# Uncharted Waters: Building Resilience in the Face of Climate Change

# 2023

## FISH AND AQUATIC CONSERVATION ANNUAL REPORT

# Message From Dave Miko

## *Assistant Director, Fish and Aquatic Conservation*

We are an agency that is continually looking ahead, because we recognize that the challenges of today are the opportunities of tomorrow. For over 150 years, we've embraced this ethos, consistently learning from past experiences to inform future endeavors. Guided by the best available science and strengthened by our expanding ecosystem of partnerships, we are working toward a future defined by resilient habitats, healthy and abundant fish and aquatic wildlife populations, and communities that are free to enjoy the benefits of the natural world without barriers.

We remain committed to that future, even in the face of a dramatically shifting climate. Navigating changes in water temperature and flow, habitat fragmentation, and species loss will demand the use of our Service values of stewardship, integrity, respect, collaboration, and innovation. In this year's annual report, we share some perspectives from both headquarters and field staff, shedding light on how climate change impacts the programs they champion and the transformations they witness firsthand. You'll read about pioneering partnerships to improve fish passage, essential outreach work building trust with marginalized communities, the evolving operational landscape of hatcheries as they respond to climate-induced threats, and the challenges we face as climate change allows invasive species to exploit newfound habitats. We share these perspectives because they represent our greatest asset – you, the passionate and innovative staff of the Fish and Aquatic Conservation (FAC) program.

In 2023, our collaborative efforts yielded significant milestones. We removed 118 barriers to reconnect over 2,200 miles of aquatic habitat, conducted hundreds of population assessments, and restored 24,000 acres of habitat to benefit aquatic species. We released 126 million fish from hatcheries to directly support heathy fisheries, bolster recreational economies, and honor our Tribal trust responsibilities. Our facilities welcomed nearly 1 million visitors, while our outreach efforts reached over 27,000 children - an impressive testament to our impact.

We extend our heartfelt gratitude to the dedicated team of over 1,200 permanent, term, and seasonal employees nationwide who make up the backbone of the FAC program. Thanks to your unwavering commitment, we are steadfast in our mission to ensure that America's fisheries remain among the most abundant and diverse in the world.

Dave Miko - Assistant Director, Fish and Aquatic Conservation.  Photo credit: Devin DeMario

A pair of spawning sockeye salmon.  Photo credit:  Katrina Liebich/USFWS

# Contents



## Fish and Aquatic Conservation Climate Change Action Plan

Climate change is stressing aquatic ecosystems. Temperatures are rising, annual events like snow melt that supply streams are changing, parts of the country are becoming hotter and drier, in other areas heavier rains are overtopping riverbanks, and sea level is rising affecting coastal species and facilities. With climate change, invasive species are reaching new areas and surviving and thriving where previously they could not, further stressing fish and wildlife. The Fish and Aquatic Conservation (FAC) program is stepping up to meet these challenges under our newly developed FAC Climate Change Action Plan. The plan identifies FAC-specific actions that flow from the seven elements of the U.S. Fish and Wildlife Service's Climate Change Action Program. It serves as an umbrella document guiding and unifying FAC's work throughout the country to address climate change, increasing resilience of aquatic systems and reducing our carbon footprint. Examples of some of the work we are doing to meet the challenge of climate change are featured throughout this Annual Report.

# Fish and Aquatic Conservation

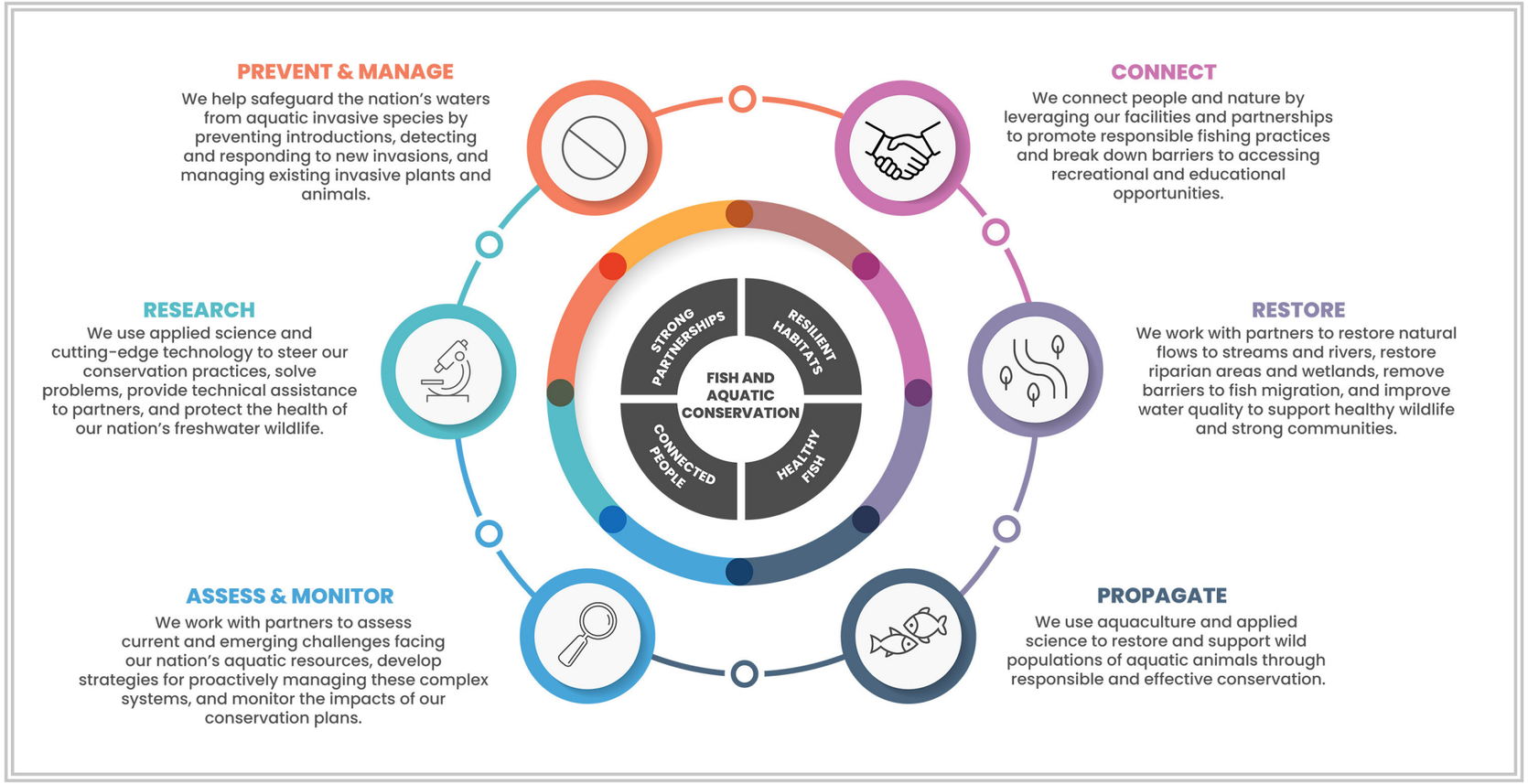
## A fish (success) story based on strong partnerships, resilient habitats, healthy fish, and connected people

### Perspective by Teresa Lewis

*Acting Deputy Assistant Director, Fish and Aquatic Conservation*

November 18, 2008. The first day I saw an Apache trout. The first time I handled a native trout as an employee for the U.S. Fish and Wildlife Service (Service). I'd been working for the Service for only three weeks.

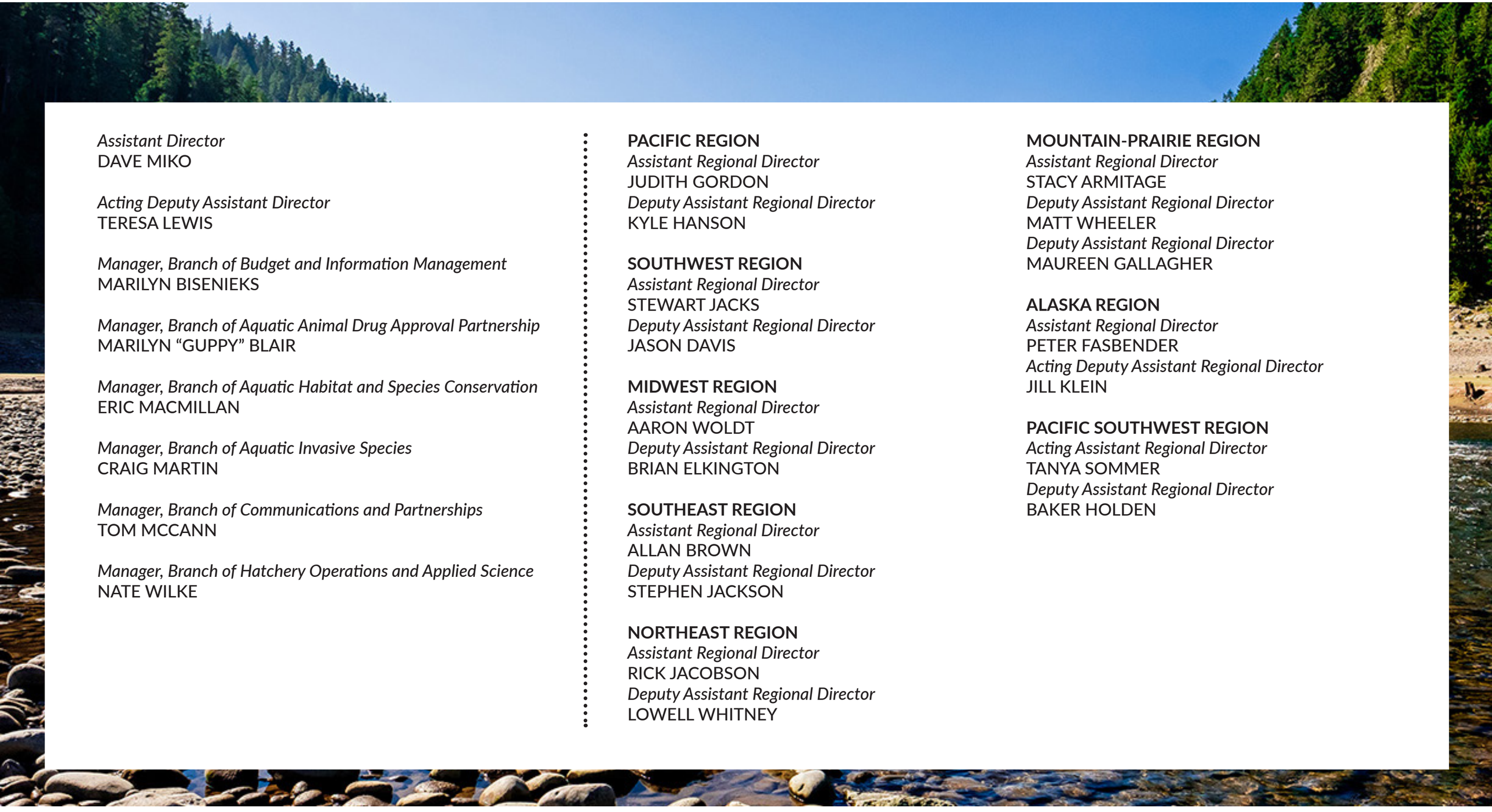
The White Mountain Apache Tribe (WMAT) have been good stewards for this species from time immemorial. They have been an important part of the formal recovery partnership that includes the WMAT, Service, U.S. Forest Service, Arizona Game and Fish Department, and Trout Unlimited. In 1955, the WMAT first put in place actions to conserve this important fishery and more recently, WMAT has been working to improve connectivity of populations of Apache trout using National Fish Passage Program project funding from the Bipartisan Infrastructure Law and involving additional partners.




