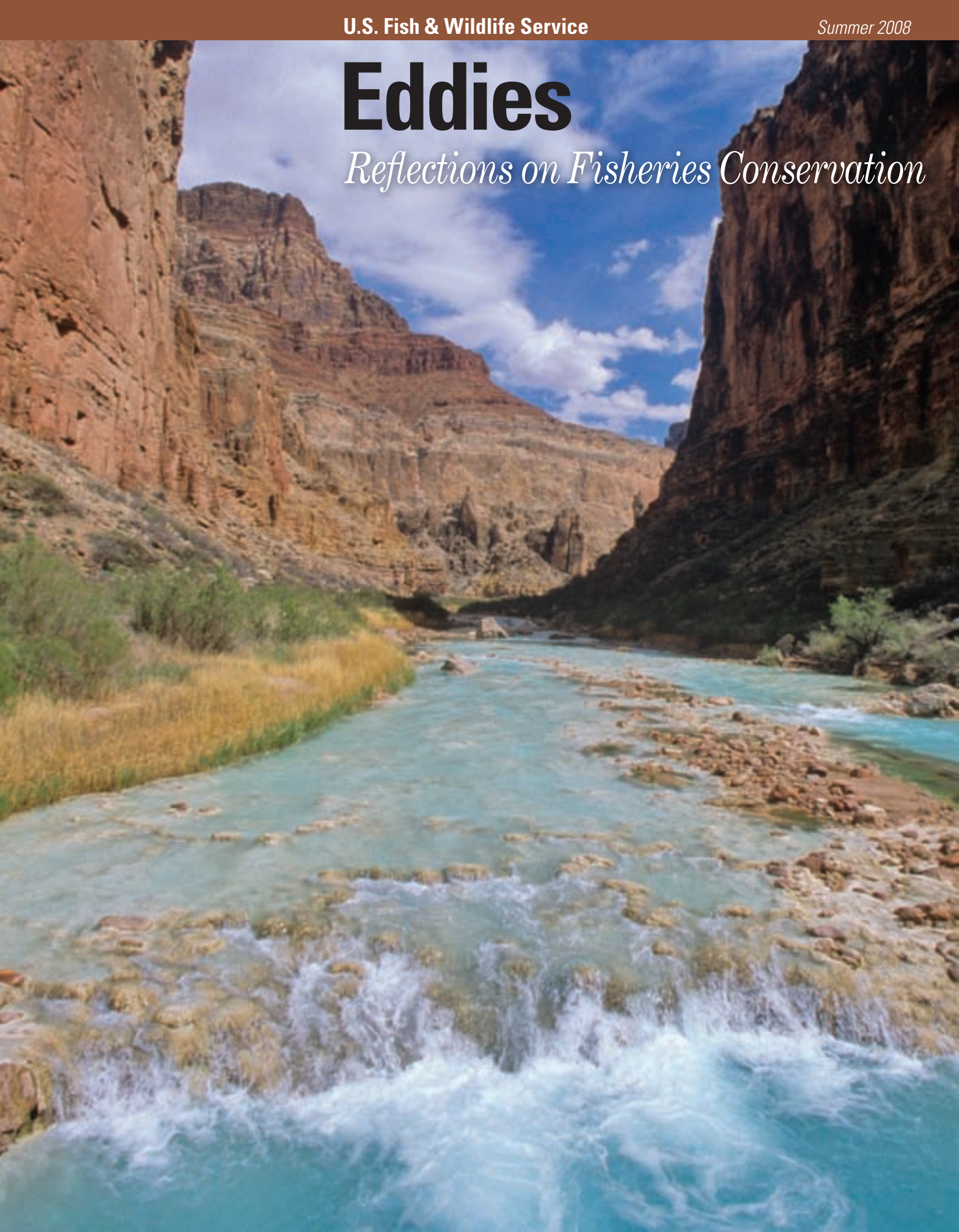


# Eddies

*Reflections on Fisheries Conservation*





# Eddies

Vol. 1, No. 2

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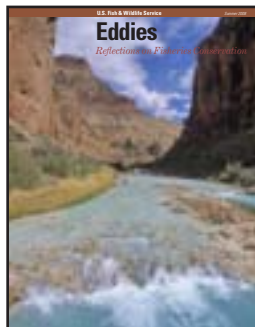
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harbors the peculiar  
endangered minnow.  
Read about it on  
page 16. Photo:  
[www.tombear.com](http://www.tombear.com)



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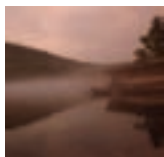
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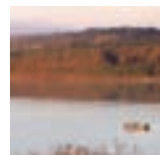
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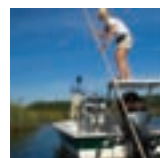
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***The mission of the U.S. Fish and Wildlife Service  
is working with others to conserve, protect and enhance fish,  
wildlife, plants and their habitats for the continuing benefit  
of the American people.***



# Headwaters

## Seeing Habitat Whole

By Gary Frazer



USFWS

Stream-bottom cobbles from a distance are rather uninteresting objects. Looking through the turbulence of a clear-water riffle, they look like one-dimensional, flat plates of stone colored like cardboard. Ovate and smooth, they bear no edges. Those that come near perfecting a complete sphere have tumbled round by time, coursing in the streambed toward the sea.

But cobbles—as inorganic, inert and inanimate as they are—are habitat. What looks one-dimensional from above has a topography that provides a place for plants and animals to dwell. Pick up a cobble, and on the underside you'll find the first links in the food chain that ends with you. In the scorch of sunlight, mayfly larvae scurry to the dark side of the stone; caddis fly larvae who have been their own architects look about curiously out of their pebbled shells glued together by their own saliva; black fly larvae that a moment ago wafted in the water like crinoids in a coral sea, now stick to the stone like lifeless curled flecks of wet pepper. These things aquatic live and feed in the physical space created by cobble. Then, they in turn feed other things – namely, fish.

Fish habitat on the whole is an amalgam of all things that go on in a watershed. Streams are conduits – the liquefied contents of the watershed. To borrow from early geographer and explorer John Wesley Powell, watersheds are where “. . . all living things are inextricably linked by their common water course. . .” What happens to the forest and fields also influences the downstream aquatic habitats. Contemporary geographer Will Graf has this to say: “Aquatic

ecosystems are the products of the dynamic relationship between the watershed and the biological resources that live in the river system; a river is the sum of its parts. . .”

We have learned about those parts a bit at a time through scientific inquiry, and have come to understand how aquatic organisms make a living in streams and lakes. Fisheries science employed by the U.S. Fish and Wildlife Service is on the whole an amalgam of disciplines and a body of knowledge compiled over decades. Fisheries biology, physiology, and population ecology marry disciplines like hydrology, restoration ecology, engineering, geospatial analysis, and sociology to develop new, more effective ways to protect fish and fish habitats.

In these pages of *Eddies*, you'll read about how we protect fish habitat, like in a story on our Fish Passage Program, a highly successful non-regulatory conservation effort that connects fish to habitats. That success is illustrated on the back cover. Tom Busiahn tenders a piece on the National Fish Habitat Action Plan. Dennis Stone has something in common with John Wesley Powell that you'll read about in his story on the endangered humpback chub. You can see where both men trod on the front cover. Ben Ikenson gives us a giddy look at some of the people who work in fisheries conservation. Jeff Finley shares some serious thoughts on the Missouri River, a place where I worked earlier in my career.

I never cease to marvel over our natural world, and I hope you, too, find wonder over the small things in nature, like the cobble in the streambed – the intricate parts that make the whole. It's my wish that you come to connect quality fish habitat with quality fish, and fishing, so that the distance from you to the caddis fly larvae on the dark side of a cobble isn't that far.

Gary Frazer is the Assistant Director for Fisheries and Habitat Conservation in Washington, D.C.





Amanda Patrick/USFWS

A little BiT shares smiles over a crane fly larva.

## Connecting kids with nature one “BiT” at a time

Biologist-in-Training, or BiT, is an experiential education program anchored at National Fish Hatcheries and the outdoor classrooms of nearby streams and lakes. Launched last autumn at Wolf Creek National Fish Hatchery, Kentucky, BiT facilitates student-led, meaningful interactions with fish and aquatic habitats.

An activity booklet engages children through five outdoor explorations of fish and aquatic environments; promotes stewardship and the intrinsic value of habitats; builds observation skills; and shows the different means of gathering and organizing biological information. Children link with a mentor in the field of biology. The booklet aligns with national education standards for upper elementary age students. An activity card, designed for little BiTs (pre-K to lower elementary) offers ideas for unstructured exploration of aquatic habitats and tips for parents on why connecting kids with nature is important.

For a BiT more information, visit [www.fws.gov/southeast/fisheries/BiT](http://www.fws.gov/southeast/fisheries/BiT) or call (404) 679-7108. ♦ Amanda Patrick



## Chloramine-T and BGD

Bacterial gill disease, or BGD, suffocates trout and salmon. If left unchecked in hatcheries it can hamstring efforts to recover imperiled species, lower the number of fish stocked for angling, and in commercial enterprises, it can send profit down the drain. Treatments for the disease remain scant, but a chemical called Chloramine-T shows promise. A recent study conducted by the U.S. Fish and Wildlife Service’s Aquatic Animal Drug Approval Partnership in Bozeman, Montana, published in the *North American Journal of Aquaculture*, confirms that the chemical effectively reduces mortality in diseased fish. Less than nine percent of treated chum salmon died in the study, while nearly 100 percent of the untreated

salmon perished. Results were similar for rainbow trout and the federally threatened Apache trout tested in the research. The data collected from this study will help meet the rigorous demands of the U.S. Food and Drug Administration, so that Chloramine-T might eventually be approved for use in aquaculture. ♦ Craig Springer



Dave Erdahl/USFWS

Miranda Dotson, AADAP biologist, scans for signs of BGD.

