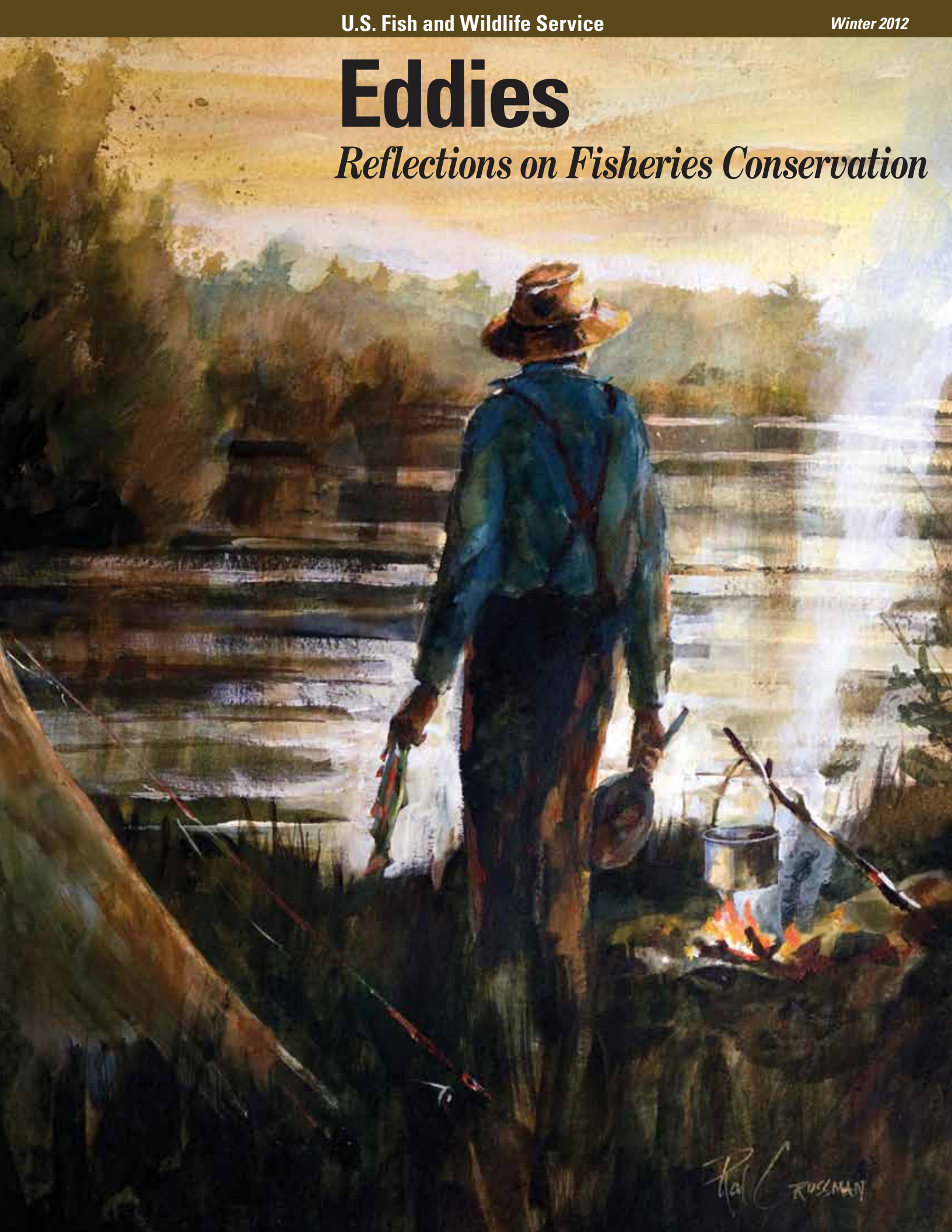


# Eddies

*Reflections on Fisheries Conservation*



Paul RUSMAN

# Eddies

Vol. 5, No. 3

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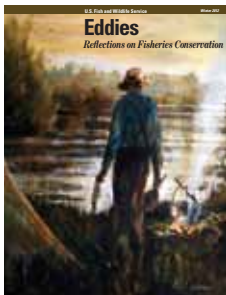
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*Two-Hearted River* by  
artist Rod Crossman  
evokes Ernest  
Hemingway. See page 16.



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Rod Crossman

*Looks like a good day for ducks. Read more about the modern master, Rod Crossman, and his affinity for fish art on 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

## *Intersections of Art and Science*

By Mike Weimer



Tom Busiahn

It may be difficult to describe such a thing as “excellence.” But you can recognize it when you see it, read it in print, or hear it sung. There’s an inner light that flickers—there is awareness. Excellence in things created by people be it an artistic creation or a scientific endeavor, no matter their form, are all derived in the same place, the wellspring of the active mind.

Albert Einstein had this to say about the origin of scientific creativity. “The state of mind which enables a man to do work of this kind ... is akin to that of the religious worshipper or the lover; the daily effort comes from no deliberate intention or program, but straight from the heart.”

Straight from the heart, he says, and that evokes passion, desire, and an inner drive. No truer words could be spoken about the men and women who strive in their daily efforts to conserve America’s fisheries. Those efforts are born from passion and desire, with our work being not just a job but a mission. With that as a basis for performing, you can be certain the outcomes will tend towards, well, excellence.

Some of that excellence is on full display in this issue of *Eddies*. We are pleased to have the work of the modern master, Rod Crossman, on our cover. We have over the years profiled artists with affinities for things finny, like Bob Hines, Ray Troll, and a number of young painters who participated in the State Fish Art program of Wildlife Forever. This time around, Crossman’s work graces the middle of the magazine with a wonderful

biographical profile by Lee Allen. Crossman’s work spans an amazing palette and I hope you enjoy it.

Also impressive is the dedication to preservation shown by archivist Randi Sue Smith, covered in the story “A Calling to the Past.” Randi has dedicated the last 15 years to ensuring that objects and records of great import to conservation are properly curated for scientists, historians, and scholars.

Be sure to read the story by Abigail Lynch titled “Leviathan Lahontans Launch a Come Back.” You’ll marvel over the natural attributes that this trout possesses, and its remarkable return guided by science and the pluck of biologists with the Lahontan National Fish Hatchery Complex.

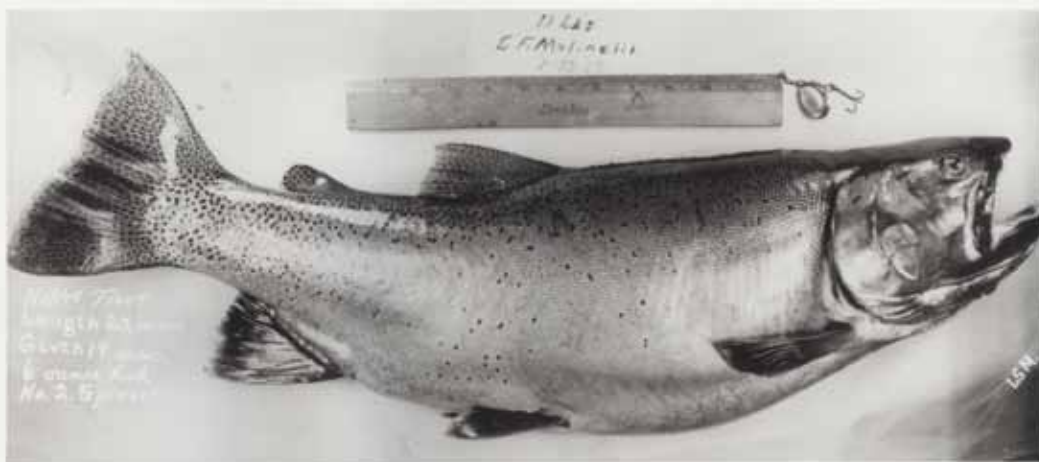
As with the Lahontan cutthroat trout, so has it been for the Gila trout. In the American Fishes department, you’ll learn about the remarkable life-history of the rare copper-colored fish that once stared into the dark abyss of extinction. If not for the strategic work of the Arizona and New Mexico Fish and Wildlife Conservation Offices and the Mora National Fish Hatchery, this beautiful trout would live only in memory.

We close out with a Meanders essay titled “Aesthetic Exercise” that speaks to the reasons we care about conservation. Art proceeds by aesthetic consciousness and science by laws. But romance and reason are two species of the same genus. There is richness in discovering forms and light, as there is in discovering the order of nature. Without that inquisitiveness, life would be dull as dishwater. ♦

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Mike Weimer is the executive editor of *Eddies*, and Chief of the Division of Fish and Aquatic Conservation in Washington, DC.

## Yellowfin trout image a glimpse of the past



*This fish freshly angled and caught on film in 1919, may be the only known image of a now-extinct yellowfin cutthroat trout. The image is housed at the D.C. Booth Historic National Fish Hatchery and Archives in South Dakota.*

It's probably gone forever – the yellowfin cutthroat trout. It was found only in Twin Lakes at the head of the Arkansas River, near Leadville, Colorado. This 1919 photo may be the only known image of the yellowfin. That was

the judgment of trout expert Dr. Robert Behnke; his opinion and the image itself are both preserved at the D.C. Booth Historic National Fish Hatchery and Archives in Spearfish, South Dakota.

In 1890, ichthyologists David Starr Jordan and Barton Warren Evermann proclaimed in the Proceedings of the National Museum a new subspecies of trout, the “yellow-fin trout,” described from fish they caught and preserved a year prior. The yellow and silver fish commonly reached 10 pounds.

And this irony is palpable: they wrote “We have taken pleasure in naming this species for Hon. Marshall MacDonald, U.S. Commissioner of Fisheries, in recognition of his

services in spreading the range of Salmonidae in America.” Overfishing and hybridization with nonnative introduced trout drove the subspecies that they had named *Salmo mykiss macdonaldi* to extinction. ♦ Carlos R. Martinez

## Partners for Fish and Wildlife Program turns 25

The Partners for Fish and Wildlife Program was established by the U.S. Fish and Wildlife Service in 1987.

It provides technical and financial assistance to private landowners and Tribes who are willing to conserve habitats of Federal Trust Species.

Participants can assist with projects that conserve or restore marshes, rivers and streams, native vegetation, and soils associated with imperiled ecosystems such as longleaf pine, bottomland hardwoods, and native prairies, or otherwise provide for a rare or protected species.

Field biologists work one-on-one with private landowners to plan, implement, and monitor their projects. Also, they help landowners

find funding and wade through the permitting process.

Partners for Fish and Wildlife exists in all 50 states and U.S. territories.

