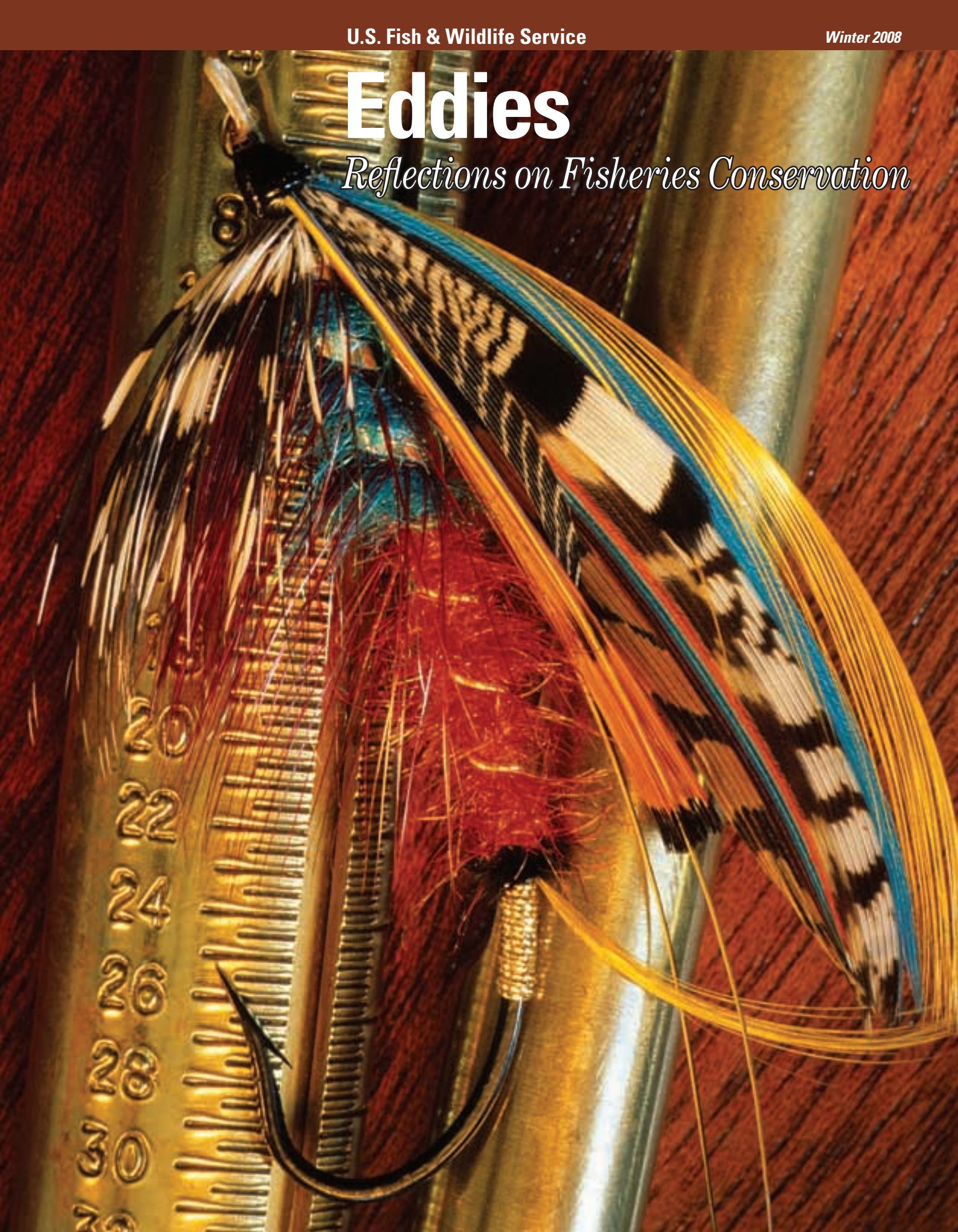


Eddies

Reflections on Fisheries Conservation



Eddies

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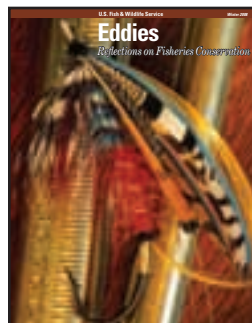
Design

Blue Heron Communications

On the Cover

Fly fishing still life of
'The Captain' salmon
fly with brass scale
and thermometer.
Excise taxes on tackle
fund conservation.

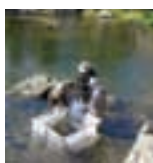
Photo by Keith Douglas



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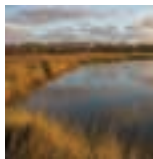
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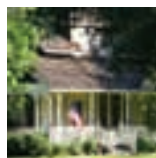
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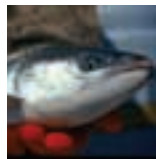
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Fishing continues to be a favorite pastime. Thirteen percent of the U.S. population, age 16 and older spends 17 percent of their time fishing. See page 16.

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

Partnerships get it done for Fisheries Conservation

By Gary Frazer



The greatest conservation successes weren't the result of singular Herculean heavy-lifting, but rather of partnerships – federal and state fish and wildlife agencies, Indian tribes, anglers, conservation groups, the business community – all working in a common cause of conservation. History is laden with examples.

The essential nature of fisheries conservation is one of partnership. Partnerships are relationships among parties having shared rights and responsibilities. Fisheries conservation inherently involves shared rights and responsibilities, and you will read about that throughout this winter issue of *Eddies*.

A great deal of modern fisheries conservation is funded by the landmark partnership among the boating and fishing industry, the state fish and game agencies, and the federal government, that produced the Sport Fish Restoration and Boating Trust Fund. Anglers and the money they spend on their sport of choice drive the cycle of success that is the Sport Fish Restoration program. Joyce Johnson writes about this inheritance left to anglers in these pages.

Mike Stempel deliberates in his story "No Trout Left Behind" about a cutthroat trout he cares about. Stempel ponders how a recent landscape-scale partnership, the Western Native Trout Initiative, means hope for native coldwater denizens from Alaska to New Mexico, especially 'his' Colorado River cutthroat trout.

Fish populations often reach beyond the boundaries of any individual agency's purview, so effective management requires partnerships among

management agencies. Similarly, activities in uplands far removed from any pool-riffle-run complex influence stream fish habitats, so partnerships with landowners, regulators, and construction agencies accomplish long-term conservation. That notion is articulated in the story "Southeast Aquatic Resources Partnership" by Scott Robinson and Marilyn O'Leary. They discuss coordinated fisheries conservation over a 14-state area.

"Many hands make light work," wrote English scribe John Heywood in 1546. Light work comes from good partnerships. During my time in Missouri, we created what I considered a genuinely good partnership with the Missouri Department of Conservation, the Natural Resources Conservation Service, local Soil and Water Conservation Districts, and landowners. We shared a commitment to restoring high-quality Ozark streams and healthy populations of fish found only in the Ozarks, like the federally listed Niangua darter. We demonstrated a willingness to accommodate each other's interests and we achieved what we each could call success.

The U.S. Fish and Wildlife Service recognizes that partnerships are essential to fisheries conservation, and we have purposefully institutionalized partnering in the agency. Witness our support for the National Fish Habitat Action Plan, the National Fish Passage Program (see *Eddies*, summer 2008), and our Partners for Fish and Wildlife and Coastal programs. Read in this issue about the remarkable work of our Aquatic Animal Drug Approval Partnership in "Pharmaceuticals for Fish." The back cover shows the breadth of partnerships in using new drugs for fish.

Heywood's proverb may be centuries behind us, but it is still spot-on. We are most effective when our conservation mission is delivered by people with both passion for fish and their habitats, and an ability to parlay that passion by partnering with others.

Our mission statement says it clearly, "... working with others to conserve, protect, and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people."

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

Connecting trout with habitat



Madeleine Lyttle/USFWS

Brook trout and brown trout swim over this Cox Brook cascade, now that a dam is gone.

Vermont's Dog River has long been recognized as an outstanding trout stream. And now the fishing stands to get better, following the removal of a small dam on

the tributary Cox Brook. The U.S. Fish and Wildlife Service's Lake Champlain Fish and Wildlife Resources Office and New England Field Office cooperated with the

landowner, Trout Unlimited, Vermont Department of Environmental Conservation, and the Vermont Fish and Wildlife Department to remove the obsolescent dam near Northfield. With the dam gone now, brook trout and brown trout have another two and a half miles of connected habitat. The 1930's-era dam, situated at the top of an impressive series of bedrock cascades, was never used for a commercial venture. But the new habitat will apparently be used: trout leapt into the cascades, maneuvering through the construction site the day after the project was completed in September. The National Fish Passage Program and the Partners for Fish and Wildlife Program paid the cost of removal. The Vermont Fish and Wildlife Department will annually monitor the fishery. ♦

Madeleine Lyttle

Don't flush your meds

You might have a cache of unwanted medications. But don't flush them. Science shows that the therapeutants can show up in water you drink. They can also feminize fish that swim in it – that is, turn the boys into girls.

Thanks to a partnership with the LaCrosse Fish and Wildlife Conservation Office and Franciscan-Skemp Healthcare, people in WI, MN, and IA are doing the smart thing. They unload their unneeded meds at the LaCrosse County (WI) Household Hazardous Materials station. Nearly seven tons of medicines have been incinerated since collections started in 2007. To learn more about what you can do where you live, go to smarxtdisposal.net. ♦ Mark Steingraeber

BASS turns 40

For 40 years, BASS has been the voice of conservation and a source of education and tournament venues for anglers everywhere. To mark the occasion of BASS' 40th anniversary and to salute BASS members and their passion for the sport, BASS hosted a calendar full of special events in 2008 while continuing to celebrate BASS' accomplishments and forward-reaching impact on the sport.

BASS has been at the forefront of conservation since its inception in 1968. From its "catch and release" concept and the Clean Water Act, which guaranteed quality bass habitat for generations, to advocacy efforts to enhance fishing infrastructure and maintain access to public waters,



BASS has been the angler's best friend, ally and guardian for 40 years.

BASS continues to move forward and evolve its tournament formats. In 2009, the first woman will compete in the Bassmaster Classic as the 2008 Toyota Women's Bassmaster Tour Angler of the Year will qualify for the premier tournament.

"It truly is remarkable to celebrate 40 years as the worldwide leader in the industry," said Tom

Ricks, vice president and general manager of BASS. "We are proud of our rich history and look forward to celebrating another 40 more years at the forefront of the sport." ♦ Doug Grassian

American Sportfishing Association turns 75

In 2008, the American Sportfishing Association (ASA) celebrated 75 years of serving the sportfishing industry. The trade association was created in 1933 to oversee the industry. Since then the association has evolved from representing the interests of just tackle manufacturers to championing the entire sportfishing community.