## All that there is, is all that there will ever be

Water is in short supply in the American Southwest, and Mora National Fish Hatchery and Technology Center re-circulates 95 percent of its water in this state-of-the-art indoor facility in New Mexico. Biologists there recently learned that they can safely and efficiently raise two imperiled fishes, the razorback sucker and the bonytail, together in re-used water at a lower cost. Their findings, published in the *North American Journal of Aquaculture*, revealed raising the two fishes together reduced labor. The razorback suckers served as the maintenance crew, perusing the bottom of the tanks eating solids hatchery workers would otherwise have to clean up. ♦ Craig Springer

## Caddo Indian remains reinterred at National Fish Hatchery

Eight years of work between the Smithsonian Institution, the Caddo Nation, and the Natchitoches National Fish Hatchery culminated on a cold, rainy Louisiana day in March 2008. It was palpable, the constancy of human experience that transcends all cultures, when the Caddo Memorial Plaza was dedicated to honor the repatriated and reinterred remains of four Caddo Indians, formerly held at the Smithsonian. These and the remains of about 100 other Indians were looted during the hatchery's excavation in the 1930s. The Natchitoches hatchery is on a site sacred to the Caddo Nation, and the remains came home to a Keep Safe Cemetery. ♦ Karen Kilpatrick



NOAA Fisheries

## Lake sturgeon genetics guide management

Research published in the *North American Journal of Fisheries Management* on lake sturgeon of the Great Lakes shines a guiding light on the path of fish stocking and habitat management. The U.S. Fish and Wildlife Service's Alpena and Ashland Fish and Wildlife Conservation Offices in Michigan and Wisconsin examined genetics to assess the existing stocks of lake sturgeon. They collected tissues from fish at 27 spawning sites in the

Great Lakes basin and the Hudson Bay drainage. The resulting genetic data distinguished three large-scale populations in Hudson Bay— northern Lake Superior; southern Lake Superior; and the remaining Great Lakes. The data inform managers where the fish need help. This long-lived leviathan has declined from years of habitat loss, and overharvest for food, roe, isinglass, and even steamboat fuel. ♦ Craig Springer

## FEATURED FACILITY Columbia Fish and Wildlife Conservation Office (FWCO)

**Where:** Columbia, Missouri

**When:** Established 1991

**Then:** With increasing concern over the declining condition of the Missouri River's fish fauna, the U.S. Fish and Wildlife Service created the Columbia Fishery Resources Office (its name changed in 2007). The office opened with only two biologists on a shoestring budget. Their work became significant in creating the Big Muddy National Fish and Wildlife Refuge along the fabled river.

**Now:** The Columbia FWCO works with Gavins Point National Fish Hatchery in South Dakota, and Neosho National Fish Hatchery in Missouri, in the recovery of endangered pallid sturgeon. The Columbia FWCO's current dozen or more employees and volunteers are immersed waist deep in the Missouri River Pallid Sturgeon Assessment and Monitoring Program; Habitat



Andy Plautck/USFWS

*Columbia FWCO biologists (l-r), Colby Wrasse, Wyatt Doyle, Brian Elkington, Patty Hermann, Brett Witte, and Lee Erickson, pose with pallid sturgeon and lake sturgeon before releasing them.*

Assessment and Monitoring Program; Mitigation Chute Monitoring Program; National Fish Habitat Action Plan; fish management on Department of Defense lands in Missouri, Iowa, and Kansas; and fish passage projects throughout Missouri and Iowa. They also work with the Mississippi Interstate Cooperative Resource Association's paddlfish program; the U.S. Army Corps of Engineers; and other state and federal agencies, including still, the Big Muddy Refuge. ♦ Tracy Hill





Matthew Patterson/USFWS

## BioFence feeds the masses (of mussels)

Algae – it’s what’s for dinner – if you’re a mussel. Biologists at the White Sulphur Springs National Fish Hatchery in West Virginia, serve it up with high technology. A photo-bioreactor, or BioFence©, produces large volumes of the green stuff to fill the bi-valve gullets of endangered freshwater mussels. The reactor continuously circulates nutrient-rich water through transparent tubes, while an automated system feeds it fertilizer and carbon dioxide for photosynthesis. The homegrown glop is a gastronomical mussel mainstay, and some of it stays at White Sulphur Springs, and some of it goes to feed mussels in conservation programs at Genoa and Nashua National Fish Hatcheries, the USGS Leetown Science Center and Northern Appalachian Research Laboratory,

Virginia Department of Game and Inland Fisheries, the Kentucky Department of Fish and Wildlife Resources, the West Virginia Division of Natural Resources, Virginia Tech, and Conservation Fisheries, Inc. ♦ Matthew Patterson

Matthew Patterson, Fisheries Biologist, tends the BioFence.

## Good migrations

The movements of fishes are surprising, and all the reasons behind their get-up-and-go remain a little mysterious. They move, drift, or migrate looking for love or the right kind of food or water: leopard darter-300 feet, lake trout-26 miles, flathead catfish-28 miles, largemouth bass-30 miles, paddlefish-200 miles, carp-200 miles, American eel-3,600 miles. ♦ Craig Springer

## Friends rally in DC

Everybody needs a friend, and toward that end, members of 14 Friends Groups around the country landed in the nation’s capital in March to discuss the future of the Fisheries Friends Initiative and the possibility for a National Fisheries Friends Association. The National Fish Hatchery System, along with The Booth Society, of Spearfish, South Dakota, hosted the event. “Fisheries Friends” are non-profit organizations that exist to promote the well-being of individual National Fish Hatcheries and Fish and Wildlife Conservation Offices. A national Friends Group would coordinate individual group efforts to benefit the Fisheries Program as a whole, and would be central in executing the National Fish Hatchery System Volunteer Act of 2006. This congressional act requires the National Fish Hatchery System to use its facilities for education. The



David Gordon/USFWS

Friends gather at DC headquarters before venturing to Capitol Hill.

number of friends groups supporting National Fish Hatcheries, and Fish and Wildlife Conservation Offices,

across the country has doubled in 18 months. ♦ Richard Christian

## National Hunting and Fishing Day

If you missed National Fishing and Boating Week, look ahead to September 27. Established by Congress in 1971, National Hunting and Fishing Day is an annual celebration of hunters, anglers and conservation. It's been called one of the most effective grassroots campaigns ever undertaken to promote traditional outdoor sports. You can learn about youth fishing derbies, hatchery tours, educational games or seminars near you at [www.nhfd.org](http://www.nhfd.org). ♦ Denise Wagner



## Catch-and-release mortality studied



USFWS

Hook-and-cook fishing certainly kills fish – and so does catch-and-release, but to what extent? That question as it relates to striped bass was answered in a study done by the U.S. Fish and Wildlife Service's Northeast Fishery Center in Pennsylvania, published in the *North American Journal of Fisheries Management*. Striped bass were caught from the Hudson River by volunteer anglers using traditional J-hooks and circle

hooks. The striped bass were tagged and held for five days in an underwater cage near shore. In the end, 16 percent of striper caught on J-hooks died, while only five percent caught on circle hooks died. The researchers believe the catch-and-release mortality is noteworthy, and should be considered in managing striper fisheries. It also underscores the care anglers should take releasing striped bass. ♦ Craig Springer

## POSTCARDS

### Neosho National Fish Hatchery



The Neosho National Fish Hatchery, established in 1888 in the Missouri town of the same name, is the oldest continuously operating federal hatchery. “Neosho” is an Indian word meaning “clear, cold water” and the combination of nine local springs and presence of an important railway led to the purchase of this site and the raising of both warm and coldwater fishes, including trout. Today the hatchery still raises the economically important rainbow trout, and helps manage pallid and lake sturgeon, Ozark cavefish, native mussels and paddlefish. This circa-1900 postcard shows the historic 1890 hatchery house. ♦ Mark Madison



By Lee Allen

## Arden Trandahl



Carlos Martinez/USFWS

*Arden Trandahl bronze at the D.C. Booth Historic National Fish Hatchery.*

*Arden Trandahl in the trenches at D.C. Booth Historical National Fish Hatchery.*

Arden Trandahl



“To succeed,” according to Roget’s Thesaurus, is “to turn out well.” Or as writer Thomas Wolfe put it: “Success involves taking a talent and learning how to use the whole of it.” By either yardstick, Arden J. Trandahl measures up as a success in his 36-year U.S. Fish and Wildlife Service career.

“Going through three and a half decades of memorabilia only reinforces to me what a great ride it was,” he says. “The work we did was more than just a job; it was a commitment to the fisheries – a way of life.

Whoever thought a kid from rural Minnesota would have so many good things happen to him?”

Smart man that he is, Trandahl is quick to point out that spouse Sylvia (married 53 years) has always been his main supporter through field assignments and office stints in six states. “More than once, she’d just pack up the kids and away we’d go. I don’t know of any other family within U.S. Fish and Wildlife Service that got around like we did.”

Growing up working in his family produce business, Trandahl took the big gamble and followed his muse to obtain a degree in Wildlife and Conservation, emphasis on Fisheries. From initial fishery assignments in Alabama, Minnesota, and South Dakota in the early 1960s, he was named manager of the National Fish Hatchery in Senecaville, Ohio in 1963.

As work responsibilities grew, so did his family – a total of nine children. “Growing up in a town with a river running through it, I’ve always loved the outdoors and my father took every opportunity to instill an appreciation

of nature. My work allowed me to do the same for my family and my sons and daughters are avid, ethical, hunters, fishers, and outdoors lovers.”

Son Jeff cites a youth around hatcheries and biologists as helping him make a career choice. “In kindergarten, I drew a picture of what I wanted to be when I grew up – a biologist like Dad – protecting fish and animals,” he says. Today, Jeff is Executive Director of the National Fish and Wildlife Foundation, a public-private partnership of federal agencies, 50 corporate sponsors, and 300 major donors which focuses on wildlife and habitat conservation.