The Apache trout story is based on strong partnerships, the resilient habitats of the White Mountains, and healthy fish that are produced using best management practices that maintains genetic integrity and monitors for pathogens of concern. Another important element of the successful work that contributed to the proposed delisting for Apache trout is the connection that the WMAT and partners has been able to build between the Tribe's community, especially students, and partnering agencies engaged in Apache trout recovery. The work conducted by student trainees is important to recovery of the species as well as building strong interest and connections to conservation careers.

It is 16 years later, and I still think Apache trout are beautiful, spiritual animals. In August 2023, the species was proposed for delisting, and it is the first listed trout species to achieve this goal. I'm honored to have been a small part of the work done to recover a species that is such an important fish to the White Mountain Apache Tribe, multiple recovery partners, the people of Arizona, and to native trout anglers.

# Meet the Fish and Aquatic Conservation Management Team



*Assistant Director*
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*Acting Deputy Assistant Director*
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*Manager, Branch of Aquatic Animal Drug Approval Partnership*
MARILYN "GUPPY" BLAIR

*Manager, Branch of Aquatic Habitat and Species Conservation*
ERIC MACMILLAN

*Manager, Branch of Aquatic Invasive Species*
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*Manager, Branch of Communications and Partnerships*
TOM MCCANN

*Manager, Branch of Hatchery Operations and Applied Science*
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# Stocking for the Future

Makah NFH propagates and releases fall-run Chinook salmon, coho salmon, and winter-run steelhead to support Tribal fisheries, and commercial and recreational harvest.  Photo credit:  USFWS

For more than 150 years, national fish hatcheries have supported wild populations of aquatic animals through responsible and effective conservation aquaculture and applied science. However, across the country national fish hatcheries are facing new and fundamental challenges to that charge.

Water sources are changing, habitats are shifting, and invasive species are threatening native wildlife like never before. To meet these challenges, the hatchery system is identifying opportunities to modernize our facilities with a focus on developing climate resiliency. By collaborating with Fish and Wildlife Conservation Offices, Fish Health and Fish Tech Centers on applied science efforts, hatcheries can expand their expertise in captive propagation. As we all work to respond to the threats of global climate change, the National Fish Hatchery System's experience as a conservation innovator is more important than ever.

## Perspective by Taylor Lipscomb
*National Hatchery Operations Coordinator*

National fish hatcheries, in many ways the bedrock of the modern U.S. Fish and Wildlife Service (Service), have served as the national leader in the use of aquaculture as a tool for conservation for over 150 years. In that time, aquaculture technologies, conservation priorities, and even what species are raised for what purpose have all evolved considerably. Effects of climate change have further complicated how hatcheries operate by threatening water supplies and forcing operational changes to accommodate warming temperatures.

Today, the average age of the existing 72 national fish hatcheries stands at ~ 83 years old. Aging infrastructure coupled with fiscal realities have led to a nearly $480 million deferred maintenance backlog at these facilities. This combination of disrepair and misalignment between programmatic goals and infrastructure provides a unique opportunity to modernize the Service's National Fish Hatchery System to better suit the aquatic conservation needs of the next 150 years.

In an effort to evaluate the scale and scope of modernization requirements in the National Fish Hatchery System, the Fish and Aquatic Conservation program of the Service contracted the review of five hatcheries in different areas of the country with unique programmatic priorities. The resulting reports for individual stations as well as a synthesis of uniting themes illuminated degraded water supplies, biosecurity limitations, changing species-based aquaculture needs, and deteriorating rearing infrastructure as the most common imminent challenges. Also, vulnerabilities to climate change risks have been evaluated for several hatcheries, adding further complexity to the issue of modernization.

The National Fish Hatchery System is as important today as it was 150 years ago. A wide array of conservation tools, including captive propagation, will be vital to ensure the continuation of healthy and diverse ecosystems. With the right investments, we can address these issues, and other modernization needs, to ensure the continued conservation leadership of our national fish hatcheries in the face of climate change.

**20 million**
**Federally Listed Animals Released or Transferred From a National Fish Hatchery**

**49 million**
**Eggs Transferred Through the National Broodstock Program**

**118 million**
**Sport Fish Stocked to Support Recreational Fisheries**

**126 million**
**Fish Released by National Fish Hatcheries**

**2023 Numbers**

## Volunteers Are the Heart and Soul of Our Conservation Mission

Our volunteers come to us as Eagle Scouts, Girl Scout troops, researchers, and retirees to spawn fish, lead tours, and maintain our facilities.

## In 2023 Across Fish and Aquatic Conservation

**18**
**Number of Friends Groups Supporting Aquatic Conservation**

**40**
**Total Full Time Equivalent of Volunteer Hours**

**1,641**
**Volunteers at FAC Facilities**

**78,216**
**Hours Contributed to Conservation**

**$2.6 million**
**Value of Volunteer Work**

2023 Numbers

A National Honor Society high school volunteer gently mixes the salmon eggs and milt (sperm) in a bowl to complete fertilization. Photo credit: Cheri A. Anderson/USFWS

# National Fish Hatcheries in Vermont Face Flooding and Climate Change

## Climate resilience: make like a fish and just keep swimming

*By Laura Vachula, U.S. Fish and Wildlife Service, Public Affairs Specialist*

July of 2023, Dwight D. Eisenhower National Fish Hatchery manager Shane Hanlon awoke to an emergency alarm call. He rushed to the hatchery and immediately noticed that the creek that supplies the facility with water, was exceptionally high.

But the alarm was triggered by another situation: The hatchery's sediment basin, which receives water from the river intake and is typically filled and flowing with fresh brook water on its way to supply the hatchery fish, was completely empty. The clock was ticking.

The high-water level in the brook had created a siphoning effect that pulled the water out of the hatchery system, back into the brook. With a valve adjustment to change the flow dynamics, water was again flowing to the fish.

The brook hadn't flooded earlier in the week, while other areas of Vermont swirled underwater. But because the ground was already saturated, isolated thunderstorms produced runoff that contributed to the sudden rise in water level. It was a reminder that climate change can be a challenge in unexpected ways and at unexpected times.

The water level of Furnace Brook was considerably higher on July 15, 2023 (right) compared to July 10, 2023 (left). Photo credit: Shane Hanlon/USFWS

**Flooded before**

While Hanlon wasn't initially concerned for Dwight D. Eisenhower hatchery when he saw the July flood warnings, he had his eye on the other site he manages: White River National Fish Hatchery. The flooding caused by Hurricane Irene in 2011 had been devastating there, engulfing rearing pools and raceways and depositing a layer of sediment throughout the facility.

As the hatchery rebuilt, they refreshed their strategy and reopened with a new mission that includes raising and maintaining broodstocks of landlocked Atlantic salmon and lake trout.

**Committed to flood resilience**

In the last centuries, humans have reshaped waterways, often disconnecting them from their natural floodplains and creating more dangerous flood scenarios. After Hurricane Irene, we joined partners to help Vermont rebuild intentionally by deconstructing dams, maintaining buffer zones on riverbanks, and replacing culverts. This work to improve fish passage complements the fish hatcheries' restoration efforts, allowing fish like landlocked Atlantic salmon to swim upstream to their spawning grounds and complete their life cycles.

**An upstream battle**

It's normal to feel tired and hopeless in the wake of destructive events. Fortunately, as humans, we're resilient, and as an agency, we're taking cues from nature to respond. Even when there isn't a clear path forward, we can follow the example of migrating Atlantic salmon: Face the current and just keep swimming.

Read full article

# Restoring Our Rivers

West Fork River in West Virginia.  Photo credit:  Callie McMunigal/USFWS

## Safeguarding the Health of Our Freshwater Ecosystems

America's rivers and freshwater ecosystems are among the world's richest in abundance and diversity, providing important benefits to communities, local economies, and the broader environment. Despite their importance, freshwater ecosystems and the species that inhabit them are under constant and increasing threat.

**Unless we act, our abundant freshwater wildlife could be lost forever.**

During the last 100 years the planet has lost almost three-quarters of inland wetlands, more than 50 aquatic species have been declared extinct in the United States, and many more species are critically endangered or threatened. Across the country freshwater habitats are fragmented by millions of barriers that block migratory pathways for fish and alter the natural processes of the systems.

## Fishery “Physicians”

Our fisheries biologists are like the family doctors of freshwater conservation. They track the health of our freshwater resources, prevent species and habitat loss by catching problems early, diagnose what’s wrong when issues arise, and work with other specialists to prescribe solutions.

### As the threats have increased so have our tools, expertise, and partnerships

The Fish and Aquatic Conservation (FAC) program uses a science-based approach carried out through a network of Fish and Wildlife Conservation Offices. These boots-on-the-ground biologists are dedicated to the protection, restoration, and recovery of our nation’s freshwater ecosystems and everything that lives in them.

### Monitoring and assessment: tracking the health of our freshwater resources

Fish and Wildlife Conservation Offices specialize in collecting information on fish and aquatic wildlife populations and their habitats nationwide. The offices operate monitoring programs throughout the year in watersheds across the country. The data collected by these programs lets us know what species need protection, which recovery efforts are working, and allow us to monitor for the spread of dangerous invasive species. We share this data with our partners to help make important decisions about what conservation efforts are working, where more efforts are needed, and to understand the impacts of climate change.

Spawning ground surveys are an important tool for measuring success and impact of hatchery programs in the Entiat River. Photo credit: USFWS

### Early Detection and Rapid Response: preventing species and habitat loss by catching problems early

Keeping risky species out of the United States is the most cost-effective approach to invasive species management. The Early Detection and Rapid Response Framework (EDRR) is our essential front-line defense against the next infestation. The Department of the Interior is working with partners to identify, enhance, and collaborate on EDRR activities through the establishment of a Rapid Response Fund for aquatic invasive species. This EDRR framework uses horizon scanning and risk assessment, novel surveillance techniques, a national hotspot surveillance network, and rapid response planning to identify the what, how, where, and what next of invasive species prevention and response.

**The National Fish Habitat Partnership leverages federal, state, Tribal, and private resources to address the nation’s biggest fish habitat challenges. In 2023, the Service and other fish habitat partners implemented 95 projects in 24 states to restore stream banks, remove barriers to fish migration, reduce erosion from farm and ranchlands, and identify conservation needs for fish and their habitats.**
**Read more**

**71**
**Federally Listed Species We Work to Recover**

**304**
**Population Assessments Conducted**

**1,301**
**In-Water Habitat Structures Placed**

**24,812**
**Acres Restored to Benefit Aquatic Species**

**2023 Numbers**

Streambed in the forest. Photo credit: Ryan Hagerty/USFWS

# NATIONAL FISH PASSAGE PROGRAM

Fish rely on free-flowing connected rivers for their survival. Millions of obsolete or poorly designed dams, roads, and levees in the United States keep fish and other aquatic species from moving freely to feed, locate suitable habitat, and complete their life cycle. These barriers disrupt healthy ecosystems and are a major cause for the decline in fish populations. The National Fish Passage Program provides funding and technical assistance to help remove barriers and reconnect aquatic habitats. Removing obsolete and dangerous infrastructure can also eliminate public safety hazards, improve climate resilience, and restore river ecosystems.

**118**
**Barriers Removed**

**2,203**
**Stream Miles Reopened**

**2023 Numbers**

In 2023, increases in funding through the Bipartisan Infrastructure Law enabled a dramatic expansion of conservation work by the National Fish Passage Program to benefit both aquatic ecosystems and their surrounding communities.

Trispot Darter Culvert Replacements fish passage project.  Photo credit: Lee Holt/USFWS

## Perspective by Shannon Boyle

*Federal Interagency Fish Passage Task Force Coordinator*

What a wild ride these past few years have been! From the whirlwind of the Bipartisan Infrastructure Law to the unpredictable twists of our global climate, I've been blown away by the sheer force of the Fish and Aquatic Conservation (FAC) program in tackling the challenges and opportunities head-on.

FAC headquarters and field staff have been working tirelessly to get the $200 million in BIL funding out the door through the National Fish Passage Program (NFPP). What keeps me up at night is that the $200 million we have in the NFPP pales in comparison to the $2 billion spread across the federal government for fish passage restoration. Not only could this investment make a significant impact on our species and habitat conservation goals, but it could also safeguard entire communities from the increased risks of climate change and aging infrastructure.