As the nation's recreational fishing trade association, ASA supports the interests of businesses, agencies and organizations and is the resource for protecting the sportfishing industry.

ASA's members include sportfishing and boating manufacturers, independent and chain outdoor

retail stores, state fish and wildlife agencies, conservation organizations, federal land and water management agencies, angler advocacy groups and media.



Through advocacy, ASA and its foundations – FishAmerica and Future Fisherman – safeguard the economic and conservation values of sportfishing, keep the nation's fisheries and waterways healthy and introduce new anglers to one of America's most popular outdoor activities.

ASA also represents the nation's 40 million anglers who generate more than \$45 billion in retail sales with a \$25 billion impact on the nation's economy creating employment for 1 million people. ♦ Mary Jane Williamson

Partners for conservation

The Chaseburg Rod and Gun Club held its annual community event in September, inviting kids and families to Genoa National Fish Hatchery, WI, to come out and learn to shoot clay pigeons, load and shoot a muzzle loader, throw an axe at a target, and get involved in hunting and fishing. Over 30 kids and 20 adults participated in educational sessions provided by the Wisconsin Department of Natural Resources, and the Rod and Gun Club. Partnering up for events like this allows everyone to reach a wide crowd with varying interests, and introduce to them fish management practices, hunting and fishing ethics, and the conservation work of the National Fish Hatchery System. ♦ Jenny Walker

FEATURED FACILITY Maine Fisheries Complex

Where: East Orland and Ellsworth, Maine
When: Craig Brook National Fish Hatchery 1889, Green Lake National Fish Hatchery 1972, Maine Fishery Resources Office 1987

Then: By the 1860's, the Atlantic salmon had virtually disappeared throughout its range. Logging damaged fish habitat; dams blocked passage to spawning habitat, unregulated commercial fishermen took too many. The two National Fish Hatcheries of the present-day Maine Fisheries Complex were built to raise Atlantic salmon.

Now: Craig Brook raises six Atlantic salmon stocks each one specific to Maine rivers – the Dennys, Machias, East Machias, Pleasant, Narraguagus and Sheepscot. They also capture returning Penobscot River Atlantic salmon, spawn, and then release their two million fry into the Penobscot. Green Lake raises over one million



E. Peter Steenstra/USFWS

Craig Brook National Fish Hatchery, East Orland, Maine.

Atlantic salmon smolts and parr for the Penobscot, Narraguagus and Merrimack rivers.

Maine Fishery Resources Office biologists restore fish habitat and solve fish passage problems for Atlantic salmon, American eel and brook trout. With their breadth of expertise in science and technology, they provide fisheries management assistance to others throughout Maine. ♦ E. Peter Steenstra

Cataloging salmon waters



USFWS biologist Luke Gauthier tosses a trap intended to catch salmon smolts as part of an Anadromous Waters Catalog survey.

Abigail Lynch/USFWS

They live two lives. Pacific salmon begin life in freshwater, spend most of their lifetime in saltwater, and return to freshwater to spawn. In Alaska, Pacific salmon freshwater habitat is afforded protection under state law if the habitat is listed in the Anadromous Waters Catalog (AWC). About 16,000 rivers and lakes are currently protected. But scientific surveys indicate that this number represents less than 50 percent of habitats actually used by the five Pacific salmon species.

In 2008, biologists from the U.S. Fish and Wildlife Service's Anchorage Fish and Wildlife Field Office surveyed 31 different streams in the Matanuska-Susitna Basin, resulting in 19 nominations to the AWC. Four of those nominations were from streams previously unmapped. More nominations are expected when biologists resume field work in 2009. Extending the AWC benefits fish, people, and fishing – especially in the Mat-Su Basin – where the human population is among the fastest growing in the U.S. ♦ Abigail Lynch

Connecting kids with catfish

For more than 10 years, Welaka National Fish Hatchery has partnered with the Florida Fish and Wildlife Conservation Commission to provide quality fishing experiences to youth in urban areas. The stocked ponds in the state's Community Fish Management Program provide year-round fishing opportunities, and receive about 2,000 hours of fishing per acre each year. They also support many outreach events.

In 2007, more than 13,200 children participated in youth fishing activities at these sites. The program has received national recognition for providing "close-to-home" fishing opportunities.

"The long-term benefits of this type of exposure to nature are tremendous for Florida's children," says Welaka manager Allan Brown. "Here more than 85 percent of the population lives in urban areas, and the majority of children in the state are now from minority groups."

The cooperative efforts begin in the spring, when the state provides Welaka NFH with fingerling channel catfish. Welaka provides the facilities and labor to grow these fish to a catchable size. When they are ready for harvest, partners work together for transport of the fish to these wonder-filled urban ponds. ♦ Judy Toppins



Bob Wattendorf/FWCC

Youth across Florida enjoy catching big catfish close to home.

New online community connects boaters, anglers

While the temperatures continue to drop, the action is heating up in a new online community that's connecting boaters and anglers like never before! Fishington – The Fishing & Boating Capital of the Internet – was introduced in November 2008 by the Recreational Boating & Fishing Foundation. Specifically tailored for boating and fishing enthusiasts, Fishington allows member to share tips and advice, upload photos and videos, join groups and swap stories with boaters and anglers from all over the country. Anyone who is 18 years or older can join. Create your profile and start connecting at Fishington.com. ♦ Stephanie West



Sanctuary for the Rio Grande silvery minnow



Angela Carrillo/USFWS

Partnerships for the endangered silvery minnow help edge the fish toward recovery.

In 2009, the U.S. Fish and Wildlife Service's New Mexico Fish and Wildlife Conservation Office (FWCO) will operate the new Rio Grande Silvery Minnow Sanctuary in Albuquerque, NM. The FWCO, the Bureau of Reclamation, the Middle Rio Grande Conservancy District and City of Albuquerque built the outdoor facility. Its 1,300 ft of flowing waters mimic the natural flows of the Rio Grande, and will hold the endangered Rio Grande silvery minnow to protect against losses in the wild population

in a river prone to dry up. The Sanctuary joins the Dexter National Fish Hatchery and Technology Center in southern NM, in rearing the fish. The Dexter facility released 500,000 minnows into the Rio Grande at Big Bend National Park in Texas in December where it had been absent for 50 years. This fish of the Rio Grande once swam from northern New Mexico to its mouth. Aside from the Big Bend stocking, the fish is confined to waters near Albuquerque, New Mexico. ♦ Angela Carrillo

POSTCARDS

Nashua National Fish Hatchery



The Nashua National Fish Hatchery was established in 1898. Waldo Hubbard moved from the Clackamas National Fish Hatchery, OR, that year to take over as first Superintendent of the new hatchery in Nashua, New Hampshire. His son, Harry, got his start at the hatchery and later worked on rail cars transporting fish across the country. The 1898 U.S. Fish Commission report described the site near the Nashua River as possessing "in greater degree than any others examined in the State the requisites for a fish hatchery. . . The property is well suited for a favorable arrangement of buildings and ponds." This favorable arrangement came to pass by 1905 when this postcard was created.

♦ Mark Madison

By Lee Allen

Jack Hemphill



USFWS

Jack Hemphill posed for this photo while serving as the Regional Director for the Great Lakes-Big Rivers region, headquartered in Minneapolis circa 1973.

If you listen to those who have worked with or near Jack Hemphill, he may not walk on water – but he spent his entire working life ensuring those waters were clean and filled with fish.

“Starting with his World War II days doing construction work as a U.S. Navy Sea Bee to a lengthy career with both the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service, everything he’s done has been connected with fish,” says friend and fellow U.S. Fish and Wildlife Service project partner, Robert Thoesen. “His efforts have had a great impact on fisheries over a long period of time over the country.”

Immediately following graduation from Oregon State University with a degree in fishery management, the early days saw Jack E. Hemphill involved in a lot of boots-on-the-ground activity. One of his projects ended up in the January 31, 1955, issue of *Sports Illustrated* magazine where it was reported that “men of ingenuity tackled the issue of winter fish-kills at an ice-locked lake near the timberline of Arizona’s Apache National Forest.” Hemphill’s habitat management innovation in preventing winter-kill saved money, saved fish, and put more trout in the creel.

Hemphill, who later served as Chief of Fisheries for that state’s Game and Fish Department, took on the challenge of saving high-country trout from their annual demise. “It took years, research by five biologists, the work of 150 men, and a unique invention before the lakes’ trout production was saved,” according to *Sports Illustrated* magazine. On the page in *SI*, Hemphill sports a cowboy hat, a heavy coat, busting ice in the high-country water at the stern of a boat.

The “unique invention” mentioned was a Hemphill creation that had a fisheries crew drilling thousands of holes in 2,700 feet of plastic hose that was then anchored across a wide bay and connected to an air compressor on shore. When temperatures of 25 below zero brought ice-out conditions and the lake’s oxygen content dropped to a deadly 2.1 parts per million, the crew cranked up the compressor, pushing air through the hose and opening a hole in the ice that allowed the lake – and its finned inhabitants – to breathe again.

Much of Hemphill’s creativity found its way into the pages of scientific journals and ichthyologic history such as his early experiments with toxaphene. Before its dangers were ultimately appreciated, the fish toxicant became the second most-used next to rotenone, as a way of controlling freshwater fish with chemicals.

As a result of his experiments, Hemphill began to publish results in a variety of publications starting in the early 1950’s like the Bureau of Sport Fisheries and Wildlife abstracts, and *Transactions of the American Fisheries Society*. His “Development of Sport Fishery Resources on Indian Lands in the Southwest” described early-day efforts at opening up Indian waters previously unavailable to the public for sport fishing. “Programs are now being formulated in cooperation with the U.S. Fish and Wildlife Service to develop these fisheries and overcome problems encountered in that development on Indian lands,” reported the American Fisheries Society publication.

Chief among the listed successes was Hemphill’s Fort Apache Indian Reservation program. “With the

support of Arizona’s highly regarded Senator Carl Hayden, Jack helped form the Alchey National Fish Hatchery,” says Thoesen, who worked at the nearby Williams Creek National Fish Hatchery. “Although it was long before the Endangered Species Act went into effect, we knew we had a different species of trout in these mountaintop headwaters. There was no funding for propagation, but Jack and I would go up to Diamond Creek and trap them and observe them because we knew they were different.” Indeed they were – *Oncorhynchus apache* – initially listed under the Endangered Species Act as ‘endangered’ (subsequently downlisted to ‘threatened’), the Apache trout, one of two trout native to the state and found nowhere else in the world, it is now Arizona’s official state fish.