One of Trandahl’s career “opportunities” came when he was transferred to the Mississippi River Twelve-Foot Channel Project in Davenport, Iowa. “We had seven children at the time and couldn’t find a home to rent for a year, so we wound up living in a small hatchery house. We were the last people to live there and when we moved out, the government sold the place for a dollar.”

From there, all roads led up – to Assistant Branch Chief of the Hatcheries Division in the Great Lakes Region which led to Technology Branch Chief of the Hatchery section, U.S. Fish and Wildlife Service, Washington, D.C. until a 1978 transfer as Spearfish (South Dakota) Fisheries Center director. He took early retirement there before being subsequently hired back as director of what is now known as the D.C. Booth National Historic Fish Hatchery.

It took nearly \$4 million to restore the old hatchery buildings and construct the current national museum and repository for fish culture. South



Dakota Senator Tom Daschle cited Trandahl's "vision and initiative" in getting the rehab done. "It's the largest and best-preserved example of a fish hatchery in the United States and probably the world, and a fantastic resource," Trandahl says.

In 1993, Senator Daschle supported Trandahl for the position of U.S. Fish and Wildlife Service Director, noting: "His dedication and initiative in rehabilitating the Booth hatchery brought the facility from a relic in the Department of Interior's outback to a Fish and Wildlife Service showcase." Arden, now 75, says modestly: "I never got the job, but was honored to be nominated."

In 1996, when he called an official end to his career, politicians entered a tribute into the Congressional Record. It read: "High praise to a man who has dedicated his life to government service and the management of fish hatchery operations." Retirement kudos came from everywhere including Speaker of the House of Representatives, Newt Gingrich, who said, "You should be proud of yourself for the contributions you made to the Department of the Interior and our country."

Ironically, D.C. Booth Historic National Fish Hatchery – now a repository of all national hatchery information and conservation artifacts – celebrated its 100th anniversary, the year of Trandahl's retirement. His former supervisor, Joe Webster, noted: "Ninety five percent of the reason the hatchery is there now is because of Arden Trandahl. Most people had doubts he could accomplish what he had in mind, but he persevered, developed partnership support, and made it a success."

One of the nicest retirement accolades came from a Montana colleague who predicted Trandahl "would not dust off a rocking chair and while away his hours on the porch. He'll encounter some project, scheme some dreams, make connections, play the angles, urge the right people, pull the right strings and persist and persist and persist until it, whatever it is, is done. That's the spirit he's exhibited all these years and it's the spirit which brings luster to the term public servant."

Prophetic words as Trandahl wasted little time in becoming an owner-broker of The Real Estate Center of Spearfish. "I must have a battery in me because I'm not the type to just sit," he says. "Nothing can beat what I did with the U.S. Fish and Wildlife Service, but this has been a good deal for me. I can spend time in the rural outdoors and because I still sit on the board of the D.C. Booth project, I can keep my oar in those waters too." ♦



Arden Trandahl

*Trandahl opens a hoop net, circa 1960.*



Carlos Martinez/USFWS

*By 1879 fish were successfully transported by railcar coast-to-coast.*



Carlos Martinez/USFWS

*Replica "Fish Car" at the D.C. Booth Historic National Fish Hatchery.*

# American Fishes

By Craig Springer

## The Longear Sunfish

*A color explosion in a tiny package*

They are a swimming painter's pallet, American as baseball and five-string banjo, and native to a huge swath of the country, swimming through brooks in your back yards. The longear sunfish has ties to a peace activist and an eccentric. It was among the first North American fishes described by science.

In 1818, European naturalist Constantine Rafinesque made a concerted collecting trip down the Ohio River to southern Illinois to find new specimens of plants, fossils, and animals for science. One resulting product, *Ichthyologia Ohiensis: Natural History of the Fishes Inhabiting the River Ohio and Its Tributary Streams*, put the light of science on scores of fishes yet unknown to the world. He collected a longear sunfish from the Licking River in Kentucky opposite the growing hub of the West—Cincinnati. He dubbed it *Ichthelis megalotis* for its most distinctive trait, the large black tab on its gill plate.

Rafinesque professed the natural sciences at Transylvania University, Kentucky. He was the son of a French businessman and German mother, born in Turkey, raised in Italy, and became a naturalized American in 1832. This man of science lived a tragic life and was an eccentric of the highest order; he was quarrelsome and recalcitrant and easy to dislike. The man was driven and accomplished and let others know it. The man that gave a name to the longear sunfish is also credited with developing a theory of evolution years before Darwin, expressing it in a 5,000-line poem. And perhaps as a monument to his hubris, *Ichthyologia Ohiensis* contains within its bindings the description of 10 fictitious fishes, including the 10-foot-long

and 400-pound devil-jack diamond fish, said to have bullet-proof scales made of stone. The fictitious fishes were entirely contrived as a mean-spirited practical joke by John James Audubon, a man with whom Rafinesque had boarded with in Kentucky.

When he gave a name to the longear sunfish in 1820, he probably had no way of knowing this gaudy fish lived in waters from New York to New Mexico, and Minnesota to Florida.

David Starr Jordan, an ichthyologist, medical doctor, and academician wrote the book *Fishes* as an installment in the *American Nature Series* in 1907, while still serving as Stanford University's first president. In his prefatory remarks he commented that the book would "answer all questions likely to be asked by anglers...and compress all that an educated man is likely to know, or care to know about fishes."

The taxonomist in Jordan doesn't start off the book with the lowest fish-life forms, like lampreys, nor does it begin with marlin or tarpon or salmon. Jordan began the treatise with an archetype, and he used the longear. He picked it in part for its looks and locale, citing that the animal lives in brooks "at the centre of our population. This will be to the northwest of Cincinnati, among the low wooded hills from which clear brooks flow over gravelly bottoms toward the Ohio River." Jordan would know; he undoubtedly caught longear sunfish when he taught ichthyology at Indiana University from 1879 to 1891. But you get the sense he was smitten, writing further: "But one of our sunfishes is especially beautiful – mottled blue and gold and scarlet – with a long, black ear-like

appendage backward from his gill covers – and this one we will keep and hold for our first lesson in fishes."

Anglers or biologists can't improve on what Jordan continues to say about the fish's traits: "It is a small fish, not longer than your hand most likely, but it can take the bait as savagely as the best, swimming away with it with such force that you might think from the vigor of its pull that you have a pickerel or a bass. But when it comes out of the water you see a little, flapping, unhappy, living plate of brown and blue and orange, with fins wide-spread, and eyes red with rage."

The longear sunfish makes a living in headwater streams, principally, and to a lesser extent bigger creeks and rivers. They hold an affinity for clear and shallow waters, warm, with a good amount of vegetation in the slack waters. With a deep, flat body, they're not one for the fast waters. They feed on the surface more than any other of the sunfishes. Terrestrial insects, like mayfly and caddisfly and moths, make up a larger part of their diets. A damselfly erratically dimpling a glassy glide will be in distress with a longear sunfish below. Longear sunfish follow along behind northern hogsucker that grub the bottoms to eat what they stir up. It is one of the few sunfishes-proper with a large mouth to take an occasional shiner or a crayfish that might scurry away in the daylight when a hogsucker dislodges it from a dark lair.

As the water warms, they turn their attentions to nesting. The male's colors are at the height of their vividness then. Strong vertical bars stripe mature females. Longear sunfish spawn in the spring, about



June at mid-latitudes like in Missouri. These fish have strong attractions to home pools, but move about to find spawning habitat and seasonal refuges from heat and cold.

Getting to those refuges means they need to move about as seasons come and go. Streams segmented by dams, or by road culverts above the stream bed, effectively block longear sunfish. The U.S. Fish and Wildlife Service's Fish Passage Program benefits this sunfish and its small-stream cohabitants, like minnows, darters and suckers, ensuring they have egress in their home pool.

Marcus Goldman fished his own home pools a century ago, about the same time Jordan collected fishes in Indiana. Goldman, a professor of literature at the University of Illinois, wrote in his book *In Praise of Little Fishes*: "The crowd in its ignorance deems it manly and impressive to catch crappies and bluegill, but scorns anything called 'sunfish.' The result of this attitude is that only seasoned and thoughtful anglers know or care to know how to identify the different species of Centrarchids."

Seasoned and thoughtful conservationists won't mind that there's more to say about the longear sunfish's appearance. It looks clad for another occasion. Seeing its startling gleam at the end of a line or in the bag of a seine brings to mind Emerson's *Rhodora*: "... if eyes were made for seeing, then beauty is its own excuse for being." ♦



Craig Springer

*Not just for kids. The longear sunfish lives in streams from New York to New Mexico, and does best where habitats are connected, like where this one was caught in Arkansas's Buffalo River.*

By Tom Busiahn

## More Habitat —

The tidal Potomac River is wreathed in morning mist. The green water dimples where a fish

breaks the surface, then another, and another. An old red rowboat is anchored in the gentle current,

while other rowboats drift into place across Fletcher's Cove. A fly rod swishes; the line snakes toward an eddy marking unseen rocks. Moments later, the rod bends nearly double. An American shad makes a powerful run and then arcs out of the water in a thrilling leap.