Thankfully, we're not treating this like a once-in-a-lifetime opportunity. Instead, we're hoping to shift to a new normal. It's time to shake things up, to rethink how we do things, and to ensure our impact is bigger and better than ever before. We don't want to just move the needle; we want to build something even better.

The Federal Interagency Fish Passage Task Force, made up of 13 Federal agencies including heavy hitters like the Federal Highway Administration and Federal Emergency Management Agency, was formed in 2022 under one common cause: leveraging Bipartisan Infrastructure Law to strategically and collaboratively restore fish passage and aquatic connectivity for the betterment of ecosystems and people. The Task Force is demonstrating the power and potential of collaboration — pooling their resources and brainpower to tackle everything from fish; and flood-friendly culverts to high-hazard dam removals to equity and inclusion in the federal grant process. It's a revolution in taking an all-of-government approach to complex problem-solving, and I'm thrilled to be a part of it.

Indian Rapids Dam. Photo credit: Dennis Manion/USFWS

**13**
**Federal Task Force Agencies**

**19**
**Federal Programs Funding Fish Passage Under Bipartisan Infrastructure Law**

**2023 Numbers**

# The Largest Dam Removal in Pennsylvania

## National Fish Passage Program helps fund removal of the century-old Oakland Dam

*By Abigail Denhart, U.S. Fish and Wildlife Service*

Susquehanna River, 1929. The Oakland Dam is a marvel of modern engineering, measuring more than 755 feet long and 16 feet high. The dam would provide power to a nearby railroad depot and hospital for the next 60 years. Around 1990, however, the dam became obsolete. Over time, it also became hazardous to boaters and caused flooding upstream. In September 2023, removal of the Oakland Dam marked the largest dam removal in Pennsylvania. Sport fish, recreationists, and nearby residents all benefit from the success of this project.

With the Oakland Dam gone, more than 250 miles of stream and aquatic habitats are reconnected, providing more places for sport fish, freshwater mussels, and other fish and wildlife to live and grow.

The rivers and streams of the Northeast once supported vast annual runs of fish species such as Atlantic salmon, American shad, and alewife, but during the past 200 years many of these populations have drastically decreased. Since 2009, the Service and partners have removed over 860 barriers to fish passage and restored access to 8,000+ miles of rivers and streams throughout the Northeast.

### Public safety

Failed dams pose a risk to recreational users and surrounding communities. After the Oakland Dam was retired and left abandoned, rebar and concrete caused hidden dangers to river users, and record rainfalls in 2006 and 2011 caused flooding to neighboring communities upstream of the dam. The dam's removal significantly decreases flood risks in this area and boating hazards. In addition to making the Susquehanna River safer for the community, the dam removal increases access to the waterfront and helps bolster economic growth.

Read full article

Susquehanna River after Oakland Dam removal. Photo credit: Sheila Eyler, Ph.D./USFWS

# FISH PASSAGE PROJECTS FUNDED IN 2023 BY THE BIPARTISAN INFRASTRUCTURE LAW

**2023 BIL-FUNDED FISH PASSAGE PROJECTS**

## CHANNEL RECONSTRUCTIONS

- Ochoco Preserve Restoration – Phase 2
- Salamander Parcel Floodplain Reconnection

## SLUICEWAY REPAIR

- Hogback Sluiceway Gate

## CULVERTS

- Making Progress Towards a Barrier-Free Copper River
- Deep Creek Watershed Fish Passage Improvements
- Crooked Creek Route 55 Culvert Fish Passage Project
- Yakutat Forest Highway 10 Aquatic Organism Passage Project
- Waukell and Junior Creeks Culvert Replacements Project
- Dye Creek Fish Passage Improvement Project
- Coeur d'Alene Tribe Lake Creek Culvert Replacement
- Upper Coonamessett River Wetland Complex Restoration
- Reconnecting Habitat for Eastern Brook Trout in Western Maryland*
- Landscape-scale Maple River Reconnection Project
- Restoring Fish Passage in Claybank Creek
- Upper Greenbrier River Watershed Fish Passage
- Priority Fish Passage Improvements in Western Montana
- Ouachita Forest Fords
- Perkins Creek Culvert Replacement in the Coast Fork Willamette Basin
- Smith Creek Tidal Fish Barrier and Estuary Habitat Restoration Project
- Metlakatla Indian Community Watershed-scale Fish Passage Improvement Project
- Fort Wayne Rivers Fisheries Improvement Project
- Subsistence Salmon Habitat Restoration
- Restoring Access to Tyonek Creek: A Subsistence Salmon Restoration Project
- Flint Hill Church Fish Passage and Flood Control Project
- Lower Toppenish Creek Fish Passage Restoration

## FISHWAYS

- Woodland Dam Fishway on the St. Croix River

## DAMS

- Dam Removals Along the East Fork of Whitewater River
- Steamboat Rock Dam Removal and Restoration
- Removal of a Low-Head Dam and Fish Passage Barrier in the Big Blue River
- Shadyside Park Low-head Dam Removal
- Talbot Mills Dam Removal on the Concord River
- Reconnecting Habitat for Eastern Brook Trout in Western Maryland
- Ela Dam Removal Project
- Washburn Dam Removal on the Mohawk River
- Low-Head Dam Removal on Long Tom River
- Fish Passage on the Little Minnesota River
- Retrofit of Killdeer Diversion Dam on the Green River
- The Removal of the Upper and Lower E.R. Collins Dams on the Pequest River
- Priority Fish Passage Improvements in Western Montana
- Zena Creek Fish Passage Project
- Forest City Dam to Rapids Conversion Project
- Fort Wayne Rivers Fisheries Improvement Project
- Lower Toppenish Creek Fish Passage Restoration

# Numana Dam Fish Passage Project

## A historic groundbreaking celebration made possible by the Bipartisan Infrastructure Law

*By Miguelina Portorreal, U.S. Fish and Wildlife Service, Public Affairs Specialist*

On September 2023, the Pyramid Lake Paiute Tribe and U.S. Fish and Wildlife Service (Service) broke ground to commence construction on a fish passage project at Numana Dam in northern Nevada. The Bureau of Indian Affairs, Bureau of Reclamation, Nevada Department of Wildlife and other partners joined the Service and the Tribe on-site to celebrate the project and what it signifies for the recovery of the Cui-ui sucker and the Lahontan cutthroat trout.

In 2022, the Service awarded the Pyramid Lake Paiute Tribe almost $8.3 million in Bipartisan Infrastructure Law funding to support the Tribe's vision of removing an in-stream migration barrier at Numana Dam.

The installation of a permanent fish passage structure will benefit two federally listed species, the Lahontan cutthroat trout and Cui-ui sucker. Both species hold cultural significance to the Pyramid Lake Paiute Tribe. The Tribe has supported modification to Numana Dam for over two decades to aid in the recovery of these federally listed fish.

Numana Dam is an irrigation diversion structure within the boundary of the Pyramid Lake Paiute Reservation and provides irrigation water to the Pyramid Lake Paiute Tribal farmers and ranchers. This structure has been in place since 1917 and, in its present form, has been a significant passage barrier for the two federally listed fish. The species have been negatively impacted by water infrastructure and land use changes over the last century, including the installation of dams.

The Numana Dam fish passage project in Nevada will open 65 miles of habitat along the Truckee River. Photo credit: Nathan Hurner/USFWS

Cui-ui were federally listed as endangered in 1967. They depend on Pyramid Lake for rearing habitat and the lower Truckee River for spawning habitat.

Lahontan cutthroat trout were listed by the Service in 1970, as endangered and reclassified as threatened in 1975. Less than 10 percent of their historical habitat is currently occupied range-wide, which includes the Truckee River and Pyramid Lake.

Read full article

Dam Removal Flickr Album

# Helping Solve a Salmonid Mystery

## At O'Brien Creek, fish passage improvements may help solve a salmonid mystery

*By Christian Thorsberg, U.S. Fish and Wildlife Service, Office of Communications*

The nine-mile O'Brien Creek is a "coho factory," says Jess Straub, a civil engineer with the Southern Alaska Fish and Wildlife Field Office's Habitat Restoration Branch. It is exactly the type of habitat young coho frequently gravitate toward.

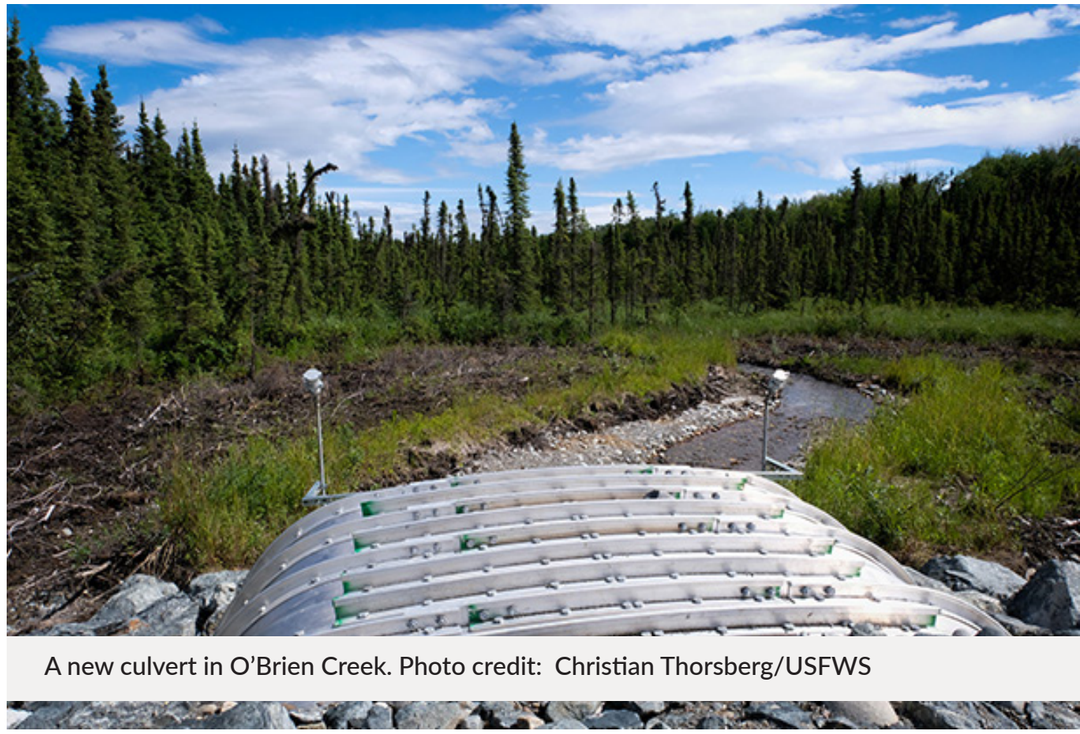
But there is one persisting quandary about these waters, which seems to contradict everything U.S. Fish and Wildlife Service fish biologists know about the salmon's life cycle: Despite the longstanding abundance of juveniles – including upstream of multiple culverts – not a single adult coho has been oberved by the Service in O'Brien Creek.

With their life cycle in mind, seeing only young coho — and no adults — in O'Brien Creek puzzled staff.

A few hypotheses had been percolating amongst the Southern Alaska Fish and Wildlife Field Office with the most likely being that the adults were spawning near the mouth of the creek, where marine and freshwater meet, instread of migrating upstream.

If the most likely explanation is indeed the true one — that adult coho weren't traveling up O'Brien Creek because its conditions were poor — Service engineers hope their efforts over the past five years will benefit the overall ecosystem's health, and sleuth out this mystery's explanation.

Working with state, nonprofit, and private landowner partners — Straub and other engineers, hydrologists, and biologists designed four unique projects where roads or paths intersect with the creek. In 2023 the four projects were completed with the goal of welcoming adult coho home.