“When it came to consideration of endangered species and trying to make sense out of a nationwide mess, it took some creative thought to ensure forward motion,” Hemphill says. “Fortunately, I had a mind of my own and realized early that you have to play your cards efficiently and lay down a lot of basic foundation to make any progress.”

Hemphill came to work for the U.S. Fish and Wildlife Service in 1955. He efficiently applied his field experience in a foray into the national headquarters in Washington, DC, in the late 1950s where he worked for a time.

Perhaps Hemphill’s greatest contribution to the fisheries world was made then, when he created what’s presently called the Fish and Wildlife Conservation Offices. The network of FWCOs unites several hundred professionals in seven regional offices

and 65 field offices in 34 states. Fisheries professionals in the FWCOs do what Hemphill did while back in Arizona, touched upon in *Sports Illustrated*. It’s on-the-ground and in-the-water work they do, assessing fish populations, determining what to do if a population is depleted and then getting it done. They work with salmon in the West, rare desert fishes in the Southwest, behemoth alligator gar in the South, tiny darters in the Midwest, and Atlantic salmon in the Northeast. Hemphill had the career experience of a state game and fish agency biologist and knew where the U.S. Fish and Wildlife Service could step up for conservation.

People and partnerships are the core strength of the FWCOs; they are unique in their ability to work across state lines and Indian lands. The work is generally non-regulatory and done in partnership with willing people and agencies for the benefit of fish.

“Jack got all that started,” says Thoesen. “In the early days, we stocked fish without a lot of science involved. We put them where there were fishermen. Jack recognized that by managing these efforts, we could make a more economical use of the hatchery product. He worked with everybody involved to develop total

management of a species rather than just dumping them where it was convenient. If you apply this to millions of fish of different species, you can see the compound effect.”

After a time in the national headquarters, Hemphill eventually moved up to become the Regional Director of the Great Lakes-Big Rivers Region, based in Minneapolis, in 1973. Retirement took him to Panama City, FL, where he presently makes a home with his wife, Norma.

If he had the chance to re-do his career, Hemphill, approaching his 85th birthday, is slow to answer the question, but when he does it’s with a firm conviction: “I might consider it if I could correct the mistakes I made, or overcome the inability to make some things happen.” ♦



Robert Elliot/USFWS

In the tradition of Jack Hemphill, biologists (l-r) Stewart Cogswell, Chuck Bronte, Dale Hanson, and John Netto, with the Green Bay Fish and Wildlife Conservation Office collect data from spawning lake trout netted in Lake Michigan near Algoma, WI. Hanson holds an envelope with fish scales used to determine age and growth rates of the trout.

Lahontan Cutthroat Trout

By Craig Springer



Michael Graybrook

The Lahontan cutthroat trout is one of 13 described cutthroat subspecies in the American West. The largest known specimen weighed 62 pounds.

French Marine Corp officer, Louis Armand de Lahontan, never laid eyes on his namesake cutthroat trout. Nor did he visit the place in Nevada stamped with his name. The Frenchman voyaged no further than the upper Mississippi from his Michigan outpost. But he wandered widely when he wrote a travelogue published in Europe in 1703. Travel writer, de Lahontan, claimed he found a link to the Orient via the *Longue* River. Makers of maps believed it. Explorer John C. Fremont sought the last incarnate of it when he wrote about a gift of enormous trout that today are named for a fiction.

The light from the midday sun strikes the black-spotted bronze flanks of a Lahontan cutthroat trout. The wet

gleam calls attention to the lines that zigzag on the side of the fish, like a stretched-out Z. These little segments of flesh stand out on this muscular fish as it writhes in the hands of Jay Bigelow to escape his unnatural grip. Bigelow, manager of the Lahontan National Fish Hatchery in Gardnerville, Nevada, holds a male about three years old and 16 inches long. It's part of a broodstock at the hatchery on the banks of the Carson River.

It's through its skin, past the Zs, and deep into its genetic makeup where the excitement lies in conserving this cutthroat trout. Bigelow clutches an outward articulation of a million wobbly trips around the sun, the ebb

and flow of ice, and a fortuitous find from a true travel story.

The Lahontan cutthroat trout evolved in the ancient Lake Lahontan where at its maximum size covered about 8,600 square miles of Nevada, and parts of California and Oregon. It's one of 13 described subspecies of cutthroat trout in the American West.

Fossils of this fish swim in stone in the lake basin bottom. As glaciers retreated north in the last ice age, the basin dried to a few isolated lakes, leaving playas and friable Great Basin dirt. With the long press of time in waters that became more alkaline, the Lahontan cutthroat trout developed into a fish able to withstand environmental extremes

that today readily kill other fish species.

With the receding waters, two forms of the trout arose: one accustomed to life entirely in streams, from tiny headwaters to larger rivers that banded the margins of the ancient Lake Lahontan basin. The other form was a lake-dweller.

Present-day Pyramid and Walker lakes, the sumps of the ancient Lake Lahontan basin, held the lake-dweller. Water only naturally leaves these lakes to slake the sun. With evaporation rates high, mineral content in the water is extremely high – and Lahontan cutthroat trout not only tolerate it, they evolved to thrive in it.

These lake-form fish had other remarkable adaptations to life in flat water. The number of filaments inside their throat called gill rakers are exceedingly high for any trout in the American West, indicating a habit of feeding on microscopic animals in lakes. Another adaptation speaks to diet; this lake-form fish has a digestive track for preying on fish – cui-ui sucker, tui chub, and cannibalizing its own.

These fish-eating lake-dwellers grew to phenomenal size. Fremont was the first writer of English to document the fish in 1844. Pyramid Lake Paiute Indians gave his party fish up to four feet long. Naturalist Henry Henshaw collected a trout on the Wheeler survey in 1876, and U.S. Fish Commission scientist, Theodore Gill, gave it a name for science in 1878. The largest known specimen tipped the scale at 62 pounds in 1916.

Talk of fish this large is largely an endeavor in history. What took the slow grind of time to create was undone by the cursive strokes of a fountain pen in 1905. This very first water development project by the Bureau of Reclamation dropped Pyramid and Walker lakes to irrigate those friable fields. All cutthroat trout, Lahontan included, must spawn in flowing water and Pyramid Lake cutthroats could no longer swim into the Truckee River to reproduce.

By simple attrition from the inability to spawn, Pyramid Lake was devoid of the leviathan cutthroat trout by 1939. The fish that carried in its genes the stamp of life in harsh lake waters and the ability for tremendous growth was extinct.

Or so it was thought. Fast forward to the 1970s; the Lahontan cutthroat trout came to reside on the list of species threatened with extinction, and it came to reside outside its native range. This subspecies has been stocked well outside its native range, including New Zealand and alkaline lakes in the coulee region of Washington. Trout from Pyramid Lake traveled overland into a small, fishless stream, Morrison Creek, on Utah's Pilot Peak and that's proved priceless. When, and who moved the trout, no one knows. A recent genetics study by the University of Nevada-Reno reveals that the trout residing on this Utah mountainside are the original lake-dwelling form of Lahontan cutthroat trout.

And they have since come to reside elsewhere: Lahontan National Fish Hatchery. The fish that Bigelow wrangled from a tank is a Pilot Peak fish, or more accurately stated – a

Pyramid Lake fish. It carries an ancient lexis of life in the alkaline lake and the Truckee River that feeds it.

Lahontan cutthroat trout are the only fish kept at the hatchery. U.S. Fish and Wildlife Service fish biologists carefully manage them. By design, families are kept separate, so are the family founders, and the young are frequently graded and separated to keep bigger fish from smaller fish. The need to do so speaks to that inborn, innate sense for piscivory of the lake-form fish. Even at the earliest ages they tend to want to eat fish flesh. To keep the wild in the fish, fertilized eggs from trout captured in Morrison Creek are brought to the hatchery, and infused into the broodstock.

Pyramid Lake Lahontan cutthroat trout from the hatchery are making their way back to native waters. There, they will contribute significantly to the recreational fishery managed by the Paiute Indian Tribe. Over 28,000 Lahontan cutthroat trout fry hatched in and imprinted on Truckee River water at the Marble Bluff Fish Passage Facility, operated by the U.S. Fish and Wildlife Service's Nevada Fishery Resources Office near the river's mouth. These young trout were stocked in headwater streams of the Truckee in 2007 where they are expected to grow and return to Pyramid Lake much as their ancestors did up to a century ago.

It's no fiction at all that a decade from now 20-pound trout may travel through downtown Reno, up the Truckee, past an angler or two, back to ancestral spawning gravels in headwater streams. ♦

No Trout Left Behind

The landscape-scale Western Native Trout Initiative puts trout conservation where it's needed most

It's an arduous hike to get into the headwaters of the North Fork Frying Pan River, and the payoff is tremendous. Colorado River cutthroat trout swim these waters, and I've gone there with some frequency over the years, just over the mountain from my Denver home.

It's a tiny creek, where wearing waders is over-dressing. Willow whips in places arch over the water; they make shade, cooling the creek, and they drop bugs into the water. Trout like that. Stealth, a three-weight rod and a bow cast is the order of the day. An Elk Hair Caddis on a #18 hook looks more like a white-winged moth that might fall from a willow on a breeze. At least that's my reasoning pitting wits with a cutthroat trout, and pulling one in from a seam of water on the edge of an undercut.

This little brassy-green trout is stippled black, mostly on the tail and back. Their bellies are a bruised orange, at least when they are not spawning. It's then that their undersides are crimson like freshly spilled blood, alarming at first to look at. It's alarming to me that these fish I like to catch are swimming relics.



Chris Kennedy/USFWS

A pair of Colorado River cutthroat trout swim flowing waters over spawning habitat.

Catching a Colorado River cutthroat is like holding a fragment of a missing dream.

About 150 pure populations of Colorado River cutthroat trout exist today – fragmented from their original and near-contiguous natural range. A range map shows they lived in a large upside-down U, from northwest New Mexico, through western Colorado and Wyoming, southward through central Utah, essentially marking tributary waters to the Colorado proper. Through that immense area, the Frying Pan, and about 150 others like it are small fragments of what once was a well-connected network of pure Colorado River cutthroat trout streams veining the higher slopes of the Colorado River basin. The Colorado River cutthroat trout lives in about 16 percent of its original range today.

