F-17-12

COOPERATIVE EFFORTS TO IMPROVE STREAMFLOWS, FISH HABITAT AND SPAWNING SUCCESS IN TWO MISSOURI RIVER TRIBUTARIES

Prepared for the

National Instream Flow Program Assessment
Denver, Colorado

February 20-24, 1995

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Ron Spoon[1] and Liter Spence[2]

February 15, 1995

For over 30 years, fish habitat preservation has been a priority activity for Montana Fish, Wildlife and Parks biologists. In 1963, the Montana legislature passed the Montana Stream Protection Act, the first such law in the nation designed to protect the physical features of streams. The act gave FWP the authority to regulate state and local government activities involving potential alterations to stream channels. The Natural Streambed and Land Preservation Act was passed in 1975. This act, commonly called the "310" law, extended the responsibility for protecting the physical features of streams to include the activities of private persons. The law is administered by the Conservation Districts with participation by FWP. Both laws require a permit before physical activity in streams is allowed.

Efforts to ensure that Montana streams had an adequate quantity of water began in 1969 with passage of a bill the allowed FWP to file on the unappropriated water in portions of 12 of our highest quality "Blue Ribbon" trout streams. These instream filings became known as "Murphy Rights" after the sponsor of the legislation.

Four years later, the 1973 Water Use Act was passed. Among other changes to Montana water law, this act authorizes state and federal agencies and their subdivisions to apply for water reservations for a variety of purposes, one of which is instream flows for fish and wildlife. To date, FWP has instream reservations on 278 streams, one lake and one wetland in the Missouri and Yellowstone river basins.

A water leasing program to enhance instream flows for fish and

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wildlife was authorized by the 1989 legislature. This law allows FWP to lease, from willing individuals, their existing water rights and convert them to instream flows. FWP has implemented three leases to date, with several others in the approval process.

All of these programs have helped protect and restore stream fisheries through law. However, missing from the agenda until recently, have been efforts to restore a stream's physical habitat through cooperative efforts with landowners through whose property the streams flow or who utilize their waters.

During the last few years, FWP has embarked on programs to restore the physical nature of stream channels and their flow regimes through cooperative efforts with individual landowners and water user organizations. Deep Creek and Dry Creek are two examples where these efforts have been successful in helping restore spawning and rearing conditions for rainbow trout that contribute to an important reservoir fishery near Townsend, Montana.

The Missouri River flows into Canyon Ferry Reservoir near Townsend. The reservoir is an important rainbow fishery. Some rainbows leave the reservoir to spawn in the Missouri River and some of its tributaries when conditions allow it. However, until recent stream restoration efforts, tributaries have been unsuitable for spawning.

Deep Creek Flow and Habitat Enhancement

Deep Creek is a tributary to the Missouri River near Townsend. For many years, an irrigation canal intercepted Deep Creek and blocked the upstream migration of spawning trout from the Missouri River and Canyon Ferry Reservoir. Portions of the stream also suffered from dewatering and sediment loading. This project involved installation of a large siphon that routes canal water under Deep Creek, thereby removing the migration barrier. Additionally, an agreement was reached with the Broadwater-Missouri Water Users Association to release surplus water into the lower three miles of Deep Creek during a season when it was previously dewatered. Also, private water users downstream of the release site cooperate by allowing water to pass by. Finally, sediment loading has been reduced by a riparian fencing project and improved irrigation practices.

Since the project was begun in 1992, flows in Deep Creek, during the rainbow spawning and rearing periods have dramatically improved. Flows historically were critically low during the peak irrigation season. In 1992 and 1994, which where drought years, a 2-mile reach above the release site was completely dry at times. Below the release site, the cooperative effort has resulted in a recommended flow of 3.0 cfs being maintained on all but two days in 1992 and five days in 1994. However, minimum flows of 1.0 cfs and 2.0 cfs, respectively, were maintained in those years. In 1993, no

flows were below 3.0 cfs.