### Trout Creek, California



Mike Dean/CDFG

Through the Western Native Trout Initiative, the U.S. Fish and Wildlife Service's Red Bluff Fish and Wildlife Conservation Office paid about half of the cost of the Trout Creek Campground Restoration Project. Trout Creek holds one of four isolated populations of McCloud redband trout in the streams north of the McCloud River in northern California on the Shasta-Trinity National Forest, and on private lands. The campground provides great access for people to fish and enjoy the creek, but unauthorized off-highway vehicles destroyed trout habitats. In cooperation with the U.S. Forest Service, California Trout, California Department of

Fish and Game, and the River Exchange, a hands-on restoration project is well underway; they are replacing failed in-stream habitat structures, enhancing riparian vegetation and have excavated the area to control erosion. A kiosk will inform visitors of the important conservation work in the Upper McCloud watershed, and how they can protect the stream. This is the third of three conservation measures meant to ensure the genetic integrity of McCloud redband, and its availability to anglers. ♦ Nathan Allan

The American shad is back in the Potomac River, as is its smaller cousin, the hickory shad. Trophy-size striped bass are increasingly abundant. Here in the nation's capital, nearly in the shadow of the Washington Monument, angling can be downright spectacular when stripers and shad move upriver to spawn.

It wasn't always this way. A low-head dam at Little Falls, a mile or so above Fletcher's Cove, blocked shad and stripers from reaching their spawning habitat. The dam, in combination with sediment from farms, pollution from factories and cities, and overharvest downstream, drove shad and striper populations to all-time lows by the 1980s. Harvest controls and judicious stocking maintained viable populations, keeping a collapse at bay.

But it is habitat restoration that brought the shad back. A fishway breached Little Falls Dam in 2000, and four years later, the American shad population recovered to the point where stocking was discontinued. This success story was the backdrop in April 2006, when government, industry, and



# More Fish

national conservation groups assembled at this same historic Potomac River cove to announce the National Fish Habitat Action Plan.

Despite the success of regulatory approaches to conservation since the 1970s, population growth and land use changes continue to harm fish habitat across the United States. Many fish populations are depleted or listed as “threatened” or “endangered.” The Action Plan takes a different tack: it encourages voluntary conservation; improves coordination across jurisdictions and land ownership boundaries; and enlists new partners to contribute time, treasure, and talent toward strategic fish habitat conservation.

Fish Habitat Partnerships recognized by the National Fish Habitat Board are the primary work units of the Action Plan, modeled after waterfowl Joint Ventures that have helped to conserve millions of acres of wetland habitat for birds since the 1980s. These partnerships identify what fish habitats need attention and are governed with input by diverse public and private entities at regional and local levels. Successful Partnerships enlist landowners, businesses, and local governments since they make many of the land use decisions that can degrade or protect fish habitat. Science guides strategic conservation goals, and measures progress of the Partnerships.

The National Fish Habitat Board focuses the resources of federal programs and funding,

national conservation groups, industry, large corporations, and foundations where most needed,

## Bear Wallow Creek, Arizona



Dewey Wesely/USFWS

Bear Wallow Creek on the San Carlos Apache Indian Reservation in eastern Arizona was named one of the “10 Waters to Watch” for 2007, by the National Fish Habitat Board. The Western Native Trout Initiative chose the creek for the threatened Apache trout that swim its waters. A barrier built on the lower end of the creek now protects two more miles of Apache trout habitat above the barrier from non-native species that hybridize with it, or out-compete it for food and space. Helicopters flew in 100,000 pounds of materials to the remote creek; the barrier was built in 18 days. In 2008, biologists removed non-native fish above the barrier and reestablished

a pure population of native Apache trout. Project partners included the San Carlos Apache Tribe; Trout Unlimited; the Arizona Game and Fish Department; Natural Channel Design, Inc.; and the U.S. Bureau of Reclamation. “It’s in the best interest to protect the environment, the land and the water, including the Apache trout, not only for the Native tribes, but for all the people in Arizona,” said Wendsler Nosie Sr., San Carlos Apache Tribal Chairman. “If anyone calls Arizona home, they need to preserve what makes it beautiful.” The Apache trout lives only in the White Mountains. ♦ Jeremy Voeltz

and where they can produce measurable results demanded by investors. The board's Science and Data Committee will produce a framework to assess the condition of fish habitat from the local to the national scale. An assessment of fish habitat across the United States is an enormous challenge, but will help to focus resources on measurable habitat improvements that deliver the greatest, most lasting benefit.

The Action Plan provides opportunities for people and organizations to get involved at all levels: national, regional, and local. Communities and landowners have a voice in setting priorities, and receive technical support from the Fish Habitat Partnerships and the Board. Scientists studying fish habitat

can see their work reflected in regional and national assessments, and contribute to tangible

progress. National organizations seeking opportunities to be "green" can contribute, secure in

## Oconee River, Georgia



USFWS

**The 2008 "10 Waters to Watch" list, assembled by the nation's leading authorities on aquatic conservation, is a collection of rivers, streams, and shores that will be cleaner and healthier habitats for the many fish and wildlife species and people who call these areas home.**

**Aaron Run, MD  
Big Spring Branch, WI  
Lake Oconee, GA  
Little Susitna, AK  
O'Dell Spring Creek, MT  
Chalk Creek, UT  
Stinky Creek, AZ  
Tampa Bay, FL  
Trout Run, MN  
Williams Run, PA**

Its name is descriptive; the robust redhorse is a full-bodied sucker with a head that looks like that of a horse. Its brick-red fins are beautiful. Despite growing to 17 pounds, this fish that flourished in the large rivers along the south Atlantic coast went missing for 122 years. Scientists thought it to be extinct, its habitats smothered in sediments by large-scale land clearing and agricultural operations. With its rediscovery in 1991 by the Georgia Department of Natural Resources in the Oconee River, it's known to spawn at only one small gravel bar – and it's getting smaller. The Southeast Aquatic Resources Partnership sought a remedy. That gravel bar is now expected

to get bigger. The Thiele Kaolin Company dumped about 75 tons of donated clean gravel upstream of the spawning bar. High river flows should naturally deposit the gravels on the bar and enhance the spawning site. A persistent drought hasn't helped; the high flows haven't come yet. But when they do, it will be one more important step toward keeping this rare southeast native fish off the list of threatened or endangered species. Thiele, the Georgia DNR, and the U.S. Fish and Wildlife Service, under the auspices of the Southeast Aquatic Resources Partnership, plan to dump another 200 tons of spawning gravel into the river. ♦ Nathan Allan



the knowledge that their aid will be strategically applied.

The Action Plan has spurred on new funding sources. The National Fish and Wildlife Foundation's "More Fish"

campaign has raised funds for on-the-ground projects and is set to announce its second round of More Fish grants. The U.S. Fish and Wildlife Service requested funds from Congress within its Fisheries Program in 2008 to support on-the-ground projects, and the activities of the Board and Partnerships. Congress commended the Action Plan, calling it "vital to the future of the Nation's fish and aquatic communities," and encouraged "a unified approach to fish habitat restoration nationwide."

Since 2006, the U.S. Fish and Wildlife Service has funded 127 projects with partners in 34 states. This year, partners will provide a nearly 3:1 cost-share match. ♦

Tom Busiahn is the National Fish Habitat Action Plan Coordinator for the U.S. Fish and Wildlife Service in Arlington, VA.

## South Pine Creek, Iowa



Iowa DNR

South Pine Creek is a quality brook trout stream nestled away in the upper Iowa River watershed of northeast Iowa. It is one of only several Iowa streams that contain a self-supporting wild brook trout population. South Pine is a small three-mile-long headwater stream surrounded by native prairie. This NFHAP project addressed two sections of eroding stream banks that contributed an estimated 228 tons of soil to the stream during each high-water event. Non-native forbs dominate the stream banks, and likely contribute to the instability and erosion. Community involvement made this habitat improvement project a local success. The Iowa Department of Natural Resources

re-sloped the banks, and the Driftless Chapter of Trout Unlimited, along with the Hawkeye Fly Fishing Association, Friends of the Upper Mississippi Fishery Services, and U.S. Fish and Wildlife Service installed erosion fabric. They planted native prairie grasses, cord grass plugs, forbs, and oats along the stream. These plantings stabilized the stream banks, and have created water-cooling shade and overhead cover for brook trout. Less sediment now pours into the creek, and that benefits sculpin and invertebrates, and the trout that eat them. ♦ Louise Mauldin

**Individuals and organizations that care about fish and fishing are the vanguard of the National Fish Habitat Action Plan. Your involvement will make a difference.**

**For more information:**

**[www.fishhabitat.org](http://www.fishhabitat.org) – The place to go for general information on the Action Plan, to sign up for regular updates, or to learn about Fish Habitat Partnerships.**

**Tom Busiahn: 703-358-2056 or [tom\\_busiahn@fws.gov](mailto:tom_busiahn@fws.gov)**

By Dennis Stone



## Fifteen Years in the Grand Canyon

If form follows function, it couldn't be better expressed than in the humpback chub. This bizarre-looking fish is a natural ergonomic expression, a body form pressed by time to keel through roiling red waters of the Colorado River. And there this olive, silvery-white minnow lived naturally, from about the present-day edifice called Hoover Dam, upriver through the Grand Canyon to the Green River in Utah and Wyoming. This fish lived in anonymity, unknown by science until 1946. By 1967, it was endangered with extinction.

Biologists knew very little about the humpback chub until recently, our dearth due mostly to where it lived – far removed in remote, turbulent waters. Much remains to be learned. But this we do know: the largest of six remnant populations occupies the Colorado River below Glen Canyon Dam within Grand Canyon National Park, and the lower end of its Little

Colorado River tributary on the Navajo Nation in Arizona.

The U.S. Fish and Wildlife Service in the early 1980's studied the ecology of wild humpback chub in the Grand Canyon at a time when any information was new information. Willow Beach National Fish Hatchery also took a close look at their temperature needs, and what it takes for them to spawn and for the larvae to survive.

These two paths of inquiry brought us to our current understanding of humpback chub in Grand Canyon and they converge at this: cold waters released from the bottom of Lake Powell by Glen Canyon Dam are too cold for humpback chub. The unusually low water temperature inhibits spawning and embryonic development. Humpback chub that do survive there compete for food and space with non-native fishes that have come to dominate in these unnatural river conditions.