The troubles of this fish I catch close to home aren't an isolated tale. Western native trout through the 12-state West have similar stories of peril. Their habitats have been altered against their favor. Their waters were developed for irrigation, flood control, and hydropower. Non-native brown, brook and rainbow trout stocked on top of them in an age much different than ours have now displaced the native fishes. Native trouts couldn't compete for food and space with the introduced trouts. They hybridized into mongrel fish. The exotic whirling disease found its way into cutthroat waters. Throughout the West native trouts retreated to isolated and fragmented headwater streams, and live in meager remains of their natural distribution. Nine cutthroat trouts through the Rockies and Sierras, and Pacific Northwest are greatly reduced in number. Same for the

desert trout – the Gila and Apache trouts of New Mexico and Arizona – and the bull trout of Northwest, and the most beautiful of all, the golden trout of California.

But help is on the way in a landscape-scale partnership, the Western Native Trout Initiative, which blurs the lines of political boundaries of states and federal and tribal lands and targets conservation resources where they are needed for the benefit of native trout. In the past, trout conservation itself has been fragmented, done piecemeal. The Western Native Trout Initiative sharpens the focus of native trout conservation with multiple partners planning and working together on common needs. The Wyoming Game and Fish Department's chief of its Fish Division, Mike Stone, chairs the Western Native Trout Initiative. He leads an engaged and enthusiastic team of similarly placed people in the western-state fish and game agencies, as well as biologists from the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the Bureau of Land Management.

The Western Native Trout Initiative is only a few years old, but it's already paying off for native trout and the people who fish for them. A multistate grant from the Western Association of Fish and Wildlife Agencies and the National Fish Habitat Plan funded habitat restoration projects from Montana to New Mexico and Alaska to California. Closer to home for me, and the Colorado River cutthroat trout, there's much to do with our partner, the Colorado Division of Wildlife, like assess the genetics relationships with closely related greenback and Rio Grande cutthroat trouts, the other two trout native to Colorado. We also

need to remove barriers to re-connect trout habitats, while at the same time elsewhere, ensure that barriers to non-native trout colonization remain just that.

We're making strides. But the western landscape has taken 200 years of steady degradation. We must be dedicated to a very long-term commitment to staunch the losses to native trout and turn the decline the other way.

As climate changes and people need more water, western native trout will be the "canaries" showing us that mountain ecosystems are hurting. That will hurt economies, too. Economists estimate that trout anglers in the Rocky Mountains generate \$12 billion spent on travel, lodging, tackle and supplies. I don't think twice about spending the money for a trip to the Frying Pan. The payoff is catching a brassy-green trout, and free physical and mental rejuvenation.

For more information on the Western Native Trout Initiative see: www.westernnativetrout.org. ♦

Mike Stempel is an ardent angler, mountain biker and fiddle player. He's also the Assistant Regional Director – Fisheries, for the U.S. Fish and Wildlife Service's Mountain-Prairie Region, based in Lakewood, CO.



Chris Kennedy/USFWS

Colorado Division of Wildlife biologists (l-r) Bill Atkinson, Jon Ewert, and Adam Hansen collect Colorado River cutthroat trout broodstock from Lake Nanita in the Rocky Mountain National Park.

By Bob Mazzuca

A Scout's Mission to Save the Mojave Tui Chub

On one recent trip with a group of friends in the Florida Keys, I had the thrill of catching bone fish – a great game fish. We also caught barracuda. The memories stir deeper thoughts of another fish story that I would like to share. It demonstrates the connections kids make to nature, and connection of fishing and conservation, and important role conservation plays in Scouting.

When I think about Scouting's mission as we approach our 100th Anniversary in 2010, conserving our natural resources easily makes the list of our top priorities. Scouts play a huge role in conservation. Our

*ArrowCorps*⁵ project with the U.S. Forest Service this past summer saw 5,000 members of the Order of the Arrow, Scouting's national honor society, working more than 250,000 man-hours of service. Their efforts resulted in more than \$5 million worth of improvements, conservation, and construction work at five national forests.

We also encourage our Scouts to lead individual projects to show our commitment to the outdoors and leaving things just a bit better for future generations to enjoy. I was heartened recently by a conversation I had with Kevin Anderson, an Eagle

Scout with Troop 985 in Whittier, California, who saw his personal commitment turn into a wonderful conservation project at Camp Cady Wildlife Area. He is a great fan of the outdoors, has fresh air and clean water in his blood; he fishes, hikes, and hunts. Kevin's long-time goal is to work for the California Department of Fish and Game.

Kevin is on a short-term quest to earn the Hornaday Silver Medal, a national Scouting conservation award named for the late William T. Hornaday. The medal recognizes outstanding efforts in planning, leadership, involvement of others,

and opportunities taken to help others learn about natural resource conservation and environmental improvement.

As one of four conservation projects required to earn the medal, Kevin identified the need to help protect an endangered fish species, the Mojave tui chub, a minnow typically that grows no larger than eight inches long. He quickly organized an Eagle Scout project to help create a new refuge for this small, but significant minnow.

The problem for the chub was one of habitat. Once abundant in the Mojave River, the species almost disappeared when the Mojave changed course and went underground. Only a few freshwater ponds formed by the Mojave at the Camp Cady Wildlife Area kept the chub alive, and one of those emptied after a leak. Kevin identified the need to restore the empty pond to expand Camp Cady's capacity.

Under Kevin's direction, 25 Scouts and parents spent a July weekend cleaning debris and dead trees around the pond so it could be later filled with a clay sealant and hold water. It was a big job, and a hot one to boot. Temperatures at the work site climbed to 108 degrees. "It was really hot out there, and we couldn't work all day, so we didn't have much time," Kevin told me.

On another weekend, Kevin and another team of volunteers returned to Camp Cady to plant 27 natural cover trees around the pond to provide a natural barrier to prevent erosion and wind from filling the pond with dirt and sand.

Kevin's project at Camp Cady now gives Mojave tui chub another pond to provide for its survival, not to mention habitat for other wildlife – quail, small game, and many non-game birds and animals.

Somebody would argue that this little Mojave tui chub in these little ponds doesn't make a big difference in the

grand scheme of things. I would counter using Kevin's words: "There are always people out there studying them, and it's important to have fish native to the area, not just fish from other places." The U.S. Fish and Wildlife Service's California-Nevada Fish Health Center conducts tests on disease, and the Ventura Fish and Wildlife Office partners with others for chub habitat conservation.

Kevin and his conservation efforts make all of us in Scouting very proud. *Field & Stream* magazine named Kevin a "Hero of Conservation." The world needs Eagle Scouts today more than ever before, and Kevin is a great example of why. The Mojave tui chub may not be a big fish, but the efforts to preserve it are a big reason to encourage all conservation efforts, no matter the size.

I learn a lot from listening to Scouts like Kevin, and I think we all can. Conservation and the things that we can do are first and foremost very important to us as a human species to be good stewards – we all know that in our heads, but rarely do we collectively do something about it. Whenever Scouting can do a project like *ArrowCorps*⁵ with such high visibility, you raise the awareness with all of those around you to the importance of these kinds of things.

We were "green" before green was a color. Scouts have always had a passion for the out-of-doors and the essence of Scouting's Outdoor Code is to "leave it better than you found it." At the end of the day, it's going to be organizations like Scouting that will help create a new generation of conservationists, and that's exciting. And thanks to the leadership of Eagle Scouts like Kevin Anderson, we can be assured that America's outdoor treasures will endure for future generations. ♦

Robert "Bob" Mazzuca is Chief Scout Executive, Boy Scouts of America, in Irving, TX.



The Mojave tui chub lives in only a few waters, among them the habitat that Kevin Anderson saved from ruin.



Field & Stream named him a "hero of conservation." Eagle Scout Kevin Anderson stands near the Mojave tui chub habitat that he saved.



It's a family affair. Excise taxes on fishing tackle and boats fund fisheries conservation.

The Sport Fish Restoration *An Inheritance for the American Angler*

Celebrated waters around the country are bound together in conservation law like a blood knot binds fishing line. Whether it's the pugnacious pull of a smallmouth bass from Dale Hollow Lake in Tennessee, a heavy-shouldered rainbow trout from Montana's Madison River peeling a fly reel to the backing, or the dead-weight drag of a 15-pound largemouth bass from Texas's Lake Fork, a remarkable conservation partnership ensures the well-being of these fisheries. Partnerships between anglers and fishing and boating equipment manufacturers, and state fish and game agencies and the U.S. Fish and Wildlife Service guarantee the scientific management of fish and

their habitats for the future of fishing across the country.

A dynamic duo of two excise taxes passed by Congress more than 50 years ago fostered the partnership. Hunters and the shooting arms industry work together under the Pitman-Robertson Wildlife Restoration Act, passed in 1937, to benefit wildlife and hunting. And anglers, they work in concert with fishing tackle and boating manufacturers under the Dingell-Johnson Sport Fish Restoration Act, passed in 1950. Both Acts embody the "user pay-user benefit" concept. Anglers pay excise taxes on equipment and anglers can expect to

Program

reap the benefits of more abundant, higher-quality fisheries and fishing opportunities.

The Sport Fish Restoration Program is a cycle of success; it is the largest and most successful fisheries conservation program in the world. How it came to be is a bit of a circuitous journey.

The story begins in 1939, when Congressman Frank H. Buck of California introduced legislation imposing a 10-percent excise tax on certain equipment related to recreational fishing. He modeled the bill on the Wildlife Restoration Act, passed two years earlier. Eventually

by 1941, the federal government imposed a 10-percent excise tax on rods, reels, creels, and artificial lures. However, instead of being used to benefit recreational fisheries, these funds were put into the General Fund of the U.S. Treasury, a practice that continued after World War II.

Michigan Congressman John Dingell, Sr., sought to change that practice, and introduced his first version of the Sport Fish Restoration bill in 1947. Although it failed, it galvanized anglers around the idea of dedicated funding for better fisheries. Dingell two years later reintroduced his bill while Senator Edwin Johnson of Colorado introduced an identical Senate bill. Despite these popular bills passing quickly through both chambers, President Harry Truman vetoed it because of concerns related to commercial fisheries. Dingell and Johnson introduced a revised bill and Truman signed the Federal Aid in Sport Fish Restoration Act into law on August 1950.

The war-time excise tax already collected on fishing equipment was now earmarked to go to state fish and game agencies for sport fish management, and the new law safeguarded that fishing license fees would be for the exclusive purpose of state fish and game agency administration.

Fast-forward to 1984. There is yet another major twist in the partnership after Senator Malcolm Wallop from Wyoming and then-Congressman John Breaux from Louisiana amend the Sport Fish Restoration Act.

The Wallop-Breaux Amendment expanded the excise tax to include all items of fishing tackle, as well as capturing taxes paid on motorboat and small engines fuels, and import duties on fishing tackle and boats. And it has paid big dividends for fisheries conservation. When the Wallop-Breaux Amendment took effect, monies brought in via the excises taxes went from \$38 million to \$122 million – over a three-fold increase.



