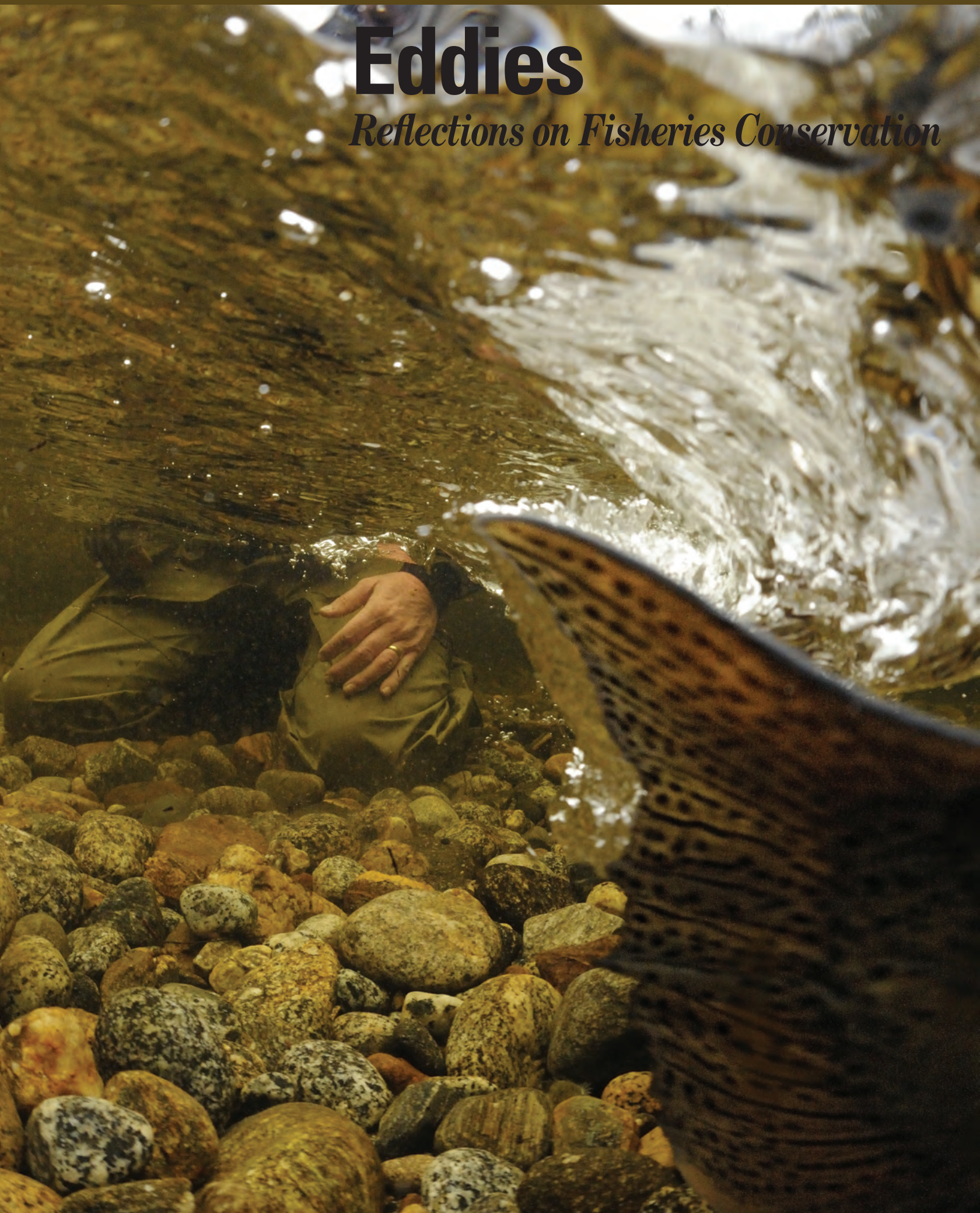
U.S. Fish and Wildlife Service

Summer 2012

Eddies

Reflections on Fisheries Conservation



Eddies

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On the Cover:
Biologists practice catch-and-release, too. Learn why on page 18.
Tim Pask / Images On The Wildside photo.

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Features

Mark Brouder/USFWS

Biologists from the Ashland Fish and Wildlife Conservation Office release a lake sturgeon. Learn about the work of fish biologists on page 12.

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.

CONSERVING AMERICA'S Fisheries
U.S. Fish & Wildlife Service

Headwaters

Until Next Time

By Bryan Arroyo

Hazel Arroyo

Richard Bach wrote, "A farewell is necessary before you can meet again. And meeting again, after moments or lifetimes, is certain for those who are friends." And as I write this, my last column as the Assistant Director for Fisheries and Habitat Conservation, I am excited to think about the next time we will see each other. While Assistant Director, I met many of you. We crossed paths at our great field facilities, at friends group meetings, and even on the water, fishing.

During my tenure, I visited the two oldest National Fish Hatcheries in the U.S. in Neosho, Missouri and Leadville, Colorado. Although their histories date to the 1880s, both facilities are beacons of promise for the future of aquatic species conservation in this country. I have every confidence in the expert hands of our field folks, the partners they work with, and their scientific and technological capabilities.

As we move into landscape level conservation it becomes more evident that our Fish and Wildlife Conservation Offices (FWCO) with their cadre of dedicated professionals are the "trouble-shooters" for fisheries conservation challenges. Our FWCOs house our conservation biologists at work, our on-the-ground practitioners who on a daily basis take on these conservation issues.

You'll read about some of the work done by our FWCO biologists in this issue of *Eddies*. Mark Brouder from the Ashland FWCO contributes an analogy about how his office and others like his are general practitioners, and fisheries are the patients. Brouder's shop is steeped in coaster brook trout and lake sturgeon conservation.

Frequent *Eddies* contributor, biologist Jeff Finley from the Columbia FWCO offers up two stories on some of the common tools used in conservation. You'll know the "how" and "why" once you read Finley's story.

Katie Steiger-Meister tells us about the FWCOs lake sturgeon restoration on the Menomonee Indian Reservation. The relationships between Native Americans and our Fisheries Program is crucial to conservation, and a proven model of cooperation, worthy of emulation elsewhere.

You may know from reading past "Headwaters" that I grew up in Puerto Rico and never need an excuse to fish my home waters. Our "American Fishes" installment on redeye bass is an exhortation to visit home and fish the waters of my youth, like Caonillas Lake. The story evokes an urge to pack my light spinning gear and hit the water. Perhaps I can share that story in a future issue of *Eddies*.

Biologist Dan Magneson closes out this issue with a colorful piece titled "The Sundowner's Club." Magneson touches upon the visceral of how people are connected to the natural world, through the experience of fishing at night. Night fishing, I think I can say, changed his perspective about his home waters. Differing perspectives are a commodity and Magneson is probably the better for it.

The Fisheries Program owns that commodity, too. That's one of the characteristics that make our aquatic resource conservation efforts so strong--diversity of thoughts and approaches we use in solving problems. I learned very early in my tenure that no two fisheries facilities were the same--nor should they be.

So I leave you with a request. I encourage you, if only in moral support, to join our professionals in their commitment to conserve America's fisheries. Only working together at a landscape level will the conservation challenges be solved for the long-term, particularly as we face a threat of climate change.

It has been an honor and privilege to serve as the Assistant Director for Fisheries and Habitat Conservation, and I close out a chapter in my journey. As the saying goes, "winds from the west, fish bite the best." May you all have westerly winds in all your endeavors. ✦

Bryan Arroyo is the Assistant Director for International Affairs in Washington, DC.

New "Mother Nature's Waterpark" ads draw families and friends to boating and fishing

RBFF

A new poster from the Recreational Boating & Fishing Foundation evokes a classic look designed to get people on the water.

