



U.S. Fish & Wildlife Service

Summer 2025

Fish & Wildlife *News*



FEATURES

A Girl With a Gift / 6

Giving Lake
Sturgeon a Strong
Start / 12

Art and Science
Help Birds / 20

features

On the cover:
Wild Lupine
flowers
(PHOTO BY TINA
SHAW/USFWS)

A Girl With a Gift / 6
Remembering Jocelyn Nungaray, namesake of Texas national wildlife refuge.
By AISLINN MAESTAS

Mapping Success / 8
National Wetlands Inventory Program has been leading wetland understanding and conservation for 50 years.
By MEGAN LANG

Giving Lake Sturgeon a Strong Start / 12
Working to reestablish the prehistoric creatures so more reintroductions are no longer necessary.
By JANET LEBSON

Hooked on Success / 16
Mora National Fish Hatchery accomplishes milestone in conservation as threatened Gila trout numbers make a big splash.
By SANDRA GLADISH

Art and Science Help Birds / 20
UMass Amherst is on its way to making campus bird-friendly.
By BRIDGET MACDONALD

Cranberry Bog Restoration Builds Resilience / 24
Coastal Wetlands Grant benefits Massachusetts community, wildlife.
By LAURI MUNROE-HULTMAN



departments

- News / 1**

Curator's Corner / 28
- Our People / 30**

#weareusfws / 31

Fish of the Week: Florida's Remarkable Opossum Pipefish

If you were to sit down with the Syngnathidae family at dinner, you'd surely be dazzled by their sundry dress. Their bony armor. Pinks, yellows, and blues. Leafy green projections! Rounded pink bumps. Tiny pursed lips. And tightly permed to rod-straight tails terminating in little, rounded flags.

As families go, there'd be your typical chitter chatter (er, clicking). Maybe they'd be talking about their varied views on habitat (some like freshwater streams). These fish tend to be rigid and controlling (we're talking movement, of course), and they're constantly hovering. Top it all off with a dad pouch for developing embryos. And these pouches are no basic baby carrier: we're talking everything from ventral gluing to inhouse snack machine and pathogen immunity. Granddaddy Opossum Pipefish's original thoracic (chest) pouch is still cool, 50 million years later, although some branches of the family tree have gone more modern with tail pouches.

Let's Go Exploring!

When it comes to the beauty of America, much can be seen and admired from the seat of your car, short walks in the woods, or from the window of an airplane during a flight. While you may be drawn to the dynamic views of mountain ranges, gorges, valleys, and other huge geological features, we encourage you to take a closer look. Especially in places like Florida where the big landscape features that bring those feelings of admiration maybe aren't as



readily realized. However, upon closer inspection, Florida's swamps, marshes, and mangrove fringes are full of amazing sights and sounds that only get cooler and cooler as you zoom your perspective in.

"When you're looking for the weird little mini fish, you feel like you're exploring and you never know what the heck you're going to find," says Eddie Perri, fish biologist with our Peninsular Florida Fish and Wildlife Conservation Office.

Imagine it. You're in Florida. Somewhere on the east coast between the mainland and barrier islands. This is where the 156-mile long Indian River Lagoon is. With over 700 species of fish that spend all or part of their life there, this shallow-water estuary is one of the most biodiverse in North America. You'll see clumps of emergent vegetation. Perhaps *Polygonum* (aka smartweed – opossum pipefish's #1 habitat!) or *Panicum* or maybe even water hyacinth. These plants break the water's surface but if you follow them down, their roots are submerged. Among this vegetation, you'll find monogamous pairs of Florida's very best

kept secret, similar in dimension and posture to an unsharpened pencil: granddaddy wet stick himself!

What's especially cool, and perhaps surprising about these amazing seahorse relatives is that there's even a stream/river-loving group of species in the genus *Microphis* (this includes the opossum pipefish, *Microphis brachyurus lineatus*).

Save One, Save All?

You probably know the story well by now: Drastic declines in habitat quantity and quality have led to the decline of the opossum pipefish. Where we used to be able to see many monogamous pairs during surveys, habitat loss due to development, draining and ditching of wetlands, algal blooms due to poor water quality, use of herbicides, and an increase in non-native species have all taken a toll.

Neighbors, including species like bigmouth sleeper, river goby, and mountain mullet (not the hairdo), are just a few of the other cool native fish that live in communities alongside the opossum pipefish. They face the same threats as our little wet

Underside of a male opossum pipefish showing pouch full of young. (PHOTO BY [LARVALFISHGUY/CC BY-NC 4.0](#))

stick. Replanting native emergent vegetation, limiting herbicide treatments in certain areas and times of year, and learning more about these understudied fish are just some of the things we can do to help this amazing native fish.

KATRINA LIEBICH, Alaska Region, and
EDDIE PERRI, Southeast Region



Listen

Our Fish of the Week podcast [episode](#) featuring fish biologist Eddie Perri and the opossum pipefish provides the full scoop.

Targeting Success: The Impact of National Archery in Schools

In 2002, the Kentucky Department of Fish and Wildlife and Department of Education partnered with Mathews Archery to create the Kentucky Archery in the Schools program. This program aimed to teach students in grades 4 through 12 the sport of archery as part of their physical education curricula. The partnership quickly captured the attention of other state wildlife agencies and the program's rapid spread prompted a name change to the National Archery in the Schools Program.

Knowing the initial monies provided by Matt McPherson, owner of Mathews Archery, were not sustainable, a question arose: "How are we going to fund this?"

Fortunately, state wildlife agencies had the answer: Wildlife Restoration's Hunter Education and Enhanced Hunter Education sub-programs.

The Wildlife Restoration Act of 1937 ensures that funds generated from federal excise taxes on firearms, ammunition, and archery equipment are distributed to state wildlife agencies to pay for conservation projects. These projects may include habitat and wildlife management, research, hunting access, hunter education, activities related to R3 ("Recruitment, Retention, and Reactivation" of individuals in outdoor pursuits), and development and operation of target ranges. The Wildlife Restoration Act, administered by



the U.S. Fish and Wildlife Service, is the bedrock for funding conservation and connecting people with nature.

Why Archery?

Archery is a sport unlike any other.

Participants don't need to be fast, strong, or traditionally athletic. It doesn't favor a person's sex, making it one of the few activities in which males and females can compete side-by-side. Archery provides a truly level playing field.

The sport is also a lifelong activity. Individuals can begin their participation as young people and continue well into adulthood. Additionally, the program was designed to align with school curricula and to be incorporated easily into physical education classes.

The scalability of the archery program is also a significant factor in its success.

It can be easily replicated at multiple schools with varying funding levels and demographics. Schools can adopt its curriculum, teach it as part of physical education in any gymnasium at any school, and form a team that can compete at the local, state, and even national level.

With an appeal to a diverse range of students and seamless integration into school activities, it's no wonder that this program has thrived! Annually, it engages 1.3 million students in over 9,500 schools. That is more student participants than Delaware's population. This number continues to grow.

Responses from students who voluntarily participated in a 2024 survey indicated that the program helped them feel more confident in themselves and that they were better equipped to control their emotions and focus on tasks at hand, were motivated to do better in their classes, and felt more connected to their schools.

Archery is one of the few activities in which males and females can compete side-by-side. (PHOTO BY [BILLY POPE/OUTDOOR ALABAMA/CC BY-NC-ND 2.0](#))

Why Is the Program Important?

Kentucky's wildlife and education agencies created the program to address declining numbers of hunters and participation in shooting sports as well as the increasing rate of students dropping out of school.

Due to its widespread appeal to students of varying abilities, archery provides opportunities for all students, including traditionally nonathletic individuals, to be part of a team. When students feel like they are part of a team, they feel better connected to their school and peers. This sense of belonging reinvigorates students, motivating them to excel in the classroom and as part of their archery teams.

For wildlife agencies, the decline of hunters means a decline in hunting licenses sold. Many state agencies rely on revenue »

The Utah Division of Wildlife Resources offers anglers the opportunity to catch native cutthroat trout as part of the Utah Cutthroat Slam. (PHOTO BY

UTAH DIVISION OF WILDLIFE RESOURCES)

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from hunting and fishing licenses for funding. Inspiring people to participate in outdoor recreation or purchase hunting or fishing licenses directly benefits wildlife agencies. What better way to reach people and encourage outdoor recreation participation than by partnering with schools?

Reaching students in schools has opened the door for individuals who typically wouldn't have interacted with shooting sports. The survey is proving that student interactions with the program is inspiring them to get outdoors.

In the 2024 survey, 37% of students indicated that because of the program, they had participated in other outdoor activities, 31% reported they had gone fishing with a rod and reel, and 17% reported having taken a hunter education course. Many more students indicate they want to learn these time-honored activities.

An addendum to the U.S. Fish and Wildlife Service's landmark five-year survey on target shooting recreation participation acknowledges the National Archery in the Schools Program as a likely influence in the current archery participation rates of those 18 and younger across the United States. By bridging the gap between outdoor recreation and education, it's providing an outlet for students to connect with their school and fellow students while also encouraging outdoor recreation and inspiring interest in shooting sports.

LANIER CLEGG, Southeast Region



Restoring Utah's Cutthroats and Creating Angling Opportunities for Native Trout

Cutthroat trout are the only trout native to Utah, but not that long ago the state's iconic cutthroats were in jeopardy of disappearing. Thanks to conservation measures supported in part by Sport Fish Restoration funds, managed by the U.S. Fish and Wildlife Service, Utah's four cutthroat subspecies have made a remarkable comeback.

The Bear River, Bonneville, Colorado River, and Yellowstone cutthroat trout are found in waterways throughout the state, and the Utah Division of Wildlife Resources offers anglers the opportunity to catch native trout that were nearly lost.

"From fears of disappearing to a special fishing challenge created to highlight the restoration success, our cutthroats have come a long way," says coldwater sportfish coordinator Trina Hedrick.

For centuries, cutthroat trout traversed the lakes and interconnected waterways of the West. However, by the turn of the century, Utah's cutthroat faced a growing number of threats from habitat loss and fragmentation, decreased water quality, the introduction of non-native species, and overharvest to feed growing communities and mining towns. By the 1960s, cutthroat populations were a fraction of

historic levels, and interest in protecting Utah's disappearing native trout was growing.

Before restoration efforts could take place, the state had to find out just how many cutthroat trout remained. In the case of the Bonneville cutthroat, many doubted that a genetically pure population still existed.

"Starting in the 1970s, state and federal biologists set out to sample difficult-to-access or rarely surveyed areas to find remaining cutthroat populations," Hedrick says. "Thankfully, pure strains of all four subspecies remained in these isolated areas, and these populations would »

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be the beginning of the state's restoration efforts with fertilized eggs being transported to hatcheries for grow out and stocking." What started with a few hundred fertilized eggs in the 1970s has grown into the largest assisted migration in Utah, stocking millions of cutthroat trout each year.