A new culvert in O'Brien Creek. Photo credit: Christian Thorsberg/USFWS

Wider culverts were installed, or, at a site downstream, old ones that were too small for adult fish to swim through were removed. Crews also adjusted the creek's slope and width in certain sections to create more sustainable flow rates and stabilize the channel. In the event of historic high- or low-flows there will still be a path for fish to swim.

Nature-based designs were used to improve the health of the channel. Along the banks, beds of vegetation were installed to help prevent erosion. Also, careful analysis of representative potential spawning ground in O'Brien Creek helped the team create the right mixture of sediment to place within the streambed.

With all projects finished, there is hope that the O'Brien Creek mystery will be solved, and adult coho, if they want to, will have healthier waters in which to migrate.

All said, says Straub, reflecting on these four projects, the work was amplified by the collaboration of multiple minds: biologists, hydrologists, engineers, and others with land and waters expertise.

Read full article

# CONNECTING LANDS, WATERS, AND MILITARY CONSERVATION PARTNERS

**Department of Defense – U.S. Fish and Wildlife Service Collaboration**

While the missions of the military services and the U.S. Fish and Wildlife Service (Service) may be different, our shared value to conserve species and their ecosystems for future American generations is evident. To leverage our collective programmatic and technical expertise, a cross-programmatic, cross-regional team was established by the Fish and Aquatic Conservation (FAC) program. Headquarters staff representing FAC programs lead the team with representation from each Service region. This approach will improve communication within the Service and with Department of Defense (DOD), identify the Service conservation strategies that align with DOD training and mission priorities, and provide the internal structure to support and execute those strategies in the field with greater efficiency.

**Air Force**

FAC headquarters continues to coordinate with Air Force and Service Regional Military Lands Conservation Coordinators to develop and execute over 150 conservation projects across the country. Each project reflects priorities of Service programs including FAC, Migratory Birds, National Wildlife Refuge System, Science Applications, and Ecological Services. Decades of our partnership's collaboration continue to benefit species and ecosystems on and off Air Force bases nationwide, all while supporting the military mission.


Marine Corps Base Hawaii Natural Resources Program staff deploy protective measures to prevent disturbance to endangered green sea turtle nests during the incubation period. Photo credit: DVIDS

**Army**

FAC headquarters staff have significantly invested in proactively growing the Service's partnership with the Army to execute on-the-ground conservation projects dedicated to threatened and endangered species, climate change, nature based solutions, environmental justice, and environmental security. Nationally, the Army committed ~$5M dollars to the Service in fiscal year 2023, funding over 15 habitat resilience and species planning level survey projects, more than 10 youth conservation interns, and five Hispanic Access Foundation climate change fellows to develop climate profiles for Army installations. Collaboration with Army at all levels has resulted in greater conservation efforts around species recovery, habitat protection, fish passage, and environmental resiliency.

# Joint Base McGuire Dix-Lakehurst Named Service's Military Conservation Partner of the Year

## Collaborative conservation supports rare plants and wildlife and recreational opportunities

*By Bridget Macdonald, U.S. Fish and Wildlife Service, Public Affairs Specialist*

On August 14, 2023, Joint Base McGuire Dix Lakehurst in New Jersey was named the recipient of the U.S. Fish and Wildlife Service's 19th Annual Military Conservation Partner Award for its outstanding contributions to natural resource management.

The award recognizes military installations that advance natural resource conservation through tangible, on-the-ground programs and projects marked by conservation success and effectiveness and achieved through cooperation and communication with partners.

Colonel Michael Stefanovic accepted the award on behalf of the installation, which is located almost entirely within the Pinelands National Reserve, during a ceremony attended by representatives from the Department of Defense and the U.S. Fish and Wildlife Service.

Sharon Marino, assistant regional director for Ecological Services in the Northeast, shared highlights of the installation's accomplishments.

"Joint Base McGuire Dix Lakehurst's approach to stewardship reflects a sense of place and urgency," Marino said. "It takes into account big-picture needs of the Pinelands ecosystem – from minimizing habitat fragmentation, to protecting native species, to discouraging invasives – and leverages a diverse network of partners and practices to meet them."

The installation is home to several federally protected species, including northern long-eared bat, bog turtle, and swamp pink, and works closely with the New Jersey Ecological Services Field Office on management and recovery.

One of the smallest turtle species in the world, the bog turtle is listed as threatened under the Endangered Species Act. Photo credit: Gary Peeples/USFWS

Their forward-thinking approach to conservation involves a new Integrated Natural Resources Management Plan. The plan identifies key natural resources, and the actions needed to manage them in support of biological diversity within the base boundaries, all while providing connectivity to the surrounding natural areas.

Joint Base McGuire Dix Lakehurst is a valuable partner in proactive conservation for at risk species, works to expand and protect important breeding habitat at the installation, and operates robust outdoor education and recreation programs.

Read full article

# Applying Science


Measuring and tagging a brook trout from Washington's Tyee Springs.
Photo credit: Jennifer Rowlen/USFWS

The U.S. Fish and Wildlife Service's Fish and Aquatic Conservation program is advancing cutting-edge technologies across the country to shape the next generation of aquatic conservation. From developing new genetic markers that will help prevent future invasive species invasions, to pioneering new captive propagation techniques that ensure a future for threatened and endangered species, our national network of fish hatcheries, fish technology centers, fish health centers, fish and wildlife conservation offices, and the Aquatic Animal Drug Approval Partnership uses applied science and technology to steer our conservation practices.

# APPLIED CONSERVATION SCIENCE ACROSS THE COUNTRY

## AQUATIC ANIMAL DRUG APPROVAL PARTNERSHIP

The Aquatic Animal Drug Approval Partnership is the only program in the United States singularly dedicated to obtaining U.S. Food and Drug Administration approval of new medications, including disease treatments, spawning aids, and anesthetics for use in fish culture and fisheries management. The partnership plays an important role nationally to address fish health and production needs to raise healthy fish for natural resource conservation and commercial aquaculture purposes.

## FISH HEALTH CENTERS

Fish Health Centers work on the front lines to periodically inspect the health status of hatchery species using validated protocols for specific disease-causing viruses, bacteria, and parasites. They also monitor health in wild aquatic animals and respond to calls for assistance from partners observing losses in wild fish (fish kills). Fish Health Centers also assist hatchery staff in health management activities like vaccinating fish and providing diagnostic support.

## FISH TECHNOLOGY CENTERS

Fish Technology Centers develop new techniques to address problems encountered in hatchery operations and aquatic resources management. They use cutting edge genetic technologies, formulate novel diets for species, study fish behavior in flumes and swim chambers, and study reproduction, stress, and thermal tolerance in aquatic animals so we have a better understanding of the rare aquatic animals that are reared in the National Fish Hatchery System.

## FISH AND WILDLIFE CONSERVATION OFFICES

Fish and Wildlife Conservation Offices provide technical assistance to Tribes, conduct scientific studies into fishery problems, track fish populations through regular monitoring and assessment efforts, restore habitat through the National Fish Passage Program and the National Fish Habitat Partnership, and collaborate with partners to conserve migratory fishes that cross multiple jurisdictions.

Fishing pier in autumn. Photo credit: Givaga/Adobe Stock

# AQUATIC ANIMAL DRUG APPROVAL PARTNERSHIP

## What We Do

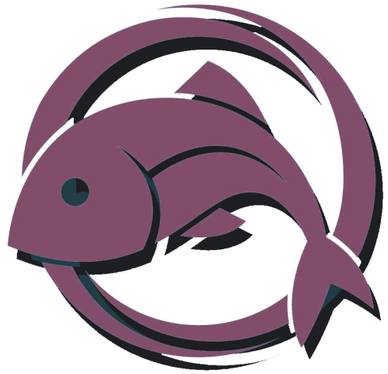
Our small but mighty partnership has two distinct yet inter-related programs - research and the National Investigational New Animal Drug (INAD) program that work together to support aquatic animal drug approvals through the U.S. Food and Drug Administration (FDA). The (INAD) program allows participants access to 19 sedatives, drugs, and spawning aids that are in the approval pipeline. Use of these substances are allowed through the INAD Program provided that participants follow a protocol and then generate and report data back to Aquatic Animal Drug Approval Partnership (AADAP). Ultimately these data are submitted to the FDA and help support full approval. These data are also used to help the research team determine what studies are needed to help support full approval. These studies include whether the drug is effective and works as intended and if the drug is safe to use within a certain dosage margin to the target species.

## Support to the Aquaculture Industry

Aquaculture in the United States is a diverse and thriving industry contributing $1.5 billion annually to freshwater and marine species including bivalves such as oysters and clams. AADAP works directly with the aquaculture industry to identify new and emerging pathogens, helps develop innovative solutions to treatment, and provides access to the INAD program to increase treatment options for aquaculture farmers in the United States. With limited FDA approved drugs for marine species, AADAP is beginning to shift attention to address this gap. The absence of approved drugs is a major challenge for marine aquaculture, particularly for intensive production of saltwater-reared fish where bacterial diseases can contribute to significant mortalities. AADAP and its partners are actively researching to expand current freshwater drug labels or gain approval for new label claims, enabling the use of existing aquaculture drugs in saltwater. This preparation is essential to confront the disease challenges anticipated with the projected expansion of intensive marine aquaculture in the United States.

## Working with Hatcheries and Fish and Wildlife Conservation Offices

Supporting the important recovery and restoration efforts of our federal and state fish hatcheries as well as the management efforts of the Service's Fish and Wildlife Conservation Offices is central to AADAP's mission. We assist hatcheries and our conservation partners by providing additional tools through the INAD program. These new tools help address disease issues with novel or innovative treatments to improve fish health and production numbers for to achieve recovery and conservation goals. We are here as a resource - to provide information, assistance when asked, and work together to find practical solutions to improve the health of our nation's aquatic species.



**22.7 million**
**Fish Treated Using INADs**

**898**
**Studies to Support New Drug Development**

**75**
**Total Species Helped Through the INAD Program**

2023 Numbers

# “Big” Work at Tishomingo National Fish Hatchery

*By Pam Sponholtz, U.S. Fish and Wildlife Service, Research Program Manager*

Working to conserve American’s aquatic resources can be demanding given the conservation challenges facing our natural environments. One of the best examples of successfully navigating conservation challenges is within the Service’s National Fish Hatchery System and the important role hatchery managers play in fish conservation.

There are big projects that Hatchery Manager Ralph Simmons and his team are excited about at Tishomingo National Fish Hatchery in Oklahoma. The definition of “big” for the team is how to safely handle and spawn the 100-pound alligator gar they have at the hatchery.

How does Ralph’s team handle such amazing creatures without losing their fingers? A sedative makes the alligator gar a little sleepy then a calculated injection of a spawning hormone is used. The hormone helps with alignment of when the fish will produce eggs, so the fish only has to be handled twice, meaning less stress for fish and staff. The result, many healthy gars are stocked within their historical range.

Ralph’s second project is on the opposite end of the size spectrum but has “big” conservation gains, conservation of the federally threatened Arkansas River shiners.

Getting these little minnows to spawn in captivity is challenging because wild species like the little shiners often won’t predictably spawn in a hatchery setting. The team uses the same sedative as the alligator gars but a different hormone has been found to be more effective for the smaller fish. Less than a drop of hormone is injected into each female shiner. Without the ability to use the spawning hormone, this fish would continue to decline in the wild.

Tishomingo National Fish Hatchery, Oklahoma, Hatchery Manager Ralph Simmons has “big” work to do.
Photo credit: USFWS

The hormones and sedatives that Ralph and staff use are allowed through the Food and Drug Administration for use in aquatic animals.

The Aquatic Animal Drug Approval Partnership program within the U.S. Fish and Wildlife Service with support of federal and state agencies and sponsors works tirelessly to get aquatic animal drugs approved by the FDA to use with conservation programs. Helping hatchery managers like Ralph get those “big” projects accomplished for fish conservation.