Come outside and enjoy "Mother Nature's Waterpark." That's the message from the Recreational Boating & Fishing Foundation's (RBFF) new Take Me Fishing™ advertising campaign. Launched this spring, the ads target the likeliest next-generation and fastest-growing boating and fishing audiences. Reminiscent of classic tourism and theme park advertising, the ads are designed to inspire boating and fishing activities and to entice people to use the resources available on TakeMeFishing.org to help guide their day on the water.

RBFF is focused on growing participation in boating and fishing as well as generating awareness for the conservation projects they support. The new ads extend the campaign message to new audiences. Research conducted both before and during the new campaign's development highlighted two groups that could be potential new boaters and anglers:

Outdoor Enthusiasts—people who enjoy boating and fishing with crossover activities such as hiking and camping.

Family Outdoors —those who appreciate the outdoor activities as a family experience.

Visit TakeMeFishing.org to learn more about the campaign and Take Me Fishing's key digital assets such as its Boat Ramp App, Fishopedia or Places to Boat & Fish Map. ✦ Stephanie Vatalaro

Fisheries interns educate the next generation

Youth Fisheries Academy was born in 2010 from a straightforward idea by Washington Fish and Wildlife Office Fisheries technician Dan Spencer. Three summers later, the week-long camps have now connected 452 Washington State youth aged 7-18 each July to area streams, biology and ecology, and natural resource career pathways. Spencer runs the Academy with the help of summer interns. The interns, pursuing natural resources degrees themselves, conduct field work, educate and engage Academy participants in their work, use social media to document their experiences, and mentor what may be the next generation of conservation professionals. ✦ Sean Connolly

USFWS

The summer interns and students enjoyed a summer working in Washington state.

Veterinary medicine guides alligator snapping turtle conservation

Brian Fillmore/USFWS

An alligator snapping turtle sets a threatening pose with its mouth agape.

You can't tell the difference between juvenile male and female alligator snapping turtles. The only non-lethal method to determine gender is with the use of a surgical laparoscopic technique. Tishomingo National Fish Hatchery in southern Oklahoma is currently assisting Dr. Day Ligon from Missouri State University and Kay Backues, DVM, Director of Animal Health of the Tulsa Zoo, in generating an age-specific description of juvenile alligator snapping turtle gender-identifying parts. Twelve turtles from three age classes were examined using high-tech procedures performed by Dr. Backues. Images of each turtle were captured and sex determined by the presence or absence of egg follicles, which resemble bubble wrap. Physical exams help to determine the age at which turtles' genitalia begin to show differences. The new techniques will allow hatchery biologists to stock known sex ratios of alligator snapping turtles into the wild, furthering the conservation management of the species by stocking a proper sex ratio. ✦ Brian Fillmore

FEATURED FACILITY
Warm Springs Fish Health Center

Where: Warm Springs, Georgia

When: Established 1989

Then: Fish health biologists were stationed at Pisgah Forest National Fish Hatchery, North Carolina, and Greers Ferry National Fish Hatchery, Arkansas. The two labs serviced 10 southeast states and were consolidated at Warm Springs, Georgia, in 1989.

Now: Today, fish health biologists are part of the Warm Springs Regional Fisheries Center. The Fish Health Center (FHC) provides expertise in aquatic animal health, including diagnostics, monitoring, investigations, certifications, and training related to both wild and captive populations. The FHC participates in the National Wild Fish Health Survey and addresses emerging disease issues through applied research and innovative management. Triploid (sterile) grass carp certification inspections are provided to private fish farmers in the Southeast. Biologists have recently surveyed wild fish populations in Kentucky for Viral Hemorrhagic Septicemia, and for disease-causing pathogens on national wildlife refuges. Visit www.fws.gov/warmsprings/FishHealth. ✦ Norm Heil

USFWS

Biologist Brian Hickson conducts an assay to identify fish viruses.

Phantom Lake Springs Ciénega wetter and better

USFWS

This small wetland in Texas supports rare aquatic animals.

Two endangered fishes—the Comanche Springs pupfish and Pecos gambusia—and three rare invertebrates live in Phantom Lake Springs Ciénega, located in west Texas. These animals live in extreme conditions due to a spring flow decline since the 1940s, coupled with short-term failures of pumps that were installed in 2001. With funding through the U.S. Fish and Wildlife Service; Desert Fish Habitat Partnership; U.S. Bureau of Reclamation; and Texas Parks and Wildlife Department, a new ciénega (Spanish for "marsh") was created, the existing pool modified to slow leaking of water through a cave wall, and a new pumping system was installed. The lined pool created a larger, more reliable habitat that acts as a refuge, provides spawning and cover habitat, and maintains water levels for longer periods of time. This ciénega now has more habitats, increasing populations of the aquatic species that swim there. ✦ Kayla Barrett

Stay or go – coaster brook trout

Ashland Fish and Wildlife Conservation Office (FWCO) biologists and its partners continue to track the movement of stocked and wild-caught coaster brook trout into and out of several Lake Superior tributaries in Wisconsin and Michigan to better understand their migratory behavior and movement patterns. Biologists first inserted passive integrated transponders, or PIT tags, into the abdominal cavity of brook trout handled during annual surveys. The tag, when passed over a reader, will record the movement of the tag and the fish carrying. Such readers, powered by solar energy, were installed at the mouths of streams pouring into Lake Superior. The movements of coaster brook trout can be recorded 24 hours a day, 7 days per week, whenever they might swim past a reader. Each PIT tag has a unique code essentially giving individual fish a "name." The dates and times that fish pass over readers are recorded on a computer for retrieval at a later time. To date, the Ashland FWCO has tagged over 3,000 brook trout and has helped deploy six PIT tag stations across the Lake Superior basin. A station set at the mouth of Wisconsin's Washington Creek has recorded some telling numbers. Over 60 percent of coaster brook trout tagged near Isle Royal National Park are swimming up the creek in September and October to spawn. They then move back out to Lake Superior before November. In the end, the data will be immense and should reveal much about the daily and seasonal patterns of an important sport fish over a large area. ✦ Henry Quinlan

USFWS

Fish biologists insert a tag into the abdominal cavity of an anesthetized coaster brook trout measuring 19 inches.

Restoring American chestnut trees at Erwin National Fish Hatchery

John Robinette/USFWS

Once gone from the Appalachian Mountains, American chestnut trees are making a comback at a National Fish Hatchery.

Erwin National Fish Hatchery, Tennessee, in cooperation with Virginia Polytechnic Institute and State University, has planted 55 pure American chestnut trees on the hatchery's grounds over the last four years. An additional 10 trees per year will be planted in an effort to restore this species to the southern Appalachian Mountains. To date, 36 of the 55 trees have survived, and survival to maturity is expected to be about 15 percent. Billions of American chestnut trees were lost during the blight infestation from 1900 through 1940. Many cooperators have planted the seed provided by Virginia Tech, and in the future, the formerly abundant American chestnut may be a common sight in the Appalachian landscape. ✦ John Robinette

FROM THE ATTIC

Notes from D.C. Booth Historic National Fish Hatchery and Archives

In 141 years of U.S. Fish and Wildlife Service history, a great deal of art has been created to communicate conservation. Some of it has made its way into the Archives at D.C. Booth. Of special importance this year is the art of Bob Hines.

Hines was hired by the Service in 1948 as an artist, a somewhat unusual occupation for a conservation agency—almost as rare as a Museum Curator! Over his career he produced countless illustrations in various media. Some of his most striking images include the fishes used in the 1971 book *Sport Fishing USA* that celebrated the centennial of the Service. Twelve of the 22 paintings live in the collection at D.C. Booth. The locations of his other fish paintings are lost, locations unknown.