Increasing Trout Numbers and Stocking Waterways

State biologists continue to collect eggs and milt from Utah's wild cutthroat to raise in state hatcheries and release back into waterways. The state operates seven fish traps, allowing biologists to collect, fertilize, and transport eggs while also releasing the captured adult trout back into the wild. Utah is producing around 2 million cutthroats annually and stocking them into 300 water bodies around the state.

It has two goals for the stocking program: conservation and sportfish. For conservation, the state typically stocks fingerlings for three to five years until natural reproduction is detected. For sportfish purposes, it usually stocks in the high country for people to enjoy fishing during a backpacking or horseback trip.

"The sportfish stocking will continue into the future, but we hope to be done with stocking to restore conservation populations very soon, around five years for Bonneville cutthroat and 10 years for Colorado River cutthroat," adds Hedrick.

Support from Sport Fish Restoration Funds

A successful multi-decade restoration effort requires dedication, time, and funding. Throughout nearly every step of Utah's cutthroat trout conservation effort, Sport Fish Restoration funds have been used. "In Utah, we utilize these federal excise tax dollars for a variety of cutthroat specific efforts including staff time used for field work surveying fish and improving habitats, supporting hatchery efforts including purchasing the feed used to raise the juvenile cutthroats, and even a portion of the stocking cost is supported by these funds," Hedrick says.

Utah's Cutthroat Trout Slam Challenge

To celebrate the conservation and restoration of Utah's cutthroat, the state manages the Utah Cutthroat Slam fishing challenge. The Utah Cutthroat Slam, focused on engaging anglers in native trout fishing, creates an incentive program for anglers to catch each of Utah's native trout species. The slam introduces anglers to the state's cutthroat and offers them a chance to be part of the restoration as proceeds from the slam go to further conservation efforts. "When reviewing submissions for the slam, about a third of the participants add a comment

expressing thanks for offering the chance to catch these unique species or sharing that the slam has offered them a way to connect with native trout while also making memories with family or friends," adds Hedrick. To date 1,700 anglers have completed the slam.

CINDY SANDOVAL, Office of Conservation Investment

75

YEARS OF SPORT FISH RESTORATION

Passed in 1950, the Sport Fish Restoration Act (a.k.a., the Dingell-Johnson Act) celebrates 75 years in 2025. As a cornerstone of America's conservation legacy, this landmark legislation has played a vital role in preserving the health, sustainability, and accessibility of fisheries and waterways. Since passage, it has generated over \$12 billion for the conservation and restoration of sport fish species and their habitats as well as supported outdoor access and education.

Revenue comes from manufacturers' federal excise taxes on sport fishing equipment, import duties on fishing tackle and pleasure boats, and the portion of the gasoline fuel tax attributable to small engines and motorboats.

Catheryn Liang from Texas Wins 2025 National Junior Duck Stamp Art Contest

Catheryn Liang, a talented young artist from Texas, has taken top honors at the National Junior Duck Stamp Art Contest.

A northern shoveler by the 18-year-old will grace the 2025-2026 Junior Duck Stamp, which raises funds to educate and engage our nation's youth in wildlife and wetlands

conservation and outdoor recreation.

A panel of five judges chose the oil painting, titled *Gliding Through Gold*, from among 58 best-of-show entries from 50 states, Washington, DC, and one U.S. territory. Liang placed second in the 2022 National Junior Duck Stamp Art Contest with a pair of

Canada geese. This is the first time a northern shoveler has been selected for the Junior Duck Stamp.

Students in kindergarten through grade 12 participate in their annual state Junior Duck Stamp Program through their school, home, art studio, or after-school group, or from a refuge, park, or nature center. After learning about wetlands, waterfowl, and wildlife conservation, they express their learning by drawing or painting of a duck, goose, or swan.

Students submit their entries to their state contest for local recognition. Each State Best of Show is then forwarded to the national competition.

The top piece of art in the nation – chosen at this annual competition – is featured on the Junior Duck Stamp.

The Federal Junior Duck Stamp Conservation and Design Program began in 1989 as an extension of the Migratory Bird Hunting and Conservation Stamp, commonly known as the Duck Stamp. The Junior Duck Stamp Program is a dynamic art- and science-based curriculum that teaches wetland and waterfowl conservation to students in kindergarten through high school. The program encourages students to explore their natural world, invites them to investigate biology and wildlife management principles, and challenges them to express and share what they have learned with others.

Each year, tens of thousands of students have the opportunity to learn principles of wildlife conservation and connect with the outdoors, hopefully sparking a lifetime love of hunting, fishing,

bird-watching, and other wildlife-related recreation activities.

Approximately 3,000 Junior Duck Stamps are sold annually for \$5 each.

The second-place winner in the 2025 national contest is Sophie Xu, 16, of Maryland with *Inner Peace*, an oil painting of harlequin ducks.

Third place went to 17-year-old Dan-Nhi Nguyen from Oregon, who entered *Nesting Tree*, an acrylic painting of a common merganser female tending to her nest.

In addition to the art contest, a Junior Duck Stamp Conservation Message Contest encourages students to express in words the spirit of what they have learned through classroom discussions, research, and planning for their Junior Duck Stamp Contest entries. This year's winner is Kaylen Kasel, 16, of North Dakota with the message: "Nature needs heroes; be one."

This year, over 13,500 young artists submitted entries to the Junior Duck Stamp contests around the nation.

The Junior Duck Stamp Contest winner receives \$1,000. The second-place winner receives \$500. The third-place winner receives \$200. The Conservation Message winner receives \$200.

The First Day of Issue for the 2025-2026 Duck Stamp and Junior Duck Stamp was June 27, 2025, in Stuttgart, Arkansas.

VALERIE FELLOWS, Migratory Birds



The top three winners of the 2025 National Junior Duck Stamp Art Contest on display. (PHOTO BY JENNIFER WRIGHT/USFWS)

A GIRL WITH A GIFT



Remembering Jocelyn Nungaray, namesake of Texas national wildlife refuge.

By AISLINN MAESTAS

Long before her name stood at the Entrance of a national wildlife refuge, Jocelyn Nungaray was known by her family and friends as a girl with a big spirit, who loved animals and enjoyed spending time in nature.

Jocelyn will now forever be remembered at a special place on the Texas coast, just east of Houston, where coastal prairie meets dense marsh, where colorful songbirds, delicate butterflies, and gentle white-tailed deer seek refuge. It is here, at Jocelyn Nungaray National Wildlife Refuge, where people of all walks of life can come to find peace, connection, and purpose in the heart of nature.

“Jocelyn once told me that the world would know her name,” says Alexis Nungaray, Jocelyn’s mother. “It is bittersweet that it came true in this way. We wanted her to be known for her talents. But I know she would have loved having this place named for her. She would have loved seeing the animals free and where they belong.”

Jocelyn had a tender heart that extended to all living things. Though she was only 12 years old, she had a gift for noticing what others overlooked, whether it involved caring for stray kittens in her neighborhood or showing concern for injured wildlife, like the pigeon she once rescued. It was her sincerest wish that every creature on Earth could have a loving home like she did.

Jocelyn tragically lost her life in nearby Houston in June 2024. To help honor her wish and to pay tribute to Jocelyn’s compassion for animals, U.S. Secretary of the Interior Doug Burgum signed a Secretary’s Order on March 10 renaming Anahuac National Wildlife Refuge in Texas to Jocelyn Nungaray National Wildlife Refuge, following an executive order issued by President Donald J. Trump.

“We are proud that one of the crown jewels of the refuge system has been renamed for Jocelyn, and that this refuge’s lasting conservation legacy will serve as a reminder of the importance of protecting these special places for wildlife and the people who love nature,” says Kristin Fritz-Grammond, manager of Jocelyn Nungaray National Wildlife Refuge.



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A Home for Wildlife, a Place to Enjoy Nature

Jocelyn Nungaray National Wildlife Refuge comprises 39,000 acres of public land along the Texas Gulf Coast. The refuge encompasses a diverse and dynamic landscape that plays a crucial role in supporting a wide variety of birds, mammals, amphibians, and insects. In addition, the refuge plays a vital role in public recreation and environmental education.

With the renaming of the refuge, the U.S. Fish and Wildlife Service embraced the theme of “a home for wildlife, a place to enjoy nature,” reflecting Jocelyn’s caring heart for animals and our shared commitment to conservation.

This sentiment connects deeply with the mission of the National Wildlife Refuge System: protecting critically important habitat to benefit people and wildlife for generations to come. Jocelyn Nungaray National Wildlife Refuge is a space for everyone to unplug and reconnect with nature. Whether it’s going on an auto tour, strolling along a trail, or sitting in solace in the butterfly garden, this refuge invites people of all ages and abilities to immerse themselves in the beauty and tranquility of the surroundings.

“As we celebrate Jocelyn’s life by renaming this refuge, we invite everyone — families, youth, nature enthusiasts — to forge lasting connections with the refuge. Together, we can create a new tradition of appreciation for our natural world, ensuring a safe place for wildlife, just as Jocelyn would have wanted,” says Fritz-Grammond.



Light, Love, and Kindness

Jocelyn was more than a budding conservationist. In addition to her love for animals, she valued her time with her friends. Together they would choreograph dances, make funny videos, and listen to music. Her mother loved hearing the endless sound of their laughter echoing from her room. For hobbies, Jocelyn was learning to bake and play the cello, and was also a talented video editor, posting her “fan edits” to a growing audience online.

“Jocelyn was the truest version of herself with her friends. It was in those moments that I saw the light, the love, the kindness, and her spirit. She was a kind and generous friend,” says Alexis.

(Top) Sunset at Jocelyn Nungaray National Wildlife Refuge. (PHOTO BY NORMAN WELSH) (Left and Previous Page, Left) Jocelyn Nungaray is remembered as a girl with a big spirit, who loved animals and enjoyed spending time in nature (PHOTOS BY ALEXIS NUNGARAY)

One moment that stands out in Alexis’ memory is when Jocelyn brought home a box of toads she had collected because “she wanted them to be together.” While some parents might have grown weary with the stray cats and injured birds and boxes of toads, Alexis took it in stride.

“Jocelyn taught me patience, to never take anything for granted, and to let the little things go,” says Alexis. “I learned that what matters most is to enjoy your children and their happiness.”

In world that often moves too fast, and forgets so much, Jocelyn Nungaray National Wildlife Refuge is a place to remember — not only the gentle spirit of the young girl whose love for nature inspired its name, but the deeper truths she understood so well: that every creature matters, and every living thing deserves a home.