Read full article

# Midwest Fisheries Center Data Branch

In 2023, the Midwest Fisheries Center established a Data Branch to serve the data management needs of the various program areas within the Fish and Aquatic Conservation (FAC) program. In doing so, we are better able to meet our conservation mission by improving open access to and utility of the data collected for the public and our conservation and management partners.

Data management is properly planning, documenting, and caring for the data and information derived from the data we collect. A Service biologist might spend hours in the field collecting habitat or species information, but without proper data management, the data might not be usable (or even discoverable) by researchers, policymakers, or even our own colleagues.

Good data management enables the data to be located and shared, which increases efficiency by reducing redundancy. Managing data improves conservation outcomes and supports the mission of the Service. The data collected, maintained, and analyzed represents and embodies the trust resources we seek to conserve and manage. Making decisions based on reliable and accessible data improves our conservation outcomes, as well as the Service's scientific credibility.

The Midwest Fisheries Center Data Branch envisions a regional FAC program that has adopted a data centric culture to implement transparent, evidence-based conservation decisions by ensuring quality data is produced and managed using the U.S. Fish and Wildlife Service's data life cycle and FAIR (Findable, Accessible, Interoperable, and Reusable) data principles.

Continue to the website


Data collection during red knot banding project. Photo credit: Abigail Gibson/USFWS

# The La Crosse Fish Health Center Works With Others to Identify Novel Aquatic Animal Viruses

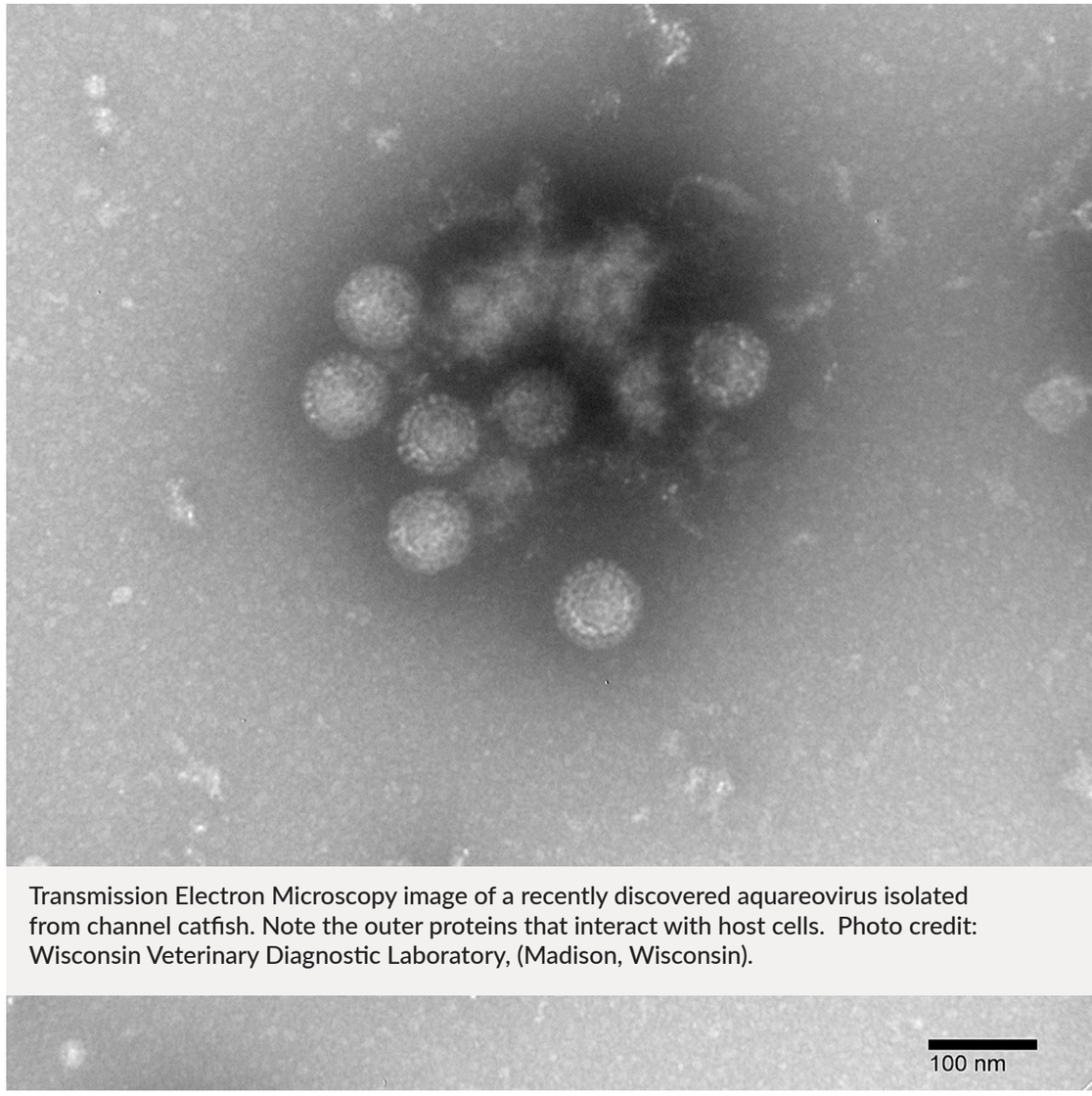
*By Eric Leis and Ken Phillips, U.S. Fish and Wildlife Service, La Crosse Fish Health Center*

The La Crosse Fish Health Center, located in Wisconsin, provides aquatic animal health inspection and diagnostic services to national and Tribal fish hatcheries. Samples collected during these inspections are brought to the laboratory to screen for bacterial, parasitic, and viral pathogens. Each type of pathogen has specific methods that lead to their detection and identification. In the case of viral pathogens, they are first isolated with tissue cell culture assays, followed by identification with molecular assays.

When tissue cell culture is used to screen for viral pathogens, samples are cultured on cell line(s) and incubated at a specific temperature optimized for the isolation of target pathogen(s). Typically, results of the tissue cell culture assay(s), or investigative procedures, are "no pathogen detected." However, when results from these assays indicate that a virus or other replicating agent is present, specific molecular assays are run to confirm the identity of the suspected virus. In most cases, staff at the La Crosse center can identify the virus present in the sample through one of the many diagnostic assays available. However, occasionally, we are not able to identify the virus present in the sample. When this happens, we work with experts at other government laboratories and/or universities to identify the potentially new, or "novel" virus.

The first step is to determine the genetic make-up of the suspected virus through sequencing. This sequence is compared to other known viruses in a publicly available database to determine whether it is a novel virus or one that has previously been described. It is also important to visualize the virus particle in order to further confirm the virus type. This involves using a transmission electron microscope that can magnify up to 50,000,000X and allow us to see virus particles that may be only 30 nanometers in size. Further work is then completed to determine whether this virus is pathogenic.

If the virus is considered significant, then diagnostic tests, allowing for rapid identification of the virus, are developed that can be used to survey wild populations for the newly discovered pathogen. This work ensures that healthy fish are brought into hatcheries for propagation resulting in healthy and robust wild populations for everyone to enjoy.




Transmission Electron Microscopy image of a recently discovered aquareovirus isolated from channel catfish. Note the outer proteins that interact with host cells. Photo credit: Wisconsin Veterinary Diagnostic Laboratory, (Madison, Wisconsin).

# Working at the Invasion Front: Carp in the Red River

*By Sam Hannabass, U.S. Fish and Wildlife Service, Oklahoma Fish and Wildlife Conservation Office*

Like many widespread invasive species, silver, bighead, grass, and black carp are notorious for their hardiness, prolific nature, impressive dispersal abilities, and competitive edge against native species.

Exhaustive studies and experimental control efforts continue in the northern half of the Mississippi River Basin but in recent years, resources have been allocated to the invasion front: the southern sub-basins. Here, all four species of invasive carp have persisted largely under the radar slowly expanding their numbers and scope.

North-northeast of Dallas at the Texas-Oklahoma border lies the Denison Dam, which forms Lake Texoma and boasts a renowned recreational striped bass fishery attracting millions of anglers annually. Just below the dam, you'll see the Red River.

It is here that the Oklahoma Fish and Wildlife Conservation Office (OKFWCO) staff began their battle against invasive carp as part of a multi-agency effort. At the inception of their invasive carp work in 2020, the presence of adult bighead and silver carp on the Red River below the Denison Dam was known; however, neither population demographics, distribution, nor abundance information were available. Where did these adult fish originate? Are these fish spawning below the dam, in small tributaries, or are they even spawning at all? How many are present in the system? Finding accurate answers quickly is vital to the development of effective management strategies.

A larval fish caught in ichthyoplankton tow by Oklahoma Fish and Wildlife Conservation Office.
Photo credit: Sam Hannabas/USFWS

To determine whether invasive carp are successfully spawning on the Red River below the Denison Dam, the office's biologists have spent past spring/summer seasons sampling for invasive carp larvae. To target eggs and freshly hatched larvae drifting in the river's current, ichthyoplankton nets with a fine mesh were deployed on each side of the boat at varying depths as the vessel is faced upstream. LED light traps were also set in tandem with one sampling the water surface and the other a foot or more below. These traps are an excellent method for catching later-stage larval and juvenile fishes that are more mobile.

OKFWCO biologists spent the 2022 field season sampling approximately 150 miles of the Red River and its tributaries. In total, 153 samples were collected and eDNA tested. This will allow biologists to prioritize which samples are processed first to streamline sample identification.

Read full article

# Protecting Our Waters

An upstream view of the Willow Beach National Fish Hatchery from the Arizona side of the Colorado River.  Photo credit:  Jessica Zehr/USFWS

Aquatic invasive species cause tremendous harm to our environment, economy, health, and recreation. They can drive out and eat native plants and wildlife, spread diseases, and damage infrastructure. We work to protect our waterways and communities from threats of invasive species through on-the-ground work, partnerships, grants, and co-chairing the Aquatic Nuisance Species Task Force. Last year in partnership with the Department of the Interior's Invasive Species Task Force, the U.S. Fish and Wildlife Service (Service) continued to develop and implement a National Early Detection Rapid Response (EDRR) Framework.  This comprehensive approach is grounded in scientific literature and has been called for in Department of the Interior interagency planning documents and Service strategic plans. These investments will complement and enhance current Service and partners invasive species management activities.

## Combatting the threat of aquatic invasive species — the Aquatic Nuisance Species Task Force

The Aquatic Nuisance Species (ANS) Task Force is the only federally mandated intergovernmental organization solely dedicated to preventing and controlling aquatic invasive species. Accomplishments during 2023 include administering a pilot Rapid Response Fund for Aquatic Invasive Species (AIS), preparing for the release of the Invasive Species Experts Database, approving national prevention practices for watercraft inspection and wildfire operations, and developing an updated management plan for European green crab. The Task Force continues to support two national ANS outreach campaigns, Stop Aquatic Hitchhikers which targets recreational water users, and Habitattitude targets both pet owners and water gardeners. The Task Force also guides development of State and Interstate ANS Management Plans, which are eligible for funding from the ANS Management Plan Grant Program maintained by the U.S. Fish and Wildlife Service (Service).

## Identifying risk and preventing invasions through assessment and regulation

The Aquatic Invasive Species Program uses science-based approaches to identify high-risk species and pathways of introduction into the U.S. Ecological Risk Screening Summaries and Horizon Scans help to identify species with the highest risk of becoming invasive and then prioritizing these species for detection and rapid response efforts. Under 18 U.S.C 42 (a provision of the Lacey Act), the Service also has the authority to limit importation and transportation of certain types of aquatic and terrestrial wildlife species by designating them as Injurious. Injurious species are those that will likely cause harm to humans, animals, habitats, or important resources if they become established in United States environments outside their natural range. Proactively identifying risky species helps to prevent the likelihood of introduction and will help to reduce the long-term management costs of potential future invasions.