George Andrejko/AGFD

*Colorado River, Grand Canyon National Park.*





Joe Tomelleri

Glen Canyon Dam isn't going away anytime soon. Therefore, the perpetuation of the entire humpback chub population currently depends on the lower Little Colorado River for spawning and juvenile rearing habitat – and ultimately to recruit more adults. Native fishes still dominate the Little Colorado River, and young humpback chub commonly migrate from there into the Colorado River. The Little Colorado River is, after all, the least disturbed tributary of the entire Colorado River. It serves as a model stream to study native fishes under near natural conditions.



Some people take a bus to work, others car-pool. We go by helicopter or white-water raft. It's February 1993; in the span of a day, I go from the security of unemployment to a vaulting helicopter ride into the flooding Little Colorado River with

my first day on the job. Either as an initiation or a gross display of my naiveté, my new field boss offered me to an Arizona State University biologist to help retrieve some of his hoop nets, set to collect humpback chub. This guy handed me a backpack containing a five-gallon bucket to hold live fish from the net, and told me to swim across the flooding river with him. Foolishly, I did. The open bucket immediately filled with water and I began flushing downriver like flotsam. A quarter-mile later I reached the other bank, luckily still breathing. Thus, I was initiated into Grand Canyon fisheries research with a near-drowning experience.

It takes a helicopter to get to work in the Little Colorado River; for those studying humpback chub in the Colorado River it takes a literal white-water rafting expedition, some lasting 18 days long. Most of my helicopter rides were uneventful, highly pleasurable experiences;



Dennis Stone/USFWS

*Helicopters transport biologists into the Grand Canyon.*



USFWS

*Biologists raft the cold Colorado River to estimate fish populations.*



George Andrejko/AGFD

*The humpback chub is built for life in fast water:*

however, there were a few flights where the wind gusts bounced the chopper around like a ping pong ball. On one occasion a wind shear literally threw the chopper down, then sideways, for a dicey moment.

Rafting through the major rapids of the Colorado River always exhilarates, and it's not nearly as dangerous as flying. Most of the

boatmen have hundreds of river trips under their belt, and historically, very few people wearing life vests have ever drowned in the Colorado River. Perhaps another gross display of my naiveté proved the point. I was once talked into swimming Hermit Rapid with my life vest on. Although I wouldn't exactly call that a pleasurable experience, it did ease my concerns over someday flipping a



Pam Sponholtz/USFWS

*Biologists walk the Little Colorado River.*

raft, especially given that we conduct nighttime electrofishing surveys or pull trammel nets suspended on floats while boatmen navigate the tumult by spotlight, headlamp or moonlight.

The perils of the Grand Canyon come in other forms. I've seen numerous people in extremely hot weather soak their night clothes or sheets in water so that they can sleep, only to wake with a full-body diaper rash. One guy soaked the ground before sleeping on it, only to be eaten alive by the red ants he drew in. Inescapable summer monsoonal thunderstorms plague our work with lightning and winds like a hurricane. You're always sharing your camp with an assortment of undesirable critters. Antihistamines do wonders for counteracting the effects of scorpion stings. Although mice urinating and defecating all over your table, stove and other stuff is disconcerting, what I find most disagreeable is waking when they lick the blood of my wounds. Once, a volunteer went to his tent for the night, zipped it up, and woke up later to find that he had trapped a skunk inside with himself.



Over the past fifteen years I've participated in myriad fishery studies throughout the Grand Canyon. The Arizona Fish and Wildlife Conservation Office where I work, now primarily conducts semi-annual



George Andrejko/AGFD

*An Arizona Game & Fish biologist scans a fish for tags.*



population estimates of the adult humpback chub in the lower nine miles of the Little Colorado River below Chute Falls. Chute Falls is a presumed fish barrier to upriver fish migrations, and we moved young humpback chub over the barrier, hopefully to extend the range of this species. So far, they are doing well.

The status of humpback chub is precarious, at best. The adult humpback chub population of the Little Colorado River accounts for most of the total “Grand Canyon” population. Its numbers there declined by about half from 1989 to 2001. That was followed though, with a quick 25-percent increase by 2006, and they are still rising in number.

Obviously, something changed. The answer centers on habitat.

A protracted drought lowered Lake Powell to a point where Glen Canyon Dam released warmer waters that in turn created habitat for native fishes. It also made the waters less favorable to the competing non-native rainbow trout and brown trout. This same drought reduced the severity of floods occurring in the Little Colorado River, improving conditions for successful humpback chub spawning and survival to adult size.

We have learned that removing non-native fish relieves some competitive pressure on humpback chub. Moreover, scientists continue to evaluate the value of modifying the intake structures that would release warmer water from near the surface of Lake Powell. Work progresses for the purpose of benefiting the river’s imperiled fishes so that more of them can swim the roiling red waters. ♦

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Dennis Stone is a biologist with the Arizona Fish and Wildlife Conservation Office in Flagstaff.



Pam Sponholtz/USFWS



Pam Sponholtz/USFWS

*Dennis Stone looks for chubs below Chute Falls.*

# Nomenclature

An Albuquerque dentist has parlayed his unfortunate name into a catchy advertising slogan: Dr. Ken Hurt. “It’s just a name . . . not an intention.”

If some seemingly preordained names sound as brutal as pulling teeth, others seem to have made use of the nitrous oxide. A number of U.S. Fish and Wildlife Service fisheries biologists bear names that suggest giddy complexity, or confusion, with their life’s work – a fact that would please plenty of playful news headline writers.

## Presence of Gar Helps Trout

Five species of ray-finned fishes called gar swim North American waters. They’re garish and crude in their primitive nature. These toothy fish-eaters can “breathe” air if they need to; luckily these fossil-age survivors don’t have legs, or they might take over the world.



Andy Plank/USFWS

Colby Wrasse of Columbia FWCO with a blue catfish.



Creston/NFH

Gar Holmes.

Gar Holmes, on the other hand, does have legs and walks upright. He’s a single bipedal primate, a mammal as scale-less as he is hairy, a specimen of *Homo sapiens* who dwells in northwestern Montana. As a biotech at Creston National Fish Hatchery, Gar does, however, work with fish. Not his garish namesake, though. Trout: westslope cutthroat trout; rainbow trout; and threatened bull trout, to name just a few.

Established in 1939, Gar’s hatchery originally provided fingerling trout for stocking waters in Glacier National Park, which itself was established just 19 years prior, in 1910, as the nation’s 10th national park. Today, the hatchery provides trout to seven Indian reservations throughout the state and stocks fish to mitigate effects of the Hungry Horse Dam. Its production of bull trout is of particular significance to its recovery. Charged with coordinating bull trout efforts, Gar’s colleague also happens to bear a name apropos for his trade: Wade Fredenberg wrote recently in *Eddies*, “Fish were my ‘destiny’ ... Once I was old enough to control that destiny, fish and fishing became my passion, and eventually my vocation.”

Unlike Wade though, Gar knew little about the vocation he was to adopt. “It was a total fluke that I first got into hatchery work,” he recalls. After being stationed with the Coast Guard in Louisiana – where some gar are native and natives marveled at the young man’s unusual name – he returned home to Montana to work for a logging company. While unloading timber one day at a spot adjacent to the hatchery, he recognized an “old feller who used to call the square dances” in his home town of Condon when Gar was a kid. The man remembered Gar as well, told him he was retiring from his job at the fish hatchery and asked if he’d

be interested in replacing him. Gar gave it a try and now, 26 years later, he’s still working at the facility that plays such an important role in fish ecology.

While Gar himself is not involved in the conservation of his aquatic namesake, it should be noted that the U.S. Fish and Wildlife Service is engaged in an excellent program to benefit at least one of the gar species. Tishomingo National Fish Hatchery in Oklahoma and Private John Allen National Fish Hatchery in Mississippi have both been working to study, monitor and even spawn alligator gar, which, like so many others, has suffered from wide-scale habitat destruction.

This big-river fish can grow to weigh more than 300 pounds, a feat to which even the hulking hairy human Gar cannot lay claim.

## Wrasse Wrangles Pallid Sturgeon

Wrasse – it’s another interesting taxon found both on land and at sea. This marine fish lives in the Pacific, Atlantic, and Indian oceans.

Wrasses are a diverse family of about 500 fish species. The land-dwelling Wrasses are the family who raised a boy named Colby who would eventually become a biologist at the Columbia Fish and Wildlife Conservation Office in Missouri.

Like the wrasses of the water get around, the land-dwelling Colby Wrasse has gotten around the waters of the Midwest. “The majority of my work has involved fishery research on the large rivers of the Midwest – the Mississippi, the Missouri, the Illinois and the Ohio rivers,” says Wrasse the man, who started his job six years ago. “Currently, I am working with the federally endangered pallid sturgeon as well as assessing fish



community response to shallow-water habitat creation on the Missouri River.”

The pallid sturgeon, like the alligator gar, is no small fish. With a long, flat snout, several rows of bony scutes and a growth potential of seven feet, the pallid sturgeon is sometimes called the “dinosaur of the Missouri River.” It too struggles to persist in a world vastly altered by dams and reservoirs. Through constant monitoring, scientifically informed stocking from the National Fish Hatchery System, coupled with habitat creation, biologists like Wrasse are working hard to prevent it, and other native fishes, from going the way of the actual dinosaurs.

Still, with all his work on river fish of the Midwest, the fact remains that Wrasse-the-man has never met wrasse-the-fish. “I’ve never seen a live wrasse – or a dead wrasse for that matter in their natural setting,” quipped Wrasse. “I’ve seen plenty of pictures and videos and have read a little on the wrasse family. And I do hope to one day do some snorkeling or diving near coral reefs so I can meet the fish with which I share a name.”