The program has gained national recognition as a vanguard in the new era of cooperative conservation based on the premise that fish and wildlife conservation is a responsibility shared by citizens and the government.

Chiniak Fish Passage project in Alaska restored 370 feet of stream, eliminating

a fish passage barrier and opened about six miles of habitat for coho and pink salmon. To learn more, visit [www.fws.gov/partners](http://www.fws.gov/partners). ♦ Delta Harris



## Where the stripers go

Striped bass are tagged by state and federal biologists along the Atlantic Coast. The Cooperative Tagging Program began in 1986, and to date more than 500,000 fish have been tagged. About 91,000 of these fish have been recaptured and reported by anglers, biologists, commercial watermen, and seafood markets. The data provided by the recaptured fish shows biologists where striped bass migrate, when they move, and the rates of mortality ♦ Ian Park



*These maps produced by the Maryland Fishery Resources Office represent the number of tagged striped bass recaptured in the months of July and December, from fish tagged September 2006 to December 2012. The changes show how the fish move seasonally.*

Ian Park/USFWS

## FEATURED FACILITY Aquatic Animal Drug Approval Partnership (AADAP)

**Where:** Bozeman, MT

**When:** Established 1994

**Then:** The U.S. Food and Drug Administration (FDA) determined that the use of drugs in aquatic species needed to be regulated. This left fisheries professionals with few approved drugs, and seriously jeopardized the well-being of captive fish across the U.S. AADAP (then known as the Bozeman National INAD Office) was established for the sole purpose of administering Investigational New Animal Drug (INAD) exemptions for USFWS facilities. INAD exemptions allow use of unapproved drugs under experimental conditions.

**Now:** AADAP exists to ensure steady progress towards FDA-approval of critically important drugs needed by fishery managers across the country. The approval process is necessarily rigorous. AADAP meets those rigors as a national partner-based program coordinating data collection, analysis, and dissemination of results per requirements of the FDA. The National INAD Program was expanded in 1999 to allow non-USFWS facilities to participate. Each year, about 250 State, Tribal, and other Federal and private aquaculture facilities engaged in conservation or commerce benefit from access to critical INAD drugs.



Dave Erdahl/USFWS

*National INAD Administrator, Bonnie Johnson, hugs a lake trout from Lewis Lake, Yellowstone National Park. Its spawn is headed to Saratoga National Fish Hatchery.*

AADAP's research program is dedicated to generating high-quality scientific data to show that a drug is effective and safe. AADAP's research program is not only prolific, but also is the only USFWS facility compliant with Good Laboratory Practice standards.

Via its website, newsletter, and list-serve, AADAP communicates timely information about ongoing drug approval efforts, comprehensive drug use guidance, and treatment options. See [www.fws.gov/fisheries/aadap](http://www.fws.gov/fisheries/aadap). ♦ Dave Erdahl, Ph.D.

## Winged Mapleleaf mussel flying close to extinction



Genoa National Fish Hatchery mussel biologist, Nathan Eckert, explains Winged Mapleleaf mussel life history to Secretary of the Interior, Ken Salazar, along the upper Mississippi River in Minnesota.

The Winged Mapleleaf is considered one of the rarest mussel species in the Upper Mississippi River Basin. The last remaining population is thought to contain less than 300 adult mussels in an isolated stretch of the St. Croix River. Once found in the main stem of

extinction. It requires a specific host-fish to complete its life cycle. The channel catfish and the blue catfish are currently the only known species of fish that will accept Winged Mapleleaf mussel larvae to successfully live a short period on

the Mississippi River; this federally endangered species was lost to the main stretches of the river by the early 1900's due to habitat alteration and pollution.

The mussel has some specific reproductive requirements that also bring it closer to the edge of

their gills where it transforms into a juvenile mussel capable of collecting its own food.

A cooperative recovery effort has been ongoing since 2005 to stave off extinction. Adult female mussels laden with larvae are collected in late summer and their larvae harvested and placed on channel catfish. These catfish are overwintered at the Genoa National Fish Hatchery and then placed in propagation cages in the St. Croix River the following spring. Mussels drop off of the gills of the catfish to the bottom of the propagation cage and begin feeding on their own. They are protected from predation and grow for two to three years in the cages until they are large enough to be safely released. The work has so far yielded the first captive-release of this rare mussel, and may well be the first Winged Mapleleaf population recruitment event in the Mississippi River in decades. ♦ Doug Aloisi

## New trout study unravels Colorado trout DNA mystery

The historic distribution of several cutthroat trout subspecies within Colorado has been clouded in recent years. A recent scientific paper published in the journal, *Molecular Ecology* by a team of researchers, including one from the Colorado Fish and Wildlife Conservation Office, makes the issue a little less murky. The paper clarifies the historic and current distribution of the fishes, revealing that the federally threatened greenback cutthroat trout occurs in only one small stream.

Analyzing DNA extracted from museum specimens, geneticists from the University of Colorado at Boulder determined that each of six major drainages within Colorado had their own genetically distinct lineage of cutthroat trout. This contrasts to the

current classification of only four subspecies historically residing within the state. The specimens from which DNA was extracted were originally collected between 1857 and 1889 before intensive fish stocking had taken place. Of the six lineages, two are believed extinct including the yellowfin cutthroat; one subspecies lives within its historic drainage; two others live throughout Colorado, and one, the greenback cutthroat trout, exists as a single population outside its historic drainage.

Researchers consider the greenback cutthroat trout the lineage historically present in the South



A greenback cutthroat trout from Bear Creek.

Platte drainage. Only one small population is left and it resides in Bear Creek, a small stream on the east side of Pikes Peak in the Arkansas drainage.

Hundreds of millions of cutthroat trout were distributed over the last century throughout Colorado. The U.S. Fish and Wildlife Service and other agencies will use the results of this study to guide recovery and conservation efforts for cutthroat trout. ♦ Chris Kennedy

## “Angler” owns an interesting origin

Words have meaning and a history. “Angler” originated in northern Europe in Schleswig of the Jutland Peninsula, once inhabited by a Germanic tribe. It’s thought these people called their homeland Angul in reference to the fish-hook shape of the peninsula. “Angul” derives from the Indo European root “ank,” meaning “to bend.”

After the fall of the Roman Empire ca. 650, the “Angels,” as the residents of Angul called themselves, joined the Jutes and Saxons and traveled westward to England to fill the void left by retreating Romans. The impact they had on English history is reflected in the Anglo-Saxon influence on the present-day names

for both the country and the English language spoken around the world. The word “angle”, spelled “a-n-g-e-l,” entered the language meaning “hook” or “fish hook.” Perhaps using an “angle” to catch fish reminded the “angler” of home.

An angle also is a figure formed by two intersecting lines measured by degrees.

Despite sharing the root “ank,” its route into the language was different, coming by way of the Latin “angulum,” meaning “corner” or “to slant.” This word can refer to the “angle” between one’s



line and rod, but not to the “angler” who uses an “angle” to catch fish.

The two words cross paths, however, and it’s interesting to note how they are connected in the many figurative ways we use “angle” today. For example, we might say: “He’s always angling for an angle!” to invoke a sense of an “angle of attack” that might be devious or “crooked” and used to “hook” an unsuspecting person, and not an unsuspecting fish.

In case you are wondering, the biblical word for angel, the ones with wings, originated from a Greek word meaning “messenger.” ♦ Michelle Kelly

## FROM THE ATTIC Notes from D.C. Booth Historic National Fish Hatchery and Archives

Who was the first to try stunning fish with electricity while wading in the water? We have a few pieces of electrofishing equipment in the museum collection at D.C. Booth Historic National Fish Hatchery and Archives. They generated juice to stun fish for collection and study. The older backpack units, called Tiny Tigers, have a gas-powered generator that ran 30 minutes per fill-up. New models run by battery. Some researchers prefer the older style: as long as you have gasoline you keep working.

A 1938 issue of *Progressive Fish Culturist* talked about German research on stunning fish. This article convinced others to experiment in New York, with their findings presented at the 1939 and 1940 American Fisheries Society meetings. There were safety concerns. In our archives we have a 1954 bibliography on applications of electricity in fishery science and a book called *Fishing with Electricity* from the Food and Agriculture Organization of the U.N. The earliest mention of electricity and fish was in a 1863 British patent for electric fishing.

Further research is necessary to develop a timeline of equipment and methods used. Our collection is small. We have no streamside generators, though we do have one in a boat. We’d like information about any old equipment and studies that readers might have. Who wore the first backpack units? We want to know. Call (605) 642-7730, ext 215. ♦ Randi Sue Smith



Randi Sue Smith/USFWS

*A gas-powered electrofisher may have been loud, smelly, and dangerous on a worker’s back, but they worked. Gas-powered units have given way to modern rechargeable battery-powered units.*

By Craig Springer

## David Starr Jordan



Smithsonian Institution

*Ichthyologist, eugenicist, university president, and a peace activist, David Starr Jordan (1851 to 1931) conducted fishery surveys under the auspices of the U.S. Fish Commission.*

The name of David Starr Jordan rises as a consummate man of science. His career investigating fish and fisheries was interwoven with the U.S. Fish Commission and the Smithsonian Institution, and later the U.S. Bureau of Fisheries. He was influenced by, and worked with, such luminaries in the sciences that would read like a “who’s who” list. As an academician, Jordan is perhaps best known for leading two major universities. His work with fishes in the golden age of American ichthyology was an age of discovery. His work with fish produced a massive amount of

published literature in books, tracts, and in journals of science. But Jordan had other interests in fields quite distant from fishes, and far from science. And like all of us, he was fallible and not free of the human constancy of fault.

Jordan was raised in the milieu of a rising concern for conservation that surely had an influence on him as a young man. The book, *Man and Nature*, written in 1864 by George Perkins Marsh when Jordan was 13, set off the modern conservation movement, and Jordan would ride that rising tide. As a boy living in his native upstate New York, he recounted in his autobiography *Days of a Man*, that he enjoyed fishing creeks, collecting wildflowers, playing baseball, writing poetry, and mapping out the celestial bodies. He would

be a wide-eyed witness of the Civil War. His older brother, a soldier, died during the war. The shredding of whole masses of young men surely informed Jordan’s later interest in pacifism.

