators not only are on the front line in disease surveillance. They play an important role in public education, wild animal welfare and supporting species at risk.



Credit: Sherri Cox

◀ A red fox receives a checkup at a rehabilitation center prior to its release. Red foxes are among the mammals being affected by avian flu.

This recent HPAI outbreak has shown the value wildlife rehabilitators can have in disease surveillance, communication with the public through a vast social media reach and working with the health of individual animals and populations, and their value is growing.

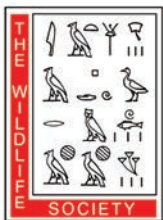
Wildlife rehabilitators are implementing the lessons of the One Health framework, which has become increasingly important in dealing with wildlife disease. The concept acknowledges that human health, wildlife health and ecosystem health are all related. That is something that wildlife rehabilitators know all too well. On a daily basis, they find themselves working at the intersection of humans, animals and the environment. The latest HPAI outbreak shows us how important that is. ■



Giselle Kalnins is a third-year student veterinarian in the Doctor of Veterinary Medicine program at the Ontario Veterinary College.



Sherri Cox, DVM, PhD, diplomate, ABVP (avian practice), is an assistant professor in integrative biology at the University of Guelph and the medical director for the National Wildlife Centre in Canada.



Together we make a difference

The Wildlife Society thanks our year-round partners for investing in wildlife professionals.

Visit wildlife.org/partners to learn more.





Bridging the Gap between Science and the Public

PLENARY SPEAKERS AT THE ANNUAL CONFERENCE IN LOUISVILLE WILL TAKE ON MISTRUST OF SCIENCE



By Joshua Rapp Learn

How do we build confidence in science and the scientific process in an era when public distrust is on the rise?

This is the question that will be addressed in the plenary session of the 2023 Annual Conference of The Wildlife Society in Louisville, Kentucky, in November—and it couldn't be timelier.

“The politicization and social reaction to the COVID-19 pandemic illustrates the polarization, where it both strengthened and weakened the trust in science aligned to complex demographic associations,” said TWS President Don Yasuda. “[The plenary] is timely, especially in the political sphere these days.”

The topic, chosen by Yasuda, was inspired in part by a survey conducted by the National Opinion Research Center at the University of Chicago—an independent social research center. Its 2018 survey of Americans showed that **only 44% had a great deal of confidence** in the scientific community, while a further 47% had only some confidence.

The issue isn't just that people mistrust a particular study, Yasuda said, but that they mistrust the process itself.

“There's just this era of mistrust of science and scientists,” Yasuda said. “How do we move forward as a society when we operate in this sphere?”



◀ The iconic Second Street Bridge spans the Ohio River in Louisville, Kentucky, where The Wildlife Society will host its 2023 Annual Conference.

Credit: Louisville Tourism



TWS' 2023 Conference Plenary Speakers



Sudip Parikh is the CEO of the American Association for the Advancement of Science (AAAS) and executive publisher of the *Science* family of journals. Parikh has spent over two decades at the intersection of science, policy and business as a Senate staffer, life science business leader and in the policy community. He was awarded a National Science Foundation Graduate Research Fellowship while earning his PhD in macromolecular structure and

chemistry from the Scripps Research Institute in La Jolla, California, and he earned his BS in applied science from the University of North Carolina at Chapel Hill.



Emily K. Vraga is an associate professor in the Hubbard School of Journalism and Mass Communication at the University of Minnesota. Her research focuses on how people come to understand news and information on contentious health, science and political issues, and how people navigate disagreement about these issues and misinformation on a range of health topics on social media. After receiving her PhD from the University of Wisconsin-

Madison School of Journalism and Mass Communication, she was a postdoctoral research instructor in the School of Media and Public Affairs at George Washington University and worked in the Department of Communication at George Mason University. She is affiliated with the Center for Climate Change Communication and has published over 50 scholarly journal articles.