### **Fishback Nurses Fish Back to Health**

“Guppy” Blair grew up Marilyn Fishback in Beaverton, Oregon, and is now a veterinarian at the Idaho Fish Health Center, one of nine such U.S. Fish and Wildlife Service facilities. Located with Dworshak National Fish Hatchery in the state’s southern panhandle, the Center serves as a kind of regional medical facility for fish in Idaho, eastern Washington and eastern Oregon. Here, experts like Guppy provide routine checks on the general health of hatchery fish, screen for dangerous pathogens, and recommend and provide treatments for specific fish diseases.

Joining the Service in 1996, Ms. Fishback-turned-Dr. Blair spends much of her time conducting tests on steelhead and spring Chinook salmon. She specializes in histology and ELISA, which, in fish-health-speak stands for “Enzyme-Linked Immunosorbent Assay.” The former pertains to a technique of preparing fish tissue for microscopic examination; the latter tests bacteria levels in fish and can often help in the prevention of Bacterial Kidney Disease, which can cause high mortality rates in trout and salmon.

Guppy earned her nickname as a student on the Aloha High School track team, where she followed in the somewhat larger footsteps of her older sister, who had been dubbed “Fishy.” When it was Marilyn’s turn to join, she was anointed “Guppy.” The nickname stuck, though the maiden name did not. Guppy eventually found herself surrounded by actual fish in her veterinarian career.

“What can I say?” she quips, “I started with a fishy name and ended up with a fishy job.”



Josh Bradley/USFWS

*Marilyn “Guppy” Fishback-Blair; D.V.M.*

Gar, Guppy and Wrasse aren’t alone. Kevin Blueback (who shares his surname with a herring) keeps rivers stocked with salmon at the Warm Springs National Fish Hatchery in Oregon. Vicki Finn and Jon Finn “steer” Pacific and Atlantic salmon conservation on opposite coasts. Brothers Ron and David Skates, who also share their surname with a marine fish, both oversee fish conservation efforts in the Rocky Mountain West. Working to restore northern California’s Trinity River, Vina Frye is offering a more hopeful future for, well, fish and their fry. The list goes on: Roach (yes, it’s a fish, too), and Rod; Anglin and Fishler share office space when not on the water.

Shakespeare posited on the artifice of nomenclature: “What’s in a name? That which we call a rose/By any other name would smell as sweet.”

Thankfully, the bard did not evoke the olfactory in a labor-intensive day handling fish, which, regardless of your name, conveys pungency all its own: just ask the gar with hair.

Ben Ikenon is a freelance writer in Albuquerque, NM

By Davy Wotton

# Tailwater Trout

*New Deal-era public works created world-class trout fisheries*



Arkansas Parks and Tourism



Craig Springer

*Rainbow trout.*



Arkansas Parks and Tourism

*A fly fisherman works seams in the current.*

The irony sits in this room with me like an unwelcome guest. Rain drops pelt my roof like aluminum tacks driven with a 32-ounce framing hammer. Near my home, the water comes through Norfolk Dam on the North Fork White River at what must be nearing its greatest capacity without breaching. The rains haven't let up for days, and no doubt people downstream are questioning their faith in the engineers' calculations who designed this and many other flood control dams in the White River system those many years ago.

Like this protracted storm that keeps me off the river and away from my primary income, a gray dreariness hung over this northern Arkansas valley and the entire United States 70 years ago. The Great Depression lingered like unwelcome rain. Congress acted on President Franklin Roosevelt's lead; in June 1938, FDR

signed into law a flood control act as part of many New Deal programs that put people to work. Their work would forever alter life here.

The resulting public works would forevermore alter stream flows and ultimately the fishes that inhabit these waters. Dams changed the time that streams flow, how much they flow, and how warm they run. All of these things combined changed fish habitats above and below these huge water developments. Lakes enveloped the Ozark hillsides once covered with hickory, oak and maple. Warm streams – teeming with sunfishes, darters, and sucker species of all sorts – turned into controlled cold-water environments. Anglers would no longer feel the muscular pull of a stream-bred smallmouth bass. The new lakes above the dams were so deep that the waters let go from the bottoms of the dams were



*The White River is not Montana's Madison. But it is indisputably a world-class destination trout fishery that would not be here, save for the dams.*

consistently cold and enriched with oxygen as they tumbled downstream.

During the period of 1941 to 1964 the U.S. Army Corps of Engineers closed six major dams along the White River basin and major tributaries in Arkansas and Missouri. Beaver Dam is the highest upstream on the White River; then there's Table Rock Dam; Tanyecombo Dam; followed by Bull Shoals Dam. All of these dams created cold water and trout habitat. Just as the White River warms up downstream of Bull Shoals, the cold waters of the North Fork White River passed through Norfolk Dam temper it again. Further downstream the Little Red River, the tail waters of Greer's Ferry Dam, does it again.

The notion that trout could live in Arkansas was first tested below Norfolk Dam in 1948. The Arkansas Game and Fish Commission planted and monitored 600 rainbow trout six inches long from Neosho National Fish Hatchery in Missouri. Biologists learned the waters were exceptional trout habitat and the fish showed extraordinary growth potential. In a year's time they had reached three pounds. In the second year, trout between six and eight pounds were commonly caught.

All told, the cold water habitats below these dams total about 170 miles of flowing river. The need for trout in these newly created cold waters was answered by creating Norfolk and Greers Ferry National Fish Hatcheries, says Mark Oliver, a fish biologist with the AGFC. "Without the federal hatcheries and our Jim Hinkle-Spring River State Hatchery, we would have to use funds that are used on a wide range of other fish management activities." says Oliver.

"These Arkansas tail waters produce some of the best trout fishing in the world; they are extremely valuable to the economy and to recreation for anglers—beginning or expert."

The numbers back Oliver. The existing world-record brown trout came from the Little Red River, tipping the scales at 40 pounds and 4 ounces, besting the previous world-record brown that came from the nearby White River. The business associated with fishing for rainbow trout produced by Norfolk and Greers Ferry National Fish Hatcheries creates about 1,500 jobs and a total economic output of \$130 million a year.

The White River and its tributaries are modified warm-water streams. Trout are not native to Arkansas – and neither are dams. The White River is not Montana's Madison. But it is indisputably a world-class destination trout fishery that would not be here, save for the dams. "Trout fishing in north-central Arkansas rivals any Rocky Mountain

destination," says Outdoor Life's Andrew McKean. The magazine, in an article titled "Paradise Found," ranked the town of Mountain Home, Arkansas, the best place to live among 200 towns in the U.S. for those that like to fish and hunt. To keep up with the fishing pressure, it takes supplemental stocking from hatcheries.

With these rains pelting my domicile, and Norfolk Lake at maximum pool, one can see that without the dams, life here would be vastly different. ♦

Davy Wotton is a professional fishing guide and President of the Friends of Norfolk National Fish Hatchery.



Davy Wotton

*Netting a trout in the morning mist.*



Jerry Wilcoxon

*Arkansas hardwoods burnished in the colors of Autumn.*

# Where There's A Weir, There's A Way Around It

The knee-deep, gelid Bark River cuts through Wisconsin forest, pouring into Lake Superior. Bugs dimple the water in a placid pool, and the rings fan out back into a calm. But it's a violent place. Coaster brook trout colored like church window glass rip the bugs like a sloppy kiss into their gullet and crush them. Geology brought the trout here; a poorly set road culvert blocked their upstream passage to spawn; the Fish Passage Program brought them back.

The wrinkles and rifts on planet Earth are the *prima facie* evidence of the geologic past. The continents drifted on a primal pond, crushing the crust like crackers as they bumped along. Plates of earth cleaved and heaved mountains of rock strata layered like cake toward the sky. Other plates of crust sank into the yawning subterranean.

Then came a cold crunch; ice better than a mile thick invaded from the north dipping as far down as Kansas. Glaciers polished much of the northern third of the United States. They brought with them and then left behind 10,000 years ago erratic boulders plucked from the Canadian bedrock, and fine till that farmers plow.

Glaciers made an extreme makeover; they re-routed ancient rivers, gouged

the Great Lakes, and left fens to fill. The Missouri, Ohio and upper Mississippi rivers and the fish that naturally live in them are where they are for the ice long melted. Far away, the American Southwest was wetter and cooler then – trout habitats remain behind like relicts in mountain islands floating in a gulf of friable lowland desert dirt. A little fish called a redbelly dace, distinctively a Midwestern headwater stream fish, thrives in a tiny southwest Colorado mountain creek separated from its Missouri kin by prairie waters too warm for them – swimming evidence of another age.

Little streams in the Midwest tendrill around folds in glacial moraines. Bigger streams vein through hills, and cut through lands so flat that they appear like planet Earth has no arc. The Earth's surface, sculpted as it was, imposed the physical and biological bounds of where fish species naturally live – and where they don't.

So, here we sit still adrift in the geologic timescale, post-Wisconsin glacier, in what ought to be called the Anthropocene epoch: since man has been on the scene, there's been an epic effect on where fish live. And that has been especially so since the age of industrialization.

With industry comes the need for energy, and water pulled by the convenience of gravity has provided it. Industry of all sizes necessitated damming or re-routing flowing water. And dams block fish – that's obvious. But even the smallest of stream-flow obstructions are problematic for fish, and that's not always so obvious.

They look bucolic on a calendar. But quaint antiquated mill ponds with millstones silenced from grinding the

grist decades ago still block fish from upstream habitats.

Road crossings over the smallest of streams with poorly placed culverts block fish from access to areas upstream. The downstream end of a culvert perched too high above the stream bottom can keep minnows, darters, sunfish, suckers and salmon from leaping into needed habitat above the culvert. Low-water crossings over small streams seem innocuous, but thin water too shallow to swim isolates fish.

It takes no intellectual leap to see that the biggest of dams are figurative brick walls. Engineered edifices chug water through turbines for power consumed miles away. Below them, fish stack up for the want of a haunt all their own.

Fish need more than water alone. They need certain waters at particular times of the year, times of day, or times of their lives, to live out their lives as accustomed by nature.