The young man’s education was unusual: aside from home-study he attended an all-girls’ high school. Jordan joined the nascent Cornell University and studied botany. After Cornell, he took jobs teaching natural history at schools in Illinois, Wisconsin, and Indiana. Jordan made a life-changing decision to attend a summer camp for teachers of natural history on Cape Cod. The camp was led by naturalist Louis Agassiz, a Swiss-born Harvard University authority on fishes, and made famous for his scientific endeavors on glaciers. Sufficiently swayed to study things finny, Jordan returned to Indiana, where he concentrated on learning about Fox River fishes. He came under the influence of Spencer F. Baird (see *Eddies*, Special Issue 2009) in 1874, visiting the U.S. Fish Commission laboratory in Connecticut. The young science teacher was offered work at Indiana University’s natural history department in 1879. Jordan became a popular teacher and his long summer field trips were well attended. He and his students made forays into the southern U.S. collecting and studying fishes. The collecting equipment was provided by the Fish Commission, and the fishes deposited in the National Museum at the Smithsonian. These trips generated papers published in bulletins of the U.S. Fish Commission. Jordan had a profound influence on one student,



Barton Warren Evermann, who went on to prominence in the U.S. Fish Commission as its Chief of Scientific Inquiry (see *Eddies*, Summer 2010). The two men had a life-long alliance on many matters related to fisheries conservation.

Only five years after taking a teaching appointment at Indiana University, Jordan was tapped to take the helm of the whole ship. He became the school's first president not ordained in the ministry, and at age 34, its youngest. Jordan made a name for himself in Bloomington and beyond, one that caught the attention of a U.S. senator from California, Leland Stanford.

Senator Stanford and his wife Jane sought to create a new school, and went shopping for a leader. Their quest took them to Bloomington, and the offer made to Jordan, too sweet not to swallow. In 1891, the fisheries scientist headed west. Stanford University flourished under Jordan, but not without controversy involving the murder of Jane Stanford by strychnine poisoning. The recent book, *The Mysterious Death of Jane Stanford*, by emeritus professor of neurology at Stanford, Robert Cutler, M.D., doesn't solve the mystery about who did it, but implicates Jordan in a cover-up of her murder.

All the while at Stanford, Jordan continued to research fish and fisheries. Jordan's ichthyologic expeditions took him and his students to the waters of Pacific Coast, the Deep South, and the middle of America, essentially amounting to a survey of much of the American fish

fauna. These endeavors formed the basis of the classic multi-volume text, *Fishes of North and Middle America*. The tome was written by him and former student Evermann from 1896 to 1900. The two men also wrote the very popular book, *American Food and Game Fishes*, in 1902. One of the more well-known fishes named for science by Jordan was California's official state fish, the golden trout. A lesser-known fish, the now-extinct yellowfin cutthroat trout from Colorado, was named by Jordan as well (see *Watermarks*, this issue).

Jordan was active in conservation and scientific societies; he was a charter member of the Sierra Club, twice the president of the California Academy of Sciences, served on the California Fish Commission, and directed the World Peace Foundation. The man was a prodigious writer on a multitude of topics outside the realm of fisheries, such as *Blood of the Nation: A Study of the Decay of Races through Survival of the Unfit*, and *The Heredity of Richard Roe: A Discussion of the Principles of Eugenics*. Jordan was an ardent supporter of the quasi-scientific pursuit of eugenics—human selective breeding. He was a founding member of the American Eugenics Society; the Eugenics Research Association; and the Immigration Restriction League, all bound by notions that segregation, anti-miscegenation, and forced sterilization led to a more fit society. Jordan wrote unfavorably about select peoples from Europe who he reasoned lacked traits that he thought were desirable, judging them harshly on the whole as “temperamental.”

Such a strident view certainly calls into question his own temperament.

Former Stanford biology professor and university president Donald Kennedy noted that Jordan's contributions to science were “significant, but not monumental.” But consider these monuments: It is conceivable to attend grade school and high school, and then earn biology or psychology degrees in buildings named after Jordan in two states. You can drive on Jordan Avenue, wade Jordan Creek, swim Starr Jordan Lake, or research ocean fisheries aboard the NOAA research vessel, the *David Starr Jordan*. One can angle fishes in the high country or in the blue sea that he described over a century ago. You can study fishes that celebrate his very name: the genera *Jordanella* and *Davidijordania*, and the species Jordan's snapper, Jordan's sculpin, Jordan's damsel. You might also earn the distinguished *David Starr Jordan Prize* for innovative work in biology.

In the end, you can measure a man in part or on the whole. This is easily measured: by the sheer volume of new fish species descriptions that Jordan brought to the light of science and the students that he educated, his influence on fisheries conservation was profound. ♦

## Gila Trout

By Craig Springer

The cutting light of morning breaks over the walls of Black Canyon in southern New Mexico, and makes moving pictures for your occupation. Illumined is a land of stark distinctions. Ancient alligator juniper and spare grasses stud the friable dirt on the south-facing rocky hillsides. The shaded slopes with a northern aspect are wetter, forested with cinnamon-yellow ponderosa pines that smell like candy. A thin green ribbon of trees bisects the canyon bottom, snaking from wall to wall following the flowing water in a curling fashion. Gila trout colored with a touch of lemon, like the light that peeks over the ridgeline, swim here.

Well inside the Aldo Leopold Wilderness, this place is as remote as the moon. Cool creek water comes off the Continental Divide in the Black Range flowing westward toward the Sea of Cortez. But it will never make it. What doesn't evaporate will irrigate chile fields or slake thirst in Phoenix. In this canyon bottom, water freshly off the high mountains courses into pools scoured under alder root masses where Gila trout lie. It's a fish that swims nowhere else in the world, but in the headwater streams of the Gila River.

It must be a clarifying experience to angle a Gila trout. Think of this: until very recently, there was probably no one alive who had legally caught a Gila trout in its native waters. These beautiful yellow trout flecked with pepper-spots, ornamented with parr marks, and striped with a faint rosy-pink band, were closed off from fishing for over 50 years. That was until 2007. It had been for a time, the

nation's only trout endangered with extinction.

In 1973, at the time of its listing under the Endangered Species Act, scientists estimated the Gila trout swam in just 20 miles of water in only four streams. That stands in stark contrast to the estimated 600 miles it once occupied in New Mexico as late as the 1890s. It's been a strong current that this trout has had to swim against.

The U.S. Fish and Wildlife Service's Fish and Wildlife Conservation Offices in New Mexico and Arizona diligently expanded the range of the trout in stream-to-stream transfers with a mind of adding geographic security by widely separating the replicated populations. It's paid off, too. These arid mountains of the Gila are prone to forest fires and trout don't do well in ash-laden waters. That came to the fore this past summer when the massive Whitewater-Baldy Fire burned 7 of 14 streams holding Gila trout.

Conservation of Gila trout would not be possible without the Mora National Fish Hatchery. This facility has been a refuge for wild fish faced with grim prospects. Four times Gila trout have gone there from the wild in advance of moving wildfires and held there safely in quarantine, only to be returned to the wild later.

Despite its beauty, this trout has not been known to science for very long. But folks have known about Gila trout for centuries. Beaver trapper, James Ohio Pattie, one of the first writers of English to traverse this remote place made mention of fish—and quite likely Gila trout. He wrote of

his 1824 experience at the confluence of the West and Middle forks of the Gila River. "On the morning of 13th [December] we started early, and crossed the river Helay, here a beautiful clear stream about thirty yards in width, running over a rocky bottom and filled with fish. We found here a boiling spring so near the main stream, that the fish caught in one might be thrown into the other without leaving the spot where it was taken. In six minutes it would be thoroughly cooked."

The boiling spring is still there and still used, but for soaking hikers' feet. The Gila trout retreated from the lower main-stream reaches of the Gila River to headwater streams of the West, Middle, and East forks. After settlement of the area, fishing pressure increased, nonnative fishes were introduced and the native Gila trout couldn't keep up. Gila trout hybridized with nonnative rainbow trout, creating a mongrel trout population that was neither Gila nor rainbow. What was Gila trout habitat became overrun with other nonnative fish species like brook and brown trouts.

The Gila trout wasn't formally recognized by scientists as a unique fish species until 1950, 125 years after trapper Pattie cooked them in a hot spring. But conservationists early on in New Mexico's history knew that the Gila trout was distinct. The New Mexico Department of Game and Fish attempted to culture them in the 1920s at a small hatchery deep in the Gila National Forest, and later ceased stocking nonnative trout in the wilderness waters of Gila.



Craig Springer

*A Gila trout, native only to the upper reaches of the Gila River system, reflects a copper-yellow sheen. The fish had been closed to angling for 50 years, and was the only trout considered endangered with extinction until 2006, when it was down-listed to threatened.*

So, there must be some clarity that comes from catching a Gila trout by hook-and-line. Things opposite one another clarify each other. There is no darkness without light, no day without night; Gila trout nearly swam into a dark abyss of extinction, and today you can try outwitting them with fur and feathers on a hook. The prize of a Gila trout today is not the size of fish that you can angle. You won't catch big fish in small waters.

Gila trout are swimming expressions of antiquity, artifacts of epochs past. In their genes they carry a time capsule. Coiled in the double-helix of their DNA lies the lexis of the environment from which they sprung forth, giving them the temperament to make a living in a harsh place.

The success of Gila trout conservation is a swimming expression of human experience, good science and the

dedication of those determined to see what had been this nation's only endangered trout turn upstream from the sweeping current of extinction. The Gila trout remains, however, one of the rarest trout in the world. ♦

By Abigail Lynch

# Leviathan Lahontans Launch a Come Back



*Lahontan cutthroat trout.*

Denver Bryan/Images on the Wildside

Conservation genetics might not sound like an exciting topic for a fisherman. But, the product of nearly two decades of broodstock development guided by genetics at Lahontan National Fish Hatchery Complex has fishermen at Nevada's Pyramid Lake very excited. Twenty-pound native Lahontan cutthroat trout are back. And there's promise that bigger fish are in the offing.

These Lahontan cutthroat trout are not your typical small-stream cutthroats. They are confirmed to be the genetic strain of the historical lake-form of Lahontan cutthroats found in Pyramid and Walker lakes in Nevada, as well as Lake Tahoe in California. They are a product of the ancient Lake Lahontan, a large inland sea that once covered about 8,600 square miles of northwestern Nevada and parts of surrounding states. Lahontan cutthroat trout, the state fish of Nevada, is one of 14 subspecies of cutthroat, and one of two subspecies that evolved to live in lakes. They tolerate high alkalinity that exists in lakes in their natural range. They have a voracious appetite for fish that allows for great growth. The largest known Lahontan on record was caught in 1916 and weighed in at 62 pounds.