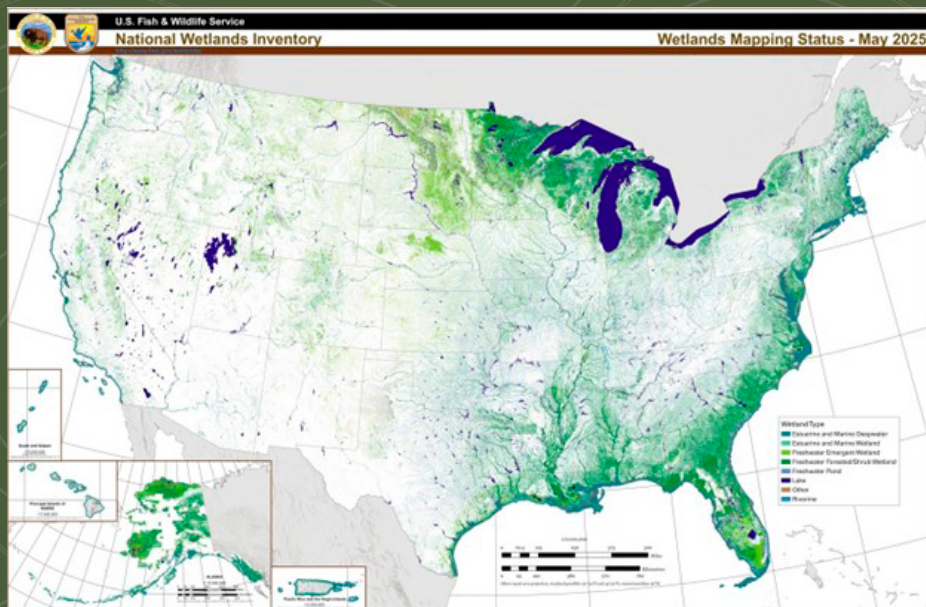
“In every dragonfly that floats by, in every flower that blooms, and in every song a bird sings, the spirit of Jocelyn lives on. While this refuge was renamed in response to a deep and tragic loss, we hope in the future it can rekindle joy, provide hope and inspire people to bring about a gentler, more caring world,” says Fritz-Grammond.

AISLINN MAESTAS, Southwest Region

Mapping Success

The National Wetlands Inventory Program has been leading wetland understanding and conservation for 50 years, boosting the health, safety, and prosperity of communities.

By MEGAN LANG



(Above Right) NWI provides information on wetland area, location, and type for the United States and its territories. (PHOTO BY USFWS)

For the past 50 years, the National Wetlands Inventory Program (NWI) has shaped the understanding and conservation of wetlands, while supporting the vitality of America's communities and economy. Wetlands contribute to the health, safety, and prosperity of communities by supplying clean water, protecting people and infrastructure from floods and storms, and providing opportunities for recreation including birding, hunting, fishing, and boating. Wetlands have long been central to the mission of the U.S. Fish and Wildlife Service because they are critical to the well-being of a wide range species — from fish that put food on American tables to migratory birds that people look forward to welcoming home each year.

NWI was created in 1974 to inventory wetland area, location, type, and trends — the foundational information needed to better manage wetlands and their many benefits. Similar to the way that scientists

must consider the path of water and migratory birds over thousands of miles, wetland managers must zoom out to understand how wetlands are intertwined with the landscape to best conserve them and their benefits. NWI maps and Wetlands Status and Trends reports provide this comprehensive, landscape-scale information so that decision-makers can best support American interests.

Over the past five decades, NWI and its partners have built the knowledge and structures necessary to collect this vital information. It started with the development of a comprehensive,

hierarchical classification system — the “Classification of Wetlands and Deepwater Habitats.” Scientists spent years developing this system — which would become the national Wetland Classification Standard. The process included gathering feedback from hundreds of wetland managers and testing at pilot sites across the United States. The resulting classification system is so precise that it can pinpoint the habitat of thousands of fish and wildlife species, yet it's flexible enough to support a wide range of mapping objectives. »

(Right) An NWI employee labeling hardcopy wetland maps with pen and ink during the 1970s. (PHOTO BY USFWS)





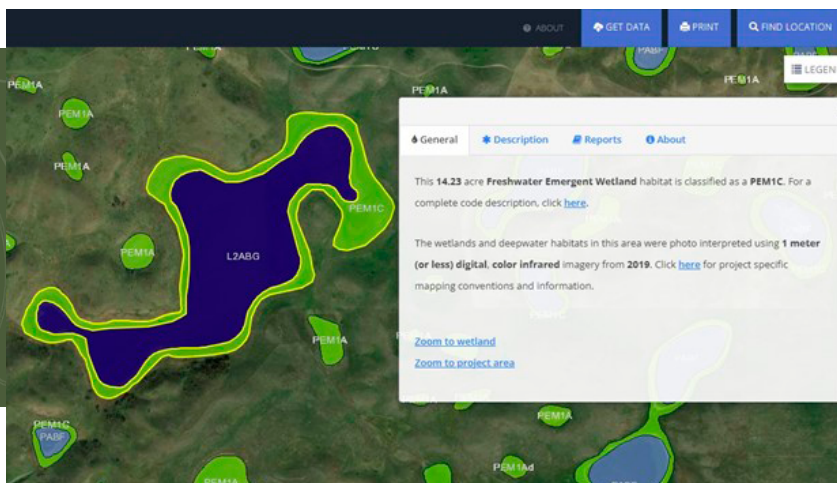
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Mapping in the 1970s and '80s was very different than it is today. That was the era of mainframe computers that occupied entire rooms but had less computing power than today's smartphone. At that time, wetlands were drawn by hand on mylar overlays and stereoscopes were used to find low-lying areas where wetlands often form. The public could request NWI hardcopy maps by calling 1-800-USA Maps.

Technology changed rapidly since that time, and NWI has been at the forefront of many of these advancements. The program uses the best available mapping approaches while meeting the high standards for accuracy and detail called for by the national Wetlands Mapping Standard. NWI does this by adaptively managing all components of the mapping process to leverage the best of different datasets and techniques — including

automated approaches that rely on satellite imagery and artificial intelligence.

This is made possible by partnerships with companies, nonprofits, universities, other government agencies, and more. By working directly with partners on data production, NWI benefits from research being conducted by these groups. Partners benefit from funding for mapping projects — and create jobs across the United »



(Top) Salt marshes support fisheries and provide opportunities for recreation. (PHOTO BY USFWS)

(Above) Wetlands bolster fisheries and the economy by providing food and shelter for fish and shellfish, including blue crabs. (PHOTO BY MARK STEBNICKI/ACCESSED ON PEXELS)

(Left) Today, NWI geospatial data includes over 37 million features, and is delivered via the interactive Wetlands Mapper (pictured), data downloads, and web map services. (PHOTO BY USFWS)



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States. Taxpayers benefit from improved data as well as the cost efficiencies that come from partnerships. This includes coordination between NWI and the U.S. Geological Survey 3D Hydrography Program that aims to produce more cost-effective and interoperable wetland and stream data.

NWI data enables environmental managers and policymakers to make more efficient, strategic decisions regarding the future of America's wetlands. NWI maps help streamline planning and regulatory decision-making that supports effective infrastructure and energy development. A wide array of organizations, ranging from tribes to

companies, use NWI data in this way – savings tens of millions of dollars every year.

Partners, like Ducks Unlimited, rely on NWI data to target wetland restoration to areas where waterfowl and sports enthusiasts benefit the most. Tribes depend on NWI data to help support enduring traditions, like subsistence hunting and fishing and the harvest of culturally important plants. Within the Service, NWI maps and reports guide billions of dollars' worth of wetland conservation, supporting wildlife while generating clean water and other benefits for communities.

The most widespread application, and perhaps the most impactful, is the use of NWI maps by individuals to guide land acquisition and development. This

conserves countless wetlands and their benefits through passive avoidance — or the voluntary decision not to impact a wetland.

NWI data can be used in many ways, and these applications have changed along with the needs of data users — and will continue to shift. However, one fact will remain unchanged. NWI data helps people across the country — from farmers that depend on a consistent supply of water to small-business owners that rely on abundant fish and shellfish.

Widespread reliance of stakeholders on NWI data is evidenced by its extensive use. NWI's Wetlands Mapper is viewed over half a million times each year and its web map services receive several tens of millions of requests for information annually. In 2024, NWI maps were »



(Top) Mallards flying over a wetland at Rainwater Basin Wetland Management District in Nebraska. Wetlands are important habitats for migratory birds, including waterfowl. (PHOTO BY BRANDON JONES/USFWS)

(Far Left) Wetlands provide opportunities for recreation, including fishing, hunting, and boating. (PHOTO BY USFWS)

(Left) The Service's Partners for Fish and Wildlife helped restore this wetland in Montana. (PHOTO BY JOE MILMOE/USFWS)

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downloaded more than 286,000 times and nearly 300,000 maps were printed.

Increased partner investment in data production further demonstrates the need for NWI data. Last year was one of the largest updates ever to the NWI Wetlands Mapper, and 2025 is on track to match or exceed that record.

As the program celebrates its 50th anniversary, we recognize not only the achievements of the past — but the promise of the future. Over the past decades, NWI has provided the foundational geospatial data necessary to guide strategic wetland decision-making by harnessing technological advancements to produce consistent, high-quality

national wetlands data. The program will continue to lead the development and distribution of this vital information by not only providing training, shared standards, quality control, database management, and national distribution but also working with partners to identify, develop, and implement even better ways to produce and share high-quality wetlands data.

As workflows evolve along with technology, NWI will incorporate these advancements into the national Wetlands Mapping Standard to ensure that user needs are met consistently across America. The program will also continue to work with other geospatial data producers to ensure interoperability and production efficiency. These actions and others uphold the principles of FAIR — findable, accessible, interoperable, and

reusable — data in keeping with statutory authorities like the Geospatial Data Act of 2018

Producing the data needed to support the conservation of wetland benefits while supporting efficient infrastructure and energy development requires strong and sustained partnerships. The National Wetlands Inventory Program stands ready to work with partners to provide consistent, high-quality wetlands data to the public. Doing so is especially important today given the growing importance of wetland benefits in meeting the needs of America's communities and economy.

MEGAN LANG, National Wetlands Inventory

A large, dark brown sturgeon fish is lying on a black mesh net that is spread out on a wooden dock. The fish is oriented diagonally from the bottom left towards the top right. Its skin is wet and glistening. The dock is made of weathered wooden planks. In the background, there are some concrete blocks and a green bag. The overall scene is outdoors, likely near a body of water.

Giving Lake Sturgeon a Strong Start

By JANET LEBSON

With the arrival of spring, we and our partners prepared for our annual lake sturgeon egg takes, one facet of a 40-year-old restoration program that relies on reintroducing fish as its cornerstone. Our efforts in the Great Lakes and Upper Mississippi River basins are at the heart of a broader lake sturgeon restoration program across the waterscape of eastern and central North America where these prehistoric creatures range.

We take pride in sharing our fishery management expertise and resources with tribal and state partners to restore this captivating fish. Lake sturgeon are sacred to tribes, and states are working to restore them as part of their native fishery conservation programs and as a valued recreational fishery.