Anyone who has turned on a TV has seen Pacific salmon slip through slim waters, shuddering their last. They've spawned their one and only time and die. They've gotten there through a gauntlet of angling, commercial fishing, predation and disease, through the ocean and over what seem like impenetrable falls in long reaches of rivers. Their decomposing bodies add nutrients to the stream that their spawn and other fish and plants will need. They can't do this in the face of barriers.

Green sunfish have no glamour. But, they too need connected habitats, not for their own well being alone, but for richness in habitat that their presence helps fulfill. Green sunfish – as are all of the sunfishes – are both

*The U.S. Fish and Wildlife Service's Fish Passage Program connects fish to habitat. It's voluntary, cost-effective, and creates instant results – more fish habitat.*





U.S. Air Force /Jerron Barnett

*Bill Tate, U.S. Fish and Wildlife Service fish biologist, watches two Okaloosa darters. These fish have benefitted from the National Fish Passage Program, and now are reproducing in new habitats on the Eglin Air Force Base, Florida.*

predator and prey throughout life. They are a tendon of sorts in small streams that bind the food chain from lower forms to higher forms. Without the sunfishes, upland streams are incomplete. Stream fish habitat segmented by barriers also make the sunfish species prone to hybridize. Green sunfish and longear sunfish co-exist, but in unnatural conditions they interbreed, and the offspring are neither species, vitalized by hybrid vigor. They out-grow and out-compete their parental species.

The reaching ecological effects of segmented habitat are many. But where there's a weir, there is a way to get fish over it. The U.S. Fish and Wildlife Service's Fish Passage Program dexterously does so.

The Fish Passage Program created in 1998 is voluntary, and non-regulatory. The U.S. Fish and Wildlife Service,

partnered with private landowners and governments—local, state and federal—have removed obsolescent dams, installed fish ladders, placed fish screens on irrigation intakes, and improved roadway stream crossings. All of them had this in common: they opened up new habitat.

The Fish Passage Program provides a value-added service, an online Decision Support System available to anyone – consultants, transportation planners, biologists and anglers.

Anyone can participate in the Fish Passage Program. The U.S. Fish and Wildlife Service lends its fisheries science capabilities in its biologists and fish passage engineers, and pays about 35 percent of a project's costs, with partners paying the remainder. It's not a grant program, and there's no matching dollar requirement— an in-kind match like volunteer labor

counts. Projects are picked through the U.S. Fish and Wildlife Service's 64 Fish and Wildlife Conservation Offices located across the country.

The past is prologue, they say. Geology predicted the present, and portends the future. The Fish Passage Program today is tomorrow's past remaking the future in fisheries conservation.

If you would like to learn more about the Fish Passage Program, visit [www.fws.gov/fisheries/fwma/fishpassage](http://www.fws.gov/fisheries/fwma/fishpassage); call the National Fish Passage Coordinator, Leslie Hartsell at 703-358-2195, or email her at [leslie\\_hartsell@fws.gov](mailto:leslie_hartsell@fws.gov). ♦

by Jeff Finley

# Romancing the River



Jeff Finley

*Boats on the Missouri River near Columbia, Missouri.*

From a distance her beauty is hidden, masked by the pockmarks of mankind's efforts to control her. The Missouri River is restless, but bound by the confines of rock-lined banks and earthen mounds designed to keep her still. The river flows through a valley once occupied by long, braided meanders gliding around golden isles of sand. Periodically it struggles free and pours over the manmade shackles to once again bathe the riversides in rich, muddy waters. The Missouri is the longest river in America.

From highway crossings here in the state of Missouri, the river looks treacherous and dirty. The rusted-iron sand barges lie lazily strewn below. Mocha-colored lines of foam fleck the surface; debris adrift leads one to assume it's polluted. Currents roll around dikes creating swirling vortexes that eddy like tiny tornados.

Sand boils upward like buckets of campfire coffee.

At river level, the sunlight shimmers off ripples and blue sky reflects from the flat sheets of slack water. Waters whisper softly in a melodic murmur, lapping against the bank. Silt that fell out in the slack waters made mud banks of chocolate pudding. The tracks left by wildlife are deep and I imagine the tracks I would leave if this mud squished between the toes of my bare feet. Against the currents lies the occasional bar of coarse, amber sand. Myriad rounded stones, small and colorful, lie there nestled, moved from far away mountains through a vast drainage. Ghosts of trees lie petrified in mud along the banks; their bare arms reach to the heavens. Cottonwood and sycamore trees with trunks as big as barrels are rooted in a narrow strip along the

banks. It's common place for bald eagles to alight on their branches.

But casual glances reveal the least. It's what is beneath these waters that have intrigued me the most. Biologists from the Columbia Fish and Wildlife Conservation Office (FWCO), where I work, use a variety of gear to learn about what swims these waters. The fish – much like the river they live in – have a hidden beauty and a mysterious allure. The anticipation of what we may pull from nets, surface from electrofishing, or dangle on a trot line keeps me up nights.

Breeding male red shiners tropically hued in brilliant blues and reds, and emerald shiners striped in iridescent green linger in slow waters. Leviathan flathead catfish mottled brown and yellow, and the black-



speckled channel cats, lurk around stumps and rocks. From the swifts, a prickly armored dinosaur of a fish, the shovelnose sturgeon entangles our nets. So do gar, some over five feet long, with a mouthful of needle-sharp teeth. In the pools, we catch buffalo, with their dark teddy-bear eyes and large blue-brown scales. The steel-grey paddlefish sporting a goofy, oar-shaped bill is most inquisitive.

But it's as much of what we don't catch as what we do that concerns me. The endangered pallid sturgeon, an ancient fish that lurked these muddy waters for as long as the river has flowed, has dwindled over the past 50 years. As the river's bends straightened, their numbers curved downward. The river's braided channels once occupied the entire floodplain from bluff to bluff. The Missouri devoured earth and trees, and yet at the same time gave birth to new sandbars and laid down beds of productive soil; seedlings sprouted amidst the wooden skeletons of snags. Deep pools, shallow swifts, a complex channel and isolated backwaters were all laden with rich mud. Early explorers wrote that the river seemed to "carry more soil than water" and it was often "difficult choosing which channel to follow" in this maze of muddy water.

The modern-day river is an astonishing feat of engineering. The river hungers for soil. String-straight lines of limestone dikes divert the water around carefully calculated turns; they've shortened the river and increased its velocity. With faster water, she feeds on herself as the riverbed digs deeper into the earth. The river water is clearer now compared to the past, and that favors sight-feeding fish. The river's complexity has been largely lost and with it the richness and diversity of fishes.

The challenges of managing the Missouri for so many competing

interests have gained national attention. Needs for navigation, irrigation, public water supply, recreation and agriculture confound managing the river. The Missouri River Bank Stabilization and Navigation Project, a collection of seven separate congressional acts dating back to the early 1900's, collectively destroyed much of the river's natural fish habitats. Caving banks were revetted, side channels closed off, snags removed and bars were held in place by driving wooden pilings deep into the ground. The river's once wide and diverse habitats were straightened and narrowed.

Presently, the U.S. Army Corps of Engineers has taken on restoration activities on some 46,555 acres at 38 sites along the river, with much more habitat work authorized. The Corps is modifying levees, dikes, banks, and control structures to encourage the river to do what rivers do: move, meander and braid. Reopened historic side channels flow again; newly dredged side channels create fish habitat. At the Columbia FWCO, we monitor the fish in these novel habitats. It is a "field-of-dreams" approach – if you build it, they will come.

And they do. Pallid sturgeon numbers are increasing as are the historic populations of other fish and wildlife. It's taken a century to degrade this system, and it'll take a commitment of time and money to swing the pendulum back in the other direction. Progress is painstakingly slow but the little victories of another pallid sturgeon caught or seeing a strong year-class of young flathead catfish lets us know we're headed in the right direction. ♦

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Jeff Finley is a biologist with the Columbia Fish and Wildlife Conservation Office in Columbia, MO



Jeff Finley

*Lee Erickson, Columbia FWCO, hefts a pallid sturgeon.*

By Ken Haddad

# Florida's Fish Formula

*Data and education drive quality fisheries*

“It’s the habitat.” It’s a common phrase used in fisheries management and by anglers. While fish certainly need a place to live, the mantra gave me pause while preparing a presentation to the American Sportfishing Association on how Florida spends its Sport Fish Restoration dollars. I realized that, while imperatively important, sound fisheries conservation isn’t just about the habitat. In fact, in Florida, particularly in salt water, it is much more than just habitat.

Florida rightfully bills itself as the Fishing Capital of the World. We have more world records from our state, more fishing trips, more fishermen, and they spend more on fishing than in any other state. The International Game Fish Association headquarters, Fishing Hall of Fame and Museum located in Dania Beach, Florida are further testament.

While habitat may be a limiting factor, it has become abundantly clear that fishing pressure is the foremost confounding factor in Florida’s saltwater fisheries, and perhaps in freshwater fisheries, too.



Florida Fish and Wildlife Conservation Commission

*Florida anglers pole through the shallows.*



Florida Fish and Wildlife Conservation Commission

*Florida grows big bass.*

For Florida, often a bellwether for national trends, it is clear we must pay close attention to recreational fish populations to prevent overfishing. The primary way we do this is through intense monitoring, and using the knowledge of fishery stocks that the data we collect yield. Educating anglers and enforcing rules is vital, too. But good information keeps the quality of our fishing experiences at a high level. Without it, there would be fewer fishermen, fewer boats, and less tackle purchased – and less of everything that makes Florida a premier fishing destination.

Reliable and consistent Sport Fish Restoration dollars have been the catalyst to managing our fisheries effectively. These dollars come to the states through the U.S. Fish and Wildlife Service from an excise tax levied by Congress on the fishing and boating industry, on many fishing-related products, and a motorboat fuel tax. These angler and boater tax dollars have been the backbone of the nation’s fisheries conservation successes. We owe a huge debt of gratitude to the industries that years ago actually came together and supported a tax on themselves for conservation.