Time on the water creates the ties that bind.



RBFF

Good parenting. Fishing connects children to the workings of nature like few experiences can.

In 2008, nearly \$400 million in Sport Fish Restoration funds, and \$133 million matched by state fish and game agencies, went towards sport fish-related projects. Of this \$533 million, states agencies spent at least 15 percent on boating access and up to 15 percent for teaching aquatic ecology and management, aquatic safety, conservation ethics, and fishing skills.

In this partnership, the U.S. Fish and Wildlife Service using less than 1.3 percent of funds for administration cost, manages the Sport Fish Restoration money that goes to the state fish and game agencies.

The state agencies must match funds at a 1 to 3 ratio. Sport Fish Restoration funds are distributed by formula, based 40 percent on each state's water area and 60 percent on its number of licensed anglers. Generally speaking, each fishing license sold nets an additional \$10 in Sport Fish Restoration revenue, underscoring the fact that anglers do fund fisheries conservation.

Fish and game agencies use the funds to hire fisheries biologists and other technical experts. Fisheries biologists at both the state and federal level discuss common needs, but the state has the final word on

how to use the funds, though the funds must be used on sport fish species. That's not to say that non-game fishes don't benefit; funds used to improve sport fish habitat benefits the wider fisheries resources. Competent scientists manage fisheries. And it is those scientists at the state level that make the on-the-ground decisions – a hallmark of the Sport Fish Restoration Program's resounding success.

The Sport Fish Restoration Program is credited with the recovery of many economically important sport fish species, and has helped develop some world-class fisheries. It unites



RBFF

A big bass for a little boy will resonate in memory for years to come. The Sport Fish Restoration Program ensures a conservation inheritance for anglers young and old.

the U.S. Fish and Wildlife Service; state fish and game agencies; the fishing tackle and boating industries; and anglers and boaters into a partnership that has achieved far more in nearly 60 years than what any could do for fisheries conservation individually – create an inheritance for the future of America's fisheries.

An angler maneuvering with the low click and hum of a trolling motor over muskie habitat in an Indiana lake has inherited what Dingell and Johnson had in mind. Muskie anglers are the epitome of optimism and hope. A stick plug cast into the cold murk is more than an act of hope; it is an axiom. It is, irreducibly, the first act toward better fisheries in the cycle of success that is the Sport Fish Restoration Program. ♦

Joyce Johnson is the Chief of Policy in the U.S. Fish and Wildlife Service's Wildlife and Sport Fish Restoration Program, based in Arlington, VA.



By Scott Robinson and Marilyn O'Leary

The Southeast Aquatic Resources Partnership

Working Together for Regional Aquatic Conservation

The Southeast U.S. harbors a vast array of aquatic habitats unparalleled in the nation. It is a place of both exceptional natural beauty and undisputed scientific importance; its natural assets enrich our communities, supply livelihoods for our citizens, and elevate our quality of life – and the need for comprehensive conservation has never been greater.

Some of the country's greatest aquatic assets boast a southern accent, from the Florida Everglades to the Cumberland River, the Outer Banks to the lower Mississippi River, the world-renowned largemouth bass fisheries of Texas and Florida and smallmouth bass fisheries in Tennessee, Kentucky, and Alabama, to the redfish, sea trout, and shrimp in the Gulf of Mexico and the South Atlantic. Across the southeastern landscape, more than 1,800 species of fishes, freshwater mussels, snails, turtles and crayfish, live in 70 major river basins. About 16 percent of the nation's coastal wetlands sit on the South Atlantic coast. Nearly half of all the nation's wetlands are in Louisiana alone, and Alabama has more native freshwater fishes than any other state – 325 species – and another 100 more marine species.

But the bounty is not endless. A rapidly expanding human population and land converted from farms, fields and woods to concrete and suburbia have altered aquatic habitats throughout the region. In the U.S., 34 percent of imperiled fish species and 90 percent of imperiled mussel species live in the Southeast. In recent years, human populations grew dramatically, especially on coastal areas, increasing along the Gulf Coast by 45 percent between 1980 and 2003. Atlantic coastal



Scott Robinson/Georgia DNR

Estuaries and wetlands in the Southeast provide habitat for fish, birds, mammals – and people.

county populations grew by 58 percent, the largest increase during that period of any coastal region in the continental U.S. Demographers predict more growth to come, and with it will come more conservation challenges.

So how can we maintain the natural beauty, biological diversity and quality of life that have drawn so many people to the Southeast? The Southeast Aquatic Resources Partnership (SARP). Over the past three years, the unique partnership worked with state and federal natural resource agencies, local organizations and community leaders from around the 14-state region to develop habitat conservation strategies. The resulting Southeast Aquatic Habitat Plan represents a blueprint for the cooperative conservation of streams, rivers, lakes and reservoirs,

estuaries, and coastal marine habitats.

That blueprint is resulting in cooperative efforts like the Southern Instream Flow Network. Water quantity and use has become a huge issue across the region as we are faced with unprecedented droughts, climate change, and population growth. The Network takes a regional approach to instream flow conservation issues, expanding on work by the national Instream Flow Council to provide information, resources, and tools to instream flow teams in each state. This effort has resulted in greater communication and collaboration among state and federal agencies, conservation organizations, and other stakeholders, on a conservation issue that has traditionally been handled by individual states acting alone or

in conflict with their neighbors. The cooperative efforts of the Network are quickly leading to more effective programs to address instream flow conservation issues.

In addition to collaborative policy and science conservation efforts, SARP's local and state partners work to implement on-the-ground or in-the-water projects that protect, restore, and enhance aquatic habitats. SARP was among the first partnerships recognized as a Fish Habitat Partnership under the auspices of the National Fish Habitat Action Plan (see *Eddies*, summer 2008). The intent of SARP and the National Fish Habitat Action Plan is to focus resources where they can be most effective in comprehensive conservation of landscape-scale aquatic habitats. Through its habitat assessment and collaborative planning efforts, SARP will identify and facilitate the most effective methods to conserve aquatic habitats throughout the Southeast. Combining the resources of multiple partners and programs often allows SARP to identify appropriate funding from multiple sources and implement priority actions in a timely manner.

One area where SARP has focused efforts is the Altamaha River watershed in Georgia. Since completing a Conservation Action Plan for the Altamaha River basin in 2005, SARP has facilitated aquatic habitat restoration projects throughout the watershed. The projects include reservoir shoreline restoration and enhancement in lakes Oconee and Sinclair in the upper end of the watershed, gravel bar restoration to enhance spawning habitat for the robust redhorse and other fish species in the main stem of the Oconee River (the largest tributary to the Altamaha), and oyster reef restoration in the Altamaha estuary.

The U.S. Fish and Wildlife Service is an active founding member of SARP and, through the National Fish Habitat Action Plan, has invested more than \$1.2 million in

fish habitat restoration projects identified and facilitated by SARP, including projects ranging from stream bank restoration in Kentucky and Virginia to sea grass plantings and marsh restoration in the Gulf of Mexico. SARP has also become a partner in NOAA's Community-based Habitat Restoration program, which provides funding for local community-based habitat restoration projects for marine and anadromous species that help meet the goals of the Southeast Aquatic Habitat Plan. SARP is unique among fish habitat partnerships because of its focus on all regional aquatic resources from the mountains to the sea. Marine and freshwater agencies and organizations work together to identify and implement effective conservation actions while recognizing the importance of working and communicating across traditional boundaries.

SARP's unique approach is leading to new and more refined methods of accomplishing its mission: "With partners, protect, conserve, and restore aquatic resources and habitats throughout the Southeast for the continuing benefit, use and enjoyment of the American people." ♦

Scott Robinson is SARP's Coordinator, based at the Georgia Department of Natural Resources in Social Circle, GA. Marilyn O'Leary is SARP's Project Manager, based in Baton Rouge, LA.



Scott Robinson/Georgia DNR

A heron fishes in the shallows of a wetland typical of the Southeast U.S.

The Southeast Aquatic Resources Partnership includes

Gulf States Marine Fisheries Commission

Atlantic States Marine Fisheries Commission

Gulf of Mexico Fishery Management Council

South Atlantic Fishery Management Council

U.S. Fish and Wildlife Service NOAA Fisheries

U.S. Geologic Survey

U.S. Army Corps of Engineers

U.S. Environmental Protection Agency

Southern Company

B.A.S.S., Inc

Bass Pro Shops

Triton Boats

The Nature Conservancy

World Wildlife Fund

EPA Gulf of Mexico Program

National Park Service

Southeast Watershed Forum

Fish and wildlife agencies from

Alabama, Arkansas, Florida, Georgia,

Kentucky, Louisiana, Mississippi,

Missouri, North Carolina, Oklahoma,

South Carolina, Tennessee, Texas, and

Virginia and other valuable partners

who implement on-the-ground projects

for aquatic habitat conservation.

A Whole Different Animal

A Fish Hatchery Takes on North America's Largest Freshwater Turtle

There is a reason there are no stuffed animal likenesses of the alligator snapping turtle, with its wrinkled flesh spilling from spike-armed shell and its thorny head, pocked with warts, thrusting into a talon-shaped maw. Even its foraging technique, entirely unique to this turtle, seems menacingly alien: from the river bottom, the beast lays in wait leaving the work to its "lingual lure," a worm-like appendage that protrudes from its tongue. When it succeeds in baiting a curious fish, snap goes the turtle.

No, no one would pretend to imagine a cuddly counterpart to the reptile. For a while, however, the largest freshwater turtle in North America had become a household item: a featured ingredient in canned soup.

After the Endangered Species Act put sea turtles off limits to commercial trappers in 1973, the alligator snapping turtle, which can grow to more than 200 pounds, became the preferred substitute. This, along with wide-scale habitat alteration of rivers and streams, posed a serious threat to alligator snapping turtle populations in the wild. Almost entirely aquatic, the



Mouth agape, an alligator snapping turtle at Tishomingo National Fish Hatchery postures in defense.

Brian Fillmore/USFWS

turtle faced the same issues that so many of our fish did with the advent of dams and channelization. Once abundant throughout most of the major waterways that drain into the Gulf of Mexico, turtle populations have been considerably diminished. In Oklahoma, the turtle's population was reduced to only a few isolated spots in the eastern part of the state.

Such were the circumstances in 2000 when Sequoyah National Wildlife Refuge delivered 16 wild-caught alligator snapping turtles to Tishomingo National Fish Hatchery.

"It's a very unique situation for us," says Brian Fillmore, a fisheries biologist at Tishomingo. "Obviously, as a fish hatchery, we are more accustomed to, well, fish."