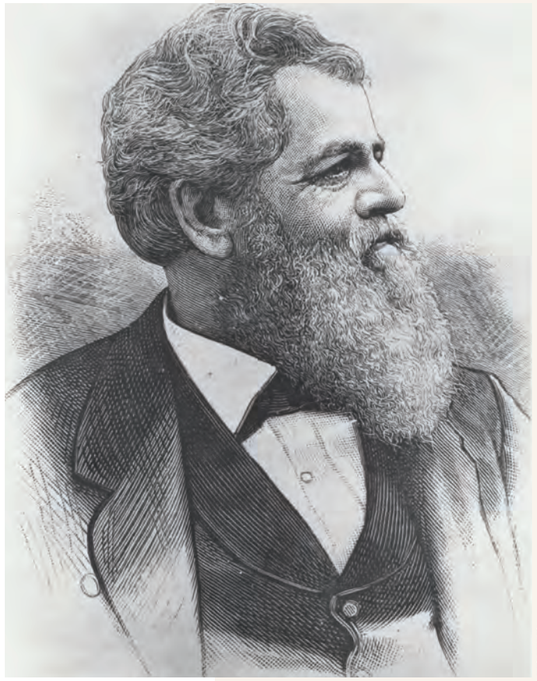
Hines kept fish in a large aquarium in his office for study, to aid in accuracy. This year, in honor of the 100th birthday of Hines, three of the fish along with two bird drawings and his famous bald eagle painting, *A Symbol of the Nation*, are on display in our museum. To learn more about Hines or the Archives, contact Randi Smith, Curator, randi_smith@fws.gov 605-642-7730, ext. 215.✦ Randi Sue Smith

Craig Springer/USFWS

This close-up of a Yellowstone cutthroat trout painting shows the detailed work of artist Bob Hines.

By Lee Allen

Seth Green



USFWS

Seth Green is considered the father of fish culture. Techniques he pioneered in the 19th Century are useful in fisheries conservation today.

Nearly two centuries ago, a young fisherman named Seth Green—fascinated by the sight of salmon preparing nests for spawning—climbed a tree overlooking the river and remained perched there for two days observing mating movements. He took note that as soon as females cast their spawn, others rushed in to feast on the roe. Observing that female fish hurried to cover the remaining eggs with gravel, he opined that it might be possible to hatch fish artificially and "thereupon he resolved that sometime in the future he would try it," according to a family scrapbook begun in 1874.

Taught the habits of fish by Seneca Indians, Green's initial scientific voyeurism near the Genesee Gorge in upstate New York prompted further fishy observations and experiments which years later brought him fame and fortune as the acknowledged "Father of Fish Culture."

"Early observations of wild spawning salmon led him to believe artificial propagation and rearing of trout species could be done by man," according to Carlos Martinez, director of the D.C. Booth Historic National Fish Hatchery & Archives, Spearfish, South Dakota. "After acquiring a hatchery site at Caledonia, New York, he began experiments which ultimately resulted in development of fundamental hatchery methods and mechanisms still in use today." For his perspicacity, Green is now enshrined in the Fish Culture Hall of Fame located at the Spearfish facility, as one of 50 persons who have made significant contributions to the advancement of fish culture. Travelers cruising Interstate 90 near South Dakota's Black Hills will discover additional accolades in the hall, a replica building of an 1899 ice house on the grounds of the historic hatchery.

Green's interest in all things fishy began at an early age absorbing what his indigenous playmates taught him—how to observe and respond to the sights, sounds, and meanings of outdoor nuance. He became an expert at fishing, inventing ingenious ways of catching fish by accounting for time of year, condition of wind and water, and spawning seasons. When his parents suffered a financial reverse in 1837, the then 20-year-old Seth realized he was now his own provider and since he was fond of fishing, he set out to catch a lot of them—salmon in scoop nets, fat catfish on night lines, sturgeon up to 150 pounds taken by hook or by spear.

According to archival data: "He kept busy skinning bullhead for the morning market and as adept as he had become, prepared two fish to the other fellow's one." Mindful of difficult financial times, Green fished commercially for salmon, selling it at five cents a pound—and saving every cent he earned. He took a bride and started a business—a fish market—by the time he turned 30, positive events that still allowed time to carry on his study of fish culture. And although people thought him "acting queerly and rather notional" because of his fish egg experiments, they were indulgent as his clam chowder was the tastiest in town.

By the time he was 40, the fish market business was booming with one hundred workers in his employ, catching and selling a daily haul between one-half and three tons. Green frequently joined catch efforts and became known as one of the greatest fishermen in New York.

The concept of fish culture still lacked a true definition in the summer of 1864, when Green bought the rights to use a stretch of fishing grounds to raise fish in the cool waters of Caledonia Creek to both restock public waters and raise trout for market at one dollar a pound. Near the water's edge, he built housing and out-buildings for his hatching apparatus as well as wooden tanks with natural-flowing waters.

The art of artificial fertilization is, at least conceptually, simple: strip the female of eggs, allow eggs to fall into a pan where they are covered by the male's milt, and immediately placed on hatching beds under a constant stream of water. It's simple—but ineffective, since only one quarter of eggs hatch. Through trial and error, Green finally dispensed with water to mix spawn and milt and his first attempt at dry spawning hatched over 95 percent of the eggs—a fact that he kept secret for four years while he sold spawn and made money.

But "It was neither money nor fame that he sought," reports a historical publication. "He was genuinely interested in restocking depopulated lakes, streams, and rivers so that the mass of people could buy nutritious fish at low prices."

As a successful fish culturist, Green developed a method of transporting fish eggs overland. He turned his attention to raising new species, and published *Trout Culture*, *Fish Hatching and Fish Catching*, and *Home Fishing in Home Waters*.

The internationally-acclaimed authority died following an accident suffered while on his way to view a new kind of fish—true to form for the man whose vision led to use of captive propagation as an essential conservation tool that exists today. ✦

Redeye Bass

By Craig Springer

Ideas have consequences and words matter. The difference in using the correct or almost correct word, to paraphrase Twain, is like using lightning or lightning bug. Common names for common fish confound their identities. That's particularly so with fishes that occupy considerable landscape. It might best be illustrated by a fish that's as southern as Faulkner and NASCAR: the redeye bass.

Here's the problem. The redeye bass shares its common name, not to mention habitat, with the rock bass, commonly called a "redeye" in parts of the mid-South. To confound matters, the redeye bass, the one that's the subject of this column, has other common names based on a geography of experiences – that is, where it's known to live and where it's caught. Over the landscape it's referred to as a "shoal bass" because of where it likes to keep house. Trouble is there is another distinct species of black bass by that very name in drainages next door in Florida and Georgia, and that fish has a red eye. In Georgia, the redeye bass has also been labeled as a "Chattahoochee River smallmouth," and certainly not for word-economy. In Alabama, the redeye bass is called the "Coosa bass" for its commonness in the Coosa River. As convention has it, science settled on that name too: *Micropterus coosae*.

The redeye is native to the Mobile River basin in South Carolina, North Carolina, Georgia, Tennessee, and Alabama. You will also find it in the upper Savannah River headwaters and the Apalachicola River in Georgia and Alabama. It also lives in Oconee River of Georgia and Saluda River of South Carolina, but may not be native there. In Alabama, it swims the Black Warrior, Cahaba, Coosa, and Tallapoosa rivers above the Fall Line. Some scientists think that a Kentucky population in Martin Fork of the upper Cumberland River may be there naturally. Redeye bass have been stocked elsewhere, well beyond their native range in Missouri, Texas, Nevada, Arkansas, and California. You can catch redeye bass in the Rio Jayuya, Rio Maricao, and Caonillas Lake in Puerto Rico.

Like the brook trout, the redeye bass has affections for bugs and takes up residence in the small, fast waters of upland streams. The redeye even shares a torpedo-like body shape with the brook trout for life in the fast lane. It's a pretty fish colored pale blue like humid southern skies, green like an apple, and purple like shaded water. The fins are brick-red in young fish and flushed with orange-red in older fish. You could mistake a redeye for a smallmouth bass, but the tongue teeth and pearly white-tipped tail fin lobes are a give-away.