Lindsay Martinez is a research program coordinator for the East Foundation. She supports research and conservation programs focused on ocelots and other threatened and endangered species on East Foundation properties in South Texas. Lindsay is originally from Great Falls, Montana, and obtained a bachelor's degree from Princeton University and a master's degree from Texas A&M University. Lindsay previously served as a

policy intern for The Wildlife Society in Washington, D.C., and was the inaugural recipient of TWS' Ronald F. Labisky Graduate Fellowship in Wildlife Policy while at Texas A&M. As a Labisky Fellow, Lindsay coordinated a multi-partner project to plan conservation policy for endangered ocelots on private lands in Texas.

To get at this question from a number of perspectives, Yasuda has invited a lineup of experts.

Sudip Parikh, CEO of the American Association for the Advancement of Science and executive publisher of the *Science* journals, will kick off the plenary with an imperative call for rebuilding public confidence in science.

Following this, Emily Vraga, an associate professor in the Hubbard School of Journalism and Mass Communication at the University of Minnesota will tackle the issue of debunking and "prebunking" misinformation.

"This can be a more effective way to ensure the scientific process remains the relevant discriminator between what is known to date and what some want to believe based on values and beliefs but not necessarily grounded in evidence or logic-based reasoning," Yasuda said.

To close the discussion, Lindsay Martinez, research program coordinator for the East Foundation and the inaugural recipient of TWS' Ronald F. Labisky Graduate Fellowship in Wildlife Policy in 2022, will take the audience through an ongoing case study using science to build widespread support amongst landowners, government agencies, scientists, conservationists and the general public for ocelot (*Leopardus pardalis*) recovery in southern Texas.

"This project provides a hopeful example of using science communication strategies to build a foundation of trust that will guide constructive dialogue to address difficult wildlife challenges," Yasuda said.

Yasuda hopes that the discussion will help attendees incorporate better techniques for reaching the public and building their trust in the science in general.

"I hope that people take away an understanding of the responsibility that we all have as scientists to help ensure that science remains a central part of how we understand what we do when we make policy decisions," Yasuda said. ■



Joshua Rapp Learn is a science writer for The Wildlife Society.

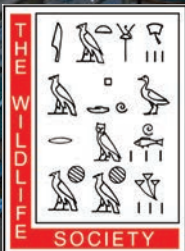
CALL FOR ABSTRACTS

THE WILDLIFE SOCIETY'S 30TH ANNUAL CONFERENCE
NOVEMBER 5–9, 2023



Register now!
TWS members get
\$200 discount

Experience TWS Live!



Join us in Louisville, Kentucky, this fall to help The Wildlife Society celebrate its 30th Annual Conference!

Check for regular news and updates at twconference.org.

Credits clockwise from top left: Richard Guenzel; Cameron Kovach; Lara Bremner; Marc Mains; Richard Harness; Rebecca Lazarus; Steve Hillebrand/U.S.F.W.S.; Gannon Castle/U.S.F.W.S.; Lisa Hupp/U.S.F.W.S



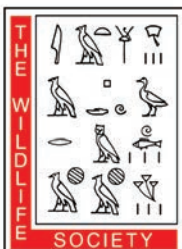
**Support wildlife.
Advance wildlife science.
Invest in wildlife professionals.**

Donate to The Wildlife Society.

Visit wildlife.org/donate to set up a monthly auto-donation.

Inspiring, empowering, and enabling wildlife professionals to sustain wildlife populations and habitat through science-based management and conservation.

Learn more at wildlife.org



Wildlife in the 2023 Farm Bill

TWS IS WORKING TO ENSURE STRONG PROVISIONS FOR WILDLIFE AS THE BILL IS DEBATED IN CONGRESS

By Laura Bies

Every five years, the U.S. Congress drafts a new Farm Bill—a multi-billion-dollar package covering everything from food assistance to crop insurance. The conservation section of the Farm Bill authorizes programs that provide measurable benefits to wildlife and habitat on working and agricultural lands.

Administered by the U.S. Department of Agriculture's Farm Service Agency and Natural Resource Conservation Service, the conservation provisions in the bill establish and support favored wildlife-centric efforts like the Conservation Reserve Program (CRP), which removes environmentally sensitive lands from agriculture production, and the Agriculture Conservation Easement Program (ACEP), which assists private landowners in conserving wetlands and grasslands.