Indeed, the hatchery has garnered a glowing reputation for its work stocking local waters with sport fish and reintroducing imperiled fish like alligator gar and paddlefish. Over the last decade or so, the hatchery has returned paddlefish to rivers that have not seen them in more than 50 years.

But the alligator snapping turtle is a "whole different animal," so to speak.

In addition to conservation for conservation's sake, Fillmore reveals an important incentive for the hatchery to take on the turtle. "Alligator snapping turtles are apex predators," he says. "They remove larger species of nongame and game fish, which are older and possibly not as productive as younger fish. Once these larger, older fish are removed, that biomass can be replaced by thousands of smaller younger fish which feed larger game fish and other wildlife making a healthier system. Some of these smaller fish become

future broodstock to replenish the river system."

Dr. Day Ligon, who has devoted nearly a decade in higher education and research to gain a better scientific understanding of the alligator snapping turtle, was recruited to assist. Then a graduate student at Oklahoma State University, Ligon helped hatchery staff develop husbandry methods to produce turtles in captivity, and designed protocols for reintroducing juveniles to rivers from which the species has been extirpated.

"It took a lot of planning and coordination between facilities at the hatchery and Oklahoma State University 150 miles away," Ligon recalls. "Fortunately, the entire hatchery staff has shown unwavering support for and dedication to the success of this long-term project."

Of course, there was more to it than sheer determination. "There was a huge learning curve," says Fillmore, "from understanding optimal captive rearing conditions to simply handling adult turtles, considering they do have the ability to remove fingers."

Hatchery staff was presented with countless unusual challenges: learning how to locate and identify alligator snapping turtle nests and excavate eggs; treating turtle diseases; and learning how to maintain ideal turtle egg incubation conditions.

No doubt, the biggest difference with raising turtles as opposed to fish is simply that the process takes a lot longer. Turtles take some 15 to 20 years after hatching just to reach sexual maturity and often outlive human beings.

At Tishomingo, "...hatchlings are reared indoors on fish and commercial turtle pellets, but moved to outdoor ponds for six months to a year prior to being released," says Fillmore. "At this point the average turtle will probably spend three years at the hatchery before release."

But, as the expression goes, slow and steady wins the race; and success makes the wait worthwhile. In 2002, the first turtles were hatched at Tishomingo. Many have since been released in different waterways in the state, though a few remain at the hatchery as part of a long-term growth study. Also, annual production of hatchlings has increased steadily since that first year, and more than 200 hatchlings were added to the hatchery's stock in 2008.

"The combination of fast growth rates and ever-increasing production has, at times, stretched capacity at the hatchery to its limit," says Fillmore. "But we have always found ways to accommodate new arrivals. Of course, reintroduction of turtles to the wild has been the most productive and satisfying approach."

In 2006, a turtle population was reestablished at Tishomingo National Wildlife Refuge near the Red River, and is now providing valuable data for biologists. Another Oklahoma State University student, Dan Moore, along with a group of eager volunteers, has been using a combination of radio telemetry and mark-recapture techniques to measure post-release movement patterns, habitat preferences, and growth rates. These data will prove crucial for assessing the success of reintroduction of the turtle to other watersheds throughout the region. Last June, 90 turtles, three- and four-year-olds, were released into the Caney River above Hulah Lake, where a turtle population once lived.

Ligon is currently working to quantify age-specific differences in alligator snapping turtle foraging strategies. Continuing his long



Craig Springer/USFWS

Turtle scientist, Dr. Day Ligon, admires a subject of his research, a young alligator snapping turtle.

collaboration with the hatchery, now through Missouri State University, Ligon is trying to determine whether or not captive-rearing affects foraging efficiency.

As for the effects of the turtle's voracious foraging on its own natural surroundings, Ligon offers a professorial take: "It could be argued, but not substantiated with data, that alligator snapping turtles have a broader range of subtle impacts on a community than many top predators because of their plurality of roles. They eat and therefore affect the population structure of other turtles, fishes,

birds, and invertebrates. They can alter floral communities by selectively eating aquatic plant species. They consume carrion, thereby contributing to nutrient cycling. So, their influence is broad, but probably small for any single variable until you start adding up the subsequent effects on other species."

For Ligon and so many others, the work at Tishomingo National Fish Hatchery is starting to add up in assembling the pieces of this intriguing ecological puzzle. ♦

By Craig Springer

Pharmaceuticals for Fish

The Aquatic Animal Drug Approval Partnership moves medicine from the theoretical to the practical



Craig Springer/USFWS

The medical doctor turned fish biologist, James Henshall, lived in this house near AADAP's quarters in Bozeman, MT. The abode now houses the Montana Fish and Wildlife Conservation Office.

The parallel is too curious to be overlooked. James Henshall, M.D., had his home just a short walk away from his work in a Victorian two-story that still stands. There on the grounds at a national fish hatchery in Bozeman, Montana, Dr. Henshall hit his stride in the late 1800s – not practicing medicine – but directing fish culture operations as the superintendent of a fledgling federal hatchery.

Henshall, profiled by historian Todd Larson in the fall 2008 issue of *Eddies*, is probably best known as author of the classic *Book of the Black Bass*. Therein Henshall posited about the “eminently American fish” and its behavioral traits: “the arrowy rush” of the “gamest fish that swims.” He waxed poetic about smallmouth bass, and argued that the spotted bass did not exist as a distinct species. Henshall gave up a career as a medical doctor for distinguished work in conservation and fish culture.

Today, modern fish culture and medicine again merge at the Bozeman station where Henshall once lived and worked. The U.S. Fish and Wildlife Service's Aquatic Animal Drug Approval Partnership (AADAP) is based there. This national program is designed to generate, compile, and manage much of the complex information needed by the U.S. Food and Drug Administration (FDA), for one purpose – to get new aquatic animal drugs on the market and in use. No matter if the drug is to be used for treating parasitic infection in largemouth bass, gill disease in walleye, or bacterial infection in salmon and trout – fish you might find on the end of your line or under plastic at the grocery – AADAP plays a major role in generating and channeling that information to the FDA.

It's an arduous process to get a new aquatic animal drug approved, and it can take years of research and millions of dollars. In some respects, getting new drugs approved for fish and other aquatic animals is more difficult than it is for people. Reason being, people eat fish and shellfish. New drugs must effectively target specific diseases and disease-causing pathogens. They must also be manufactured at the highest quality and be safe for the target species, the environment, and for people – and all such claims must be supported by solid scientific data.

“With any new animal drug that's been approved by the FDA, you know it's met the gold standard,” said Dr. Dave Erdahl, AADAP's director. “Getting useful drugs approved and into the hands of fishery managers



USFWS

AADAP director, Dr. Dave Erdahl, spawns a lake trout using a luteinizing hormone studied through the drug approval process.

and fish culturists results in healthy fish and a healthy environment.”

Recent examples of new drugs are worthy of note: The FDA approved formalin for controlling external parasites in all species of fish. The new animal drug Chorulon® enhances fish propagation; it induces spawning and plays an important role in endangered species conservation. A number of new skeletal marking products are now available. With these products fishery biologists can quickly, safely, and with low cost, mark fish *en masse* so that they can more effectively assess fish populations in the wild. In 2005, the FDA approved Aquaflor® for catfish – the first new oral antibacterial

drug approved in over 20 years. More recently, the FDA approved Aquaflor® for use in all freshwater-reared salmonid species. In 2007, PEROX-AID® was approved to treat freshwater finfish and their eggs. This year, Terramycin® 200 was approved to control bacterial coldwater disease and columnaris, an often-fatal bacterial infection in freshwater-reared salmonids.

Inherent in its name, AADAP is a partnership, and works closely with the Association of Fish and Wildlife Agencies' Drug Approval Working Group to prioritize work and meet the needs of fishery managers across the country. AADAP's scientists help coordinate real-life field

investigations and consolidate data generated from nearly 250 entities comprised of state and federal agencies, Native American tribes, and private companies – all set on seeing new aquatic animal drugs approved.

The parallel continues. Henshall made a mark in fisheries conservation, and certainly influenced the pursuit of what is today America's favorite game fish. AADAP's work resounds in fisheries managed for public good or private gain. The science is manifest in the live-well, staving off extinctions, and even on your dinner plate.

To learn more, visit: www.fws.gov/fisheries/aadap. ♦

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Description: Each kg of Aquaflor® (florfenicol) contains 500 g (1.1 lb) of florfenicol in a palatable base.

NADA #141-246, Approved by FDA.

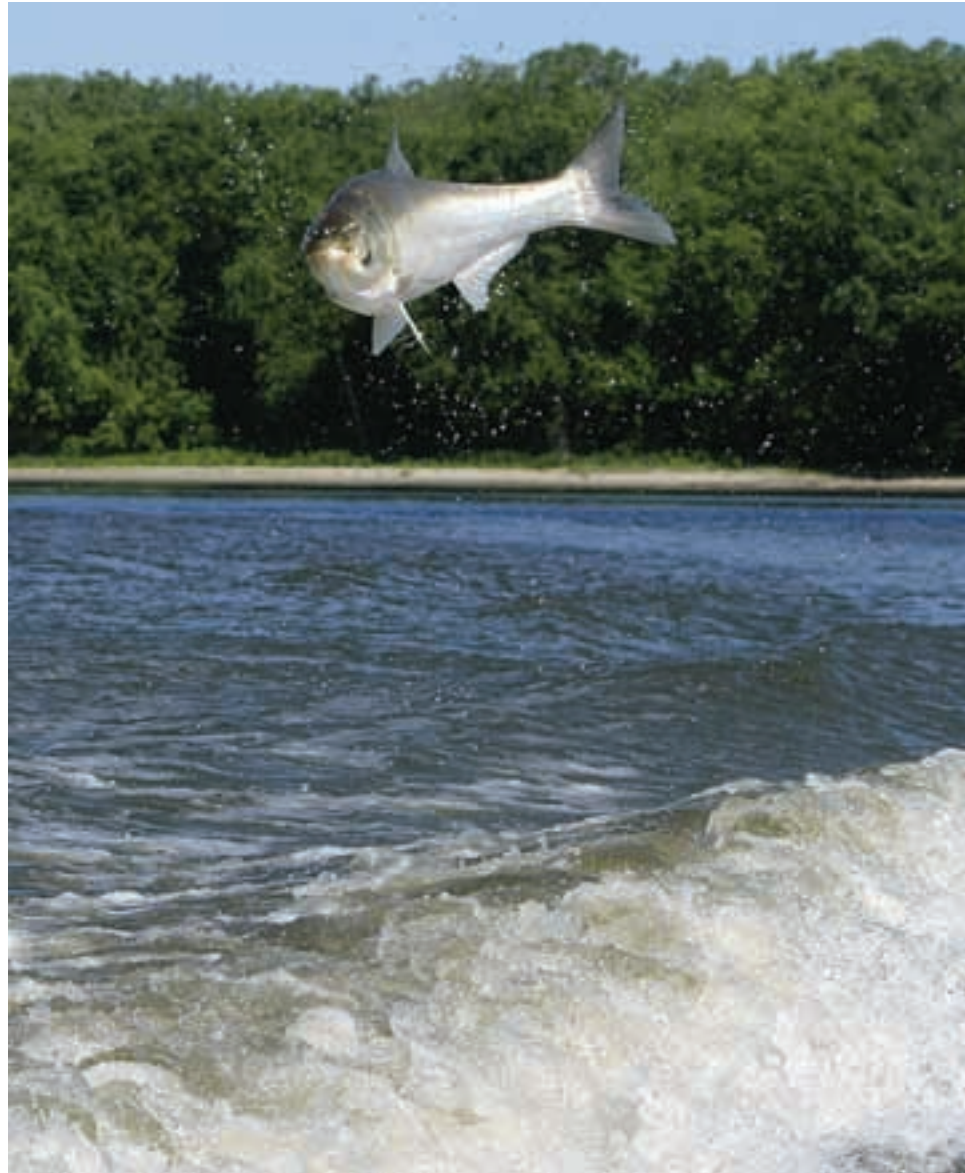
Schering-Plough

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Interview/ Schering-Plough, Animal Health

Drug research marshaled by AADAP biologists got the anti-bacterial Aquaflor approved for catfish, and trout and salmon species.