When water levels in both Pyramid and Walker lakes dropped over the first part of the last century due to agriculture, these leviathan Lahontan cutthroats could no longer reach river spawning sites upstream from their lakes. The last of these historical lake-dwelling Lahontans were thought to be gone by 1939. Then, a small population believed to be have been stocked in the 1930s from Pyramid Lake, was

discovered in the late 1970s in the small Morrison Creek on Utah's Pilot Peak by renowned trout biologist Dr. Bob Behnke from Colorado State University. But, how could this Pilot Peak strain be confirmed as the historical lake-form Lahontans?

Genetics was the answer. Enter Lahontan National Fish Hatchery Complex, *Jurassic Park*-style.

Fish biologists at the hatchery complex sought to confirm if the Utah population of Lahontan cutthroat trout was related to the original Pyramid Lake and Lake Tahoe populations. As geneticists in the movie *Jurassic Park* were fictitiously able to pull dino DNA from ancient mosquitoes, DNA was extracted from a suite of Lahontan specimens. They had been collected in the early 1900s from Lake Tahoe, the Truckee River, and Pyramid Lake and preserved in museums. Studying the trout DNA fell upon University of Nevada-Reno geneticist Dr. Mary Peacock. She compared the DNA of contemporary Lahontans from Morrison Creek to the genetic makeup of the Pilot Peak cutthroat trout along with the genetics derived from the old museum specimens. She also examined the genetics of contemporary stream-dwelling Lahontans throughout the fish's range. The results confirmed that the Pilot Peak Lahontans are indeed more closely related to historical lake-form Lahontans than to the contemporary stream-form Lahontans.

"The museum samples offered a tremendous opportunity to the modern conservation biologist. With such samples, history comes alive,"

said Peacock. "These preserved specimens allowed us to peer into the past and ask questions of organisms that are no longer with us. Such information informs conservation today as we recreate an environment that supports our natural heritage."

Modern genetics has allowed biologists to restore a native strain to its historical habitat. "We may once again see these magnificent cutthroat trout swimming up the Truckee River to spawn," Peacock says.

And toward that end, the hatchery complex biologists took an integrated approach to conserve the genetics of the newly rediscovered large-growing lake-form Lahontan cutthroat trout. They built a robust broodstock of the fish from Pilot Peak. For biologist Lisa Heki, the hatchery complex supervisor, the native lake-form of Lahontan cutthroat trout provides an excellent opportunity to promote angling—and community economic



Courtesy Matt Ceccarelli

*Matt Ceccarelli caught this Lahontan cutthroat trout in Pyramid Lake in 2012. The fish derived from the Pilot Peak strain holds the distinction of being the first angler-caught cutthroat that had been tagged and stocked from the national fish hatchery. The fish weighed 19 pounds and had been stocked six years earlier.*

development. Simply put, fishing is good for the economy. And using a fish naturally best suited to the habitat makes good sense.

“The lakes we work in provide the key parts of the ecosystem that can support a robust trout population. There’s habitat and food the trout need for maximize growth,” says an enthusiastic Heki. The lake-dwelling Lahontans naturally grow faster and larger than their stream-dwelling cousins. When they return to streams flowing into the lakes to spawn, the bigger Lahontans can compete with non-native trout for optimal spawning habitat. This is often not the case for the smaller stream-form Lahontan cutthroat trout.

But with this larger size, comes later maturity—which requires a vigilant commitment to the reintroduction program to build self-sustaining populations in the wild. The hatchery complex is needed to fully restore the fishery. It’s well-suited to do it. Nineteen professionals work at the hatchery, the fish passage facility on the Truckee River, and in field crews studying fish populations and habitats. From February to early May, it’s all hands on deck in the hatchery to spawn broodstock. By March, crews are at Marble Bluff Fish Passage Facility moving fish from Pyramid Lake into the Truckee River. Summer and into autumn, crews on Fallen Leaf Lake, Lake Tahoe, and Pyramid Lake and their tributaries monitor fish populations and habitat. These field activities yield new information and direct future management actions.

The results have been very favorable. The Fallen Leaf Lake community understands the economic link between conservation and fishing and supports native trout restoration. Pyramid Lake anglers know that biologists have tagged each stocked Lahontan cutthroat trout. Moreover, they know that the data they provide on tagged fish that they catch helps direct future conservation work.

The reintroduction efforts have shown successes. Getting Lahontan cutthroat trout back into Fallen Leaf Lake began in 2002. Ten years later, researchers documented a spawning migration and successful reproduction of the lake-form Lahontans. Forty adults migrated from Fallen Leaf Lake into Glen Alpine Creek to spawn—the first spawning migration recorded in the basin in over 70 years.



USFWS

*Erik Horgen, a Lahontan National Fish Hatchery Complex fishery biologist hangs on to an 11-pound Pilot Peak strain Lahontan cutthroat at Marble Bluff Fish Passage Facility, near Reno, Nevada.*



Courtesy Ernie Gulley

*Ernie Gulley caught and released this 17-pound Lahontan cutthroat trout in 2012.*

Fallen Leaf Lake isn't the only water that has seen results. Since 2006, biologists from the Lahontan National Fish Hatchery Complex and the Pyramid Lake Paiute Tribe have worked together to stock and evaluate the performance of the Pilot Peak fish in Pyramid Lake. Anglers are pleased with the outcome. In January 2012, a fisherman caught a tagged Pilot Peak strain Lahontan cutthroat trout that weighed 19.5

pounds. In March, another fisherman caught a 17-pounder.

The future of the fishery looks bright. Heki expects to see the 30-inch long Lahontan cutthroats cruising up the Truckee River to spawn in the next high-water year. The leviathan Lahontans are on their way back. ♦

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Abigail Lynch is a Ph.D. candidate at Michigan State University. She wrote about Gulf sturgeon in the last issue of *Eddies*.

By Lee Allen

# Rod Crossman

*Searching for Awe and Wonder*



*Inventing Trout 24" x 30" acrylic on canvas*

Rod Crossman



Artist Rod Crossman spends a lot of time standing in wooded streams with a fly rod in his hand. He calls it *required research* before he trades fish pole for artist pallet, stepping to the easel to capture yet another outdoor experience on canvas.

“I come by my love of the outdoors naturally because nature was a part of my life growing up. I love rivers and streams and moving water—that’s just who I am,” says the Indiana art professor and Artist-in-Residence at Indiana Wesleyan University where he teaches the next generation of painters and designers.

Crossman’s work is exhibited worldwide at museums and galleries, in places like the Smithsonian. “If I can do one painting that has a chance to change a person’s life, it will make my life worthwhile. I don’t make art to make me famous—I make art as a bridge to bring people together, filling in gaps in the world that need to be filled in to make it a better place.”

Although South Dakota born, Crossman’s family tired of prairie living and migrated back to the Finger Lakes region of upstate New York. “We lived in the country on the shore of a lake. That was my playground where I spent time fishing, catching frogs, and selling nightcrawlers to visiting city anglers for 25 cents a dozen. Nature was a place where I felt whole,” he says.

The outdoors was brought inside when his father, a power company lineman, would bring home young, wild animals. “I raised them all from turtles and rabbits to even a bat which I’m sure my mother loved.”

Fortunately, his appreciation of nature coincided with a youthful desire to draw. “Never thought I’d make a living from it though,” he says with a chuckle. “I was a psychology major in college who took a drawing class as an elective course and loved it so much that I quickly changed my major to art education. I loved the magic of creating an illusion of space and dimension on a flat surface.”

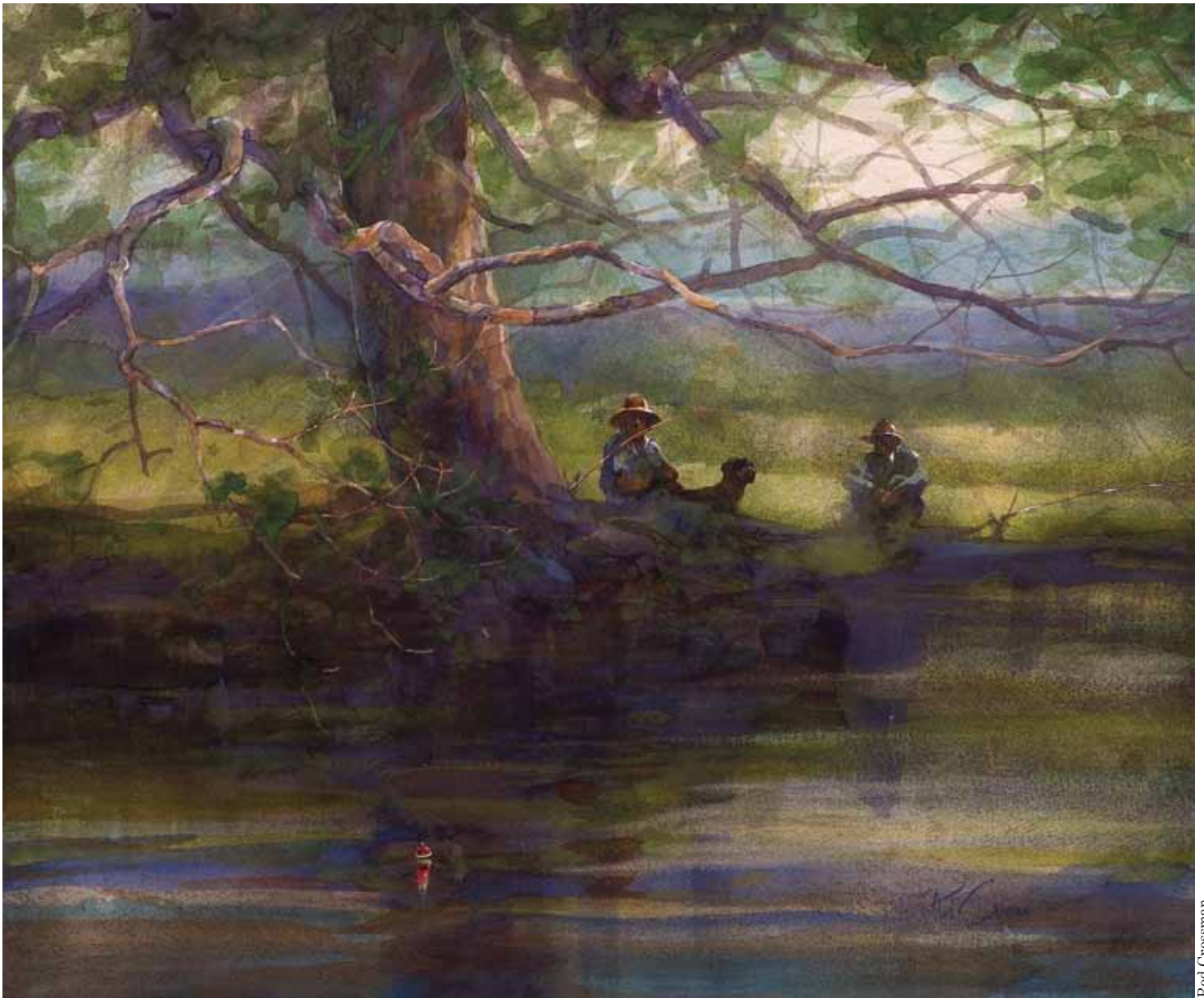
Loved it so much in fact that it became his lifetime profession initially teaching art to elementary, junior high, and high school students during the day and painting creatively in the evenings. “I began showing in galleries and discovered

*“I love rivers and streams and moving water—that’s just who I am,”*



*Pumpkin Seed 16” x 20” acrylic on canvas*

Rod Crossman



Rod Crossman

*Childhood Dreams 24" x 30" watercolor*

I could make more money in commercial art so, two years out of college, I became a professional artist and have been painting full-time since 1978.”