Redeye bass are among the most demanding of the black basses in what they need to make a living. They live in waters too warm for trout and too cool for the other black basses. Clear fast-flowing mountain streams with rocky runs and deep pools are favored waters. The U.S. Fish and Wildlife Service's Fisheries Program works with the National Fish and Wildlife Foundation and its Native Black Bass Initiative, state natural resources agencies, and the Southeast Aquatic Resources Partnership to learn more about the redeye bass's life history and to conserve its habitats. The fish thrives in the smallest of streams in the southern Appalachian Mountains with a bottom of rocky rubble. Seldom do they occur in natural lakes or impoundments. Their absence in flat water points to their need for streams. Reservoir populations of redeye bass hybridize with spotted bass, and don't compete well with smallmouth bass or largemouth bass. Agriculture contributes sediment to rocky streams. Logging takes away shade that keeps their streams cool. Urbanization contributes to poorer water quality. Low-head dams on streams not only block their movements, but also destroys vital stream habitat.

Populations in the small headwater streams move to deeper waters downstream about October, but come March they move back into the headwaters. Redeye bass are frequently found in close association with the shadow bass and rock bass. When found in the same streams as smallmouth bass, the redeye tends to occupy the upper stream reaches, while the smallmouth the lower.

Redeye bass eat food from the top and bottom of streams. Terrestrial insects taken on the surface, like grasshoppers and moths, comprise much of their diet. Aquatic larval insects, crayfish, salamanders, and fish are also on their menu. The growth rate of redeye bass is slow compared to other black basses. They grow quickly in their first year then taper off to about one inch per year. Their maximum length is about 10 inches. A fish older than ten years of age would be rare.

As water temperature approaches 65 degrees in early May to late June, adult redeye bass turn their attention to procreation. In typical sunfish fashion, they build a nest in coarse gravel in the upstream portions of pools in the small creeks where they reside all summer. Males guard the young for about seven days after hatching when schools of young have dispersed from the nest. A five-inch female may lay about 2,300 eggs, only a few of which may reach adulthood.

Jeff Durniak/Georgia Department of Natural Resources

This handsome redeye bass was angled from a remote area along the Chattooga River in Georgia.

Until the late 1990s, science recognized the "Alabama form," and the "Apalachicola form" of redeye bass. Detailed study revealed that these two forms were in fact distinct species. The Apalachicola fish is now the distinct shoal bass of Florida and Georgia which can grow significantly larger than the redeye bass. The redeye bass is also of recent scientific vintage, given distinct species status in 1940. That's fairly late when you consider that the smallmouth bass was described in the first decade of the 19th Century. But then again, science is never done and ideas do have consequences. ✦

The real redeye bass is on Craig Springer's bucket list.

By Mark Brouder

Practicing Medicine

Fisheries conservation is a lot like seeing the good doctor

Mark Brouder/USFWS

Biologist Henry Quinlan from the Ashland Fish and Wildlife Conservation Office, aboard the research vessel R/V Chub, *is about to release a lake trout, an iconic keystone predator of the Great Lakes. The species has been restored in Lake Superior. Today, lake trout conservation is focused on research to better understand the fish's role in the complex food web of the Great Lakes.*

Like general practitioners of the medical profession, the Fish and Wildlife Service's 65 Fish and Wildlife Conservation Offices (FWCOs) are responsible for diagnosing and treating a variety of fishery and aquatic resource issues. When faced with a problem, FWCOs begin by examining the current condition of a given fishery, perform a suite of tests using specialized equipment and instruments, and carefully examine the results of those tests. Results direct prescribed remedies and treatments, even surgery—literally and figuratively—with scheduled follow-ups to make sure the treatments are working.

This is a somewhat simplistic view of what FWCOs do on a daily basis, but rest assured, the job of an FWCO fish biologist is not as simple and straightforward as it seems in this analogy.

The issues that fisheries and aquatic resources face are quite complex. The U.S. population continues to grow as does the demand for clean water. Threats of new aquatic species invasions and their impacts on tribal, sport, and commercial fisheries, along with local economies are ever changing—and that change is a constant. Additional conservation actions are needed to recover existing threatened and endangered species, as well as preventing future listings. Past, current, and proposed future land use practices continue to jeopardize long-term sustainability of aquatic species that rely on healthy, intact, unaltered habitats in order to survive. And if that weren't enough, all of this is taking place in a time when the earth's climate is changing. Uncertainty exists as to what this might mean for the roughly 400 aquatic species—fish, mussels, and plants—that require attention from the 300 FWCO biologists working across 32 states. Fortunately, the diversity of expertise found within the FWCOs matches that of the aquatic species they strive to conserve, protect, and enhance.

No amount of expertise within the FWCOs, or any one organization, can result in successful conservation of aquatic resources on its own. Establishing and nurturing partnerships with federal, tribal, state, and non-governmental organizations are critical, and that's where FWCOs come in. They are problem-solvers; FWCOs facilitate, coordinate, and lead a number of endangered species recovery teams, task forces, technical committees, and working groups, often times with little or no jurisdictional authority over the very species or resource they are working collaboratively to benefit. It is within these partnerships that the biological planning and conservation design expertise within FWCOs can be witnessed. FWCOs work with others to set goals and identify limitations and prioritize conservation actions, all of which culminates in the drafting of an action plan. And when it comes to delivering conservation in the water, the expertise of the FWCOs really stands out.

Whether its Apache trout and Gila topminnow recovery in the Southwest, lake trout and lake sturgeon rehabilitation in the Great Lakes, or Atlantic salmon and striped bass conservation in the Northeast, FWCOs deliver fisheries conservation on a daily basis.

Our biogists prescribe sizes, strains, and numbers of fishes to be stocked from the National Fish Hatchery System, and evaluate the fishes' performance in the wild as it pertains to meeting the goals in management plans. FWCOs examine such things as age, growth, condition, diet, recruitment, and survival of fishes to better understand the ecology of a given species.

We investigate movement patterns, predator-prey interactions, habitat use preferences and overlap with other species. Armed with this information, FWCO biologists analyze the results of their findings, evaluate progress toward goals, and where necessary, adjust their conservation strategies as they press forward on their quest toward realizing the ultimate goal—long-term, self-sustaining fish populations.

In the field, our workers also serve as the front line defense against the threat or discovery of new aquatic invasive species that threaten important fisheries or hinder current fish conservation measures currently underway.

Our professionals conduct risk assessments on aquatic invasive species likely to invade a given location, develop and implement early detection protocols, work with others to develop rapid-response plans in the event a new aquatic invasive species is detected, and assist with staving the spread of newly detected invasive species.

Self-sustaining populations of fish and other aquatic species are often times limited by a lack of intact, healthy aquatic habitat. Where this is the case, FWCOs turn to their aquatic habitat restoration expertise. With the Fish Passage Program in hand, impediments such as perched culverts, low-head dams, and large hydro-electric or flood control dams are either replaced, removed, or by-passed so that fish and other aquatic organisms can once again occupy historic spawning, nursery, and rearing habitats. Working with the many Fish Habitat Partnerships, FWCOs restore instream habitat that provides cover and refugia for fish, riparian habitat that provides shade and cover that helps regulate stream temperatures, and upland habitat that slows the overland flow of runoff and excessive nutrients into streams to enhance water quality and quantity.

A side benefit to all of this, biologists at the FWCOs typically publish their findings in rigorous scientific journals, sharing knowledge gained in their professional circles. You may have read about some of the published science reported in "Watermarks" of past *Eddies*.

By no means is this a comprehensive account of the many roles that FWCOs play in fish and aquatic species conservation. However, you can be assured that behind the scenes and across the nation's diverse aquatic landscapes, the FWCOs and their biologists, like a good general practitioner, are working tirelessly to prevent illness, diagnose problems, prescribe treatments, and provide follow-up care for the many fish and aquatic resources entrusted to us by the American people. ✦

Mark Brouder supervises the Ashland Fish and Wildlife Conservation Office in Wisconsin. You can learn more about the FWCOs near you at www.fws.gov/fisheries.