## Prioritizing and responding to invasion risk — Early Detection Rapid Response

Early Detection Rapid Response (EDRR) is a coordinated approach to find and eradicate invasive species before they have the chance to establish or spread. As part of a National EDRR Framework being developed though the Department of the Interior and its partners, the Fish and Aquatic Conservation program uses horizon scans at the national, regional, and basin level to prioritize high-risk invasive species and pathways. Then targeted surveillance, such as environmental DNA or traditional field sampling techniques, may detect new invaders early enough that a rapid intervention can mitigate harm to United States interests and resources. In 2023, the Service initiated a pilot rapid response fund to make financial resources available to assess and support response actions in partnership with others for quick containment or eradication of newly detected AIS. Plans were also underway in 2023 to form a Department of the Interior Interjurisdictional Invasive Species Rapid Response Team (IInSRRT) to provide support or leadership as requested by states, Tribes, territories, or federal land management agencies.

Peninsular Florida FWCO Fish Biologist Cedric Doolittle displaying non-native Orinoco sailfin catfish (*Pterygoplichthys multiradiatus*) and Nile tilapia (*Oreochromis niloticus*) collected during an early detection survey. Photo credit: Eddie Perri/USFWS

## National coordination on invasive carp

The Midwest Region leads a coordinated national effort, in cooperation with federal and state partners, to manage and control invasive carp populations throughout the Mississippi River Basin (MRB) in support of the National Plan for invasive carp. The region coordinates closely with other Service regions to conduct annual planning and prioritization of national invasive carp funds in collaboration with partners. In 2023, over $18.5M in funds were awarded to MRB state management agencies to support 37 of the highest priority projects, which included targeted monitoring and population assessment activities, evaluation of deterrent technologies, and targeted removal through commercial fishing to prevent further range expansion and establishment. The Service implements work on-the-ground to complement state partner projects with surveillance activities such as electrofishing, netting, telemetry, and eDNA sampling, to understand the distribution and abundance of all life stages of invasive carp so that the right management actions can be deployed.

## Perspective by Susan Pasko

*Executive Secretary, Aquatic Nuisance Species Task Force*

The interaction between climate change and invasive species poses significant threats to the environment, economy, and human well-being. Climate change is altering the distribution and behavior of many species, creating new opportunities for invasive species to thrive in areas where they were previously unable to establish. Fast growth, rapid reproduction, and the ability to survive in a wide range of environmental conditions are among some of the traits shared by invasive species that allow them to capitalize on the transformations generated by climate change, further destabilizing ecosystems.

Addressing the combined challenges of invasive species and climate change requires coordinated efforts at local, state, and national levels. When a new, potentially invasive, species is introduced, the best strategy is early detection and rapid response. This includes monitoring habitats to discover new species soon after introduction, reporting sightings of previously unknown species, and working quickly to keep the species from becoming established and spreading, avoiding the need for costly long-term control efforts.

The Department of the Interior invested Bipartisan Infrastructure Law funds to develop a National Early Detection Rapid Response Framework to complement existing systems in place for agricultural pests and pathogens. The Framework has brought federal and non-federal partners together to develop innovative approaches for invasive species surveillance, data integration, and response capabilities along with a coordinated process for implementation. The U.S. Fish and Wildlife Service has been a key player in advancing several components of the Framework, including horizon scans to identify species at high risk of being introduced, a Molecular Laboratory Network for environmental DNA analysis of samples collected for invasive species of interest, and a rapid response fund to make financial resources available for quick containment or eradication of new species detections.

Moving forward, it is crucial to keep increasing the level of commitment, collaboration, and innovation to mitigate the impacts of invasive species in a changing climate.

Arthur R. Marshall Loxahatchee NWR American Conservation Experience intern Zach More displaying invasive clown knifefish (*Chitala ornate*) during cross-program training on aquatic invasive species early detection and management provided by Peninsular Florida FWCO staff. Photo credit: Eddie Perri/USFWS

# A Rapid Response Fund for Aquatic Invasive Species

## Financial resources available for quick containment or eradication of newly detected species

*By Susan Pasko, U.S. Fish and Wildlife Service, Executive Secretary, Aquatic Nuisance Species Task Force*

Aquatic invasive species can lead to the extinction of native plants and animals, permanently alter habitats, and imperil public health. Aquaculture, tourism, recreation, shipping, and hydropower facilities may also be adversely impacted by biological invasion. Effective and coordinated approaches are necessary to manage aquatic invaders and protect our nation's waters. Although prevention is the most effective approach to eliminate or reduce the threat of aquatic invasive species, Early Detection and Rapid Response (EDRR) serves as a failsafe when prevention measures are ineffective or unavailable.

A person holds an invasive snakehead, native to parts of Africa and Asia. Photo credit:  Ryan Hagerty/USFWS

Recognizing the importance of timely action, the Department of the Interior is working with partners to identify, enhance, and collaborate on EDRR activities, including the establishment of a Rapid Response Fund for aquatic invasive species. This fund is intended to make financial resources available to assess and support response actions for quick containment or eradication of newly detected species, thus avoiding costly long-term and wide spread control efforts.

In FY23, as part of the Bipartisan Infrastructure Law authorization for ecosystem restoration, the Department invested $1 million to establish a pilot Rapid Response Fund for Aquatic Invasive Species with an additional $1 million envisioned each year from 2024 through 2026 as part of advancing a National EDRR Framework.  Proposals for the Notice of Funding Opportunity are accepted on a rolling basis and evaluated on a quarterly basis.

The Rapid Response Fund will be administered within the existing authorities of the U.S. Fish and Wildlife Service's Fish and Aquatic Conservation program and coordinated through the Aquatic Nuisance Species (ANS) Task Force. Co-chaired by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, the ANS Task Force consists of federal agency representatives and ex-officio representatives that work in conjunction with six regional panels and issue-specific subcommittees to coordinate efforts related to aquatic invasive species across the nation. Accordingly, the ANS Task Force is well positioned to coordinate and successfully operate a rapid response fund. In July 2023, the ANS Task Force approved The Model Process: Rapid Response Fund for Aquatic Invasive Species that outlines a structure and process for operation of the fund.

Read full article

# Working With Partners to Combat Aquatic Invasive Species

## Aquatic invasive species control in Florida - it takes a village

*By Eddie Perri, U.S. Fish and Wildlife Service, Peninsular Florida Fish and Wildlife Conservation Office*

The unique tropical climate and wealth of food sources in Florida have made it the nation's top hot spot for invasive species, with now over 500 calling Florida home. The occurrence of these species is harmful to agricultural and tourism industries, native plants and animals, and to human health and quality of life. Controlling these invasive species is a difficult task, especially since many go unnoticed by the public and land managers, and the negative impacts may not be seen for 10 or 20 plus years after introduction.

The most important impact that managers can make in the fight against aquatic invasive species (AIS) is in the early stages of an invasion when prevention and eradication are possible. Peninsular Florida Fish and Wildlife Conservation Office focuses their efforts on outreach and early detection monitoring (EDM). Most importantly, they know that no one group can fight this fight alone.

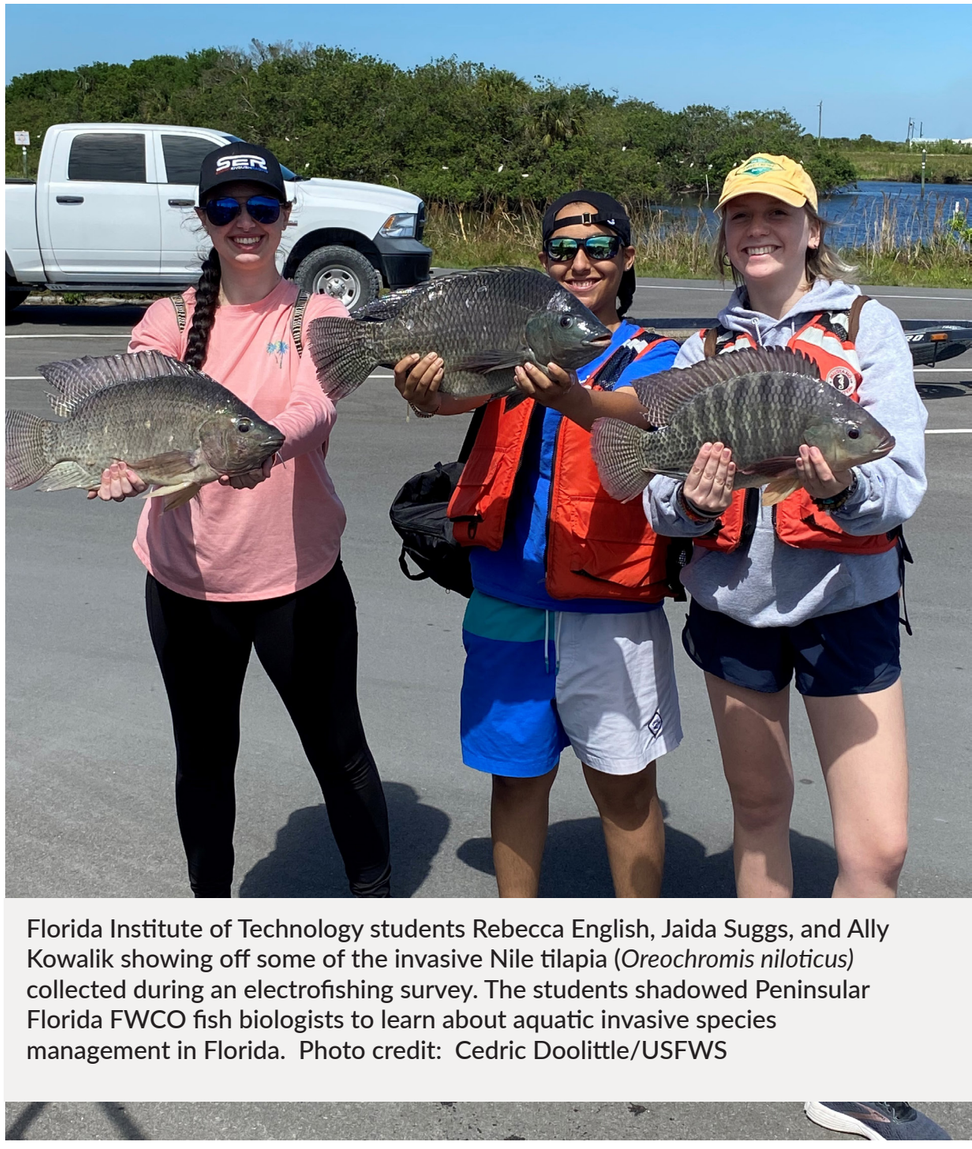
Different approaches of outreach and education must be explored to effectively reach the largest portion of the public possible. Unfortunately, it is not enough with many AIS literally slipping through the cracks and making their home in Florida's many waterways.

Teaming up with multiple governmental agencies, nonprofit organizations, and universities to form Cooperative Invasive Species Management Areas (CISMA) is one way the regional offices work as a "village" to combat AIS issues. Partnering with Tribal Nations on projects, like the Removal of the Swamp Invaders Fishing Tournament, engages Tribal members and the local public alike.

The biannual Non-Native Fish Slams aids in EDM by getting biologists together twice a year to survey areas of Florida where high numbers of introduced AIS are known and share information, techniques, and new survey methods with the "village."