We intervene early as caretakers to give new generations of the species a strong start. What we call *egg takes* refers to collecting gametes – the name for milt and eggs before fertilization – from spawning lake sturgeon. In late spring, we also collect young sturgeon in their larval stage. These are two main ways our agency begins the annual cycle of restoration activities, which includes rearing more than 120,000 lake sturgeon in nine national fish hatcheries all summer for reintroductions in nearly 40 locations in 11 states in the fall.

The goal is to eventually reach a point where lake sturgeon are reestablished in enough places and reproducing sufficiently on their own that reintroductions are no longer necessary. Although dams and

degraded habitat may prevent their return in some parts of their historic range, lake sturgeon are demonstrating their resilience in other areas.

Providing a Spawning Assist

Every spring in areas in and around the Great Lakes Basin and upper Mississippi River, we join partners in collecting gametes from spawn-ready lake sturgeon. We carefully capture fish that are sometimes almost the size of their human helpers, gently expel the milt and eggs, and then safely return the fish to the water. We carry out these egg takes so that we can rear young sturgeon in hatcheries during their most vulnerable life stage. »

(Previous Page) One of the largest and longest-living freshwater fish in the world, lake sturgeon are slow to reach reproductive age.

(PHOTO BY BRETT BILLINGS/USFWS)

Conservation partners carefully expel milt and eggs from spawn-ready lake sturgeon.

(PHOTO BY USFWS)





A biologist holds a juvenile lake sturgeon reared at Genoa National Fish Hatchery in Wisconsin.

(PHOTO BY KATIE STEIGER-MEISTER/USFWS)

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For example, our agency takes part in gamete collections at six sites in four states in and around the Great Lakes Basin and upper Mississippi River:

- Michigan: The St. Clair River, a tributary of Lake Huron, with the largest Great Lakes population at 33,000, and the Sturgeon River, a tributary of Lake Superior.
- Minnesota: The Rainy River, part of the Hudson Bay drainage
- New York: The St. Lawrence River, the outflow of Lake Ontario and all of the Great Lakes.
- Wisconsin: The Wisconsin River, a tributary of the Mississippi River, and the Wolf River, a tributary of Lake Michigan.

From these areas, most of the fertilized eggs are transported to Genoa National Fish Hatchery in Wisconsin where they are raised until the fall. By then the lake sturgeon are large enough for the insertion of tags that enable us to monitor them from afar to learn more about their life cycle needs. About 20 of our Fish and Wildlife Conservation Offices take part in

ongoing monitoring that helps us measure our progress in reestablishing healthy populations.

Genoa has one of the largest aquaculture operations for lake sturgeon in the United States, including a production building specifically for the species, raising more than 60,000 per year. Those fish support ongoing reintroduction efforts in Michigan, Minnesota, New York, Ohio, South Dakota, Tennessee, and Wisconsin. Genoa also ships sturgeon eggs and fry as far away as Georgia for rearing, research, and stocking.

Rearing Larval Fish Close to Home

In late spring we take part in a similar effort, joining partners in collecting and rearing larval lake sturgeon. In these cases, spawning has already occurred naturally and fertilized eggs have grown into tiny versions of the lake sturgeon's adult form.

Larval sturgeon are cared for in our partners' streamside rearing facilities – basically mobile mini hatcheries – so that water from the natal stream can be continuously pumped into holding tanks. The Little River Band of Ottawa Indians pioneered the streamside rearing method to help restore their sacred clan animal they call nmaé. Streamside rearing takes place in several locations throughout »

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the Great Lakes Basin. After a few months, streamside-reared young sturgeon are also implanted with tags before their release.

Fishery biologists believe a specific water chemistry helps mature lake sturgeon return to their birthplace when they are ready to spawn. This phenomenon, called imprinting, is what enables fish to return to these specific geographies even though they migrate far and wide into large lakes and rivers during their growing stage. Our agency takes part in lake sturgeon streamside-rearing partnerships at six sites in three states in the Great Lakes Basin and provides expertise in support of many others:

- Michigan: The Cedar, Kalamazoo, and Manistee rivers, tributaries of Lake Michigan, and the Saginaw River, a tributary of Lake Huron.
- Ohio: The Maumee River, a tributary of Lake Erie.
- Wisconsin: The Ontonagon River, a tributary of Lake Superior.

After our hatchery caretakers have reared lake sturgeon through summer, they are large enough to implant with tiny tags so we can monitor them after they reintroduced in the fall.

(PHOTO BY BEN SASSE/USFWS)

Adaptive Approaches

Why do we sometimes collect gametes and other times larval sturgeon? When we are trying to give a boost to an existing remnant population, we would be more likely to choose the streamside-rearing method, providing the full advantage of imprinting, to help that existing population rebound.

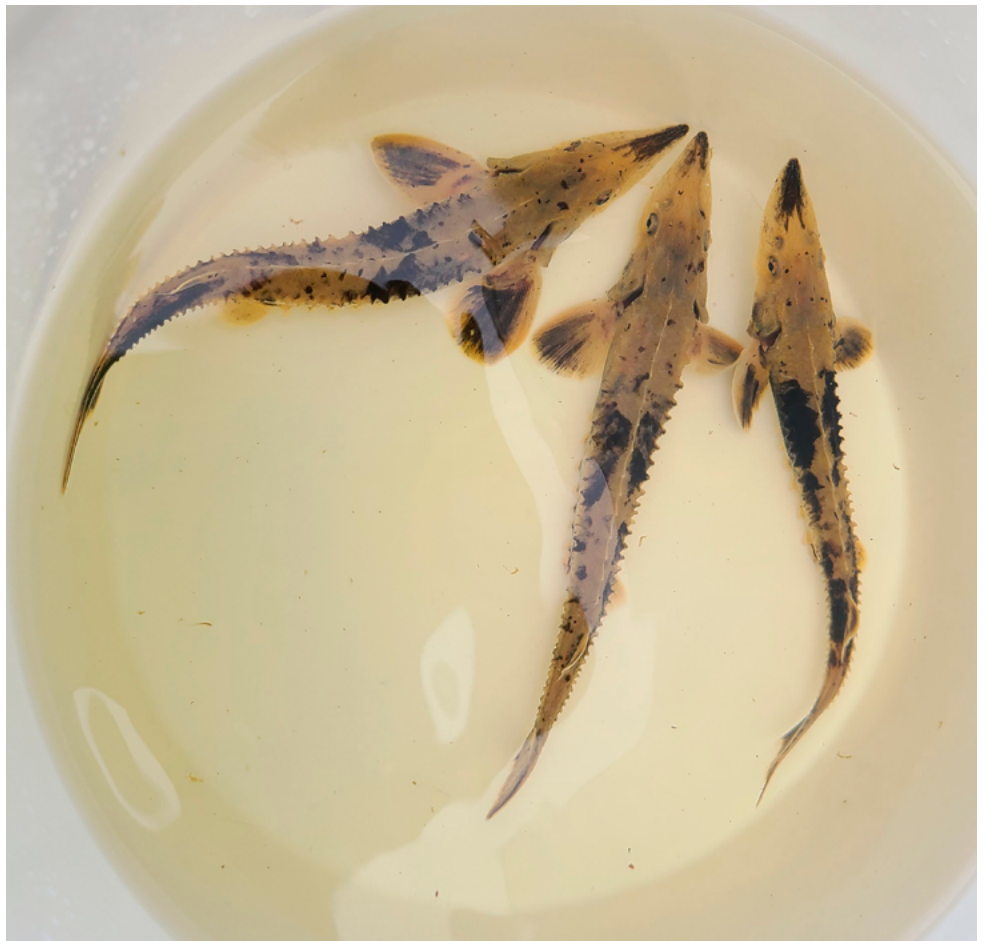
In areas where lake sturgeon have been completely wiped out, no donor population exists to supplement with reared fish. We must borrow gametes from other populations to reintroduce lake sturgeon into other areas of their historic range where we think they have a good chance of reestablishing. Even though imprinting at the larval stage is not possible, in some

areas we have eventually seen reintroduced fish return to their reintroduction sites to spawn.

Progress Takes Persistence

Because lake sturgeon are slow to mature and do not spawn every year, much of the successful natural spawning and population growth we are now seeing is a result of reintroductions that began decades ago. The long-term reality of these restoration efforts means we must keep our eyes on the prize, building on the progress of our colleagues from the previous generation to make fully restored populations possible during the next.

JANET LEBSON, Midwest Region



Hooked on Success

Mora National Fish Hatchery accomplishes milestone in conservation as threatened Gila trout numbers make a big splash.

By SANDRA Gladish

(Photo) Gila trout are bred and raised at Mora National Fish Hatchery in New Mexico. (PHOTO BY RYAN HAGERTY/USFWS)





Mora National Fish Hatchery in New Mexico is the only hatchery in the world dedicated to raising the threatened Gila trout for conservation purposes.

Surrounded by ponderosa pines, the hatchery sits at 7,200 feet within the eastern end of the Sangre de Cristo Mountains. The rare mountain stream fish is bred and raised with the hopes that one day, it may again thrive throughout its historic waters. In recent years, the hatchery has achieved major results in bringing this conservation vision to fruition thanks to its passionate local team.

“The facility is checked daily by hatchery staff and is monitored 24-7 by our complex monitoring and alarm systems. The fish need to be cared for and fed daily and the water quality, such as dissolved oxygen, total gas pressure, temperature, flow, etc., need monitoring,” says Daniel Gallegos, project leader at Mora National Fish Hatchery. “In all my combined 10 years here, there’s not been one day where somebody has not reported in for duty, seven days a week.”

Local People Helping to Save a Local Species

Gallegos started his career at Mora as a Youth Conservation Corps intern in June 2012. He continued to work there as a Pathways intern while attending college and then was hired as a fish biologist at the facility after graduating. After two years at Mora, Gallegos left to work at other federal hatcheries. He returned in February 2023 as project leader, guiding and mentoring his team of upward of 13 people. This number fluctuates during the year because the hatchery hires students and interns.

“This is my hometown, and I am the first local project leader in the history of this facility,” Gallegos says. “This was my career goal, and then on top of that, we’re having all this phenomenal success.”

The sense of pride runs deep with the staff at Mora. With only a handful of

native trout found in both New Mexico and Arizona, it has been an all-hands-on-deck effort to conserve the Gila trout. Found only in the upper headwaters of the Gila River in New Mexico and Arizona, the striking Gila trout is often described as having taken its coloration from New Mexican sunsets. The fish is iridescent and golden-bodied with small, dark spots that concentrate above its lateral line.

The Gila trout was protected as endangered under the precursor to the Endangered Species Act in 1966 and again in 1973. Then, in 2006, the Gila trout was downlisted from endangered to threatened due to recovery efforts. The reclassification allows recreational fishing in specific areas within New Mexico and Arizona. Mora raises and stocks a large percentage of the Gila trout that anglers find in waterways across the Gila River.