Crossman says giving up the safe and secure for an uncertain future doing the thing he loved most was a move supported by wife, Mary, and

their two boys, Barry and Bryan. “The boys were denied a chance at a normal childhood because of my love of fishing. Thankfully, they inherited the lure of moving water, wilderness, and trout which still gives us time to spend together.”

In an example of unusual artistic irony, his early endeavors were

confined to watercolors as oil paints caused him allergic reactions—a self-inflicted wound as he used to wipe his brushes on his jeans exposing his skin to resins. “Now I do a lot of work with acrylics and watercolors,” he says, although the Ask Art web page shows him a practitioner of both acrylic and oils.

The lure of the outdoors coupled with his artistic dexterity soon defined him as an artist—fishing, wildlife, landscapes, and nature in general. “I love water that moves—it’s magical, a mystery, miraculous stuff that behaves differently than anything else. It’s where my inspiration comes from. I see things when I’m immersed in nature. Painting is really an exploration of trying to figure out things I don’t understand—it’s beautiful, but what does it mean when you end up with mist hanging over the water, the evolving shapes, a hatch of mayflies that appear from the river bottom and in just a few hours go through their entire life cycle. I just try to figure things like that out and as a result, my paintings are more questions than answers.”

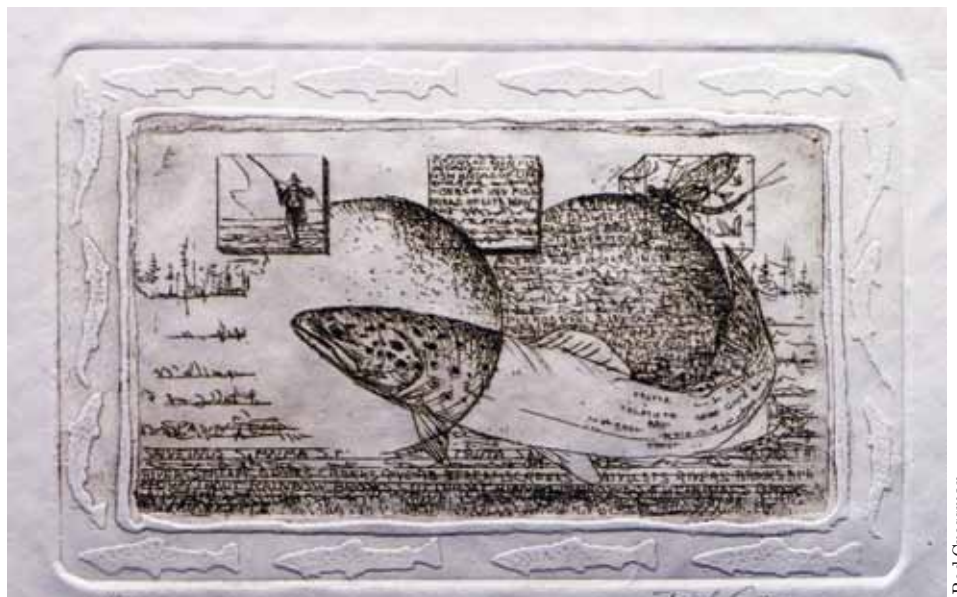
Crossman’s introspection parallels his search for artistic projects through what he calls “River Walks” he has taken over the past three years along the banks of a stream near his home. “The walks are ritual and meditative on my part,” he says. “They are also a mashup of interdisciplinary art practices including passive performance art, installation art, and community service.” Translated, that means his findings -- from car tires to baby bottles—become a part of his eco-art projects, indicative of explorations of human activity and environmental impact.

“What I’m in search of in a lot of my work often involves the mundane, things you see everyday, things you walk past and take for granted. Like brushing your teeth, same routine every day, but if you think about it in reverse, toothpaste going back into the tube—it’s an extraordinary revelation—seeing the familiar in an unfamiliar way.”



*Magic Hour 24" x 30" oil on canvas*

Rod Crossman



*Trout Journal 6" x 9" embossed etching*

Rod Crossman

Crossman's works have impressed many, none more so than Wayne Knight, art director for *Gray's Sporting Journal* who has used 43 Crossman images in 20 years: "He's one of my favorites because his art draws you into the painting, just like you were there. You can hear the stream flowing, feel the wind blowing at your back, hear game birds taking flight, smell a smoldering campfire and the coffee brewing—you just feel the excitement of a dog on point and the flush of a bird.

"His style continually evolves too. Just when you think his art couldn't get any better, it does. As the history of sporting art is written, Rod's name will be listed as one of the greats."

Years ago someone tried to define the essentials of Crossman's work by calling them "invisible elements in his paintings, emotions that lay exposed." Modest to the nth degree, the 6' 5" outdoorsman says although there are some abstract elements in

what he paints, he's a realist trying to represent subject matter. "The edges of things, both soft and hard, fascinate me and when you're in nature with its own atmosphere and light, those edges are affected. You get soft edges when light explodes while hard edges come in the form of silhouettes—you get contrast, dominance, and minority at the same time."

*Eddies'* cover image, *Two-Hearted River*, arose from springtime trout trips to the Upper Peninsula of Michigan, retracing the footsteps of Ernest Hemingway's personal camping and fishing exploits. Surprisingly, out of his entire portfolio, he has a personal favorite, a small oil titled *Waiting for Spring*, "one of the best little things I've done" as a lone fisherman, standing along the edges of a winding frozen stream in a snowy landscape, looks out in anticipation of angling to come. "It's a simple metaphor for bigger questions like 'why are we here'



*The Bridge 12" x 40" acrylic on canvas*

or ‘where are we going’—a visual expression of those questions,” he says.

Asked facetiously what he wants to be when he grows up, the 60-year-old says: “I hope I’m not grown up yet because part of the awe and wonder I enjoy comes from staying childlike. It’s one of the things I’m trying to hold on to.

“When I was young, I wanted to be famous and sell my paintings for lots of money. That was just not right. Now I feel like my work is its own reward.”

The artist’s web page, [www.rodcrossman.com](http://www.rodcrossman.com), has art samples in several categories ranging from sporting to abstract. ♦



Rod Crossman



Rod Crossman

*Migration 5”x 12” watercolor*

By Kevin Endejan

# Kokanee Moving Upstream

*Fish passage structure removes 70-year-old blockage*



Kevin Endejan

*Sammamish, Washington, landowner Wally Pereyra beams over the kokanee salmon swimming upstream through his property. Quilcena National Fish Hatchery and the Western Washington Fisheries Resources Office are among several entities involved in kokanee conservation.*

When Wally Pereyra says he's never seen anything like it before, take note. The Sammamish resident has lived along Ebricht Creek—a feeder to Lake Sammamish—just shy of 40 years. In that time, he said he's never seen so many brightly colored kokanee salmon splash their way up the adjacent waterway to spawn.

“This is the biggest run I've ever seen, by far,” said Pereyra, noting that in one day volunteers counted 1,100 kokanee in the stream. “I

think the total is going to be several thousand.”

David St. John, an administrator with King County's Department of Natural Resources and Parks, shares Pereyra's enthusiasm, but remains cautiously optimistic. “I never use the words ‘great,’ ‘good,’ ‘well’ or any of that, I just say we're doing better because there is a long way for us to go,” he said. “This is a good sign. We think something good is happening, something is going right.”

St. John said the first signal things were different this year came with an early run. The kokanee, which typically start spawning in mid- to late-November, began to run the last week of October—the earliest he's ever seen in 15 years of monitoring the species. And it wasn't just a few kokanee here or there—the feeder streams have remained thick with the bright red fish.

“There really hasn't been a drop off,” St. John said.

Typically only three streams—Ebright Creek, Laughing Jacobs Creek and Lewis Creek—have a significant number of fish spawn, but this year a new stream, Pine Lake Creek, started to see heavy numbers. While there’s no way for St. John to pinpoint the exact reason for the surge, he said it could be due to ideal lake conditions or the heavy rains that came at the end of October. He also has a hunch that the increase has a lot to do with the Issaquah Hatchery’s supplementation program—a project that started four years ago to prevent extinction of the native land-locked fish.

“If they came back this year, they would have been in the lake for three years and they’re usually four-year fish,” said St. John, noting the goal is to keep the hatchery program running for up to 12 years until the fish population has stabilized.

Whatever the cause of this fall’s fish explosion, St. John said the timing couldn’t have been better.



Roger Tabor/USFWS

*Biologist Kira Mazzi carefully handles a mature kokanee salmon. She collected tissue samples for further genetic study. Kokanee, though not sea-going in their adult life, are like all Pacific salmon; they spawn once and die.*

Pereyra recently fixed a major blockage on Ebright Creek, removing a 70-year-old cement culvert. The structure only had a 20-inch pipe running through it, allowing for only a lucky few fish to make it through and get full use of the creek.

This past summer, Pereyra had the culvert taken out, replacing it with a brand new 40,000-pound structure that allows the fish to comfortably swim upstream. Pereyra fully funded the project, he estimated at \$175,000.

“When the kokanee started coming up, they didn’t even stop and wave a fin or anything,” he said, laughing.

In an effort to keep the fish population growing, Pereyra recently purchased property adjacent to his that includes Zaccuse Creek—another stream he hopes can be reintroduced to spawning kokanee. When he bought his home in 1973, it only included 6.5 acres. Now Pereyra owns 25 acres that he has dedicated to improving fish habitat.

“I just think it’s such a wonderful asset to the city of Sammamish to have these fish coming back like this,” he said.