The removal of the migration barrier has resulted in an increase in spawning rainbow trout in Deep Creek. The estimated rainbow spawning run in 1994 was 3,400 fish. During 1992 and 1993, significant numbers of spawners entered the creek, but we have poor estimates of total numbers. Some of these fish are utilizing spawning habitat as far as 20 miles upstream from the former migration barrier. This has been a cooperative effort with the Department of Health and Environmental Sciences and private landowners in the area. The EPA has provided additional funding to develop a watershed plan and further address sediment loading. The total cost of the siphon and related structures was about $237,000.

Dry Creek Flow Enhancement

Dry Creek, another tributary to the Missouri River near Townsend, has been historically dewatered due to irrigation withdrawals. In 1991, FWP's local biologist was able to work with landowners to provide flow releases to maintain incubating eggs laid by spawning fish that had entered Dry Creek from the Missouri River. Surplus water releases by both the Broadwater-Missouri Ditch and the Big Springs Ditch are typically 2-3 cfs during the egg incubation period. These releases are the result of the voluntary cooperation and good will of the landowners. Since flows have been enhanced in the approximately 1-mile reach of Dry Creek below the Broadwater-Missouri Ditch, about 8,000 rainbow fry were produced in 1991 and 1992. Data is poor for 1993 due to high flows which reduced sampling success. There was no evidence of fry production in 1994 due to an inadvertent shut-down of the flow releases that dewatered the stream. This problem will be corrected in 1995 by installing a new headgate that will be regulated by the local fishery biologist.

Please refer to the attached article from Montana Outdoors, FWP's bimonthly magazine entitled "Second Genesis for Trout", for a more in depth discussion of the process involved in restoring these two important spawning streams.

Note: Of particular importance in these two projects, is the cooperation and enthusiasm of the landowners and water users that made them a success. Releases of water for fisheries has not hindered their own water use and they have taken pride and ownership in reestablishment of the two spawning streams. A third project is underway to improve an "unnatural" channel entering the Missouri as a spawning site. The Broadwater-Missouri Water Users Association and MFWP tested the concept in 1994. Water was successfully delivered from May-October and the water users have authorized these water releases in future years.

SECOND GENESIS FOR TROUT

by JEFF STOFFER

IT'S LATE JUNE 1991, the seventh of eight straight drought years in the upper Missouri River Valley, and two men of stereotypically opposed interests are tromping through the last trickle of Dry Creek's spring runoff. One of the men, Ray Doig, is a life-long Broadwater County landowner, former county commissioner, and a rancher/farmer who for decades has relied on the agricultural lifeblood of the valley—irrigation water diverted from the Missouri River and its tributaries. The other man is fisheries biologist Ron Spoon, a newcomer to the area, whose challenge is to convince irrigators that a new water diversion is needed—not to save crops from withering, but to restore trout spawning beds.

In silence, they cross Dry Creek, which drains down the rugged gulches of the lower Big Belt Mountains before intersecting the Broadwater-Missouri Canal, an irrigation ditch that flows through about 50 miles of the county. The water is low, and it will get lower before drying up completely, an annual occurrence during irrigation season for decades.

Nervously, Spoon breaks the silence and tells Doig to watch his step. He may plant a foot into a bed of new eggs laid in the gravel during the spring spawn. Doig, wearing worn coveralls and holding a video camera on his shoulder, stops abruptly and says, "I wonder how many thousands of fish eggs I've stepped on over the years."

They continue wading upstream. Spoon checks a trap he has set to count the number of new rainbow fry this summer. Doig rolls the videotape and catches a glimpse of disappointment cross Spoon's face. Spoon looks in the trap, then at the low flow of the stream. He fully expects thousands of the fry to perish when the creek goes dry. Irrigators from Grassy Mountain south will have drained it to bring life to Broadwater County's leading industry—agriculture. Doig listens quietly as Spoon describes the dilemma. Spoon doesn't expect much sympathy. It is, after all, a drought year. Spoon finishes his trap-checking, wondering about the futility of his work, and the two men climb into their pickups and go separate ways.

"THE NEXT DAY, I THINK IT WAS JULY 1, I returned to Dry Creek and found plenty of water and large numbers of rainbow fry in my trap," Spoon says. "The previous evening, Ray traveled upstream and began releasing water from the Broadwater-Missouri Canal into Dry Creek. The primary users of the water were not formally notified. It was a matter of opening the head gates and asking questions later."