By Sean Connolly

Fish People – Jeff Jolley, Ph.D.

Matt Hennen

Jeff Jolly, Ph.D. angled this white sturgeon in the Columbia River Gorge near a rock outcrop called Cape Horn. These are the same waters he routinely examines for Pacific lamprey.

Jeff Jolley's colleagues sometimes tease him about studying "worms instead of real fish." But these days, Pacific lamprey research is no laughing matter. The species is in decline, and scientists, like Jolley, are studying the movement and life history of a fish that's considered vitally important, both ecologically to Northwest rivers and their salmon runs, and culturally to West Coast Native American tribes.

Fish biologist Jolley leads a team studying Pacific lamprey and native mussels. He's stationed at the U.S. Fish and Wildlife Service's Columbia River Fisheries Program Office in Vancouver, Washington. The Midwest native, who holds degrees in Zoology and Fisheries from North Dakota State University, Auburn University, and South Dakota State University, is now ensconced in the Northwest. The Columbia and White Salmon rivers are his laboratory, and this past summer Jolley was out almost daily surveying deepwater habitats for lamprey larvae.

"Working with Pacific lamprey is fascinating," says Jolley, "First and foremost, they are primitive and predate dinosaurs, having evolved very little in that time. This in itself is pretty amazing. And compared to most other fish, we know very little about it. We are constantly learning new things about the fish."

Jolley's field work conserving native Pacific lamprey is a bit of a departure from his work in Michigan, where he served on a U.S. Fish and Wildlife Service Sea Lamprey Control Team. The sea lamprey is an unwelcome invasive species (see *Eddies* Winter, 2010). Studying a little-known species is also a welcome change to studying yellow perch, bluegill, and catfishes, "very well-studied critters," Jolley says. Prior to moving to the Northwest, he worked for the North Carolina State Cooperative Fish and Wildlife Research Unit, researching striped bass and American shad. At the Alabama Cooperative Fish and Wildlife Research Unit, he was involved in fish management in regulated rivers.

Jolley's well-traveled career reflects his interest in learning and the mentors who instilled a passion for fusing science and exploration. His undergraduate zoology professor Dr. James Grier at North Dakota State University had a profound influence. "One day, Dr. Grier gave us a lecture about the bald eagle research that he was involved in. He climbed trees in northern Minnesota to get to the nests and record information. It dawned on me at that point that I could actually make a living doing this stuff! I was hooked and declared my major the next day."

An avid angler, hunter, and explorer, in his free time Jolley also draws inspiration from people who use science to make a difference, even when it's unpopular. Carl Safina is one of his role models. "His work on issues relating to the moral and ethical dimensions concerning humankind's relationship with the natural world and his adherence to scientific fact to guide these discussions is impressive," says Jolley. "I admire the people who understand the value of science and that it makes us a more open society." ✦

By Craig Springer

Fish People – John Gill

What's in a name? That which we call the man; by any other name would probably be half as cool.

His name is John Gill. He's a fish biologist in the Maryland Fishery Resources Office (FRO), in Annapolis. Was it cosmic determinism or happy chance that Gill would come to earn a living concerned with fisheries conservation?

The gill is an essential anatomical part of a fish, needed for respiration. St. John is the patron saint of fishermen. Angling's great apostle and author of *The Compleat Angler*, Izaak Walton, is buried in the floor of St. John's Chapel in England. John Gill says in an affable fashion that he hasn't read the book yet, and that his family isn't particularly big on saints, instead tend to worship steamed crabs. Gill is in fact named after his Uncle Johnny, killed by a German sniper in WWII two days after the war had ended.

A Maryland native, Gill earned a B.S. degree in Biology at St. Mary's College of Maryland in 1979; a M.S. in Wildlife Biology at Tennessee Tech soon followed. He started his career with the U.S. Fish and Wildlife Service in 1985. In the span of the last quarter-century, Gill has spent a great deal of time in, on, or near his beloved Chesapeake Bay.

Early on, Gill worked as a wetlands ecologist restoring important waterfowl and fish nursery habitats at Black Water National Wildlife Refuge. In his present gig, Gill works with seven other professionals on things fishy, such as American shad reintroduction studies, horseshoe crab assessments, freshwater mussel ecology, oyster reef habitat restoration, and up until recently, a long-term Atlantic sturgeon tagging study.

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Biogist John Gill pilots a boat through an estuary on Blackwater National Wildlife Refuge in Maryland.

Now, striped bass get a great deal of attention. The Maryland FRO was created in 1985 to do tagging studies on striped bass when that fish had sunk to a low. Striped bass tagging studies revealed that the Chesapeake Bay is a very significant habitat for much of the striped bass along the Atlantic Coast. "The tagging told us that bay is THE spawning area for the fishery from Maine to North Carolina," said Gill. The work that Gill and colleagues perform has consequences across a large landscape. The state natural resources agencies and Gill's shop work through the Atlantic States Marine Fisheries Commission to use the data for fishing regulations. "Folks in New England care about what happens in Maryland," Gill added.

When not handling fish for work, you can find him fishing, hunting, or farming a small plot of ground near the tidewater with his wife of 30 years, Chris, who runs a youth rowing team. Gill likes where he lives: "In the spring, I can smell the striped bass spawn – smells like fishy paint. Cows roll on the water and males surround them, you seen the sheen and you get that scent."

Gill sums his outlook on conservation to this intimate relationship: "My whole view on natural resources is that to *know* the resource, you have to *eat* the resource," citing his affinity for catfish, squirrel cobbler and roasted duck. The man with the fishiest of names is attached to that with which he works. ✦

By Craig Springer

Sonar Reveals Fish Behavior at an Electric Barrier

Technology proves useful in Chicago Sanitary and Shipping Canal study

USFWS

Fish biologist, Brad Rogers, carefully watches fish swim through a sonar field well below the water's surface.

Whether you're an angler or a fish biologist, to be successful at what you do you need to know how fish behave. When it comes to protecting the Great Lakes from three invasive carps—bighead, silver, and black carp—collectively called Asian carp, the stakes are high. Knowing how these fishes behave in the face of electrical barriers intended to repel them is an essential element in preventing their spread northward.

Biologists with the Carterville Fish and Wildlife Conservation Office (FWCO) based in the southern Illinois town of the same name were tasked with helping solve this problem: how might Asian carp behave trying to swim into water charged with electricity?

Electrical barriers have been set up on the Chicago Sanitary and Shipping Canal—a potential straight-line passage for fish from the Mississippi River basin to the Great Lakes—and it is essential that the barriers work. To test them, Brad Rogers and colleagues with the Carterville FWCO employed high-tech tools to get some answers.

Rogers and crew used sonar to observe and record the behaviors of wild fish and caged gizzard shad experimentally exposed to electrical fields. The shad were a surrogate for Asian carp, since the two species have similar body conformities at a young age. A fish's body shape affects its response to electricity in water. The experiments were a ground-truthing of sorts. As with any technology, it has its plusses and minuses: the sonar produced real-time pictures of how fish behaved as they were intentionally passed through electrical fields in the Chicago Sanitary and Shipping Canal, as if peering deep into not-so-clear water several feet below. The sonar technology is so refined that it allowed Rogers to determine the length of wild fishes observed, but not so refined so as to determine the species. The sonar can only peer into a small portion of water, and not an entire cross section of a water body.

Fish responses to electricity have been studied in labs, but what happens in the real world facing real-world problems matters most. The FWCO biologists by the very nature of their work, are problem-solvers, and toward that end, Rogers and his co-workers learned a great deal from an immense collection of data from time spent on the water.

After three weeks of testing the study methods and field equipment, the Carterville FWCO biologists conducted 133 separate caged-fish trials. They made observations of wild fish at 240 sites in and around the electrical barriers, amounting to 40 hours of in-water sonar observations.