United Front Against Invasives



Chris Young/The State Journal-Register

The sound of boat motors stimulates Asian carp to leap out of the water, a hazard to human health. They create a hazard to the health of fisheries since they compete with native fishes for food and space.

Spanning more than 90,000 square miles and reaching depths of more than 1,300 feet, the Great Lakes are an ocean within a continent. Their waters flow uninterrupted across the international border between Canada's Ontario Province and eight U.S. states. Just as these waters geographically connect two countries,

they also bring together the agencies and organizations dedicated to protecting their fisheries from invasive species.

Fish biologists agree that invasive species are one of the biggest threats to the long-term health of the Great Lakes fisheries, and the artificially

united waterways of the Mississippi River watershed.

Mark Steingraeber, fishery biologist with the LaCrosse Fish and Wildlife Conservation Office (FWCO) says invasive species like Asian carp and round goby are two of the most threatening fish species because they compete with native fish for food and spawning habitat. The threat of blackhead, silver and bigeye carp – collectively called “Asian carp” – surfaced in U.S. waters back in the 1970s, when they were introduced into the aquaculture industry. Exploited for their appetites, catfish farmers used Asian carp to rid ponds of unwanted algae and plankton. Asian carp escaped into the wild in the Mississippi River in the flood of 1993, and have steadily swum north. The round goby appeared in the Great Lakes in the 1990s, carried in ballast water in trans-oceanic ships. The goby's rapid reproduction rates and aggressive feeding behavior facilitated their spread in the Great Lakes and Mississippi watershed, threatening the survival of native fish, like smallmouth bass.

For 13 years, the La Crosse FWCO has led a multi-agency close-watch on Asian carp infiltration in the Illinois Waterway and round goby in the Great Lakes and Mississippi watersheds. Every year, a coalition of volunteers and career conservationists convene in the heart of the upper Midwest to survey the abundance of round goby as well as the upstream distribution and abundance of Asian carp. The annual “Carp Corral and Goby Roundup” has become a joint venture between more than 12 federal, state, private and corporate enterprises.

This year's effort spanned a distance of nearly 100 miles of the Mississippi watershed in Illinois from Alsip downstream to Peru, and included portions of the Calumet-Sag Channel, the Chicago Sanitary and Ship Canal, the Des Plaines River and the Illinois River.

“In some places of the Mississippi watershed, species like Asian carp and round goby represent the largest amount of living matter,” said Pam Thiel, LaCrosse FWCO supervisor. Asian carp have been found in a few isolated areas of the Great Lakes, but not yet in abundance in Lake Michigan. In 2004, the U.S. Army Corps of Engineers built a permanent electric fish barrier in the Chicago Sanitary and Ship Canal to prevent Asian carp from spreading into the Great Lakes. The Chicago Sanitary and Ship Canal is the solitary water link between Lake Michigan and the Mississippi River watershed.

According to Greg Sass, Field Station Director and large river ecologist for the Illinois Natural History Survey, Asian carp have been caught less than 50 miles from Lake Michigan.

Each year, the Illinois Natural History Survey places nets around the dispersal area to see if Asian carp are advancing their range. “We know in our longer-term monitoring, we are continually collecting them farther south in the Illinois River. But, up until this summer, we haven't seen



USFWS

A round goby rests on a bed of another invasive species, zebra mussels.

any further expansion north,” Sass said. The Illinois Natural History Survey, record-keeper of Illinois' biological resources, is just one of the many partners dedicated to this annual invasive species initiative.

“I think the partnerships are critical. It's an opportunity for communication and helps form a network perspective. We are able to develop more questions, formulate needs, and find out what information we don't have. Our participation helps our research program by understanding what managers need as far as the science,” Sass said.

Fishery biologists with the U.S. Army Corps of Engineers, and Illinois Department of Natural Resources, annually electrofish the Dresden Island Pool on the Illinois River in Grundy County to monitor Asian carp movements. By implanting ultrasonic transmitters into the fish and releasing them, they can retrieve data on movement and behavior, and evaluate the effectiveness of the electrical barrier.

Randy Berry, wildlife biologist with the U.S. Army's Joliet Training Center, and Dave Wedan from LaCrosse FWCO work the downtown Joliet stretch of the sanitation canal that pours into the Des Plaines River. For 10 years, the U.S. Army and LaCrosse FWCO team have run traps and gill nets and shocked sections of the stream in the downtown area as part of the Carp Corral and Goby Roundup. “This past year we shocked up walleye, northern pike and other sport fish,” Berry said. “A few years ago it was nothing more than a bunch of carps! Now we are seeing a lot more diversity.”

Shedd Aquarium in Chicago sits at the gateway to the Great Lakes, between the Illinois Waterway and Lake Michigan. As part of its “Listen to Your Lakes” campaign which educates the public on pollution, lake levels, habitat loss and invasive

species, the Shedd Aquarium offers its media relations expertise to generate public interest in the Carp Corral and Goby Roundup. “We work here and play here. It's our own backyard, so it's important that we use our voice at Shedd to communicate ailments affecting the Great Lakes,” said Elizabeth Latenser, Shedd Aquarium communications director and Carp Corral volunteer.

“We work with many different agencies, representative of NGOs, academia and other fields,” said Thiel. “We all have different missions but with this project we are able to work together on a common problem.” The Carp Corral and Goby Roundup allows conservation partners to monitor and evaluate the impacts of invasive species like Asian carp and round goby on native fishery resources, commercial and recreational fishing, water quality, and ecosystem health, and take preventative measures to ensure the Great Lakes and Mississippi watershed ecosystems continue to sustain and support native fishery resources. ♦

Ashley Spratt is a public affairs specialist for the U.S. Fish and Wildlife Service in Minneapolis, MN.

Partners in the 2008 Carp Corral and Goby Roundup include the Forest Preserve District of Cook County Fisheries Program; U.S. Geological Survey – Upper Midwest Environmental Sciences Center; Hanson Material Service; Discovery World; Metropolitan Water Reclamation District of Greater Chicago; Brookside Associates; and the U.S. Coast Guard Marine Safety Office in Chicago.

S.H.A.R.E. Partnership in Downeast Maine

Restoring habitat for endangered sea-run Atlantic salmon

The name “Downeast” is derived from the prevailing winds of New England during the summer months, and the shipping trade that used them. The sailors coined the phrase “Headin’ Downeast,” and the name stuck to the geography east of the Penobscot River.

Downeast Maine harbors the last remaining populations of wild sea-run Atlantic salmon in the United States. In December 2000, eight Atlantic salmon river populations were listed as endangered under the Endangered Species Act. Five of the eight protected river populations occur Downeast — the Dennys, Machias, East Machias, Pleasant and Narraguagus. All are historic Atlantic salmon angling rivers, all have a long heritage with the “King of Sportfish,” and all are off limits for sea-run Atlantic salmon fishing. The Maine Department of Marine Resources ceased sea-run Atlantic salmon fishing throughout the state, with the exception of a 30-day catch-and-release season on the Penobscot River.

Fisheries scientists believe sea-run Atlantic salmon, along with 11 other fish species, once made spawning runs from the North Atlantic to their home rivers of New England by the hundreds of thousands. By the mid-twentieth century, however, spawning run numbers had dramatically declined due to commercial overfishing, pollution, and habitat loss particularly from logging. Dams hindered migration. The numbers of returning salmon have dwindled in all New England



E. Peter Steenstra/USFWS

A female Atlantic salmon set for spawning at Craig Brook National Fish Hatchery.

rivers for the past three centuries. Salmon in the five Downeast rivers declined but the fisheries persisted into the 1980’s and early 90’s, although far fewer numbers. Atlantic salmon fly fishing on the Downeast rivers is storied in annual fishing trips by baseball legend Ted Williams and “The Crooner” Bing Crosby. Perhaps the most notable event was the “Presidential Salmon” tradition, when each year the first salmon caught in Maine was presented to the President of the United States at the White House. The tradition began in 1912 with President Taft, and ended with President George Bush in 1992.

Extensive logging operations in Downeast Maine have produced a

network of dirt roads – three miles of road for every square mile of area – to move logs to the mills. These roads crisscross the five rivers and their tributaries over hundreds of culvert road crossings. Improperly placed road crossings produced severe erosion and sedimentation. Loose rocks important to fish for food and spawning became imbedded. Long-abandoned log drive dams slow water flow and sediments settling there bury spawning habitat. Perched culverts installed too high above stream level deny upstream fish passage, hindering migrations. Some culverts are too small to move high volumes of water with heavy rain, and present a barrier to migration because of high-velocity water jetting

out of the narrow culverts. The problem is confounded by a beaver population burgeoning with hardwood re-growth after logging. All these things create obstacles to migration for endangered Atlantic salmon as well as for countless other species.