A Reel Dedicated Team

As with many recovery efforts for threatened and endangered species, the hatchery has faced challenges. It had historically experienced low eye-up rates (viable fertilized fish eggs) and survival rates for the Gila trout. Recent procedural changes, spawned from updated scientific techniques, experimentation, collaboration, and infrastructure changes (such as upgraded plumbing, new tanks installed, and upgrades to the reuse systems), brought positive outcomes.

“You cannot be afraid of change,” says Gallegos says. “Do you have something? Let’s try it, and if it works out, it’s phenomenal. I give the team all the credit.”

Mora National Fish Hatchery had a historical average eye-up rate of 20% for the Gila trout. This was concerning. “Every year you produce fish, you might think it was a great year; but, in my opinion, the way you measure success »



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at a fish hatchery is by crunching the numbers and calculating percent eye-up and percent of on-station survival,” Gallegos says. “There’s something going on. We need to figure it out and then work towards implementing new science and new changes to our spawning protocol.”

Gallegos encourages his team to bring solutions to him. Brandon Maes, a fish biologist at Mora, literally did just that when he suggested using a different egg fertilizing solution for the Gila trout and a new method to treat eggs while they are incubating. “Anything is as complicated as you make it out to be, whether it involves implementing new techniques or going back to the basics,” Maes says. “However, perfection is the result of all the small steps done right. There is always room for improvement, and we strive for just that.”

These changes proposed by Maes, along with the new spawning techniques Gallegos proposed, proved to yield higher success rates. After implementing the updated spawning protocols, the eye-up rate increased to an average of 70% in 2023 and 86% in 2024. In fact, some eye-up rates were as high as 98%.

Hooked on Success

Overall juvenile fish survival from 2020 to 2022 averaged 16% (10% in 2022). After implementing new culture techniques and procedures, the survival rate jumped to 85% in 2023 and 91% in 2024. Now, the hatchery exceeds its stocking requests and

has more fish available for recovery and fishing.

“This past year, we hosted 11 interns through different programs,” Gallegos says. “All of the interns have contributed to our success because each of them has helped in one way or another. I can’t stress enough how proud I am of the whole team, the facility, how grateful I am for everybody who came to help, and how proud I am for the great accomplishments and success we have achieved together.”

Partnering Together

Gallegos led the efforts to create the Gila Trout Work Group two years ago to share best practices. This group is a collaboration between Mora and the two state hatcheries that breed and raise Gila trout for sport fishing: Glenwood State Fish Hatchery in New Mexico and Canyon Creek State Fish Hatchery in Arizona. The group exchanges information about annual Gila trout production at their respective stations, including hatchery results, challenges, and successes. The goal is to have the two other facilities raising Gila trout achieve the same or better results.

“I can’t tell you how many employees and partners that have contributed to the hatchery’s success because there are so many,” Gallegos says. “This not only includes the Service, but other federal agencies, state partners, and volunteers. So many have helped in one way or another.”

In January 2025, the hatchery hosted the second Annual Gila Trout Work Group meeting. There were hatchery updates, discussions about updated protocols, and a tour of Mora showing the infrastructure changes such as the plumbing, new tanks, and upgrades to the reuse systems.

Keeping an Eye on Today and Tomorrow

In addition to its primary purpose of supporting the Gila trout recovery program by spawning fish and »

(Top) Employees at Mora National Fish Hatchery gather Gila trout into nets. (PHOTO BY USFWS)

(Middle) Daniel Gallegos (left) and Brandon Maes net Gila trout during spawning at Mora National Fish Hatchery. (PHOTO BY BRETT BILLINGS/ USFWS)

(Bottom) Staff at Mora National Fish Hatchery sort through viable fish eggs. (PHOTO BY USFWS)

maintaining future broodstock, Mora also works to meet all its recovery stocking goals for partners and provide any surplus fish to New Mexico and Arizona for sport fishing.

“When I first started here, producing 30,000 Gila trout was considered a great year,” Gallegos says. “In 2024, we ended up producing almost 290,000 viable eyed eggs, shipped 130,000 eyed eggs to Canyon Creek State Fish Hatchery, kept and hatched out the remaining 160,000 eyed eggs, and ended up stocking about 112,000 fish for recovery and recreational purposes. This is hands down the best year we have ever had in the entirety of the facility.”

Mora is one of the many federal hatcheries that raise fish to help restore and sustain these populations for the ecosystem and the American people. Because of its incredible efforts, there are more Gila trout stocked in the mountain rivers of New Mexico and Arizona. Not only does this support the recovery of this threatened species, but it also gives the public an even better chance of catching one.

“This is the public’s hatchery,” Gallegos says. “We just take care of it, but it’s for the public.”

SANDRA GLADISH, Southwest Region

(Top) The Gila trout was protected as endangered under the precursor to the Endangered Species Act in 1966 and again in 1973. Then, in 2006, the Gila trout was downlisted from endangered to threatened due to recovery efforts. (PHOTO BY USFWS)

(Bottom) Service employees, partners, and volunteers transfer Gila trout to mountainous streams. (PHOTO BY USFWS)





Most artists dream of having their work displayed where thousands of people will see it. For Margaret Lepeshkin, it's equally important that her artwork be seen by birds.

Her new work, on permanent display at the University of Massachusetts Amherst's Studio Arts Building, is visible to human and avian viewers alike.

Lepeshkin created the winning design for the "Make UMass Bird-Friendly Art Competition," which invited members of the campus community to submit ideas for adhesive panels to install on the atrium windows at the Studio Arts Building to prevent bird collisions.

Her design features several bird species that can be seen around campus — including a great blue heron, blue jay, cedar waxwing, and peregrine falcon — set against a crosshatch pattern. Once applied to the windows, the high-contrast design provides a visual cue to keep birds from flying into the glass.

"I wanted it to be effective in stopping collisions but also provide a glimpse of what birds can be found on campus," says Lepeshkin, an art major with a

concentration in design and creative technologies who enjoys bird-watching for fun.

In late April, Lepeshkin's design began to take flight. A team of volunteers from the U.S. Fish and Wildlife Service's Northeast Regional Office joined UMass community members to begin the process of applying giant sticker-like panels to the windows ... puzzle pieces that would come together to realize Lepeshkin's design.

After a couple of hours, the volunteers had finished applying decals on the building's seven ground-level panes of glass, a task involving painter's tape, cleaning spray, squeegees, utility knives, many hands, and a lot of patience — particularly on a windy day.

In early May, an experienced crew from the Service finished the job, with the help of a construction lift and a couple of ladders.

Envisioning a Bird-Safe Campus

Although Lepeshkin came up with the design for the panels, the vision behind the initiative originated with Monica Mestre.

Now a UMass graduate student in the Department of Environmental Conservation, in 2022 Mestre was an undergraduate intern with the Service when she tuned into a webinar on the loss of nearly 3 billion breeding birds in North America since 1970.

She learned that every year, more than 1 billion birds collide with glass in the United States alone. Many die from the traumatic injuries they sustain.

Windows are disorienting for birds because they mirror natural elements — like trees, clouds, and the sky. Birds can't distinguish between the reflection and the real world, and sometimes fly directly »



(Previous Page) The completed installation at the entrance to the Studio Arts Building is inviting to viewers and a deterrent to birds. (PHOTO BY BRIDGET MACDONALD/USFWS)

(Previous Page, Left) Service employees use a lift to install decals on the University of Massachusetts Amherst Studio Arts Building. (PHOTO BY BRIDGET MACDONALD/USFWS)

(Previous Page, Right) Service employees install a bird-collision-prevention decal, featuring the signature of the student artist who designed it, at the entrance of the University of Massachusetts Amherst Studio Arts Building. (PHOTO BY BRIDGET MACDONALD/USFWS)

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into the glass. At night, lights left on in buildings attract birds and lead to collisions.

Mestre was impressed to hear that the Service and partners are actively working to address threats to birds, including by modifying buildings to reduce the risk of collisions. The Service led by example at its Northeast Regional Office in Hadley, Massachusetts, installing adhesive film adorned with a pattern of dots spaced two inches apart to the windows in its three-story building.

“It was inspiring,” she says. “I thought, this is such a great idea; I should see if anyone is doing this at UMass.”

To her surprise, nobody was. So, she took the initiative herself.

A Fledgling Initiative

In the fall of 2022, Mestre collaborated with Professor Kelly Klingler — in UMass’s Department of Environmental Conservation at the time, now at Paul Smith’s College in New York — to launch a campus-wide data collection effort to inform the fledgling Make UMass Bird-Friendly initiative.

“We wanted to see which buildings presented the greatest risk to help us prioritize where to retrofit,” Mestre says.

They enlisted students in the Department of Environmental Conservation to conduct daily monitoring of 15 buildings in two sections of campus to look for signs of collisions, following a standard protocol. The students earned lab credits for participation.

After a break for summer, daily monitoring resumed in the fall. Based on observations of other high-risk buildings shared by students, faculty, and staff, they added seven buildings to the monitoring list for spring 2024.

Knowing those 22 buildings represented just a fraction of the vertical infrastructure on campus — there are 198 buildings in total — the team also developed an app-based reporting tool to allow community members to submit data on bird collisions anywhere on campus.

By the end of spring 2024 semester, they had documented 142 bird mortalities just at the 22 buildings that were being monitored. The data showed that six buildings were responsible for 58% of documented collisions. The Studio Arts Building was among them. Only one other building had a higher rate of collisions.

‘Solutions Can Be Beautiful’

The Studio Arts Building stood out among the campus’s high-risk buildings for another reason. It represented an outreach opportunity.

“We thought it would be a good place for a pilot project to educate the community about this issue on campus, and to show through art that solutions can be beautiful,” Mestre says.

Margaret Vickery, a professor in the History of Art and Architecture who joined the Make UMass Bird-Friendly flock, was inspired by a bird-friendly decal design contest held at the University of British Columbia, where about 10,000 birds die every year due to window collisions.

She reached out to the chair of her department to ask if they would be open to doing something similar at UMass. “I thought it would tie in nicely with our program and serve as a catalyst for the larger effort,” Vickery says. The department chair agreed.

In late 2024, the team launched the Make UMass Bird-Friendly Art Competition to solicit beautiful solutions to this tragic but preventable problem.