Numbers of this year’s Lake Sammamish kokanee run won’t be official until April, according to St. John. There’s little question, however, they will be the largest returns seen in quite some time—something he said wouldn’t be possible without neighbors of the surrounding creeks like Pereyra’s.

“I don’t think we could do this without folks from the community,” St. John said. ♦

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Kevin Endejan is the assistant editor of the Issaquah-Sammamish Reporter in Bellevue, Washington.

## Rolling Out the Redd Carpet

The Service and its partners are ecstatic about early results from the Lake Sammamish Kokanee Strategic Habitat Conservation effort. Hundreds of kokanee built spawning redds, or nests, upstream of the replaced culvert within weeks.

“The real success is that local communities have stepped forward, made kokanee recovery their own, to protect, reconnect, and restore the habitat and increase kokanee survival,” says Brad Thompson, Western Washington Fisheries Resource Office Project Leader.

The Lake Sammamish Kokanee Work Group partnership includes King County; the Washington Department of Fish and Wildlife; U.S. Fish and Wildlife Service; the cities of Issaquah, Redmond, Bellevue, and Sammamish; Trout Unlimited; the Snoqualmie Tribe; local landowners; and businesses like Darigold. The project also employs an emergency supplementation program at Quilcene National Fish Hatchery and Issaquah State Hatchery to prevent the possibility of near-term extinction. If future years see returns similar to this fall’s, that’s unlikely to happen.

“This year we’re seeing hundreds of kokanee spawners in a given day, repeated in multiple creeks, some streams where we haven’t seen fish in decades,” said Thompson. “That’s progress!” See [www.fws.gov/wafwo](http://www.fws.gov/wafwo) ♦ Sean Connelly

By Craig Springer

# A Calling to the Past

*Archivist preserves fisheries history for the future*



Craig Springer/USFWS

*German-born Hector von Bayer, an architect and engineer for the U.S. Fish Commission, designed this hatchery building in 1899. It originally housed hatching troughs, an office, and bedrooms. Today it houses a one-of-a-kind museum.*

You can see the pattern: *vocare*, *vocal*, *vocation*. What one's chosen field of endeavor, what they choose to do to earn their way in the world, is a calling. It's rooted in the Latin, *vocare*, "to be summonsed; to be called up to do something." And so it was for Randi Sue Smith of Spearfish, South Dakota, that she would become an archivist at one of the most unusual and arcane field stations of the U.S. Fish and Wildlife Service in all of the country.

Smith would be the first to tell you that knowing the present-day, fully, means knowing something about history. To know the present, you need to know the past. So then, here is some historical context about Smith's place of employment, the D.C. Booth Historic National Fish Hatchery and Archives in Spearfish.

This site, which is on the National Register of Historic Places, had its genesis near the end of the gilded age. Tucked toward the head of Ames Canyon, the U.S. Commission of Fish and Fisheries, an independent federal agency attendant to the Smithsonian Institution (and precursor to the U.S. Fish and Wildlife Service), sought to locate a fish-cultural station somewhere in the Black Hills. Streams pouring out of the hills were devoid of trout, though perfectly capable of supporting species of fishes with affinities for cold water. The Fish Commission in 1892 sent from Washington D.C., Barton W. Evermann, its Chief of Scientific Inquiry, to look into the matter. Evermann and crew not only examined potential hatchery sites, "but included an examination and study of the



physical and biological features of the waters, with especial reference to the species of fish and other animal life they already contain, and their suitability for stocking with other species of food-fishes not indigenous to them.” The waters of the Black Hills were thoroughly vetted by the scientist. It was Spearfish to which Evermann returned. And he tells Congress why:

“Spearfish Creek—This is by far the most picturesque of all the streams of the Black Hills seen by us. We examined Spearfish Creek at the town of Spearfish where it was 30 feet wide, 1 foot or more deep, and with a swift current. The bottom was gravelly and there was considerable vegetation along the banks. From it we took brook trout (planted), Jordan’s sucker [a species Evermann described for science in 1893 and named for his mentor David Starr Jordan], and western dace. The stream is a fine one, indeed. The bulk of its water comes from the hills, but even at Spearfish there are some fine springs. If fish-cultural work should ever be undertaken at any place in the Black Hills, the most satisfactory natural conditions could probably be found here.”

Indeed they were. The fish-cultural station did come to fruition when it was authorized by Congress in 1896. Construction started in 1898, a year later, the hatchery was operational. The rest they say, is history.

Fast forward a century, and enter Randi Sue Smith. Owner of a history degree from the University of California – Davis, with husband



Craig Springer/USFWS

*Archivist Randi Sue Smith has handled most of the 175,000 documents and objects at the D.C. Booth Historic National Fish Hatchery. Here, she stands over a tray filled with badges from yesterday, those worn by game wardens, fish car messengers, and National Wildlife Refuge agents. Some of the materials in this tray date to the 1870s.*

David and their three young boys, Smith arrives on the north edge of the Black Hills to do something for history – preserve it. Over the decades, Spearfish National Fish Hatchery would change its course on the caprice of Congress and others 1,500 miles away. Spearfish National Fish Hatchery would mutate into its current charge expressed in its new name, the D.C. Booth Historic National Fish Hatchery and Archives.

It’s the last part of the title where Smith makes her mark. The archival facility holds some 175,000 items in cabinets and boxes and shelves from not just the Black Hills, but from all over the country, all dealing with fisheries conservation in some fashion. It’s a national archives



Craig Springery/USFWS

*Before the advent of modern highways and aerated tank trucks, it was fish cars that delivered fish and fish eggs overland. This reproduction fish car stands on the grounds near the Hector von Bayer hatchery house. It's labeled "Bureau of Fisheries," as the U.S. Fish and Wildlife Service was known before 1940.*

of sorts of fish stuff. And all that important historical matter needs a curator.

Smith has Dakota family roots, but came of age in Concord, California. She started college majoring in math, but had a change of heart after she found the UC Davis campus Antique Mechanics Club. "I always had a thing for tractors," said Smith. "The club restored old farm equipment, showed tractors at events, and we went on collecting trips." The experience informed her future, and thus came along that *vocare*.

While earning a B.A. in History, Smith experienced internships at the Oakland Museum and the John Muir National Historic Site. Full-time employment didn't happen right away. "I waited tables, and did seasonal short-term historian work with California State Parks," said Smith. "History jobs turned up at the right time to keep me from wandering anywhere else." Smith volunteered at Grant-Kohrs Ranch National Historic Site in Montana. That turned into a full-time gig, and it's there she would be employed as a historian and curator for 15 years. In 1992, Smith made the move to D.C. Booth National Fish Hatchery and

Archives, to take over the growing collection of historic matter.

She would have much to do. “Bigger collections and museums have specialized workers; one who receives items; one to catalog; and one to exhibit—I do it all,” exclaimed Smith. “I love the variety, but sometimes the volume gets to me.”

Smith clearly has ownership in her work, calling the massive amount of materials in the archives, “my collection.” That’s probably deserved given she has handled most of the collection over the last 20 years.

“I like old stuff—how things used to be done, how things worked,” said Smith. In the archives collections, she has her favorites—like a Studebaker dump truck used at Williams Creek National Fish Hatchery in Arizona another lifetime ago. “These things tell a story,” she notes. “An antique rubber toy found here at Spearfish



Craig Springer/USFWS

*This woolen flag, the official symbol of the former U.S. Bureau of Fisheries, once ornamented a mast of a ship on the ocean or one working on the Mississippi River. Archivist Randi Sue Smith must ensure they remain wrinkle-free in storage.*



Craig Springer/USFWS

*The archive at D.C. Booth Historic National Fish Hatchery holds an impressive collection of official U.S. Bureau of Fisheries china. The dishes were used on board ships and at field stations.*



Craig Springer/USFWS

*She's labeled "U.S. Fisheries 39" on her bow and stands outside the Hector von Bayer Museum. Craft like this one were commonly used on big waters in fisheries work. This one is under protective cover while in full public view.*

always makes me think about the children who lived here years ago. One child drowned in 1944, and that always feels sad."

Aside from these sorts of objects, the archive preserves books, art, photos, reports, and correspondence--and even boats, nets, and pipes--that offer windows into fisheries conservation work done decades ago. Some items date to the 1850s, the nascent period of conservation in the United States. The museum collection is growing, and invaluable volunteers, interns, and seasonal staff help get the work done.

After 35 years as a professional historian, Smith plans to wade onward into the fisheries archives, citing "piles that need tending to."

Beneath the shadows of muscular oaks, inside the museum is Smith, with protective white gloves always nearby if not on her hands. Daily, she delves into putting things where



Craig Springer/USFWS

*Livingston Stone authored this mid-19th century book, which is in pristine condition. Stone was among the first scientists employed in the U.S. Fish Commission and he argued passionately in professional circles and the popular press for habitat conservation. His persistence paid off when President Benjamin Harrison issued Proclamation 343 on Christmas Eve 1892, creating the first federal refuge for wildlife—the Afognak Salmon Reserve in Alaska.*

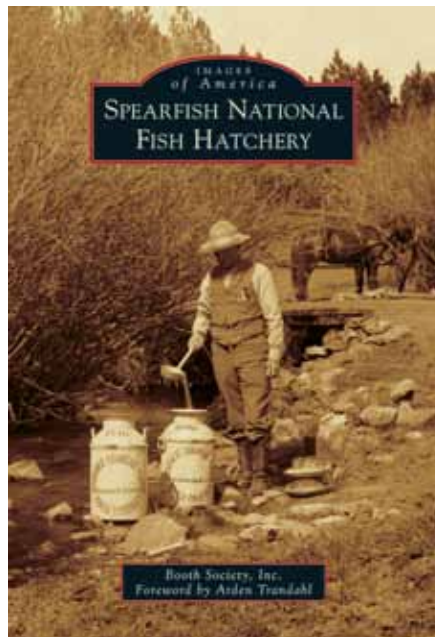


Craig Springer/USFWS

*This old house is as fun to tour as it is pleasing to look at. Known as the Booth House today, it was the home of several hatchery superintendents until 1983. DeWitt Clinton Booth retired and left the house in 1933. The home is open for tours and is appointed with period pieces, some of them original to the home.*

they belong in an orderly manner, marking items, cataloging, finding the right cabinet, the right file for future retrieval by researchers. “The objects speak all the time, saying ‘store me, put me away,’” quipped a smiling Smith.