The massive amount of data and video will take some time to completely analyze. Moreover, the research continues. Rogers and team are employing a video camera with caged fish to better document fish behavior in the face of electrical barriers. In the end, the Carterville FWCO will have a large amount of fish behavior data and observations made in real time for use in managing and protecting important fisheries. Furthermore, their experience with leading-edge technology will be useful to others conducting similar research in the future.

To learn more, visit www.asiancarp.us ✦

By Jeff Finley

Net Returns and Other Ways of Catching Fish

USFWS

These men employed by the U.S. Fish Commission at Craigbrook National Fish Hatchery in Maine circa 1890, are retrieving a gill net. The same very effective technology is still used today.

Driven by survival, prosperity, or prestige, man has found ways to harvest more and bigger fish, and journey farther to catch them. A tipping point between sustainable harvest and the total demise of fish populations gave rise to fisheries management. As knowledge of fish behavior has increased, so has our ability to capture them. Biologists are pretty savvy about coming up with "new and improved" ways of catching fish. Early biologists were fin-clipping fish out of wooden rowboats using cotton gill nets to catch fish. We now use sophisticated electronics, durable powerboats, and synthetic materials to do the same thing, only better. Here's a look at some of the gear we use.

First, the gear we use to catch fish can be divided broadly into two categories, active and passive gears. With active gear, you go after fish. Pulling a seine, operating an electrofishing boat, towing a trawl, and even angling are active gears. Active gears give the advantage of surveying over a large area at specified durations, that can be repeated over time, thus accurately show trends in fish numbers over time. If active sampling is not carefully deployed, we can miss the daily, seasonal, or environmental cues that prompt migrations. Consequently, it is critically important to know how and when to set the gear. Active gears sometimes allow us to mimic the impact of recreational and commercial harvesters which, in combination with other techniques, can provide us with valuable information about harvest rates and help set regulations and stocking rates from our National Fish Hatchery System.

With active gear, you can drag it or tow it; surround or encircle fish; shock fish; or hook or snag fish. All imply some sort of movement. Trawls or dredges are the most recognizable of the dragged or towed gears. A trawl is a conical shaped net which is held open by water pressure as it is hauled through the water. Fish fill the "cod" or bag sewn into the net. Biologists trawl at the surface, at mid-water, or on the bottom of the water, and sometimes behind a stern or off the bow. The latter, a "push trawl," works well in shallow and fast currents or over soft bottoms where one could not stand.

Dredges, pulled over a lake or river bottom, scrape the surface for bottom-dwelling animals. They have a downside: they create much disturbance and indiscriminately collect rocks, soil, and debris along with the intended catch—usually mussels.

Surrounding or encircling nets, commonly called seines, come in a variety of sizes and shapes. They all

Jeff Finley/USFWS

A push trawler on the Missouri River is mose useful in catching fish in shallow, swift waters in big rivers. The biologists are measuring and releasing a recent catch.

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A biologist from the Carterville Fish and Wildlife Conservation Office tosses a cast net off the bow of a boat. Cast nets have been used for centuries.

operate on one premise—to corral fish. Two people operate a small beach seine, dragging the net through the water toward land where the catch is sorted. Larger seines, like purse or lampara seines are deployed and retrieved by one or multiple boats in big water and capture tons of fish. A purse seine has a purse line at the bottom which when pulled taut creates a bag to entrap the fish.

The most common active gear used to catch fish is electrofishing. Electricity passed between two nodes creates a field that fish involuntarily swim toward and then are temporarily stunned, and easily netted. Electrofishing is done off boats in larger bodies of water. Backpack electrofishing units are used in streams. The technology has improved greatly, allowing fisheries workers to efficiently catch fish while reducing harm to the fish. Biologists can tweak settings for specificity based on water quality or the type of fish sought.

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Electricity passed through water from the bow of a boat temporarily stuns fish for easy capture.

Aimee Roberson/USFWS

Biologists from the New Mexico Fish and Wildlife Conservation Office pull a seine through a slough looking to catch endangered Rio Grande silvery minnow.

Paul A. Lang/USFWS

Frank Parauka from the Panama City Fish and Wildlife Conservation Office feeds a gill net into Blackwater River near Milton, Florida, as part of a gulf sturgeon research project.

Now, let's take a look at passive gear, those devices that are set for a period of time waiting for fish to encounter them, such as traps, gill nets, and baited lines. Passive gears are perhaps the most ancient of methods. Woven nets and traps have been used for centuries.

Gill nets and trammel nets entangle fish as they swim through the water. Both have a buoyant float line and sinking line to keep the net vertical. Fish are snagged and entrapped as they swim into the mesh, tangled either by their teeth, spines, fins or by their gills. Both gill nets and trammel nets operate the same, except that trammel nets have a smaller meshed net sandwiched between two outer layers of larger mesh net. Fish swim through the larger outer mesh and try to push through the smaller mesh only to be encapsulated. With either gill nets or trammel nets the mesh size determines what size of fish will be retained. Larger meshes capture larger fish.

Entrapment gears are the most diverse of passive gears ranging from weirs built to divert fish into a trap, various rigid traps, to framed hoop nets and fyke nets. These are archaic tools that have changed little over time except that nylon has replaced cotton, and fiberglass has replaced wood. All of the entrapment gears guide swimming fish into a trap.

Passive angling gear called "trot lines" are baited hooks on drop lines or "ganions" attached at intervals along the line, strung out into a river or off a lake shore. These lines can be set floating, suspended in mid water or weighted on the bottom. If deployed in the right place, at the right time with the right bait, it can be very effective. But it is selective, favoring larger fish.

Much of what we do as fish biologists hasn't changed over time. "If it ain't broke, don't fix it," is the maxim. The horizon holds much, much more and we haven't even addressed acoustic sonar and advanced underwater cameras. Survival, prosperity, and prestige still drive people to harvest more and bigger fish, and journey farther to catch them. ✦

When not netting and tattooing fish in the Missouri River, Jeff Finley spends time with his wife and children. Captain Finley served in the U.S. Army in Iraq in 2009 – 2010.

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Fish Biologist Jennifer Johnson hangs onto a huge blue catfish pulled from a hoop net fished in the Missouri River.

Donna Allard/USFWS

Brook Silver, a fish biologist with the Columbia River Fishery Program, looks over two fyke nets arranged to capture coastal cutthroat trout and other fishes coming and going in Redd Creek, on the Bandon Marsh National Wildlife Refuge in Oregon.

Tattoos and Body Piercings

Marking fish is essential to fisheries conservation

By Jeff Finley

The fish that biologists catch in field studies are usually marked or tagged and then released to be caught again. At least that is the hope. When a tagged fish is re-caught, it's then that the fish yields the most useful data. Researchers can learn about the ages and growth rates in fishes. Knowing where and how far a fish ranges throughout the year can lead to refined habitat management decisions. Knowing the population density of a fishery in relation to the habitat and forage base reveals much about the well-being of a fishery. To do any of these things, fish have to be caught and marked in some manner. A multitude of fish-marking techniques exist, some of them spawned from cutting-edge technology, while others are quite simple.

Jeff Finley/USFWS

A small syringe is used to insert a tiny tag in fish slightly below the skin.

Fin-clips. Sharp scissors and a steady hand can leave a lasting mark on a fish. Fins regenerate, but leave a visible scar.

Tattoos. A liquid latex dye injected under the skin of a fish creates a lasting mark. These are typically used in hatcheries to mark batches of fish, but are time consuming and can fade with time.

Chemical markers. Oxytetracycline (OTC), added to the water of young fish in a tank or incorporated into fish food is absorbed into bony parts, like fin rays, scales, or ear bones called otoliths. The otolith shows growth much like a tree ring, and the point in time where OTC is applied leaves a circular stain that fluoresces under black light, marking the event. Reading ear bones, though, requires sacrificing the fish.