To overcome these obstacles, in 1994, a coalition of private companies, organizations, individuals, and state and federal agencies established Project Salmon Habitat and River Enhancement (S.H.A.R.E.) “to conserve and enhance Atlantic salmon habitat and populations in Downeast Maine.” In its 14 years of existence, S.H.A.R.E. has become a prime partner in U.S. Fish and Wildlife Service Atlantic salmon population recovery efforts in Maine. Executive Director Steve Koenig works closely with Scott Craig of the U.S. Fish and Wildlife Service Maine Fishery Resources Office. Together they identify Atlantic salmon habitat problem sites and seek remedies. Just in the past three years Koenig and Craig and S.H.A.R.E. staff have surveyed 500 logging road crossings, conducted over a hundred fisheries assessments, and installed 36 new arched culverts that let fish pass upstream.

Arched culverts are excellent for migratory fish passage. They are adequately engineered to pass heavy rain and snowmelt. Culvert bottoms are completely open, installed at the natural stream grade, and filled with natural habitat, providing habitat connectivity throughout their length. In addition to a reopened passage for endangered Atlantic salmon, arched culverts allow turtles, crayfish, frogs, salamanders, and invertebrates easy passage up and downstream.

True to its partnership form, the USDA’s Natural Resources Conservation Service’s Wildlife Habitat Improvement Program, the U.S. Fish and Wildlife Service’s Fish Passage Program, and the Maine

Corporate Wetlands Restoration Partnership fund engineering of culvert replacements for S.H.A.R.E. Landowners contribute, too. The Maine Fishery Resources Office provides the fisheries expertise for all assessments, project planning, and construction area mitigation. Koenig’s expertise glues all the project parts, agencies, and landowners together.

The state of Maine and the Maine Fishery Resources Office assess newly restored areas as potential stocking sites for Atlantic salmon produced by Craig Brook and Green Lake National Fish Hatcheries. They monitor these newly reconnected habitats for natural colonization. S.H.A.R.E. and the Maine Fishery Resources Office removed four dilapidated log drive dams this year, restoring the ecological processes that had been absent for over 80 years.

S.H.A.R.E.’s 36 arched culverts are exemplary work in partnerships and have proven to be an unqualified success – with 25 miles of spawning and nursery habitat reopened and reclaimed by endangered Atlantic

salmon and countless other species in the Downeast waters. Indeed, the partnership has given new life for the survival of endangered Atlantic salmon populations of Downeast Maine.

For more information on S.H.A.R.E., see: www.salmonhabitat.org. ♦

E. Peter Steenstra is the Outdoor Recreation Planner at the Maine Fisheries Program Complex in East Orland, ME.



E. Peter Steenstra/USFWS

New culvert construction underway.



Joseph McKeely/USFWS

Fish habitat fills this arched culvert throughout its length, allowing Atlantic salmon, brook trout, turtles and aquatic bugs to pass under the road without hinderance.



Bern Brittain/Newfoundland and Labrador Department of Tourism

What's in a Name

By Howard Frank Mosher

Author Howard Frank Mosher is at home on Labrador's wild waters, where he had "a father's and a fisherman's epiphany" trout fishing with his son, Jake.

"Name children some names and see what you do." Maple – Robert Frost

It was the summer of 1969, and I had just made a monumentally foolish mistake. Imagining that there were shortcuts to learning how to write and publish fiction, I accepted a creative writing fellowship at the University of California at Irvine and lit out with my wife, from our home in Vermont, for the Pacific coast. Along the way, we fished. We fished in the Upper Peninsula of Hemingway's Michigan, in Norman Maclean's Montana, up in the mountains of Alberta. We fished in Washington and Oregon, and then we hit southern California, where there were no trout, just automobiles and palm trees.

One afternoon a week or so after we'd arrived, I stopped at the intersection of Hollywood and Vine, where a man in a gorilla suit was busily directing traffic. A guy in a phone company truck pulled up beside me. He must have noticed my green license plate because he rolled down his window and called out, in a deadly serious voice, "I'm from Vermont, too. Go home while you still can."

So, missing the mountains, the farms and the woods I'd begun to write about, and, not least of all, the fishing, that's exactly what we did. Three days later, we were back in northern Vermont. I had no writing degree, no job, no prospects. There were two small consolations. We'd gotten home just in time for the fall brown trout run, and the brook trout fishing in the

beaver bogs was just starting to pick up again.



"What have you done for work before?" Jake Blodgett asked me on the morning after my somewhat less than triumphant return to New England.

Standing on the falling-in door stoop of the tall, white-haired logger and former whiskey runner, feeling his pale-blue stare cut through me like a chain saw, I admitted that all I'd ever done was to teach school, but hearing that he needed a helper, I was hoping to get some "real-life" experience.

Jake thought about this proposition. Then he said, "Well, schoolteacher. How much would you want for pay?"

Now it was my turn to think. Finally, I said that I'd never worked in the woods before, and suggested that Jake try me out for a few days, then pay me what I was worth to him.

"That wouldn't be much," he said, and it wasn't. But for the rest of that fall and on into the winter, I worked with Jake, up in the mountains near the Canadian border, skidding the logs he cut out to a clearing with his ancient lumbering horse.

After work and on Sundays, we fished the brooks and rivers of the border country. When the lakes froze, we went ice fishing. Over lunch in the woods, and on our fishing expeditions, Jake told me stories of his wild, Prohibition-era days, running Canadian booze, making moonshine, outwitting game wardens. He was the best fisherman I'd ever known, with a sixth sense of where trout lay and how to entice them to strike, and a sixth sense, too, for telling a good story. During the course of that fall and winter, the Vermont woods became my graduate school, Jake Blodgett my literary mentor.

One day in a snowstorm he asked me if I'd ever write about his life. I told him yes.

Jake nodded. "Well, schoolteacher," he said, "then you better get on with it."



I love Labrador. I love its big, wild lakes, its unexplored whitewater rivers, its northern lights flaring up pink and silver and blue across the

entire night sky. Most of all, I love its brook trout. In 1992, my 20-year-old son, Jake, and I stood by a nameless Labrador river we'd walked over a nameless mountain to reach. I was upstream from Jake a hundred yards or so, and we were both catching brookies from three to five pounds, as fast as we could land them.

"What have you got on there?" I called out to Jake over the rapids. "A whale?"

"No, a two-pound brook trout," he called back.

"That's no brook trout. That fish you're fighting is huge."

"Oh, that," Jake said. "That's the twenty-pound lake trout that has my two-pound brook trout in its mouth and won't let go."

Thinking how much my son's logger-whiskeyrunner-fisherman namesake would have enjoyed being here to see this, I began to laugh. Jake, in the meantime, handed me his fly rod, walked into the river, wrapped his arms about that monstrous laker and picked it up out of the rushing water, with the brook trout still in its jaws.

At that moment, I had a father's, and a fisherman's, epiphany. I realized, standing in the last wilderness of eastern North America, one hundred miles from the nearest settlement, that like his namesake, my son was attuned and connected to big woods and wild rivers, and the wild animals and fish that lived in them, in a way I could only marvel at. That, too, would have delighted my old bootlegger friend, and so would Jake's reply when I asked him what he was going to do with his unusual two-for-one catch.

"Put them back where they belong and fish some more," Jake said,

and that of course, is just what we proceeded to do. ♦

Howard Frank Mosher is the author of 10 books, including *Disappearances* and *Where the Rivers Flow North*, which have been made into motion pictures. His Civil War-era novel, *Walking to Gatlinburg*, is due out in 2009. He still lives in Vermont.

"I'm from Vermont, too. Go home while you still can."

U.S. Fish & Wildlife Service
<http://www.fws.gov/eddies>

Winter 2008



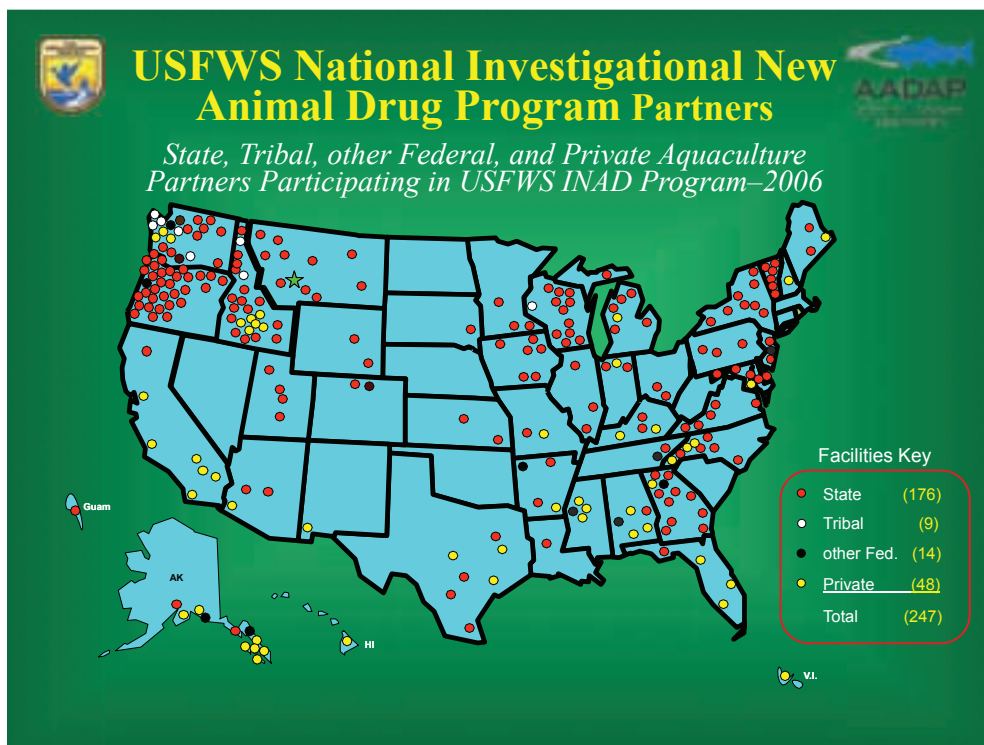
New Animal Drugs

Investigational New Animal Drug (INAD) exemptions allow for the legal use of specific unapproved drugs by fisheries managers. The U.S. Food and Drug Administration grants INAD exemptions only after determination that no potential use-related safety concerns exist. INADs are an essential tool used by fisheries biologists across the U.S. to help meet fishery management objectives.

The U.S. Fish and Wildlife Service's (USFWS) National INAD Program (NIP) allows other federal, state, tribal and private aquaculture facilities throughout the U.S. to use certain drugs under USFWS-held INAD exemptions. To date, over 500 aquaculture facilities have participated in the NIP. Typical annual participation includes nearly 250 facilities in over 40 states. Not only has the NIP provided numerous fisheries management programs needed access to a number of specific drugs, it has also generated a wealth of important drug efficacy and safety data necessary to support several new aquaculture drug approvals.

◆ Dave Erdahl

For more information visit: www.fws.gov/fisheries/aadap/home.htm.



Eddies

Reflections on Fisheries Conservation

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