She might hear the same voice at her house. The *vocare* and avocation in Smith’s case maybe aren’t so much separated. At home, she has a late-1930s Farmall tractor torn apart that also needs some tending to. Some interests never leave us. ♦



Craig Springer

*Editor’s note:  
Randi Sue Smith writes “From the Attic” in Eddies.*

*She’s co-authoring a history book in partnership with the Booth Society, Inc., titled, Spearfish National Fish Hatchery in Arcadia’s Images of America series. Look for it in June.*

*If you have items that belong in the Archives, contact Randi at (605) 642-7730 or randi\_smith@fws.gov*

By Michael L. Smith

# Celebrating 75 years of Success

## *Sport Fish Restoration projects improve angling*

Floating or wading, trolling or casting, no matter your method of angling, many opportunities that you enjoy today result from a successful user-pay form of conservation funding. And it's celebrating an anniversary. The Wildlife and Sport Fish Restoration program turned 75 years old in 2012.

The mechanism has been called "the cycle of success." Cycles start somewhere, and in this case it starts with you: the angler, the boater, the hunter. Your demand for boating and sporting gear generates an excise tax that goes to state fish and game agencies for on-the-ground conservation work, with the express

purpose of improving fishing and hunting.

There's a proven track record, 75 years' worth, and toward that end, here's a look at some recent projects that made a difference, all funded through the Sport Fish Restoration program.

### **Fishing in the Community – a North Carolina Solution**

"Sure, I want to take my kids fishing – but where?"

"I'd love to start fishing again – I just don't know how to go about it or even where to go."

"Well, fishing's great recreation, but who has the time to go all the way out in the country?"

Heard something like these grumbles before? So has the North Carolina Wildlife Resources Commission. In fact, queries and comments like the above are exactly what prompted the agency's statewide response to what has been a vexing national phenomenon – anglers drifting away from their sport.

The North Carolina solution, stated in its simplest form, is "bring the fishing to the people." But the process to arrive at that solution was a bit more involved and complex. Like most state fish and wildlife agencies, the Commission conducts fisheries management and research on a number of water bodies. But it simply doesn't have the fiscal capacity to build new lakes near towns and cities in order to attract new anglers or draw old ones back. So the Commission over a decade ago embarked on an innovative program to partner with municipalities and establish the Community Fishing Program (CFP).

From the mountains in the west, through the piedmont and down to the coastal plain, the CFP provides fishing opportunities in and near small towns and big cities alike. More than 40 ponds and lakes – and one stream – have been designated CFP sites. These waters are intensively managed to assure good chances for angler success.

Many of the sites have been further enhanced with fishing piers to provide ready access for anglers with physical challenges. Sites feature solar-powered fish feeders to keep the fish in a biting mood, and some sites have fish attractors to help congregate fish.

The program represents an excellent example of how the Sport Fish Restoration program funds fishing opportunities. The Commission and local governments operate CFP sites cooperatively. The Commission historically provided 75 percent of the operating funds through Sport Fish Restoration money, while the local government funded 25 percent and provides the fishing site. Most are conveniently located in city- or county-owned parks, so other recreational opportunities are often nearby. These sites are especially appealing to young families seeking enjoyable and economical outdoor recreation.

But what about fishing tackle? Well, the Commission has addressed that need as well. A companion to the

CFP is North Carolina's popular Fishing Tackle Loaner Program, which encourages first-time and novice anglers to borrow rods and reels free of charge. The program was introduced to bring North Carolinians, especially children, to fishing. It also encourages novice anglers to continue developing their fishing skills.

The Fishing Tackle Loaner Program operates just like a library. Anglers register at participating parks to receive a tackle loaner ID card, which allows them to check out a free rod and reel. Anglers under 18 must have a parent or guardian complete the registration form. Here's a bonus feature: first-time participants under 16 receive a free mini-tackle box, complete with lures, hooks, bobbers, sinkers and a stringer, when they return their loaner rod and reel.

The Fishing Tackle Loaner Program and Community Fishing Program are two imaginative and innovative uses of the Sport Fish Restoration fund—and both are helping recruit a whole new generation of North Carolina anglers. 🐟





Indiana DNR

*Indiana's St. Joseph River produces fine steelhead fishing.*

### The St. Joseph River in Indiana – a Vision of Success

The St. Joseph River rises in southwestern Michigan and starts its leisurely flow south and west through northern Indiana. As it traverses the Hoosier State, it wends and bends and finds its way north and west once again. It flows through South Bend, virtually in sight of the campus of the University of Notre Dame. And then the “St. Joe,” as it’s known locally, returns to its native state and enters Lake Michigan between the towns of St. Joseph and Benton Harbor.

Like many other rivers in the Great Lakes Basin, the St. Joe is rich in history and drains an area abundant and diverse in its agricultural and natural resources.

But, the St. Joe also is unique. It has one of the most remarkable anadromous fisheries in America,

and is the “go-to” water for the exciting Skamania steelhead.

This was not always the case. Less than 40 years ago, the St. Joe was but another struggling Midwestern fishery, pressed by industrialization and urban encroachment. Its fishery kept some local anglers busy and reasonably happy. But fishery managers and a relative handful of anglers in two states realized the river could become so much more.

In 1969, Michigan’s Department of Natural Resources (DNR) began an experimental stocking of trout and salmon in the lower 23 miles of the river. The results encouraged Michigan to forge ahead with fish passage structures on existing dams. These early successes with anadromous fishes on Michigan’s reach of the St. Joe led the Indiana DNR to engage in discussions with Michigan and the U.S. Fish and Wildlife Service to craft what would become “The St. Joseph River Interstate Cooperative Salmonid Management Plan” in 1980.

A significant portion of the early funding for the plan came from the now lapsed Anadromous Fish Conservation Act, which enabled Indiana to construct fish passage facilities around dams and secure increased public access for boaters and anglers.

Fully a third of the funding for the project came from the Sport Fish Restoration Fund. One of the great benefits of the SFR funds in the St. Joe project is the program’s ability to support long-term projects. It has helped sustain the dynamic partnership achieved among angling organizations, boaters, fishery managers, local communities and private industry, including American Electric Power.

The outstanding and nationally recognized Skamania steelhead fishery that brings throngs of anglers to the St. Joe each year is the result of careful planning. Project partners continue to strive for improvements in the fishery. The access developments in Indiana have been particularly notable.

While Indiana’s portion of the river supports a Skamania fishery for only 16 miles (compared to Michigan’s 47), Indiana DNR has sought to create a network of boat launch and angler access sites throughout this reach. Indiana has applied a portion of its SFR funds to create an important hatchery geared for Skamania steelhead production.

The advent of the Skamania steelhead fishery on the St. Joe in Indiana has been a boon not just to anglers, but also to the regional economy. It has generated several million dollars in local communities.

Thanks to the vision and cooperation of two states, the U.S. Fish and Wildlife Service and many organizations and individuals, an exciting fishery thrives where it had never existed. Thanks, in part, to the equipment and fuel expenditures of anglers and boaters, an award winning, top-rated steelhead fishery has been delivered to the doorstep of thousands of urban anglers. In fact, it’s now possible to spend your lunch hour in downtown South Bend or Mishawaka hooking into a leaping silver trophy of a lifetime. 🎣



Rich Klett/WDNR

*Wisconsin's Wild Rose State Fish Hatchery.*

### **Growing Wisconsin's Wild Rose**

By the end of the 1950s, Lake Michigan was known by many local anglers as the “Dead Sea” largely because of the devastating effects of various invasive species on native fish populations. A decade later, Wisconsin's Wild Rose State Fish Hatchery, in Central Wisconsin some 90 miles west of Green Bay, began stocking Pacific salmon species, and then trout, to help combat the problems associated with sea lamprey and alewife, a herring native to the Atlantic Ocean.

Today, the same facility annually produces 2.2 million trout and salmon that lure some 200,000 anglers to Lake Michigan. The facility also now produces northern pike for stocking statewide, most of the state's native lake sturgeon, most of the spotted musky and walleye, totally some 350,000 a year, in Green Bay and the Fox River.

Purchased by the State of Wisconsin from a fish farmer in 1908, the Wild Rose hatchery was set perfectly in a valley surrounded by hills that bubbled with groundwater. The natural springs feed the hatchery with an abundance of cold, clean water.

Over the years, however, hatchery raceways deteriorated and the flow and quality of the natural groundwater declined, and in turn affected the health of the fish reared there. At times, large numbers of fish died due to the poor conditions at Wild Rose. It was clear by the end of the 20th Century the entire facility needed some serious attention if it was to be efficient into the next century.

Toward that end, an environmental settlement with some of the industrial companies responsible for polluting the Lower Fox River and Green Bay

watershed provided a significant portion of funding to fix the hatchery; another significant portion came from the Sport Fish Restoration Fund.

With funding in place, fisheries and engineering professionals developed a plan to address the facility's design, maintenance and construction needs to make it meet environmental laws and reverse declining fish production. The first phase saw the construction of a new building to shelter broodstock, incubate eggs and rear young fish in several new tanks and raceways. The old, failing artesian wells were sealed to protect from groundwater contamination, and new deeper wells were drilled to provide water that is filtered and recirculated throughout the new raceways. Additionally, a visitor's center was built that incorporates four of the facility's historic buildings and tells the important history of the Wild Rose fish hatchery. A new wastewater



system keeps the water discharged from the hatchery into Pine River, a quality trout stream, as clean as possible. A second phase involved a new coolwater incubation and rearing facilities and modern rearing ponds, for raising pike, sturgeon, walleye and muskie.

All told, the renovation project allows Wild Rose to produce healthier fish and increase coldwater production for trout and salmon by about 15

percent. Eventually the hatchery will be able to nearly double its production of coolwater fish like northern pike, musky, sturgeon and walleye.

Efforts such as these promise to keep what was once perceived as a “dead” fishery at memory’s distant bay as happy anglers now shell out some \$2.3 billion every year to partake in Wisconsin’s thriving sport fishing industry. 🐟



Rich Klett/WDNR

Lake sturgeon are among the several fish species benefitting from the upgrade at Wild Rose State Fish Hatchery.

### Iowa Walleye – Long-term Research Yields Widespread Gains

No one who has ever seen *Field of Dreams* can forget the signature line from that motion picture: “Build it and they will come.” That movie’s premise was about hewing a baseball field in a mythic Iowa cornfield and awaiting the appearance of diamond greats from yesteryear. In movie lingo, it took some real “suspension of disbelief.”