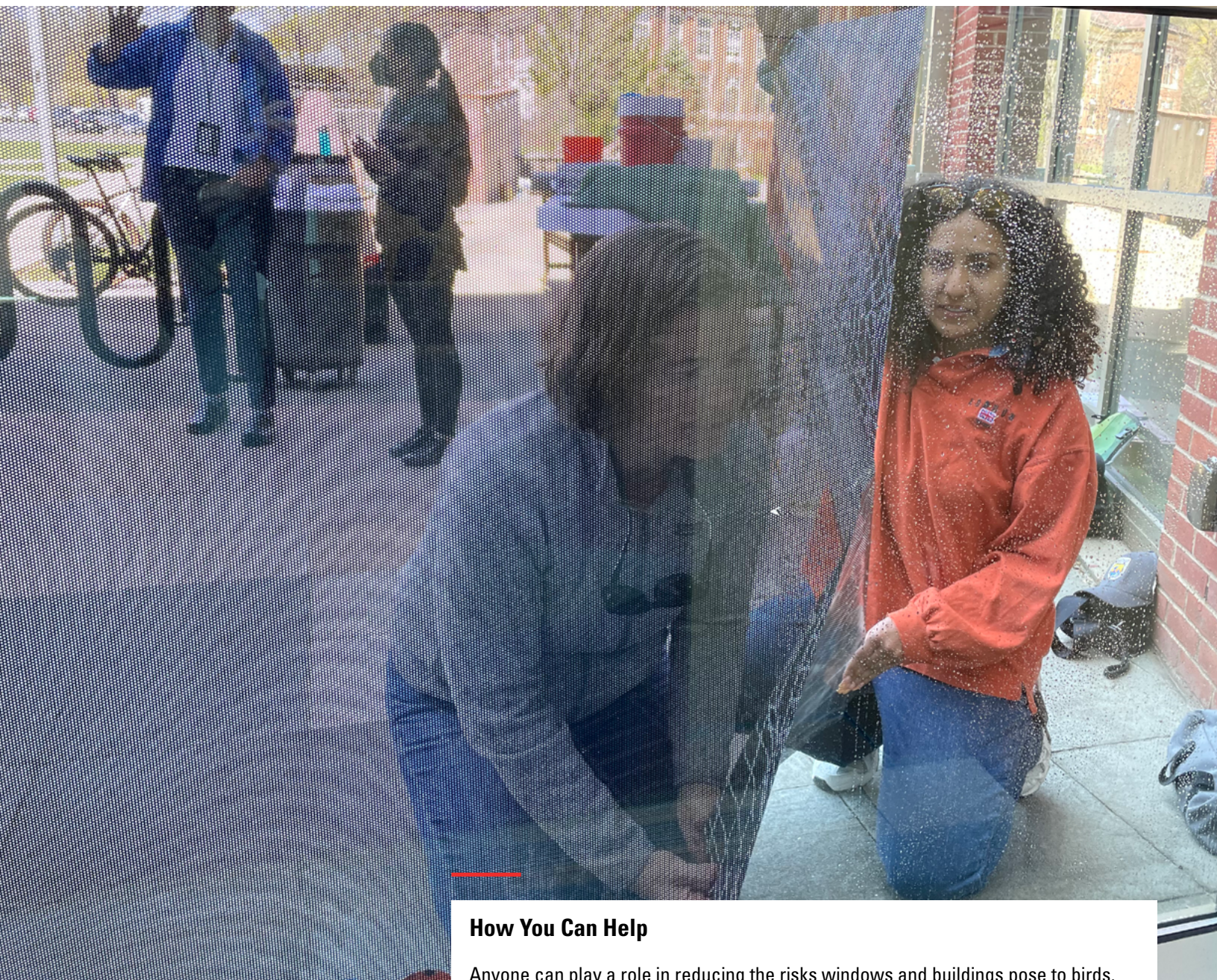
“It is exciting to see Monica’s motivation to start the Make UMass Bird-Friendly initiative become reality with this beautiful retrofit of the Studio Arts Building,” says Randy Dettmers, a senior biologist with the Service’s Migratory Bird Program who helped with the retrofit at UMass. “It’s an inspiring example of how community-led efforts to address a big problem can yield real results that will prevent bird collisions for years to come.”

While the Studio Arts Building is the first bird-friendly retrofit on campus, it won’t be the last. In the short term, Make UMass Bird-Friendly plans to work on window retrofits for five other high-impact buildings on campus. The long-term vision is to grow collaborative momentum to take on the rest.

The core team has already expanded to include additional students and faculty. In addition to Mestre, Klingler, and Vickery, it includes doctoral candidate Rosalyn E. Bathrick in Organismic and Evolutionary Biology, and in the Department of Environmental Conservation, undergraduate students Mark Titus and Feipeng Huang, and Professor Nathan R. Senner.

“It’s really been a team effort,” Mestre says. “Without U.S. Fish and Wildlife Service, the idea wouldn’t have come about.”

BRIDGET MACDONALD, Northeast Region

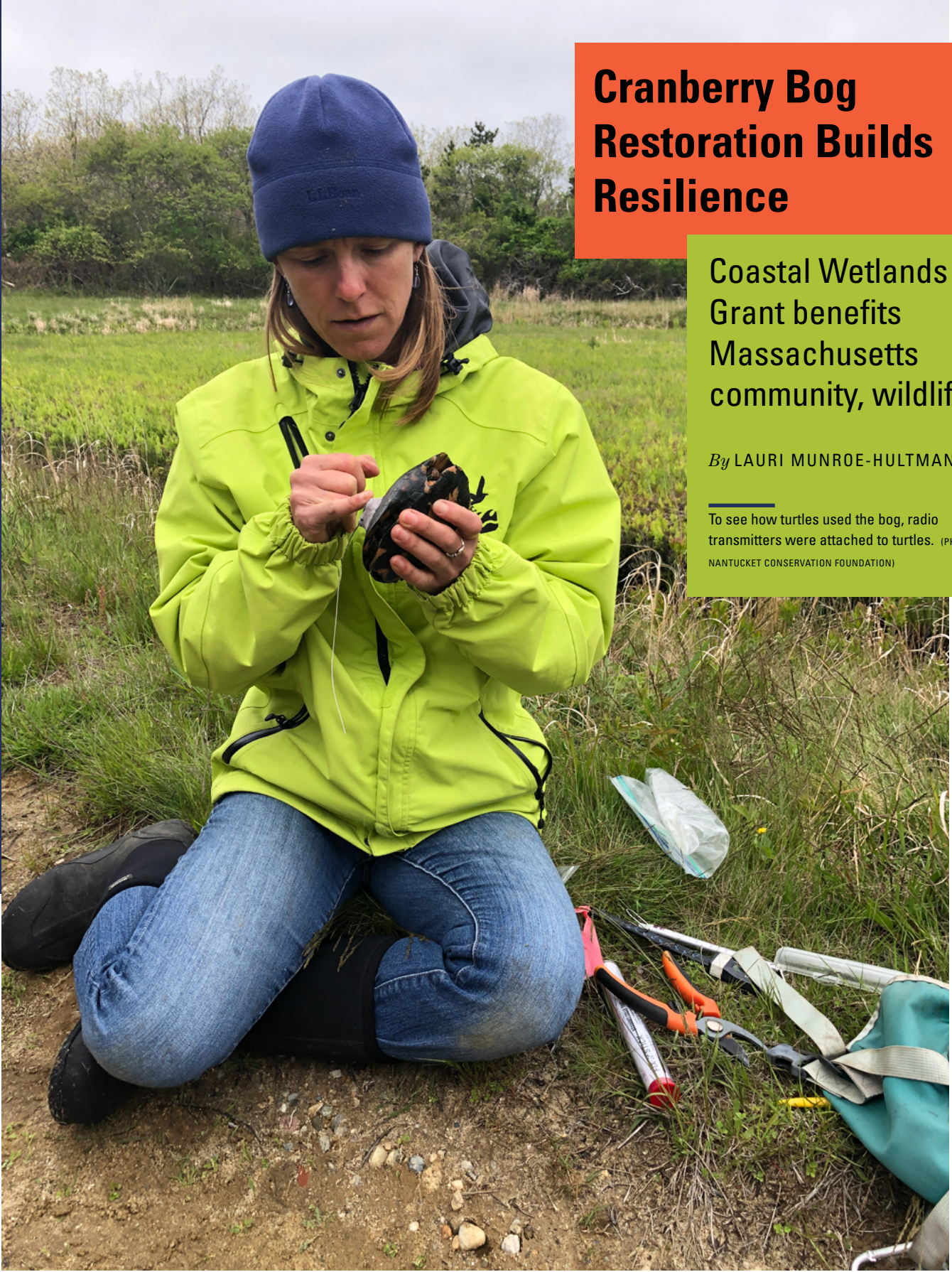


Service employees Maureen Correll and Nicole Yunes Perez apply one of the large, sticker-like decals to a window at the Studio Arts Building. (PHOTO BY BRIDGET MACDONALD/USFWS)

How You Can Help

Anyone can play a role in reducing the risks windows and buildings pose to birds. Check out our collection of [Bird-Collision Reduction Toolkits](#) for tips on how to make your home, workplace or campus safer for our feathered friends. [The Bird Collision Prevention Alliance](#) has helpful resources as well.

If you find a bird that's injured, contact the nearest permitted wildlife rehabilitator. Our interactive [Migratory Bird Rehab Facility](#) map can help you find experts nearby.



Cranberry Bog Restoration Builds Resilience

Coastal Wetlands
Grant benefits
Massachusetts
community, wildlife.

By LAURI MUNROE-HULTMAN

To see how turtles used the bog, radio transmitters were attached to turtles. (PHOTO BY NANTUCKET CONSERVATION FOUNDATION)

Karen Beattie has studied the ecology of Nantucket for 30-plus years. But even she's blown away by the process of restoring Windswept Bog.

"Setting the stage for nature to come in and take over and do the rest of the work ... it's really awe-inspiring," she says. "I'm looking forward to seeing how the site responds."

As vice president of science and stewardship at the Nantucket Conservation Foundation, Beattie's been with the Windswept Bog project from the start, working with a "dream team" of experts and relying on funding from the U.S. Fish and Wildlife Service and others.

Together, they've returned a century-old cranberry bog on the island off Cape Cod, Massachusetts, to a naturally functioning wetland that will serve people and wildlife for generations.

Responding to Changing Conditions

Harvested for thousands of years by the native Wampanoag people, cranberries are one of the few crops that thrive in Nantucket's sandy, nutrient-poor soil. They've been grown commercially for more than 150 years, and cranberries once offered residents a source of income outside the tourist season.

The Nantucket Conservation Foundation owns both historically significant cranberry bogs on the island: Milestone and Windswept. Milestone was once the largest contiguous cranberry bog in the world. The foundation has continued production there since acquiring the property in 1968.

The 40-acre cranberry bog at Windswept produced for about a century, including after purchase by the foundation in 1980. In 2018, however, leadership decided to cease cranberry operations due to economic and environmental concerns.

Cranberries rely on traditional seasons to thrive. The plants need cold winters to generate blossoms and fruit. If spring-like weather comes early, they may produce premature blossoms that are killed by sudden, late-spring frosts. And the berries rely on cold fall nights to create their deep-red color just before harvest.

Shifting environmental conditions have reduced production in Massachusetts and

brought increased competition from Canadian growers.

"Our climate is now more like New Jersey, or even Delaware and areas farther south," Beattie says. "This has also brought a whole new suite of insects and fungi."