That's when Spoon really got nervous. The newcomer did not fully understand the depth of Ray Doig's influence in Broadwater County, a place where if one of its prominent citizens decides to forfeit some irrigation water to save some fish, that's what happens. No questions asked.

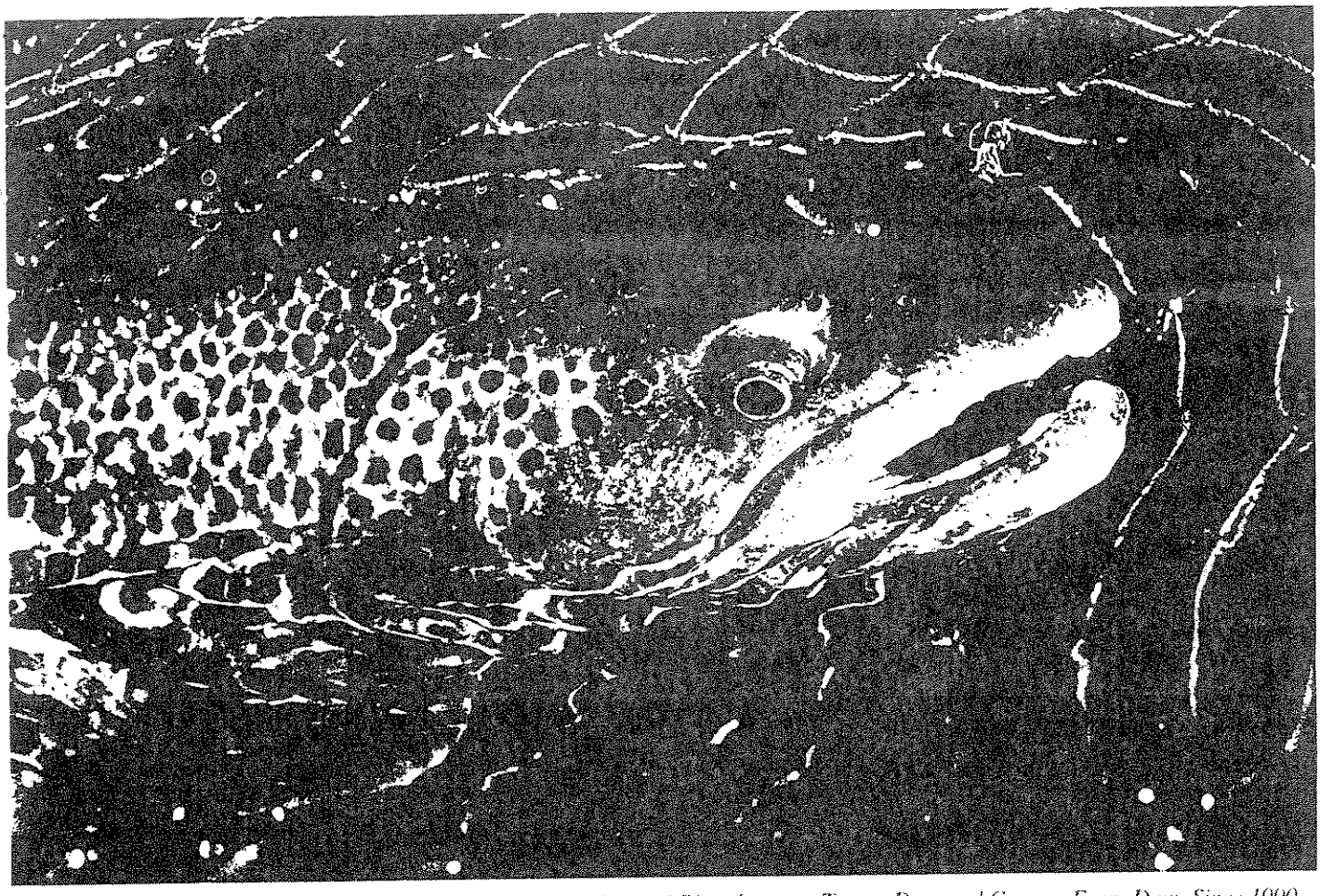
Doig's individual turn of the faucet launched a wave of cooperation between Broadwater County landowners and the Montana Department of Fish, Wildlife & Parks (FW&P). Now, the landowners and biologists work in unison toward restoring depleted trout populations of recent years on the upper Missouri.