TWS is working with our chapters and sections in TWS' [Conservation Affairs Network](#) and a broad coalition of conservation partners to ensure that the 2023 Farm Bill continues to support the public-private partnerships, technical assistance and cost sharing vital to improving fish and wildlife habitat on private land.

Conservation through coalitions

The Wildlife Society is a member of the [Theodore Roosevelt Conservation Partnership's](#) Agriculture and Wildlife Working Group (AWWG), which led the [development](#) of the "[Hunter and Angler Priorities for the 2023 Farm Bill](#)." The AWWG met regularly while developing the platform and continues to meet to track movement on the legislation and share information and activities. That platform provides robust recommendations that support key overarching priorities:

- ▶ Maintaining conservation-related funding levels from the 2018 Farm Bill and the additional funding that was allocated to Farm Bill conservation programs from the Inflation Reduction Act
- ▶ Ensuring fish and wildlife conservation is prioritized equally alongside soil and water conservation
- ▶ Ensuring the U.S. Department of Agriculture has adequate capacity for conservation planning and program delivery
- ▶ Supporting research and extension, USDA data collection, management and sharing and on-farm trials that enable science-based conservation and long-term agricultural resilience

TWS also joined with 30 other professional, conservation and environmental organizations to develop the "[Recommendations to Strengthen Conservation in the 2023 Farm Bill](#)." Those recommendations call on Congress to:

- ▶ provide adequate and sustainable conservation funding
- ▶ harness the talents and practices of farmers, ranchers and forest owners to face a changing climate
- ▶ advance equity to ensure that all producers, regardless of geography, race, gender, ethnicity, income or farm size, can access and benefit from conservation programs
- ▶ improve the effectiveness of existing conservation programs

This coalition followed a similar process to the AWWG, meeting regularly and dividing into smaller work groups to tackle specific programs or topics. A mediator assisted the group in bringing together the work products from the smaller groups and shaping them into the final platform.

What's next?

This year's Farm Bill is complicated by the recent influx of funds from pandemic-era laws such as the Inflation Reduction Act and the American Rescue Plan. While those funds are not technically part of the Farm Bill budget, some members of Congress want to see some of those funds re-directed into other areas, especially given that the current political climate is unlikely to support increases for most Farm Bill programs.

With the current Farm Bill expiring at the end of September, House and Senate agriculture committees must each develop a bill, and any differences between the two bills must be ironed out between the chambers. That is unlikely to be possible by Sept. 30, making an extension of the current Farm Bill the most probable next step. Given that 2024 is an election year, finalizing the Farm Bill early in the year will be desirable to congressional leadership.

As the 2023 Farm Bill moves forward, The Wildlife Society will continue to work with partners and with Congress to ensure that wildlife benefits from its conservation programs. ■



 Laura Bies, JD, is a government relations contractor for The Wildlife Society.

Field Notes

Tools and techniques for today's wildlife professional

To improve wildlife deterrents, researchers turned to robots

By David Frey

An unlikely team made up of biologists, ranchers, professors and engineers used robots to scare off coyotes—a technique that sounds like a science fiction movie (or at least a Warner Brothers cartoon), but one they believe could become a real-world deterrent for predators and other wildlife.

“We were trying to make the case that there’s a lot of technology that already exists and needs to be integrated into new deterrents,” said TWS member Stewart Breck, a research wildlife biologist at the National Wildlife Research Center in Fort Collins, Colorado. “Robotics have a lot to do with that.”

Breck was one of the biologists on the team, which was looking for off-the-shelf technology to protect livestock from predators. Coyotes (*Canis latrans*) cause more damage to livestock than any other predator—amounting to millions of dollars in losses a year—so it made sense to look for a novel way to try to reduce their impacts. Robots seemed like they may offer a new alternative to lethal methods of control.



Credit: Stewart Breck

▲ A Foxlight mounted on a remote-controlled vehicle is positioned by meat baits used to attract coyotes.

“Society is moving towards a more mutualistic way of thinking,” said Breck, the lead author of the [study](#) published in *PeerJ*. Coming up with alternatives that are effective and reduce the need for lethal control is a high priority.”