Sport Fish Restoration dollars represent an important \$11.5 million in 2007-08 in Florida, of which \$5.7 million was spent on saltwater fisheries.

Many people are surprised to learn that the Florida Fish and Wildlife Conservation Commission spends most of its money collecting and analyzing data about our saltwater fisheries stocks. But the information is essential to manage key recreational species. In fact, we garner some criticism for not spending more on fish habitat and hatcheries. The data help focus how best to use other tools.

It's critically important that we understand the fishery and fish populations, and we do this through angler-catch data, by surveying fish populations, and understanding the rate at which released fish perish from hooking mortality. We collect data directly from anglers on species caught, their size and age, and mortality. But this gives only a glimpse of what's going on in the water. For a more complete look at our fish stocks, field crews use special techniques and gear to assess important fish species.

Finally, our stock assessment team runs sophisticated data models to determine the health of the fish stock and whether regulations in place need to be changed. Any needs for action are brought to the fisheries managers and ultimately lead to changes in species management.

While this approach is highly successful, we realize that with tremendous fishing pressure in Florida, saltwater hatcheries must ultimately play a role in the future. Consequently, we have major science and production efforts on the drawing board.

For our freshwater fisheries, we focus on habitat restoration, hatcheries, regulations, and promoting fishing and aquatic education. This makes sense due to profound differences among lakes, ponds, and rivers.

Habitat management alone cannot solve all fisheries conservation woes – it requires a much broader commitment. Harvest management is the cornerstone of good fisheries conservation.

While all state natural resource agencies regulate human activities affecting fish and their habitats, it is the strong and enduring partnerships between state, federal, and tribal agencies, and industry and non-governmental organizations that strengthen fisheries conservation. Witness the programs of the Fish and Wildlife Service, including the Sport Fish Restoration Program, the National Fish Habitat Action Plan, the National Fish Passage Program, and the shared science and technologies coming from the National Fish Hatchery System.

We must recognize all the nuances of fisheries issues, enhance fisheries with hatchery fish where appropriate, and monitor populations, all the while remaining vigilant in protecting habitat. Then we will provide a future.

Florida responds to increased demands of human population growth and the need to balance programs for our fresh and saltwater fisheries, based on intensive monitoring and data analysis, and strength in its partnerships. This management approach truly has earned Florida the Fishing Capital of the World title. ♦

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Ken Haddad is the Executive Director of the Florida Fish and Wildlife Conservation Commission

*We owe a huge debt of gratitude to the industries that years ago actually came together and supported a tax on themselves for conservation.*



*Sunshine bass puts smiles on faces.*

Florida Fish and Wildlife Conservation Commission

## *The Haddycall # 23 (Adirondacks)*

By Bruce Matthews



Bruce Matthews

The Haddycall's story is one of family, friendship, fishing and American roots—shared all over this country in as many variations as there are folks to tell them. It's about passing on a tradition and legacy, and a reminder of what could be lost if we are not diligent in our work today.

As a kid I'd notice this scarred red-and-white wooden plug whenever rooting through my dad's tackle box. Shortly before he passed on my Dad gave me the lure, and called it a "Haddycall." Seems he'd used it in Eastern Kentucky in the early 1950's as a young mining engineer. A couple of the guys working at the quarry would take my dad fishing on the Kentucky River and they used

this plug, a Paw Paw Pikey Get-Um, which they called a "Haddycall" because, according to Dad, it was good for any fish that swam.

Dad thought haddycall was a local mountain patent medicine supposedly "good for what ails ya," which sort of explained how the lure got its name, but that was about all the light he could shed on it.

There had to be more to it. So I asked my friend and expert in Appalachian colloquialisms, Jim Casada, if he'd ever heard of haddycall. Jim came up with Hadacol, which he recalled as a locally popular cure-all from his youth. Then it all came together:

"What's Hadacol? Well, basically, it's a patent medicine—a little honey, a little of this and that, and a stiff shot of alcohol hyped up with vitamin B. Actually it's a great deal more. It's a craze. It's a culture. It's a political movement." -- *Newsweek*, 1951

Legend suggests Hadacol got its name because they "had to call" it something. But in reality Hadacol is short for Happy Days Company, the final "L" being the first initial of LeBlanc. Dudley LeBlanc was a Cajun politician whose entrepreneurship, showmanship and plain old-fashioned hucksterism built Hadacol from a backwoods bayou hip-pocket cure-all to a southern states phenomenon grossing more



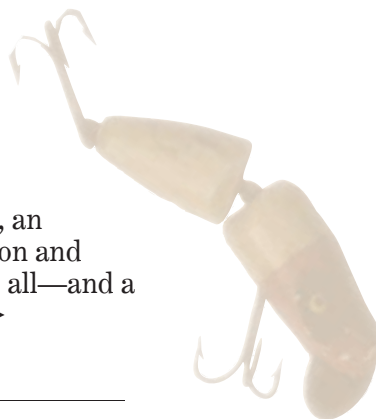
than \$20 million in 1950. LeBlanc was a marketing genius, and his Hadacol Caravans traveled town to town featuring Mickey Rooney, Hank Williams, Minnie Pearl, Roy Acuff, Ernest Tubb, Carmen Miranda, and George Burns and Gracie Allen. Kids collected Hadacol boxtops to win bicycles and other prizes. It's an amazing story.

LeBlanc rode his product until the FDA started asking questions. Claiming sales were going to top \$75 million for 1951, LeBlanc sold the Hadacol business to New York investors for a cool \$8 million. Not long after, the investors went bankrupt amidst a flurry of accusations that LeBlanc had doctored the books. Reportedly LeBlanc's Louisiana constituents felt little sympathy for the Yankee buyers and proceeded to re-elect him anyway.

Hadacol had reached the backwoods of Kentucky in 1952. This Paw Paw Pikey lure carried its story locked up in my Dad's tackle box for more than 50 years. It is now mounted in a shadowbox with a picture of my dad, me and my son Nate—three generations of outdoors tradition firmly rooted in our family story.

So here's the #23 "Haddycall" for you. This particular Paw Paw with its painted tack eyes and stamped lip dates to the 40's and 50's when the Paw Paw Bait Company was at its zenith. It is mounted among rocks and driftwood gathered from Raquette Lake, in New York's Adirondack Mountains, where my mom and dad built a cabin, and passed it on to me and my sister; where our families are growing their own outdoor traditions among the trails and mountains of the region.

Perhaps that dream fish wrapped it among the debris before breaking free to fuel even more dreams. In the way of all fishing lures, it represents the hopes and dreams of anglers all across America, an intergenerational connection and common thread binding us all—and a legacy worth passing on. ♦



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Bruce Matthews is the founding president of the Recreational Boating and Fishing Foundation (RBFF) and currently the Executive Director of the North Country Trail Association, Lowell, Michigan



*Three generations of Matthews, (l-r) Nathan, Bruce and Jack, on Raquette Lake in the Adirondacks.*

Bruce Matthews

Summer 2008



## Moving Forward

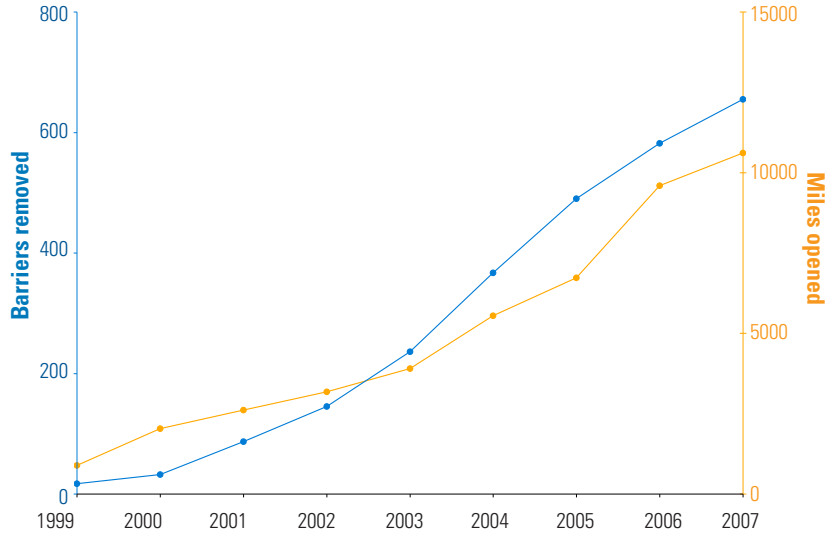
Millions of dams, diversions and dikes across the U.S. block the upstream passage of fish. The U.S. Fish and Wildlife Service's Fish Passage Program reconnects aquatic species to historic habitats. To date, 655 barriers of all sorts including culverts and spillways have been removed or by-passed. Various species of fish, game and non-game or imperiled, have been given renewed access to restored habitat in 10,612 stream miles and 51,361 acres of flat waters. Trout, herring, striped bass, shad, sturgeon, salmon, minnows, and darters are among some recent successes.

A fish ladder put on York Haven Dam, Pennsylvania, opened 435 miles to new spawning habitat for shad and herring. At last count, 29,062 shad moved through the ladder.

Four barriers on Florida's Mill Creek are gone, and the endangered Okaloosa darters are back. The restored 2,500 feet of stream harbor a self-sustaining population of the rare relative to the walleye.

Alaska's Moose Creek meanders again, thanks to a constructed creek bed and removal of an unnatural 10-foot waterfall. Within days, Chinook salmon had returned. ♦ Abigail Lynch

Passage Accomplishments



Please let us know how we are doing; visit us at [www.fws.gov/eddies](http://www.fws.gov/eddies).

# Eddies

*Reflections on Fisheries Conservation*

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