Landowners up and down the valley have been quietly changing a way of life. For generations, they have been drying out Missouri River tributaries to feed ditches and canals that water their fields. Now, things are different. They carefully keep the creeks flowing with clean water until after the new trout have moved out of the stream. They have abandoned the trout-unfriendly practice of flushing the winter's build-up of tumbleweeds, sediment, and other debris down Dry and Deep creeks at the opening of irrigation season, burying the lower-end spawning beds.

Landowners are also taking a closer look at the way stream banks have been eroding. Tons of earth yearly slough into the streams, clogging spawning beds. After allowing FW&P to measure the extent of erosion on the banks, some landowners began fencing them, giving the riparian environment a chance to rejuvenate. Landowners have not only made these changes voluntarily, they have done so with a sense of proprietorship for the county's fishery.

Radersburg-area rancher Maurice Ferrat has stood knee-deep in tiny Marsh Creek, which runs through his property, and helped biologists milk brown trout eggs in a temporary holding pen. "These fish were conceived on my property," he said after the eggs he helped milk returned as fingerlings to the Missouri a year later.

All these acts of cooperation from landowners have been essential to FW&P's



In the mid-1980s, trout populations began to decline in the Missouri River between Toston Dam and Canyon Ferry Dam. Since 1990, FW&P biologists and area landowners have worked to restore them by keeping water flowing in spawning tributaries, curtailing erosion, and protecting stream banks.

trout repopulation project. "They've treated these streams as water delivery systems," says Spoon. "That is the change."

Since the mid-1980s, brown and rainbow trout populations have rapidly fallen on the upper Missouri. The stretch between Toston Dam and Canyon Ferry Dam is designated as a Class I—or "blue ribbon"—trout fishing area. Canyon Ferry Reservoir north of Townsend is Montana's most popular state recreation area, with more than 200,000 visitors a year. Its economic impact for the state was estimated at $6.5 million in 1989. That was before anglers began giving up on the declining fishery. In the last three years, businesses in Townsend have suffered through the trout depletion, no longer drawing the motel and restaurant traffic they did when creels came back full of trout ranging from one to three pounds. A Townsend tackle store and guide service closed its doors in 1987. State concessionaires who operate marinas and stores along the reservoir's perimeter have seen their boat slips go vacant. As the fishing swung downward, a movement was launched to turn Canyon Ferry Reservoir into a walleye fishery.

The aquatic system was ailing, and one reason was the practice of severing creeks from the Missouri River during irrigation season, which coincides with the spring hatch and migration of new trout fry. Nearly a decade of drought has worsened the situation. Creeks were run dry earlier in the year and for longer durations.

A little more than a year after the department's repopulation effort began in full, the trout fishery and habitat have dramatically improved. Biologists still await conclusive results from the work, but when they cast their fish-counting gill nets at 18 locations in Canyon Ferry Reservoir last fall, they collected a record number of rainbows. In recent years, biologists have counted between four and seven fish per net. This past fall, the nets averaged 18.2 rainbows. The largest previous collection, in 1986, turned up an average of 16.7 rainbows per net. In part, the increase is attributed to a switch from the Arlee strain to wild Eagle Lake and DeSmet rainbows. Improved spawning habitat has been a simultaneous, essential ingredient.

The trout project includes three main elements: one, a specialized stocking technique for brown trout that mimics wild reproduction; two, the switch from Arlee rainbows that live only two or three years and won't spawn on their own to the wild strains that live five to seven years and can successfully reproduce; and three, management of the region from Toston Dam to Canyon Ferry Dam as one unified circulatory system. Landowners have helped link the system's veins and capillaries. The clots have been removed.

The work was begun for a variety of reasons. First, there was the meager fishing. Funding for such a project also became available through the Department of Natural Resources and Conservation's (DNRC)

Toston Dam Mitigation Project. That money came after the DNRC added a turbine to the 50-year-old dam three years ago, an addition that was expected to cause significant fish losses. Largely, that is what's paying for the trout habitat improvement work now under way.