To see if robots could successfully scare off coyotes, the team turned to an NWRC facility in Millville, Utah, which houses some 100 coyotes to research ways to minimize conflict between predators and people. These coyotes tend to be more brazen than those in the wild, Breck said, so if the robots could deter them, the method would hopefully work even better in the field.

Team members wanted to see what would happen if they fitted a remote-controlled vehicle with a [Foxlight](#)—a commercially available set of randomly flashing LED lights meant to deter predators. By testing it with a vehicle controlled by an operator, they wanted to see if coyotes responded differently depending on if the Foxlight was stationary, if it moved in predictable ways or if the vehicle reacted to the coyotes’ movements.

The researchers deployed the vehicle in pens with pairs of coyotes trying to get meat baits. Moving the vehicle predictably—along a set route at a set time—roughly doubled the effectiveness of when it was standing still, Breck said, but the coyotes quickly figured it out. When they controlled the vehicle to react to the coyotes, though, “the effectiveness is exponentially increased.”

The next step, Breck said, is to try to deploy vehicles in the field to see how well they perform in a real-world setting. If the strategy works and a prototype can be developed, it could become a cost-effective, nonlethal way to help protect livestock from predators. It may also work to solve other issues with other wildlife.

“In my mind it goes well beyond coyotes and livestock,” he said. ■



Credit: Stewart Breck

▲ A coyote reacts to the movement of the remote-controlled vehicle.



Colleen Olfenbuttel, CWB®

Credit: Melissa McGaw/NC Wildlife Resources Commission



Commit to excellence.
Showcase your credentials.
Advance the profession.



Become a Certified Wildlife Biologist.®

Learn what it takes to be a CWB® at wildlife.org/certification.