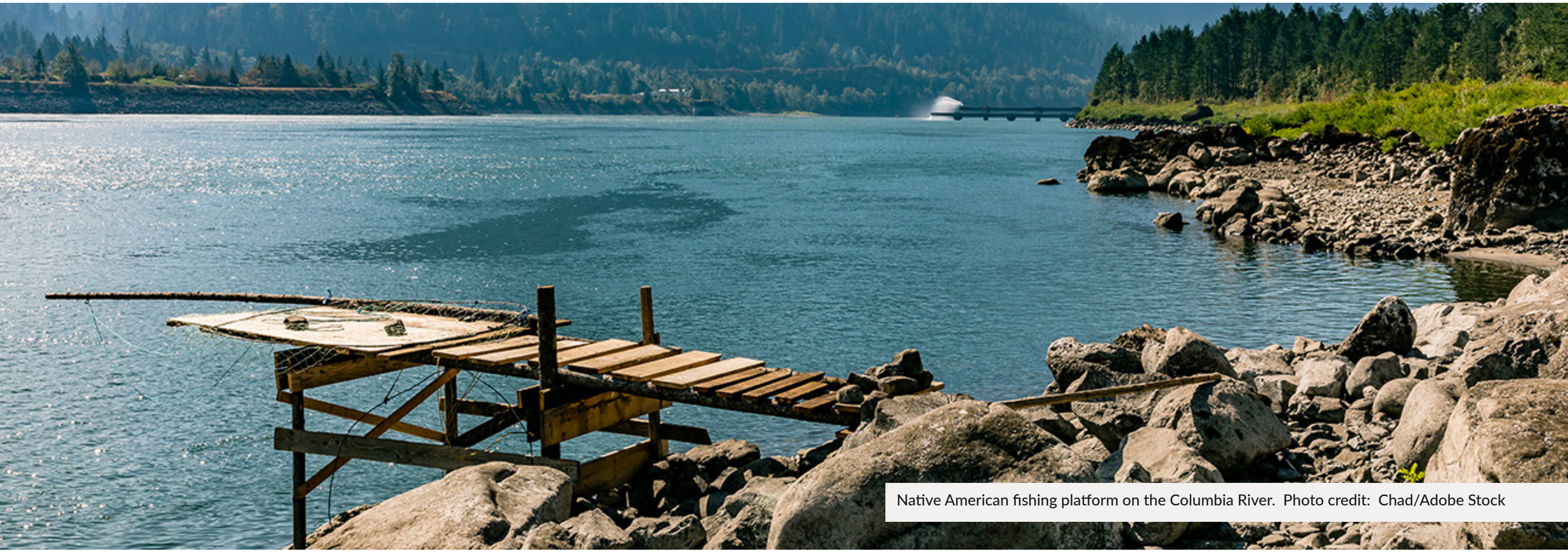
Continued cooperation and communication between all stakeholders are imperative as we are all in this fight together and need to act as a "village" to turn the tide on aquatic invasive species.

Read full article



Florida Institute of Technology students Rebecca English, Jaida Suggs, and Ally Kowalik showing off some of the invasive Nile tilapia (*Oreochromis niloticus)* collected during an electrofishing survey. The students shadowed Peninsular Florida FWCO fish biologists to learn about aquatic invasive species management in Florida. Photo credit: Cedric Doolittle/USFWS

# Fulfilling Tribal Trust and Subsistence Responsibilities



Native American fishing platform on the Columbia River. Photo credit: Chad/Adobe Stock

Natural resource management programs operated by federally recognized Tribes protect the traditional, cultural, spiritual, medicinal, subsistence, recreational, and economic needs of their communities within their respective Tribal lands. The collaboration between the Fish and Aquatic Conservation (FAC) program and Tribes plays a crucial role in protecting both natural and cultural resources. This joint effort not only honors Tribal treaty rights but also contributes to sustainable management, acknowledging the broader benefits of resource conservation for everyone involved.

Tribes have a special connection to the natural environment and climate change poses significant challenges to Tribal communities by impacting their essential resources and cultural practices. Tribes' traditional knowledge can help FAC and the U.S. Fish and Wildlife Service in developing climate adaptation strategies, resource management practices, and to ensure the benefits of resource conservation are accessible to everyone.

# TRIBAL TRUST CO-STEWARDSHIP

“Co-stewardship is not just one more assignment or priority.  Fulfilling our Trust responsibilities should be woven into the fabric of everything we do.”  -- U.S. Fish and Wildlife Service Director Martha Williams

The Fish and Aquatic Conservation (FAC) program is a co-steward with many Tribes regarding these incredible natural and cultural resources.

For decades, the FAC program has partnered with Tribes to stock fish in Tribal waters and provide technical assistance for fish and wildlife resource management needs on Tribal lands - from collaborative conservation of the Apache trout to co-management of salmon stocks in the Pacific Northwest and lake trout in the Great Lakes. We pursue these collaborative management efforts not just to fulfill our Tribal Trust responsibilities and acknowledge Tribal treaty rights, but also to promote sustainable management of important Tribal fisheries and wildlife and to ensure the benefits of resource conservation are accessible to everyone.

A returning coho salmon at the Suquamish Tribe’s Grovers Creek Hatchery.  Photo credit: K. King/USFWS

# Casting a Fly Rod to Apache Trout is a Testament to Perseverance

*By Craig Springer, U.S. Fish and Wildlife Service, Office of Conservation Investment*

The Apache trout stands to be the first sport fish species to be recovered and removed from the federal list of threatened and endangered species. And what a path it has wended to get here. The Apache trout went from anonymity to misidentification to an endangered species, and the official state fish of Arizona over the span of a century.

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

Places everywhere have their scars, and the White Mountains are no exception, both on the Apache-Sitgreaves National Forest and Fort Apache Indian Reservation. The loss of habitat from excessive timbering and grazing and the introduction of non-native trout species proved detrimental to the native Apache trout.

Over the last 70 years, Apache trout populations have rallied through habitat restoration, brood stock development, and stream-to-stream transfers. It's been a long slog, and it's been successful.

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

Today, Apache trout swim in the purposefully targeted benchmark of 30 different populations in 174 miles of streams as outlined in a recovery plan created by scientists many years ago. Dropping an Elk-hair Caddis on the nose of Apache trout while standing knee deep in a cold creek is fully immersive and a salve for one's soul. With the flick of its tail my fish darts back to dark water. I marvel over the trout's natural rarity in a sky island high above the Sonoran Desert, the path taken by conservationists to improve its lot, and the great cast of people that one would have to thank for it all.

Read full article

An Apache trout. Photo credit: USFWS

**20 million**
**Fish Distributed to Tribal Lands**

**57**
**Tribal Reservations, Pueblos, and other Native American Communities Stocked with Fish for Recreational and Subsistence Fisheries**

**2023 Numbers**

The Lander Fish & Wildlife Conservation Office in Wyoming assists the Eastern Shoshone and Northern Arapaho Tribes of the Wind River Reservation with fisheries and wildlife conservation. The Reservation provides an abundance of habitat for native cutthroat trout, burbot, and sauger as well as a variety of non-native fish. Native wildlife is also abundant and provides sustainable harvests for Tribal hunters.

On the Wind River Indian Reservation collecting dropped mule deer collars for the Lander FWCO. Photo credit: Dana Shellhorn/USFWS

# Coming Home to the Clackamas River

## Bull trout reintroduction in the Pacific Northwest

*By Amanda DeVleeschower, U.S. Fish and Wildlife Service, Science Applications, Directorate Fellow Program*

What do you look for in a new home? If you were a bull trout, you'd want rivers and streams that meet the four Cs – cold, clean, complex, and connected habitat.

Populations of this Pacific Northwest native have been impacted by reduced habitat quality, physical barriers to river migration, and even competition with non-native trout species. Climate change multiplies these threats by increasing water temperatures and reducing water available for habitat. For fish that love cold, clean water like the bull trout, warming waters can mean successful reproduction is no longer possible. The combination of these threats has resulted in bull trout populations declining to levels that required them to be listed as threatened under the Endangered Species Act.

The Clackamas River, located in northwestern Oregon, was once home to bull trout. By 1963, this native fish had disappeared from the river and was locally extinct. Since then, habitat restoration efforts have improved the river, reduced migration barriers, and limited the number of non-native trout species.

In 2011, the U.S. Fish and Wildlife Service joined with the Confederated Tribes of the Warm Springs and other partners to bring back the bull trout. The goal is to re-establish a self-sustaining population by the year 2030. The first step, find bull trout that could be moved to the Clackamas River without harming the population from where the trout are being taken. The next step in reintroducing bull trout was to ensure each individual trout was healthy enough to be moved to the Clackamas River. In June 2011, the first bull trout were ready to move to their new home.

Pinhead Creek on the Clackamas River. Photo credit: USFWS

Before releasing the trout, scientists tagged them with PIT tags/radio tags to track their location. Tracking the location was vital to understanding their survival rates, which parts of the river they were using, and allowed scientists to learn more about what the trout were doing at locations, such as spawning or feeding.

A few months later, for the first time in more than 50 years, a bull trout was observed spawning in the Clackamas River and later five bull trout redds were identified. With this success, researchers pushed forward with their goal of a self-sustaining population by 2030.

Reintroducing species to habitats that are projected to be suitable in the future is an important management tool for adapting to climate change.

Read full article

# Improving Access - Welcoming the Next Generation

Father and son fishing together in park.  Photo credit:  wavebreak3/Adobe Stock

As climate change continues to threaten the health of fisheries and their habitats, the Fish and Aquatic Conservation (FAC) program is committed to inspiring future generations to love, understand, and protect those precious resources.  In 2023, nearly a million people visited national fish hatcheries and conservation offices across the country. These visitors came to us to catch their first fish, welcome salmon returning upriver to spawn, and become more deeply engaged in conservation.

These facilities provide the public with safe local places to access fishing and conservation. To pave the way for that access, our Fish Funds small grant program helps hatcheries and conservation offices fund new outreach projects.

## Perspective by Nicole Hams

*Science Communication and Outreach Biologist*

Natural resource management decisions have disproportionately segregated minority and low-income communities from public lands, thus limiting, or outright eliminating, their participation in outdoor recreation activities. Compared to white communities, minority and low-income communities are three times more likely to be situated in a geographical area that is deprived of forests, streams, wetlands, and other natural places- a disparity that directly impacts their participation in outdoor recreation activities.

It's widely accepted that outreach and engagement by land management agencies is a crucial component for removing this barrier, yet there remains a fair amount of discourse about strategies that effectively address this inequality among disparate community needs.

The outreach program at the Columbia River Fish and Wildlife Conservation Office uses an adaptive collaboration strategy for developing high-impact environmental education experiences that expose marginalized communities to public land and nurture their interests in outdoor recreation.

Our office focuses on building trust with the communities we work with. This is, by far, the most time-consuming aspect of our approach but the results facilitate open and honest communication needed to address current needs and anticipate future ones – a goal that can only adequately be accomplished through collective support. We continue to build trust by being intentional about how we engage, prioritizing consistent, high-impact experiences tailored to smaller groups above general experiences that appeal to the masses. Finally, we engage with the expectation of providing resources in the form of staff support, supplies or equipment, and technical assistance.

Equity-centered considerations and adaptive strategies are implicit in implementing polices that lead to marginalized communities receiving the same quality and quantity of access to outdoor spaces as traditional stakeholders.

**188,981**
**Participants in Community-Based Recreation and Education Programs**

**992,805**
**Visitors to FAC Facilities**

**27,985**
**Youth Engaged in Aquatic Resource Education**

2023 Numbers

## A closer look: fishing at the front line of conservation

Everyone deserves access to clean, safe, and local opportunities to connect with nature. The Fish and Aquatic Conservation (FAC) program is eliminating barriers that prevent people from connecting with the natural world around them while protecting our shared resources for future generations to enjoy. Improving the connections between human communities and the wildlife and ecosystems around them is at the heart our conservation work.

**Fishing Matters Because**

- **Anglers are some of the primary users of the resources we protect.**
- **Waterways connect people's lives with the work we do.**
- **Fishing and boating provide direct and indirect benefits to communities.**

Fishing's popularity spans geography, age, culture, and income. In 2022, 15 percent of the American population 16 and older went fishing at least once. That translates to **39.9 million anglers**, averaging **20 days** spent on the water, and taking **12 fishing trips** per year. (Source: National Survey of Fishing, Hunting, and Wildlife-Associated Recreation)

**Protecting and restoring healthy habitats for fish and people help ensure equitable access to nature.**

The fish passage, habitat restoration, and water quality monitoring work of FAC contributes to clean healthy aquatic environments that benefit both wildlife and people. By protecting and restoring healthy habitats for fish and people, FAC helps ensure equitable access to nature and helps fulfill the Service's commitment to racial equity and social and environmental justice goals.