"We felt that when we started this project in 1990 that it would take four or five years to reach the goal of 20 trout per net," says FW&P's Region Three Fisheries Manager Richard Vincent. "We're almost there in three. Another year and we're definitely there."

FALL OF 1991 IS NEARING.

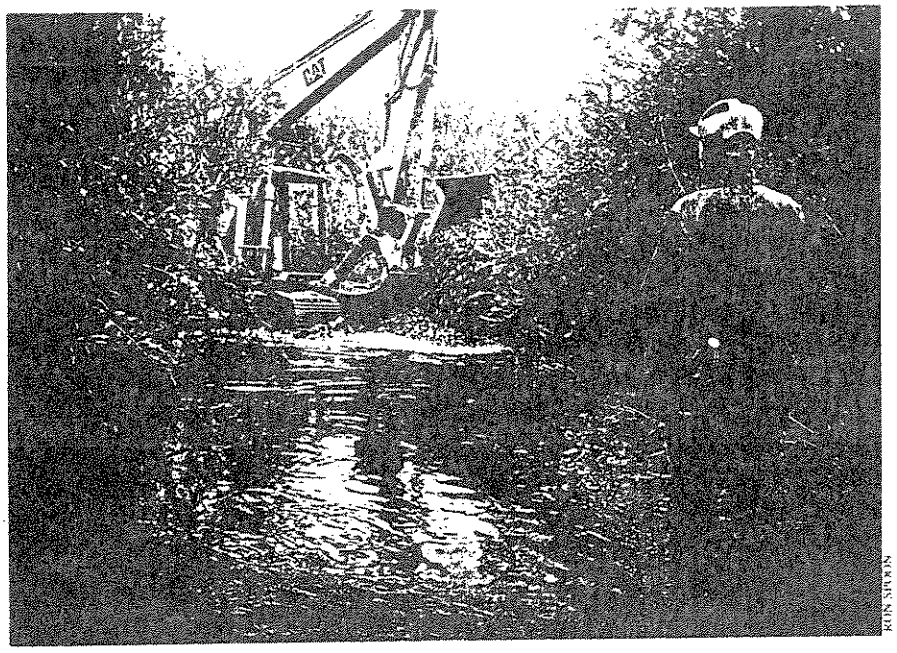
Doig and Spoon are wading up Deep Creek. Spoon is pacing off the number of feet of eroding stream bank. They are finding exposed banks six to 10 feet high and 50 feet in length. A little more of the bank slides into the stream with each new spring runoff, partly because the vegetation, which holds the stream bank together, is missing. Over the years, the plants have been removed, the stream shortened in places, narrowed, and rechanneled. Its natural dynamics have been reordered by human hands.

Doig watches Spoon measure the bank. A low-level aerial survey of the creek has given him a map from which to identify problem areas and monitor them.

Doig has a different measurement method in mind. "I can tell you how to measure it," Doig tells Spoon, pointing upstream to two fence posts suspended midair over the vanishing bank. "See those two posts? I've been watching some posts upstream for a few years. There used to be two in the air up on one place. Now there are six."

Doig, Spoon, three scientists from the Water Quality Bureau of the Montana Department of Health and Environmental Sciences, and the U.S. Soil Conservation Service's Larry Robertson walked about 19 miles of Deep Creek, measuring erosion from the mouth of the stream to the Helena National Forest boundary. Landowners along the way gave permission to conduct the study. They measured 165,765 square feet of eroding bank, approximately 3.8 acres. Earlier in the year, on a lower stretch of the creek surrounded by pastures, Spoon measured more than 24 tons of sediment moving downstream in one day. "Those banks were sloughing a lot of material," he says. "The problem here is that landowners are losing their pasture, and their pasture is ending up on fish spawning gravels."

Livestock contribute to the erosion problem, so FW&P has offered landowners along Deep Creek funding to put up fences. The work is paid for through funding sources such as the River Restoration Program, which is endowed by a recent 50-cent increase in the price of fishing licenses. When Broadwater County ranchers John and Chuck Hahn signed a contract in October to fence their cattle away from Deep Creek, the Upland Game Bird Habitat Enhancement Program was designated as the funding source because plants along streams are not only helpful to fish, but also to a variety of wildlife, including pheasants.