As a natural basin, Windswept Bog collects runoff from surrounding roads, residential septic systems, and lawns. That runoff contains pollutants like fertilizers and bacteria. Fertilizers were also applied directly to the bog during cranberry cultivation.

A healthy wetland would have filtered out pollutants. Instead, layers of sand applied over decades to encourage cranberry growth let runoff flow quickly through Windswept into Polpis Harbor and eventually Nantucket Harbor, where high levels of bacteria and nitrogen threaten the island's scalloping and boating industries.

Restoration to a naturally functioning wetland addresses these issues.

"We felt it would be the right thing to do for the property itself," Beattie says. "We wanted to restore ecological services, but the other thing was this site is a really important property of ours and provides a lot of public access, use, and enjoyment on behalf of the public."

In addition to the bog, the 231-acre property includes more than 100 acres of

natural wetlands and about 80 acres of upland habitat. It's also connected to several thousand additional acres of protected land. As part of the project, low-profile boardwalks were built so hikers and bird-watchers can explore the restored bog without harming sensitive plants.

Finding Funding

Cranberry farming began in Massachusetts in the early 1800s. More than 13,000 acres in the state's southeast are still managed for cranberries. But adjusting to changing economic and environmental conditions isn't easy.

While Massachusetts supports farmers in improving the efficiency of their bogs, it also created the Cranberry Bog Restoration Program in 2018. Jessica Cohn is an ecological restoration specialist with the Massachusetts Department of Fish and Game's Division of Ecological Restoration, which oversees that program.

"There was an unfortunate perfect storm in the cranberry industry, with out-of-state competition, challenges with water resources, and a desire by some growers to stop farming cranberries in Massachusetts," Cohn says. "The state realized there could be a lot of land in transition."

Abandoned cranberry bogs tend to become upland habitats, rather than revert to their wetland beginnings. The program offers farmers the option of taking bogs out of production and »



Jessica Cohn (green jacket), with the Massachusetts Department of Fish and Game's Division of Ecological Restoration, gives a tour of Windswept Bog to project partners from one of the new boardwalks. (PHOTO BY NANTUCKET CONSERVATION FOUNDATION)



Windswept Bog before restoration. (PHOTO BY NANTUCKET CONSERVATION FOUNDATION)

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restoring them to functioning wetlands that provide wildlife habitat, water filtration, and coastal resilience. Interested landowners can apply for technical assistance and funding to move a bog from a highly altered landscape to a more natural one.

“It creates a good partnership from the front end, done with a lot of hope and excitement about honoring the land and returning it to a healthy state,” Cohn says.

Massachusetts has restored nearly 500 acres of wetlands and more than 10 miles of stream through seven completed cranberry bog projects. Seventeen more are in various stages of planning, design, permitting, and construction.

The Division of Ecological Restoration chose Windswept Bog as a priority restoration project in 2020, granting the Nantucket Conservation Foundation and project partners more than \$1.6 million.

In 2024, the Service awarded a \$1 million National Coastal Wetlands Conservation Grant to the project. These grants conserve, restore, and enhance coastal wetland ecosystems and nearby uplands. Since 1992, we’ve granted more than \$530 million, contributing to the long-term conservation and restoration of 600,000 wetland acres.

National Coastal Wetlands Conservation Grants are just one funding source under the Sport Fish Restoration Act, which turns 75 in 2025. Manufacturers and importers of sport-fishing equipment,

electric motors, fishing tackle, yachts, and pleasure craft pay taxes and import duties on their products, and recreationists pay taxes on fuel for motorboats and small engines. Together, these revenues have provided \$12 billion to states to ensure Americans have the best sport fisheries in the world.

“Coastal wetlands provide valuable habitat for countless species of wildlife, including some at risk of becoming threatened or endangered,” says Chris Dwyer, biologist with the Office of Conservation Investment in the Service’s Northeast Region. “They also absorb stormwaters and buffer wave action that might otherwise cause flooding and erosion.”

National Coastal Wetlands Conservation Grants of \$1 million have supported cranberry bog restoration in Massachusetts from the beginning:

- Eel River Headwaters, in Plymouth, was the state’s first project, completed in 2010, before the formal Massachusetts program was created. It restored 40 acres of wetland, 1.7 miles of stream and 20 acres of upland.
- Tidmarsh Farms — the largest freshwater wetland and river restoration undertaken in Massachusetts — followed in 2016, restoring 610 wetland acres and 3.5 miles of stream in Plymouth.
- Cold Brook, in Harwich, was completed in 2024, restoring 46 wetland acres and one mile of stream.

- Mill Brook Bogs, in Freetown, will begin construction in 2025.

The U.S. Environmental Protection Agency’s Southern New England Program and the Richard King Mellon Foundation also provided funding to support restoration of Windswept Bog.

Renewing Windswept

For cranberry production, Windswept Bog’s 40 cultivated acres were divided into 14 units by berms containing water-control structures. Ditches drained the surface, as did a one-to-three-foot layer of sand built up over a century. Upland plants had begun to take root.

Over two phases, in 2024 and 2025, crews removed more than 2,500 feet of berms and 28 water-control structures, filled »





A restored Windswept Bog. (PHOTO BY NANTUCKET CONSERVATION FOUNDATION)

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ditches, and dug up the sand layer to restore more natural water movement through the site. They also “roughened” the surface, breaking up the cranberry mat to release seeds of native wetland plants lying dormant below.

“If you can get the hydrology right, the plants start to recover, and eventually the soils and peat start rebuilding,” Cohn says.

Some sand from the bog was placed in adjacent upland areas to create sandplain grassland habitat, a regionally rare habitat found on Nantucket. Foundation staff harvested seeds from native grassland plants on its other properties — capturing local varieties — to replant the upland.



Heavy equipment removes sand from Windswept Bog. (PHOTO BY NANTUCKET CONSERVATION FOUNDATION)

“This is the first large-scale habitat restoration project we’ve undertaken,” Beattie says, “and I’ve learned so much from working with this team of experienced people. It’s kind of jaded me in terms of future projects and expectations of perfection.”

Tracking Change, Charting a Course

Funding from the state supported monitoring of the site before, during, and after restoration. The foundation’s ecology staff studied wildlife and plant populations, surface and groundwater flow, and water quality. Results from pre-construction monitoring guided the timing of restoration activities.

“Our team did a lot of research into the property to understand it better before we actually put any shovels in the ground,” Beattie says.

Turtles were fitted with radio transmitters so researchers could track their use of the bog. Data showed the animals were active there in the spring, summer, and fall but traveled to nearby wetlands to hibernate in winter.

To protect the turtles and nesting songbirds, work was limited to winter. Splitting it across two years allowed researchers to observe a growing season in between, which led to changes in Phase II. They were excited to see turtles return to the bog after Phase I.

“We always set aside funds for monitoring for learning,” Cohn says. “We like to check up on our sites at specified time

periods to learn what’s going on. We want to make sure what we’re doing is actually helping and find ways to make it better, more efficient.”

Looking to the Future

Within a decade, Windswept Bog should be a functioning freshwater wetland serving the wildlife and people of Nantucket. But the sea is creeping closer.

Though Windswept is half a mile from the coast now, the National Oceanic and Atmospheric Administration predicts saltwater will reach its northwestern quadrant by 2100. The restored bog will give coastal salt marsh habitat, which is becoming scarce, a place to go as it retreats from rising seas.

In the distant future, Windswept Bog’s freshwater wetland plants will likely be replaced by salt-tolerant ones, and the habitat will shift to salt marsh, absorbing waves and storm surge from an encroaching ocean.

“When we intervene with restoration, we set the site back on a trajectory of a healthy wetland,” Cohn says, “and healthy wetlands are more resilient to change.”

Windswept Bog, in its various incarnations, has served Nantucket for millennia. Thanks to everyone involved in its restoration, it should continue to do so for a long time to come.

LAURI MUNROE-HULTMAN, Northeast Region

MUSEUM OBJECTS COME TO LIFE

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



Conservation Hero Edmund Lee Goldsborough

Coming soon to the U.S. Fish & Wildlife Service Museum and Archives is an exhibit delving into the life and work of Edmund Lee Goldsborough (1868-1953). Goldsborough worked for the Bureau of Fisheries (one of our two predecessor agencies) and lived 10 minutes from today's National Conservation Training Center in Shepherdstown, West Virginia, placing him close to our heart in more ways than one.

Goldsborough was a diligent lifelong learner. He co-authored reports about the fish populations of Hawai'i and Alaska, both of which he studied

in person. Behind Goldsborough's humility, you discover an impressive expedition from the U.S. East Coast to Hawai'i and the crown of royalty among Shepherdstown orchardists. From Goldsborough's legacy, we find the timelessness of the love of the natural world and appreciation of the bonds it brings us.

In addition to the exhibit at NCTC, we will be launching a companion exhibit on our Google Arts and Culture site later this year. Please visit the Goldsborough exhibit in person at NCTC or online, and learn all about this amazing Conservation Hero.

(GENE DAVIS, MUSEUM INTERN, U.S. FISH & WILDLIFE SERVICE MUSEUM AND ARCHIVES)



Take a Virtual Tour

The U.S. Fish & Wildlife Service Museum and Archives has four online exhibits, available on Google Arts and Culture. Explore our featured collections: Wildlife Portraits for a Cause, The First Stewards, Journey Under the Sea-Wind with Wildlife Illustrations, and Bob Hines, National Wildlife Artist. In addition to the exhibits, explore over 150 artifacts in the online collection that connect the rich history of American conservation.

[Link to Tour](#)

Bison at the CSKT Bison Range, formerly the National Bison Range.
(PHOTO BY STEVE HILLEBRAND/USFWS)



The Bureau of Fisheries transported fish via fish railcar.

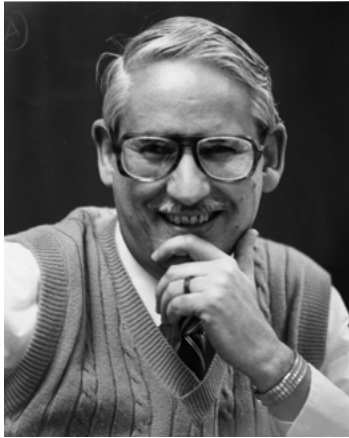


Swinging for Life

You may have seen tinier versions of this object today if you go down to a bar and order a drink with ice! This object is a wooden mallet, and it is from Spearfish National Fish Hatchery, now called D.C. Booth Historic National Fish Hatchery & Archives. This mallet was discovered on site in the original hatchery building. It's large, measuring over 3 feet in length and head of the mallet weighs a significant amount. While mallets are usually used to knock pieces of wood together, this mallet was most likely used to break ice on the hatchery grounds. Ice was broken and stored at the hatchery icehouse so it could later be used to transport fish during the warm season. In fish railcars, ice would be added into pails of fish to allow for the fish to remain cold and to aerate them. So, the next time you watch a bartender use a mallet to break ice, remember that fisheries staff were using much larger mallets to break ice for fish.