What if the scenario was changed just a bit: no ball diamonds, but fishing lakes amidst the nearly endless fields of Iowa corn? And what if the fabled legend to emerge from another era was a fish, and one particular about its needs for clear, clean water:

Well, the fish is the walleye in the real-world Iowa, and the tale is completely true. Walleye are not the easiest fish to raise under hatchery conditions. In fact, they can be one of the more challenging species fish culturists work with. But because the walleye is such a popular species, many states spend considerable effort to assure its availability to anglers.

Iowa’s approach to improving its walleye fishery has always been guided by the principles: how can we make the fishing better, and how can we make our stocking efforts more effective and efficient.

The Iowa Department of Natural Resources (DNR) began a long-term and comprehensive effort to improve

its walleye more than 25 years ago. DNR biologists embarked on several long-range projects designed to up walleye available for harvest, while at the same time making it a species more economically attractive to raise and release.

In some of their studies, DNR researchers demonstrated that stocking walleye fry supported a fishery. But timing of the stocking and location were vitally important. Stocking walleye fry in rivers during high-water and periods of turbidity yielded very few fish that anglers could harvest. They also found that stocking fry well upstream of popular fishing areas resulted in better catch rates.

Other research projects have disclosed that stocking larger walleye fingerlings in lakes, including fish seven inches or larger produced better survival than use of smaller fry and also resulted in increased angler harvest.

But growing walleye to 10 inches long required innovation and a willingness to explore new techniques. One method Iowa pioneered involves the use of what was once considered an experimental technique on a large production scale. Iowa researchers showed convincingly that walleye fry can be transferred successfully from hatchery ponds to intensive inside tank culture.

After the walleye fry reach nearly two inches, they go into tanks in dark rooms and trained to accept a specially formulated high-protein pellet feed. The darkened rooms reduce stress on the young fish, which in turn aided their growth. As a result, Iowa enjoys unusually high survival rates from the fry stage to advanced, stocking-sized fingerling. That’s been good for the fish and for the fishermen.

Iowa’s work has focused on continuing refinements not only in determining the best sizes, times and locations for effective stocking, but also in producing maximum value for the recreational dollar. Along the way, the DNR has been able to show, quite compellingly, that improved water quality improves angling and increases outdoor recreational.

The walleye work carried out in Iowa demonstrates anew one of the great benefits of the Sport Fish Restoration program—the ability to conduct long-term, inter-related research and management projects. Iowa DNR’s walleye work yields important information and management options to benefit present and future Iowa anglers. Their groundbreaking work will have valuable applications well beyond the Hawkeye State, proving once again: “Build it and they will come.” ♦

# Meanders

By Craig Springer

## Aesthetic Exercise

Scraps of a 35-year-old memory plays behind my eyes, pieced together in fragments. Aged memories are overlain in layers like the autumn sky that I see. It's variegated in various shades of gray, leaden like fresh glazier's putty and sullen like soot, but yet there is a pleasant platinum quality in the shadowless light. Clouds move in thick lumpy layers, like they can't quite mix with one another. Fat raindrops patter the ground. Sodden soil curls around my boots as I slog through a fallow field that hadn't been plowed for a few years. A Winchester 12-gauge pump shotgun gets heavy on my shoulder. I am but a wiry boy, barely 16 years of age.

In an adjacent cathedral-like woodlot, a blue jay's scolding chatter arcs through the cold air. Bony branched Osage orange trees line some of the fences on this old Ohio farm near where I lived for a time as a kid. The tree's softball-sized pomes that look more like rusty-green brains than they do oranges litter the fields' edges. They lie over last summer's grasses laid level by wind and rains and killing frosts. Common hackberry trees crop up in the corners on this old place. Their gnarled gray stucco bark mirrors the sky above. The brown hulls of Queen Anne's lace too wet to crackle belie the snowy white umbrella-topped flowers

that they were in summer. The briar tangles reach through rusted field fence and scrape my brush pants already tattered by previous such encounters.

Ninety acres of brambles and hedge rows and fallow rocky fields, they cut at right angles through the recesses of recollection. Tiny silver rills populated with southern redbelly dace and orangethroated darters dissect the smooth distant hills that were a patchwork of fields and woodlots, like a lumpy symmetric quilt that rises and falls. I fancy that these fields I hunt in memory once looked more manicured before they turned fallow. Pioneering vegetation softens the visual edges. The place wasn't too productive for farming; seads of erratic protruding rocks scraped by the disc spoke to that. So did the occasional small cairns in the corners beneath the common hackberries that marked nothing in particular, save for the muscle and sweat that went into the land many years back. Old farmland reverted to a mosaic of hardwood forest and pockets of prairie made an ideal place for a bobwhite quail hunter in the autumn.

Come early November, it usually brought with it the first real makings of winter: cold, wet, dismally gray, sometimes in doses a week long. But it also brought with it in a complex paradox something that was spiritually uplifting, hunting seasons.

Despite the press of years, this place and the experiences that it yielded are an everlasting spiritual larder. All things spiritual rise. Most any ardent hunter or angler will tell you that a full-immersion experience in nature that comes with hunting and fishing is, irreducibly, a spiritual one. Witness the dissonance of a ringneck pheasant as it puts sky between the two of you; or the disquieting skirr that comes with a covey of quail taking to the wing from your ankles—they both turn your eyes upward. A smallmouth bass takes a floating stickbait then leaps and smacks the water. From a dark lair, a cutthroat trout rises to the ring on the water from a deftly laid elk-hair caddis. Duck hunters scan the skies for distant black specks. Goose hunters sit in pits listening for the jarring cacophony coming from afar; their eyes and thoughts turn upward. Blue grouse hunters in the West, already in the high country, their eyes are drawn upward to the tops of blue spruce and white fir on the flush. All of these things have an upward movement. All of them immerse you in nature. All of them sharpen your senses, and all of them are without question, spiritual experience.

Few hunters and anglers in our contemporary society go afield strictly to put food in the freezer. People hunt and fish for the aesthetic ritual and the kernel of ritual is spiritual experience. "The duck hunter in his blind and the operatic singer on the stage, despite the

disparity of their accouterments, are doing the same thing,” said the father of modern wildlife management, Aldo Leopold. He reduced the reasons for this odd comparison. “Each is reviving, in play, a drama formerly inherent in daily life. Both are, in the last analysis, aesthetic exercises.”

Hunters describe their full-immersion nature-experience in varying degrees as connecting with the fruits of the land in ways that can't come from other recreations. Writers from Socrates to Aldo Leopold to Ortega y Gasset to James Swan mused that the experience of hunting clarifies the mind. Hunting fully immerses the hunter as a participant not just observing nature, but one who is in nature. This is true, too, for angling. It's deeply emotive—like a painter locked in the canvas, a writer living in the page, a carpenter crafting the right cut—all caught in the muse. It is nature that makes us human and hunting and fishing makes our existence cogent.

These things are recreation; your senses stir and awaken to

*“Most any ardent hunter or angler will tell you that a full-immersion experience in nature that comes with hunting and fishing is, irreducibly, a spiritual one.”*

re-create one's own being. The aesthetic primordial act of hunting is paradoxical: immersed in the hunt that could end in death is life-affirming. And that speaks to core of why hunters—and anglers too—are conservationists, why they care immensely for nature. Conservation of wild things in wild places matter to people. For the last 75 years, it's been the hunter and the angler, and the boater, too, who have funded conservation through the Wildlife and Sport Fish Restoration programs in the U.S. Fish and Wildlife Service. If you've bought a lure, a box of shotgun shells, or boat fuel, you've helped fund conservation through an excise tax on sporting gear.

Old memories still fuel me. One of my favorite places to hunt Mearns quail in New Mexico where I live is at the juncture of two dry ravines where a spring wells up through a crack in the earth. On a jutting rock outcrop, a lone knarled netleaf hackberry hangs by roots that palm through crevices. Its knobbed corky bark is just like that found on common hackberries growing on a fallow Ohio field from my youth. The lone tree near a wet desert seep evokes an everlasting

fluid image that flows behind the orbits of my eyes. A covey of bobwhite quail takes to the wing in a flurry. My 12-gauge kicks my skinny frame and a thud hits my ears. The birds' brown forms in flight pass through the hackberry trees and meld into a miasma, swallowed by a sooty gray sky.

Over and again these many years, I have lived in that fixed spot of time. Chance encounters with wild things in wild places registered. Those odd acres made an impress upon my morals. Deeper yet, the land that I will probably never see again still serves up spiritual food that sticks to my ribs. ♦

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Craig Springer is a fish biologist and editor of *Eddies*.

# Eddies

*Reflections on Fisheries Conservation*

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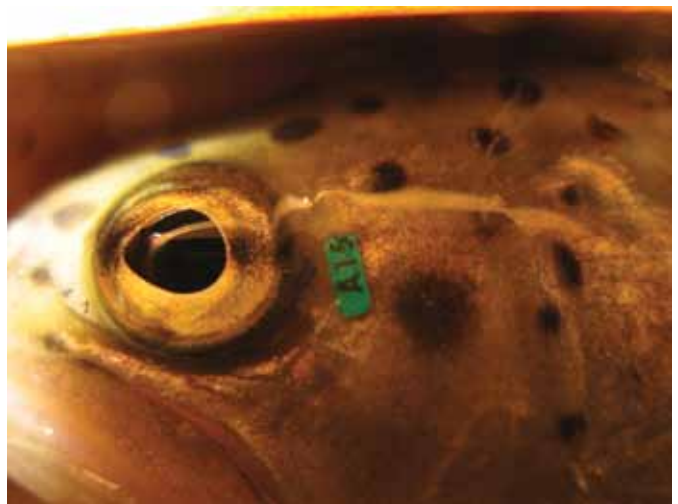
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## Tagged for Conservation

It's a small tag, but very useful. Biologists from the Arizona Fish and Wildlife Conservation Office use tiny implanted tags to study the survival and growth of Apache trout. The yellow fish is listed as a threatened species, and biologists aim to improve its conservation status. Toward that end, it's necessary to catch and handle and release Apache trout in the wild to learn more about them. Also, electrofishing is one tool used to remove competing nonnative brown trout, by temporarily lightly stunning the fish so they may be captured. Some Apache trout are also stunned, but not removed. The tagged fish provide data on the efficiency of electrofishing.

By monitoring tagged Apache trout and the population as a whole, biologists will be better equipped to make future management decisions. Future tagging studies may include tracking the movement and growth of populations of Apache trout that are pursued by anglers. ♦ Jeremy Voeltz



Jeremy Voeltz/USFWS

*These tiny tags are a simple and relatively inexpensive way to individually track fish for studies such as movement, growth, and survival. The tag is readable just under skin of this Apache trout.*