Taking a fishing break to color a rainbow trout. Photo credit: Scott Walker/USFWS

## The Sport Fishing and Boating Partnership Council

What: A legislatively mandated Federal Advisory Committee established in 1993 to advise the Department of the Interior through the U.S. Fish and Wildlife Service and Department of Commerce through the National Oceanic and Atmospheric Administration.

Who: National and regional leaders in angling, boating, and conservation who represent a wide range of stakeholder organizations.

Why: Provide critical input on the development and implementation of programs that affect conservation strategies that benefit recreational fishing and boating resources.

In 2023 a new Council charter was signed by Secretary Haaland, and the Fish and Aquatic Conservation program worked with counterparts at the National Oceanic and Atmospheric Administration (NOAA) to recommend new council members. In addition to the new charter and call for nominations, work continued on the oversight of the National Outreach and Communications Program (NOCP). The Council is tasked with conducting periodic reviews of the NOCP to evaluate its effectiveness. The Service contracted with an outside consultant to complete a programmatic assessment of the NOCP for the period of 2016-2021. The assessment includes literature reviews, stakeholder interviews, and additional research. The final report also includes several new recommended metrics to help achieve the goals of the NOCP.

**Economic Impact of Boating and Fishing**

**Fishing and boating support local economies and improve the physical, psychological, and social health of people.**

- **$32.4 billion: total economic output of fishing and boating (BEA, 2023)**
- **$1.2 billion: economic output of the National Fish Hatchery System recreational fish stocking program (USFWS, 2017)**
- **$2.8 million: economic output /$1 million invested through Bipartisan Infrastructure Law on fish passage (USFWS, 2023)**

## National Outreach and Communications Program

What: A national fishing communications program established by the 1998 Sportfishing and Boating Safety Act (Act) and funded by two percent of the Sport Fish Restoration and Boating Trust Fund.

Who: Since 1999 the Recreational Boating and Fishing Foundation has implemented the National Outreach and Communications Program through grants and Cooperative Agreements averaging $12 million per year.

Why: Improve communications about fishing and boating opportunities, reduce barriers to participation, and promote safe fishing and boating practices as well as the conservation and the responsible use of the nation's aquatic resources.

In 2023 RBFF supported improved national communication efforts through a variety of direct consumer outreach, marketing, grant programs, and their annual State Marketing Workshop. In addition to their longstanding Take Me Fishing website and marketing campaign, the Vamos a Pescar and State R3 Program grants distributed $316,500 in direct support to increase access and remove barriers to fishing. The funding will help 26 outreach and communications programs improve fishing and boating experiences, expand conservation education, and support data-driven marketing approaches.

# Angling for Equity

## Fish and Wildlife Conservation Office expands creative methods for addressing barriers to fishing participation

*By Kevin Cody, U.S. Fish and Wildlife Service Intern through the American Conservation Experience*

For many of us, some of the first connections to nature came from going fishing as a kid. From the first big fish to time spent with loved ones by the water, the memories stick with you and can spark future gateways into career paths, areas of study, and a lifelong love for the outdoors.

Unfortunately, not everyone has those opportunities due to some form of a barrier, such as the rising cost of equipment or simply not having access to the knowledge on how to get started. This is where the U.S. Fish and Wildlife Service's Western Washington Fish and Wildlife Conservation Office and their partners come in. Together, they are providing opportunities for all to become future anglers and stewards of the environment.

Two of the most successful outreach programs on this front have been fishing events with Big Brothers Big Sisters of Southwest Washington and the Library Fishing Tackle Loaner Program, which continues to expand.

One of the largest trout caught at the Big Brothers Big Sisters event of Southwest Washington  Photo credit:  Dan Spencer/USFWS

**Big Brothers Big Sisters**
For the third year, Big Brothers Big Sisters, Rods and Reels in Need, and the Service teamed up to host a fishing event on May 25, 2023, in Lacey, Washington. A goal of the program is to prepare everyone to become self-sufficient anglers.

The first step at the event for participating Bigs and Littles was a casting station. This activity helped participants learn casting basics and fish identification. The activity celebrated the intrinsic value of learning about fish species while also stressing the importance of being a good steward.

Next was a knot-tying station where Bigs and Littles were taught basic knot tying, and how to set up their own rods for bait fishing. Last, the participants headed down to a pond, where they were able to try their hand at catching rainbow trout.

The fish were biting that day, with many of the kids catching several large rainbow trout.

**Library Fishing Tackle Loaner Program:**
In-person programming can only reach a limited number of people. The Library Fishing Tackle Loaner Program provides individuals and families the opportunity to go fishing without the potential barrier of equipment cost.

Since its launch in April 2021, the library program has been a great success, growing from a single location to five. The participating library system has experienced such high demand that the number of available kits has increased as well.

Read full article

# We Are Fish and Aquatic Conservation

## NATIONAL FISH HATCHERIES

*ARIZONA*
ALCHESAY NFH
WILLIAMS CREEK NFH
WILLOW BEACH NFH
*ARKANSAS*
GREERS FERRY NFH
MAMMOTH SPRING NFH
NORFORK NFH
*CALIFORNIA*
COLEMAN NFH
LIVINGSTON STONE NFH
*COLORADO*
HOTCHKISS NFH
LEADVILLE NFH
*FLORIDA*
WELAKA NFH
*GEORGIA*
CHATTAHOOCHEE FOREST NFH
WARM SPRINGS NFH
*IDAHO*
DWORSHAK NFH
KOOSKIA NFH
*KENTUCKY*
WOLF CREEK NFH
*LOUISIANA*
NATCHITOCHES NFH
*MAINE*
CRAIG BROOK NFH
GREEN LAKE NFH
*MASSACHUSETTS*
BERKSHIRE NFH
NORTH ATTLEBORO NFH
CRONIN AQUATIC RESOURCES CENTER
*MICHIGAN*
JORDAN RIVER NFH
PENDILLS CREEK NFH
SULLIVAN CREEK NFH
*MISSISSIPPI*
PRIVATE JOHN ALLEN NFH
*MISSOURI*
NEOSHO NFH

*MONTANA*
CRESTON NFH
ENNIS NFH
*NEVADA*
LAHONTAN NFH
*NEW HAMPSHIRE*
NASHUA NFH
*NEW MEXICO*
MORA NFH
SW NATIVE AQUATIC RESOURCES & RECOVERY CENTER
*NORTH CAROLINA*
EDENTON NFH
*NORTH DAKOTA*
GARRISON DAM NFH
VALLEY CITY NFH
*OKLAHOMA*
TISHOMINGO NFH
*OREGON*
EAGLE CREEK NFH
WARM SPRINGS NFH
KLAMATH FALLS NFH
*PENNSYLVANIA*
ALLEGHENY NFH
NORTHEAST FISHERY CENTER
*SOUTH CAROLINA*
BEARS BLUFF NFH
ORANGEBURG NFH
*SOUTH DAKOTA*
DC BOOTH HISTORIC NFH
GAVINS POINT NFH
*TENNESSEE*
DALE HOLLOW NFH
ERWIN NFH
*TEXAS*
INKS DAM NFH
SAN MARCOS AQUATIC RESOURCES CENTER
UVALDE NFH
*UTAH*
JONES HOLE NFH
OURAY NFH

*VERMONT*
DWIGHT D EISENHOWER NFH
WHITE RIVER NFH
*VIRGINIA*
HARRISON LAKE NFH
*WASHINGTON*
CARSON NFH
ENTIAT NFH
LEAVENWORTH NFH
LITTLE WHITE SALMON NFH
MAKAH NFH
QUILCENE NFH
QUINAULT NFH
SPRING CREEK NFH
WILLARD NFH
WINTHROP NFH
*WEST VIRGINIA*
WHITE SULPHUR SPRINGS NFH
*WISCONSIN*
GENOA NFH
IRON RIVER NFH
*WYOMING*
JACKSON NFH
SARATOGA NFH

## NATIONAL FISH HEALTH CENTERS

*CALIFORNIA*
CALIFORNIA/NEVADA FHC
*GEORGIA*
WARM SPRINGS FHC
*MONTANA*
BOZEMAN FHC
*NEW MEXICO*
SW NATIVE AQUATIC RESOURCES & RECOVERY CENTER
*OREGON*
PACIFIC REGION FISH HEALTH PROGRAM
*PENNSYLVANIA*
LAMAR FHC
*WISCONSIN*
LA CROSSE FHC

## NATIONAL FISH TECHNOLOGY CENTERS

*GEORGIA*
WARM SPRINGS FTC
*PENNSYLVANIA*
NORTHEAST FISHERY CENTER
*MONTANA*
BOZEMAN FTC
*NEW MEXICO*
SW NATIVE AQUATIC RESOURCES & RECOVERY CENTER
*TEXAS*
SAN MARCOS AQUATIC RESOURCES CENTER
*WASHINGTON*
ABERNATHY FTC
*WISCONSIN*
WHITNEY GENETICS LABORATORY

## FISH AND WILDLIFE CONSERVATION OFFICES

*ALASKA*
SOUTHERN ALASKA FWO
CONSERVATION GENETICS LABORATORY
NORTHERN ALASKA FWO
KENAI FWCO
*ARIZONA*
ARIZONA FWCO
*CALIFORNIA*
ARCATA FWO
SAN FRANCISCO BAY-DELTA FWO
LODI FWO
RED BLUFF FWO
YREKA FWO
*COLORADO*
COLORADO FWCO
GRAND JUNCTION FWCO
*FLORIDA*
PANAMA CITY FWCO
PENINSULAR FLORIDA FWCO
*IDAHO*
IDAHO FWCO
*ILLINOIS*
CARTERVILLE FWCO
*LOUISIANA*
BATON ROUGE FWCO
*MAINE*
MAINE FWCO

*MARYLAND*
MARYLAND FWCO
MID-ATLANTIC FWCO
*MASSACHUSETTS*
CONNECTICUT RIVER FWCO
*MICHIGAN*
ALPENA FWCO
LUDINGTON BIOLOGICAL STATION
MARQUETTE BIOLOGICAL STATION
*MISSISSIPPI*
LOWER MISSISSIPPI RIVER FWCO
*MISSOURI*
COLUMBIA FWCO
*MONTANA*
MONTANA FWCO
*NEVADA*
LAHONTAN FWCO
*NEW HAMPSHIRE*
CENTRAL NEW ENGLAND FWCO
*NEW MEXICO*
NEW MEXICO FWCO
*NEW YORK*
LOWER GREAT LAKES FWCO
*NORTH DAKOTA*
MISSOURI RIVER FWCO
*OKLAHOMA*
OKLAHOMA FWCO
*OREGON*
KLAMATH FALLS FWO

*SOUTH CAROLINA*
WADMALAW ISLAND FWCO
*SOUTH DAKOTA*
GREAT PLAINS FWCO
*TENNESSEE*
APPLACHIAN FWCO
*TEXAS*
TEXAS FWCO
*UTAH*
GREEN RIVER BASIN FWCO
UTAH FWCO
*VERMONT*
LAKE CHAMPLAIN FWCO
*VIRGINIA*
VIRGINIA FWCO
*WASHINGTON*
COLUMBIA RIVER FWCO
MID-COLUMBIA FWCO
WESTERN WASHINGTON FWCO
*WEST VIRGINIA*
APPLACHIAN FWCO
*WISCONSIN*
ASHLAND FWCO
GREEN BAY FWCO
LA CROSSE FWCO
*WYOMING*
LANDER FWCO

U.S. Department of the Interior
U.S. Fish and Wildlife Service

Read the report online: 2023 Fish and Aquatic Conservation - Uncharted Waters: Building Resilience in the Face of Climate Change

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Silhouette of person fishing from dock at sunset. Photo credit: Tom Ramsey/Adobe Stock