Coded internal tags. A tiny stainless steel wire injected under the skin of a fish carries a numeric code detectable by an electronic reader. The code gives the fish a unique identity. This is frequently used in hatchery fish. Passive Integrated Transponders, PIT tags for short, are microchips encapsulated in a tiny pill-shaped tube. Your pet cat or dog may have one. PIT tag readers can be hand-held or remotely stationed to record fish as they swim past a given location.

Freeze branding. Liquid nitrogen creates a freeze scar on a fish's skin usually detectable for life. The placement of the brand can be used to determine specifics of when or where the fish was marked.

Tags. They might remind you of the price tag attached to shirt. T-bar tags, Floy tags, dangler tags, and jaw tags are among the most common. These attach to the fish by anchoring them to the fish's body.

Telemetry. You can't collar a fish, but you can surgically implant a radio transmitter into one. Radio telemetry allows scientists to follow fish for long periods of time. New developments in telemetry employ GPS tracking while logging water temperature and depth, and periods of inactivity. These tags are expensive, and require highly technical equipment.

DNA. When a fish passes through a field biologist's hands, biological data is being recorded. Sometimes that includes DNA. Scientists derive information about disease, parentage, and hybridization from DNA.

Like the variety of fishes themselves, there is much variety in tags and marking methods. Some are injected, crimped, riveted, or branded. No matter the method, tagging fish is essential to fisheries studies and sound management decisions. ✦

By Ashley Spratt and Katie Steiger-Meister

The Return of Namé

The King of Fish of the Red River Basin

Jerald Roberts/White Earth Natural Resources Department

Scott Yess from the La Crosse Fish and Wildlife Conservation Office in Wisconsin happily returns a spawned lake sturgeon to the Rainy River.

Thousands of years ago the Red River Basin in northwest Minnesota, like many tributaries of the Upper Mississippi River and Great Lakes region, teemed with what the Native Americans called "namé" or "king of fish." Known to most as lake sturgeon, this primitive freshwater fish can grow to nine feet and weigh up to 300 pounds.

The fish was common, too. "Early accounts from Native Americans speak of the fish being so plentiful that it appeared to them you could walk across the river on the backs of the fish," said Tom McCauley, archeologist for the White Earth Band of Ojibwe in northwest Minnesota.

The lake sturgeon was threatened with extinction across its range in the mid-1900s due to commercial over-fishing, pollution, and the building of dams. Fishery biologists with the U.S. Fish and Wildlife Service (Service), state natural resource agencies, and tribal partners have spent the last decade working together on stocking fish back into native waters, and building fish passage projects to bring the "king of fish" back to its historic range in the Red River Basin.

Tom Groshens, fishery biologist with the Minnesota Department of Natural Resources (DNR), explains that while overfishing and pollution were key instigators in the decline of the lake sturgeon, the building of dams catalyzed the near extinction of the species by the mid to late 1900s.

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A tagged lake sturgeon is examined by a volunteer on the Menominee River, Wisconsin.

"Lake sturgeon had a broad native range through the Red River Basin, Upper Mississippi River Basin, Great Lakes and extended into Canada. But the building of dams cut off their access to spawning habitats," he said. "That's when we saw the need to restore their populations. We were worried about their ability to survive."

In 1997, the states of Minnesota, North Dakota, and South Dakota took action alongside their federal and tribal conservation partners to rehabilitate the lake sturgeon

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The U.S. Fish and Wildlife Service stocks lake sturgeon into Round Lake on the White Earth Reservation, Minnesota, and expects the sturgeon to move into Many Point Lake.

in the Red River Basin. Short-term recovery efforts aim to augment lake sturgeon populations through stocking and removal of dams to allow for fish passage, but maintaining lake sturgeon populations that are able to reproduce on their own and sustain their population is the ultimate goal.

"Our main focus is on restoring populations that were depleted," said Scott Yess, Service fish biologist in LaCrosse, Wisconsin. Yess and staff from the LaCrosse Fish and Wildlife Conservation Office work on lake sturgeon in the Red River Basin in Minnesota, as well as, the Menominee Reservation in Wisconsin. The Service, state natural resources agencies, and tribes collaborate on public and tribal lands to modify dams in the Red River Basin that currently prevent lake sturgeon and other fish from passing through.

"Lake sturgeon like to spawn on rocky bottom most often found in the rivers. With all of the dams we have dotted across the landscape in the Midwest, lake sturgeon are up against fragmented habitat where they are essentially separated from their lake habitat and their river spawning habitat," Yess said. "The Service's Fish Passage Program allows us to work with our partners to reconnect that lake and stream habitat."

Staff from the Minnesota DNR leads fish passage efforts in the Red River Basin. Together with Service biologists and tribal partners, more than 30 fish passage projects have been completed. Tribal and Service biologists led the effort on three fish passage projects on the White Earth Reservation tributaries to the Red River, and a fourth was underway in 2011. The projects were funded in part by the Service's Tribal Wildlife Grants program, which funds federally recognized tribal governments to conserve wildlife and habitat, including species of Native American cultural or traditional importance.

"If you think of a low-head dam, you know that you have an instant drop and the fish can't navigate upstream because of that drop," said Yess. "Dam modification basically alters the dam face by putting rocks and boulders immediately downstream of the dam, in turn creating a gently sloping rock-riffle-run, allowing fish to pass through." Fish passage projects like this aim to restore the connectivity of the river, allowing lake sturgeon to access the habitat they need to spawn and reproduce on their own.

To supplement fish passage projects, the partnerships that have emerged

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Fish Biologist, Josh Schloesser, Ashland Fish and Wildlife Conservation Office, checks egg mats at the lower falls of the Bad River, Wisconsin, looking for deposited lake sturgeon eggs.

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A close-up look at a juvenile lake sturgeon.

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Young helpers stock lake sturgeon at White Earth Lake. Sturgeon were raised to fingerling size at Genoa National Fish Hatchery, in Wisonsin.

around lake sturgeon also work on stocking issues. The Sustainable Sturgeon Culture hatchery, situated on the Rainy River First Nations reservation, propagates lake sturgeon from the Rainy River, where traditional harvest remains an important practice. The hatchery supplies fertilized lake sturgeon eggs to conservation agents like the Service and Minnesota DNR for their lake sturgeon conservation work in waters across the Red River Basin where lake sturgeon once thrived.

Joe Hunter is a member of Rainy River First Nations and operator of the Sustainable Sturgeon Culture fish hatchery near Emo, Ontario. His team collects broodstock fish from the Rainy River. They collect two males for every one of the seven to ten females used for spawning. The technique produces the most genetically viable offspring. Eggs are sent to the Service's Genoa National Fish Hatchery (NFH) in Wisconsin, where they are hatched and raised to fingerling size, between five to seven inches in length. They are then released back into the wild, like the Blackduck River, which connects to the Red Lakes in northwest Minnesota, or in waters of the White Earth Reservation. The Red Lakes are two prairie lakes in northwest Minnesota with 285,000 acres of relatively shallow, turbid water. All of the fingerlings from Genoa NFH are marked with coded-wire tags to monitor and track the movements and survivability of each year class.

Minnesota DNR and Service biologists also test lake sturgeon broodstock for viral diseases by clipping a small portion of the pectoral fin. Staff from the Service's LaCrosse Fish Health Center examine the samples to ensure broodstock are healthy, and thus ensure healthy eggs are transferred between hatcheries. Transfer of infected eggs could infect other hatchery fish. Fortunately, no lake sturgeon broodstock have tested positive for viral diseases in the past 10 years.

"Ideally, we'd be getting broodstock from the Red River, but, since there are few sexually mature sturgeon left in that system, we wanted to get the closest genetic strain to that system. The Rainy River is as close as we can get because both the Red River and the Rainy River drain to Hudson Bay," said Pat Brown, fishery biologist with the Red Lake Band of Chippewa Indians. "Our hope is to use the Red Lakes as a nursery area, and provide suitable habitat for young lake sturgeon to thrive and then populate the rest of the Red River Basin," said Brown. "This could potentially mean up to 185 miles of upstream tributaries and 70 miles of the Red Lake River."