Broadwater County landowner Ray Doig watches as spawning-bed gravels for trout are dumped and spread in Confederate Creek. Trout from Canyon Ferry Reservoir have found their way to the new beds, created in September of 1991.

Agricultural water users of the region are looking at the environment differently these days. "For generations, the stream was dewatered, and the riparian growth was in poor shape," Spoon says. "For a person growing up here, that's the way it always looked. They didn't see it as being unhealthy. That's just what it looked like."

"Since 1940—that's when the first water came down the canal—we *always* dumped all the Russian thistle and debris from the winter down Deep Creek," explains Robert Davis, chairman of the Broadwater-Missouri Water Users Association. "We did it until 1992." That was when Spoon went to the board and explained that the practice was burying the spring trout spawn. The water users did not realize it. "We said, 'Hey, if this is important to the fish, we can't keep doing it—covering up their beds with silt and trash.' Not being in fish management, we just weren't aware of any negative effect."

The board owns a $100,000 excavator, and last spring Davis and other water users put it to work clearing the Broadwater-Missouri Canal of winter build-up. They spent 36 sleepless hours working section by section as the season's initial irrigation water flowed in. Deep Creek was saved from an avalanche of mud and tumbleweeds that would have buried a quarter of a million trout eggs downstream.

The benefit was twofold, Davis says. "We've run with less water out of the Missouri River than ever because this is a clean canal. And we've got a good fishery."

Meanwhile, landowners are continuing their practice of rewatering the creek and limiting their draw during the trout incubation period. They've made sure at least some water flows between the canal and the creek mouths, the sections that usually run dry. "We needed just enough water to keep spawning gravels wet, enough for a one-

such fish to migrate over a riffle," Spoon says. "We had a solution. We asked for a small amount of water for a specific period of time."

Irrigators also have had to schedule chemical treatment of the canal—the only dose of acrolein which kills algae and moss—around the incubation period. Before, they only had to schedule the treatments among themselves. "That time of year, it wasn't a hell of a lot of sacrifice," Big Springs Ditch Chairman Ted Flynn says. "If they'd have said we needed this in the middle of July, it might have been different. But this is mutually beneficial. We're really pretty easy to get along with." All they needed to do was stagger their treatments to allow one ditch to rewater the creek while another was in the toxic period. For the irrigators, much of the transition has been a matter of timing.

"We're not taking any water away from anyone," says Davis. "We used to manage this thing for our benefit only. Now, we can do it for the fish, too, and not hurt a soul."

IT IS A WINDY SEPTEMBER AFTERNOON IN 1992 near the base of Toston Dam. Jack Boyce, manager of the Big Springs Hatchery in Lewistown, backs an FW&P tanker truck down a boat ramp, and climbs out of the cab and onto the back to begin replacing hatchery water with Missouri River water. Boyce has been careful to match the temperatures as closely as possible to avoid shocking the fingerlings when they enter their new world.

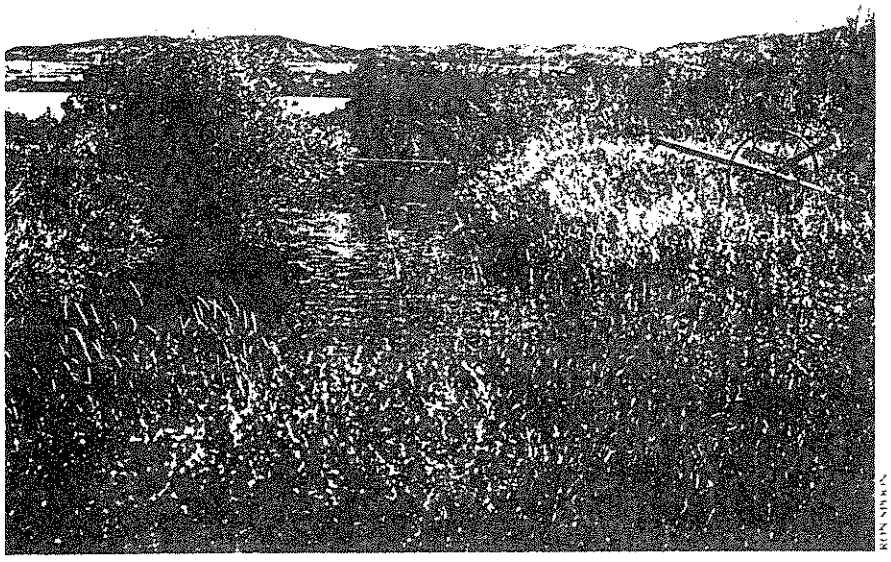
He opens the first four tanks, and foamy fish slime billows into the wind. Spoon is there, standing in the gray water next to Ferrat, the Radersburg rancher, and Jerry Reller, the Canyon Ferry Reservoir concessionaire at Goose Bay Marina. Ferrat has a 35-millimeter camera around his neck. Reller has a video camera. They look something like expectant fathers.