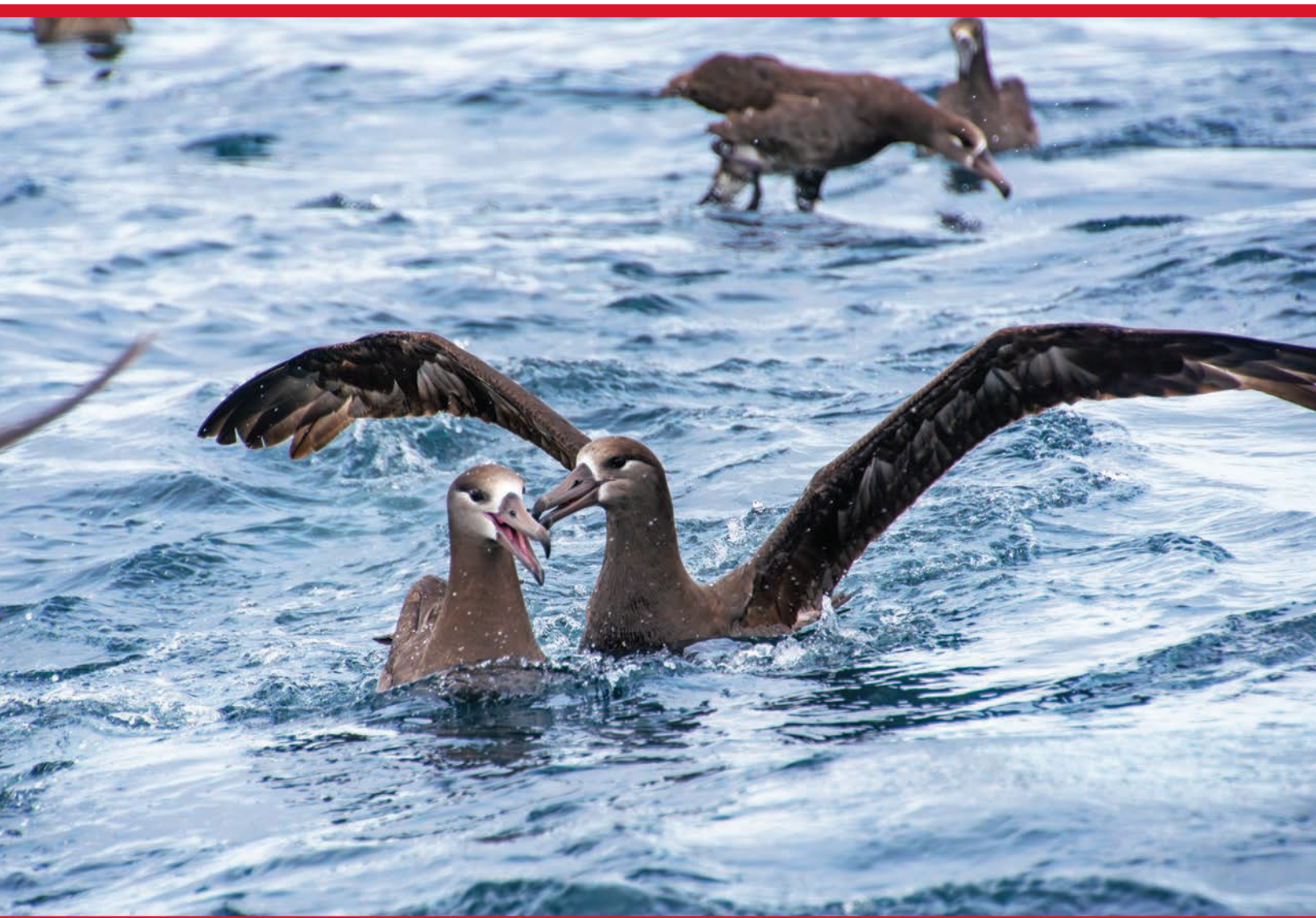


Photo by Theodore Lee

Gotcha!

TWS member Theodore Lee, a student at Humboldt State Polytechnic University, captured this image of black-footed albatrosses (*Phoebastria nigripes*) crowding the waters near Humboldt Bay, California, on an ornithology class expedition in search of pelagic birds.

Want to share your photo here? Send it to editor@wildlife.org.

EVERYTHING YOU NEED FOR YOUR TRACKING WORK.

Guaranteed delivery and performance.



L20 SOLAR-CELL COLLAR TRACKER

A 85 gram wireless GPS location logging "Tracker" featuring 4G LTE Cellular communication and solar-cell assisted power for longer life. Unlimited FREE data access included with every device.

G5-2D IRIDIUM/GPS COLLAR

A dependable, field proven GPS collar utilizing the most capable satellite communication technology available: Iridium. Plus, unlimited text messaging on mortality and geo-fencing events.



VHF TRANSMITTERS

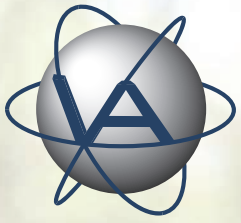


RECEIVERS DATALOGGERS



ANTENNA SYSTEMS





**VECTRONIC
Aerospace**

SOLAR-POWERED WILDLIFE MONITORING SYSTEM

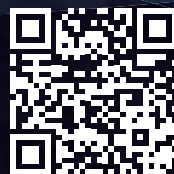
**WITH OUR NEW SOLEX COLLAR
YOUR RESEARCH PROJECT
IS POWERED BY THE SUN**

**GET MORE BATTERY LIFE, MORE REMOTE DATA
AND LONGER FIELD DEPLOYMENT WITH SOLEX.**

OUR NEW RUGGED, EFFICIENT, AND SOLAR-POWERED GPS WILDLIFE MONITORING SYSTEM DELIVERS PEAK PERFORMANCE WITH THE POTENTIAL FOR UNLIMITED BATTERY LIFE. BUILT SEAMLESSLY INTO EACH COLLAR BELT, THIS TECHNOLOGICAL BREAKTHROUGH FEATURES A LIGHTWEIGHT DESIGN AND THE DEPENDABILITY YOU EXPECT FROM THE BIOLOGISTS AND ENGINEERS AT VECTRONIC AEROSPACE.

PATENT PENDING IN THE U.S.A. AND ABROAD

**SCAN FOR SOLUTIONS:
WILDLIFE GPS TRACKING DEVICES
INVENTA APP & DATA MANAGEMENT**



Visit our display at the TWS 2023 Annual Conference to learn more about Solex and the latest in wildlife telemetry innovations

www.vectronic-aerospace.com · wildlife@vectronic-aerospace.com