After more than a decade of lake sturgeon work, Tom Groshens feels that all the hard work is starting to pay off. "We've made a lot of progress in a number of different aspects in lake sturgeon restoration, and we are seeing in our monitoring efforts that the lake sturgeon is coming back."

Pat Brown agrees. "With all of these partners working together toward a common goal, I feel that we've got a lot better chance of being successful." ✦

Tom Heinrich/Minnesota DNR

Scott Hess takes a fin clip from a Rainy River lake sturgeon for viral testing at the La Crosse Fish Health Center, Wisconsin.

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Josh Schloesser from the Ashland Fish and Wildlife Conservation Office inserts a PIT tag under the skin of a lake sturgeon.

By Dan Magneson

The Sundowner's Club

The pleasure that I derive from listening to pop hits from the late 1960s on through the 1980s stems from the fact that each song provides a unique trip down memory lane. I'm a nostalgic sort anyway, and these songs take me back to when I was younger, pulling up treasured memories of some very special times. Most are happy occasions, but not always, and what seems most unusual is just how vividly I will recall specific people and settings. For the first time in years I recently heard Jim Stafford's 1973 hit *Swamp Witch*. Instantly, I was night fishing for largemouth bass in a southwest Iowa farm pond.

I had fished for largemouth bass during the day in ponds and was intimate with the surroundings. Meadowlarks gurgled their songs from a fence post. The crow of a rooster pheasant sounded like an antique car horn somewhere in tall covers. Red-winged blackbirds scolded as they hovered over you. Pushing through elbow-high grass near the bank, little reddish-hued grasshoppers panicked and hurled themselves in every direction, some landing on your pants and others out in the water. Clusters of little sulphur butterflies that gathered on the pudding-like mud along the water's edge rose skyward in a swirl of saffron. Jewelweed, and every once in a blue moon, maybe even some cardinal flower tucked against the bank with flowers startlingly red enlivened the water. Duck potato, cattails, and the omnipresent pondweed ringed the shallows. Twelve-spotted skimmer dragonflies and iridescent damselflies ornamented the air. Ornate black and yellow garden spiders hung in the zipper-like center of their circular webs. The air hot and heavy with humidity smelled like mildew. Most of all, I remember the excitement when those bass struck a topwater plug, how the silver of their scales had that slight greenish cast, the sandpaper roughness of those little teeth along the lower lip as you lifted them from the water, and that dark band that ran down along the center of their sides.

That was the daytime world I knew. I lived for and loved all of it, and especially that tranquility in the evenings after work. According to some, I liked it too well. This was back during the heyday of movies like *Saturday Night Fever*. Somehow I just never quite got the allure of the throngs of people and the throb of the music at the local discothèque. I had a reputation of being anti-social for my indifference, but I remained as I was. A magazine article about bass fishing at night led to a different "night fever."

It was weird starting to fish at the time I had usually been heading home. The western horizon was painted various blends of purple and red and yellow and orange and pink, and the landscape took on a slightly golden glow. The breeze died down in the evening and sounds carried over long distances. This was a new world dominated by sound and physical sensation. It had a Zen-like quality—you were a part of, and apart from, that which surrounds you both at the same time. Metallic clanks emanated from self-feeders in the hog lot atop the neighboring hill. Cattle gave a lowing call off in the distance. A passing nighthawk, tottering on the wing spoke its distinctive *speark*. Across the water, a bullfrog started a deep and deliberate serenade. Bats took over where the swallows left off. The long shadows faded. The sky turned a deeper shade of blue. The evening star popped in a sky that worked from indigo to blackness. Flashing fireflies competed with the stars. Passing through an invisible veil, the air turned instantly cooler at the water's edge. The blazing streaks of shooting stars were stunning visions, but when looking skyward, my personal favorite was always connect-the-dots "Teapot" which was part of the constellation Sagittarius hanging low in the southern sky. Your hearing improved to offset your far poorer vision. Amid the gentle din of the crickets, you could discern your fishing partner casting and the plop of the lure landing on the water.

One thing that proved refreshing was the reduction in clutter. The vast choices of lures in an infinite variety of colors that ruled daytime fishing could give you a migraine. Nighttime fishing for largemouth bass was amazingly spartan. Fred Arbogast's famous Jitterbug, always black in color and always 5/8 ounce was THE lure of choice. A pair of needle-nosed pliers in my back pocket and a penlight clipped to my shirt pocket was all I needed for the evening.

We didn't have alligators or cottonmouths in our neck of the woods, which was comforting when prowling pond banks in the dark. We were young then and didn't worry about things like treble hooks flying through the darkness or breaking your leg in an unseen muskrat hole. The closest call I ever had was once mistaking the ivory-colored underside of a snapping turtle for the ivory-colored underside of a big bass.

"It was both holy and haunted, bass fishing in an Iowa farm pond in the middle of the night."

It was incredibly eerie out there. We used our penlights only when we absolutely had to, and then only when kneeling down within the cover of tall, dense grass. Things tumbled out of the black willows and the cottonwoods. Muskrats and northern water snakes that moved through the grass, slipping into the water made a lot of noise in the dark of the night. That faint flutter and little blast of air against the side of your face was a bat or just a big moth wheeling away in the darkness. You never really knew for sure. The rustling of the grass as something moved away from the water was spookiest of all; that would really make the hair stand up on the back of your neck!

But the bass fishing was very good, and the fish ran considerably larger at night; they seemed to drop their guard under the cover of darkness. The even cadence of that soft, back-and-forth *lou-duh-lou-duh-lou-duh-lou-duh* from the aluminum lip of the Jitterbug working towards you through the darkness was a pleasant, reassuring sound. Sometimes explosive strikes happened lifting the lure from the water, soaking your pants, the rod tip bent toward your toes. It was also common for the bass to miss the lure completely, and especially when it occurred right up against the shore. You'd stand there in the darkness with your heart pounding in your ears and watch the moonlight wobble in the ripples. When you latched onto an exceptionally large bass, you'd wade out in hasty excitement to disentangle your fish from the weeds, cool water seeping through your tennis shoes and rotten-egg odor wafting up from the pond bottom.

The greenish-white glow from the dashboard and my own headlights were so bright that they hurt. The light violated the surreal where it felt like I lived simultaneously—and incongruently—between a Christmas evening church service and spending Halloween night in a cemetery. It was both holy and haunted, bass fishing in an Iowa farm pond in the middle of the night. An old song can resurrect that sense of having done something special, a sense that we owned driving home under ink-black skies, silent. ✦

Dan Magneson is the Assistant Hatchery Manager at Quilcene National Fish Hatchery on Washington State's Olympic Peninsula. He has worked for the U.S. Fish and Wildlife Service since 1989.

Eddies

Reflections on Fisheries Conservation

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Where in the World is Eddies?

These U.S. Fish and Wildlife Service employees take *Eddies* on the road.

Denise Wagner is pictured with her *Eddies* in front of the Missoula, Montana, church of Norman Maclean, fly fisherman and author of *A River Runs Through It.* The movie of the same name changed the culture of fly fishing. Denise is the national Conservation Education Coordinator for the Branch of Communications and Partnerships.

Mary Price, pictured in Alaska with a furry friend looking to get his paws on her *Eddies*, is a Fish and Wildlife Biologist with the Wildlife and Sport Fish Restoration (WSPR) Programs in Anchorage. WSFR, which changed the nature of conservation funding, celebrates its 75th anniversary this year.

Where in the World is YOUR *Eddies*? Email your photo to craig_springer@fws.gov. ✦ Abigail Lynch

Rand Price

Steve Wagner

U.S. Fish and Wildlife Service employees, Mary Price (L) and Denise Wagner, show off their Eddies *at landmarks in Alaska and Montana.*