(TAYLA BAHR, MUSEUM TECHNICIAN, NATIONAL FISH & AQUATIC CONSERVATION ARCHIVES)

in memoriam



On March 20, 2025, former U.S. Fish and Wildlife Service Director **Lynn Adams Greenwalt** (1931-2025) died at the age of 94. Mr. Greenwalt was raised within the National Wildlife Refuge System and during his long career oversaw some of our nation's most beautiful and remote places before ultimately running the agency that nurtured him over the decades.

Mr. Greenwalt was the son of a newspaperman turned refuge manager, Ernest Greenwalt, and he inherited his father's eloquence and love for public lands. For the first five years of his life, Mr. Greenwalt lived on Charles Sheldon National Wildlife Refuge, now Sheldon National Wildlife Refuge, in northwest Nevada.

As there were no schools near this remote refuge, his family moved, and Mr. Greenwalt spent nearly 20 years at Wichita Mountains Wildlife Refuge in Oklahoma. During his Wichita Mountains childhood that was marked by the Great Depression in the 1930s, Mr. Greenwalt would watch motion pictures

at one of the three Civilian Conservation Corps Camps located on the refuge, which was remarkable for that time and place. He collected scrap metal for World War II.

Having grown up surrounded by wildlife and their habitats, Mr. Greenwalt was inspired to earn a Bachelor of Science degree in zoology from the University of Oklahoma in 1953 and a Master of Science in wildlife management from the University of Arizona in 1955.

While working on his undergraduate degree, Mr. Greenwalt worked summers at Wichita Mountains Refuge cleaning toilets, hauling garbage, and repairing roads and facilities. There he met his future wife, Judy Cunningham, herself the daughter of a refuge manager. She shared Mr. Greenwalt's passion and dedication to the refuge system. They married in 1955.

After serving in the U.S. Army for two years and briefly cleaning campgrounds and repairing fences for his father who was then at National Elk Refuge in Wyoming, Mr. Greenwalt finally got a permanent job with the Service in 1957 at Salt Plains National Wildlife Refuge back in Oklahoma. He would go on to become refuge manager at Bosque del Apache National Wildlife Refuge in New Mexico, and then at a new refuge in a remote part of western Utah called Fish Springs National Wildlife Refuge.

Mr. Greenwalt's talents were evident and in 1962, he was promoted to refuge supervisor at the Albuquerque regional office, later moving to Minneapolis to

serve as the associate regional supervisor for the refuge system. In 1970, his career led him to Portland, Oregon, where he served as the regional supervisor of Law Enforcement. Two years later, he became Chief of the National Wildlife Refuge System, working out of Washington, DC. He also acted briefly as special assistant to the Director.

In October 1973 at the age of 42, Mr. Greenwalt was tapped to be the Director of the Service. He served in the role from 1973 to 1981, witnessing and stewarding a huge transformation in conservation serving under Presidents Richard Nixon, Gerald Ford, and Jimmy Carter.

During Mr. Greenwalt's tenure, he helped lead the implementation of the newly passed Endangered Species Act (1973) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1975). He also oversaw the 54-million-acre expansion of the National Wildlife Refuge System through the Alaska National Interest Lands Conservation Act (1980). Mr. Greenwalt managed these challenges and opportunities with political acumen and a

compass that always pointed toward conservation.

After leaving the Service, Mr. Greenwalt worked for the National Wildlife Federation (NWF) for 13 years, following the footsteps of an earlier director, Jay N. "Ding" Darling who founded NWF. Mr. Greenwalt continued to travel, teach, mentor many, and speak out passionately for the agency that he was so deeply connected to and so ably led.

In a 2003 issue of *Fish & Wildlife News* dedicated to the centennial of the refuge system. Mr. Greenwalt wrote: "Wichita Mountains and Fish Springs still have a hold on me. If I have any sense of deprivation, it is that I can't go back again to recapture the joy and sheer pleasure of living on a refuge."

Mr. Greenwalt's contributions to fish and wildlife conservation will forever be remembered as part of the Service's legacy. Our condolences go out to his family and friends.



Lynn A. Greenwalt (center) is sworn in as Director of the Fish and Wildlife Service by Secretary of the Interior Rogers C.B. Morton (right). To Mr. Greenwalt's right is his wife, Judy. Between Mrs. Greenwalt and Mr. Morton is one of the Greenwalts' young sons. (PHOTO BY STEVE HILLEBRAND)

Federal Wildlife Officer Robert Sundown Served on the Front Lines of Conservation

By KRIS PACHECO



(PHOTO BY BOYD BLIHVDE/USFWS)

It would be difficult to talk about Refuge Law Enforcement at Yukon Delta National Wildlife Refuge without talking about the late Federal Wildlife Officer/airplane pilot Robert Sundown.

Growing up in Scammon Bay, a village along the western coastline of the refuge, Sundown had a literal lifetime of experience on the refuge. After receiving his degree in biology from the University of Alaska Fairbanks, Sundown started his career with the U.S. Fish and Wildlife Service in 2000 focusing on fisheries management and working on the Kwethluk River Weir at the refuge. It wasn't long before refuge leadership noticed that Sundown's lifetime of experience in the outdoors, education in

biology, experience with fisheries management, and special way of communicating with the public, made him an exemplary federal wildlife officer candidate.

Listening to stories Sundown's siblings tell about him as a kid, it's clear he always had his eye on the sky. Having the freedom to explore Alaska from the cockpit of a plane was a well-known ambition. A career in Refuge Law Enforcement was his ticket to that dream, and in the fall of 2001, Sundown went to the Federal Law Enforcement Training Center to start his career as a federal wildlife officer and soon began to pursue his dream of becoming a pilot.



Robert Sundown on a boat working a gillnet.

(PHOTO COURTESY OF NILI SUNDOWN)

Busy as a federal wildlife officer and raising a family, Sundown didn't have it easy finding the time to rent planes and take flight lessons on his off time. But eventually, he got the right credentials to add "airplane pilot" to his official job title.

Adding to his list of skills exponentially increased the area he could patrol as a federal wildlife officer. Sundown quickly obtained certifications to fly a tail dragger and planes with floats and skis. If there was any chance of landing a plane at a site on the refuge, Sundown could do it and do it safely.

Safety was ingrained in Sundown's personality. He displayed it in every aspect of his job. Whether he was at the controls of a plane, the helm of a boat, or the handlebars of a snow machine, his passengers knew he'd get them to their destination safely. As he became more experienced, his knowledge spilled over to those around him. He became an instructor in various roles, including a certified flight instructor. Sundown had a passion to serve those around him, and his position with the refuge was the perfect outlet.

Federal wildlife officers are among the most visible conservation professionals within the U.S. Fish and Wildlife Service. Throughout his two decades working on the refuge, Sundown had a huge »



Continued from previous page.

influence on those he worked with, not only his co-workers, but the people in rural villages. As a federal wildlife officer, Sundown served at the “front lines” of fish and wildlife conservation. While he represented the U.S. government in every interaction he had with the public, he also brought his understanding of the people and their ways of life as he enforced and provided education on the regulations for hunting, trapping, and fishing on and around Yukon Delta National Wildlife Refuge.

“He was talking from a perspective of an indigenous individual, and not just from law enforcement,” widow Nili Sundown says. “I think he excelled because of that, because he was able to look at things from a different perspective.”

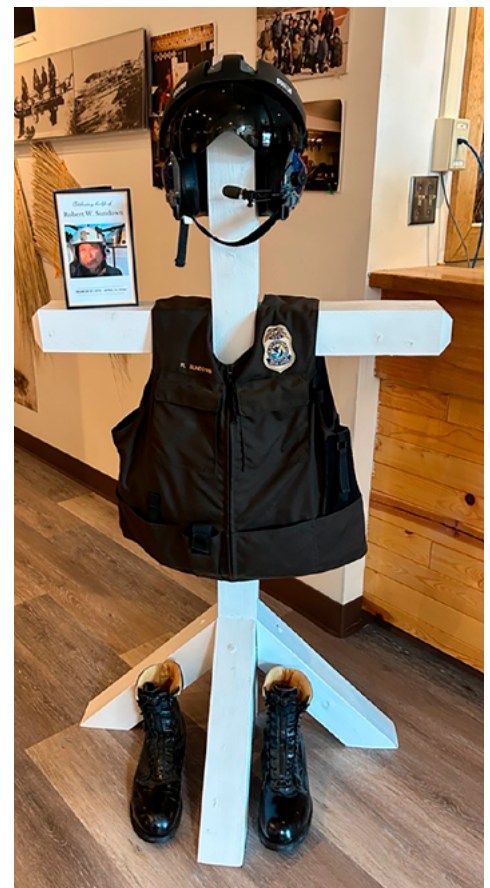
Working as though an architect, Sundown’s focus was on building up those around him, which was essential for the success of Refuge Law Enforcement on the Yukon Delta. For nearly three years, Senior Federal Wildlife Officer Matthew McDonald served as Sundown’s right hand and “professional back seater” of the

planes they traveled in. Sundown shared everything he knew about working in the Yukon Delta with McDonald. Having grown up on the delta, Sundown knew very well the cultures and uniqueness of each village in and around the refuge. He introduced McDonald to the people he had built relationships with over his 20 years working on the refuge. These relationships are essential for the mutual flow of information and in some cases, can be life-saving.

“Robert was the type of FWO that other officers inspire to be,” McDonald says.

On 15 April 2023, Sundown unexpectedly died at the age of 53 during a moose hunt on the refuge he spent his life serving. His influence in the region was easy to see as over 200 people gathered to honor his life in Bethel, Alaska. His legacy and experience live on through those that were fortunate enough to be one of his students.

KRIS PACHECO, Alaska Region



(Top left) Robert Sundown did not let a snow-covered runway stop him from using his aircraft. Skis equipped on the landing gear were a valuable tool to keep Sundown flying in the winter. (PHOTO COURTESY OF NILI SUNDOWN)

(Bottom left) Federal Wildlife Officer/airplane pilot Robert Sundown after a landing his single engine plane on floats. (PHOTO COURTESY OF NILI SUNDOWN)

(Right) A memorial for Federal Wildlife Officer Robert Sundown in the Yukon Delta National Wildlife Refuge Visitor’s Center in Bethel, Alaska. (PHOTO BY LAURIE BOECK/USFWS)

Fish & Wildlife *News*

U.S. Fish and Wildlife Service

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parting shot



School for Turtles

The opportunity to take part in the head-starting of local wood turtle hatchlings was too good to pass up for Bangor and Stroudsburg high schools in eastern Pennsylvania. Both schools eagerly agreed to participate. Here, Bangor High School students hold a young wood turtle. WATCHES (ROBERT HACHTMAN/STROUDSBURG HIGH SCHOOL)

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[Fish & Wildlife News](#) archive

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