River water has finally replaced tank water. The temperatures are about the same, the river a touch colder. Boyce opens the hatch. The water suddenly boils and pops with fingerling brown trout. They flip and jump through the surface as if not sure whether to swim or to fly.

Brown trout have not been planted in this region since the 1950s. They have been on their own, a self-sustaining, but gradually declining, population. This new batch represents a second genesis for the browns. They are being asked to spawn in the newly modified habitat and start another self-sustaining population.

In nature, brown trout reproduction is complicated and risky. Adults migrate many miles to lay eggs in a specific habitat that only their instincts tell them exists. The eggs incubate in the icy winter water, and fry emerge in the spring. The tiny new fish swirl in the gravel, feeling out their new world. Then, as instinctively as the adults came to spawn, they move downstream. "It's a tenuous situation with many predators," Spoon says. "There is extremely high mortality at that phase of their life."

This summer's stocking of fingerling browns whose parents came from these waters is intended to bypass some of the obstacles faced by emerging fry. Easy routes to modified spawning grounds await them. On Confederate Creek, for instance, which flows into Canyon Ferry about 10 miles north of Townsend, gravel spawning beds were specially prepared by Interfluve, Inc., and FW&P workers. On the lower end of Deep Creek, an elaborate siphon structure was built to allow the Montana Ditch to pass underneath the natural stream. Trout can now swim up and down Deep Creek any time of year. The once-ailing aquatic system is on the mend.

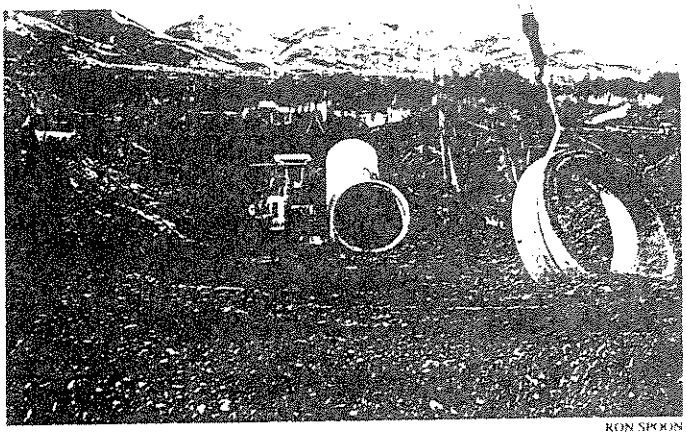


Vegetation has grown back, and summer waters now flow at a trout-friendly rate on lower Deep Creek. Stream bank grazing practices have changed, and irrigators make sure there's enough water in the creek for young fish to make it downstream.

FALL OF 1992. ON LOWER DEEP CREEK, Spoon opens a gate near where the Hahns have kept livestock away from the fragile stream bank for more than a year. The vegetation is growing back. He heads toward a trail that leads past the concrete siphon structure that allows the irrigation canal to pass underneath the natural stream. Just up the trail, Spoon stops at a trap and finds the first brown trout to explore the new, unencumbered spawning route. It is a three-pounder, full of about 2,000 eggs. She has taken a path that wasn't there a year ago. "It'll take a few years for a significant run to be established," Spoon says, freeing the fish to continue upstream. "It'll take some time." All the pieces are in place.

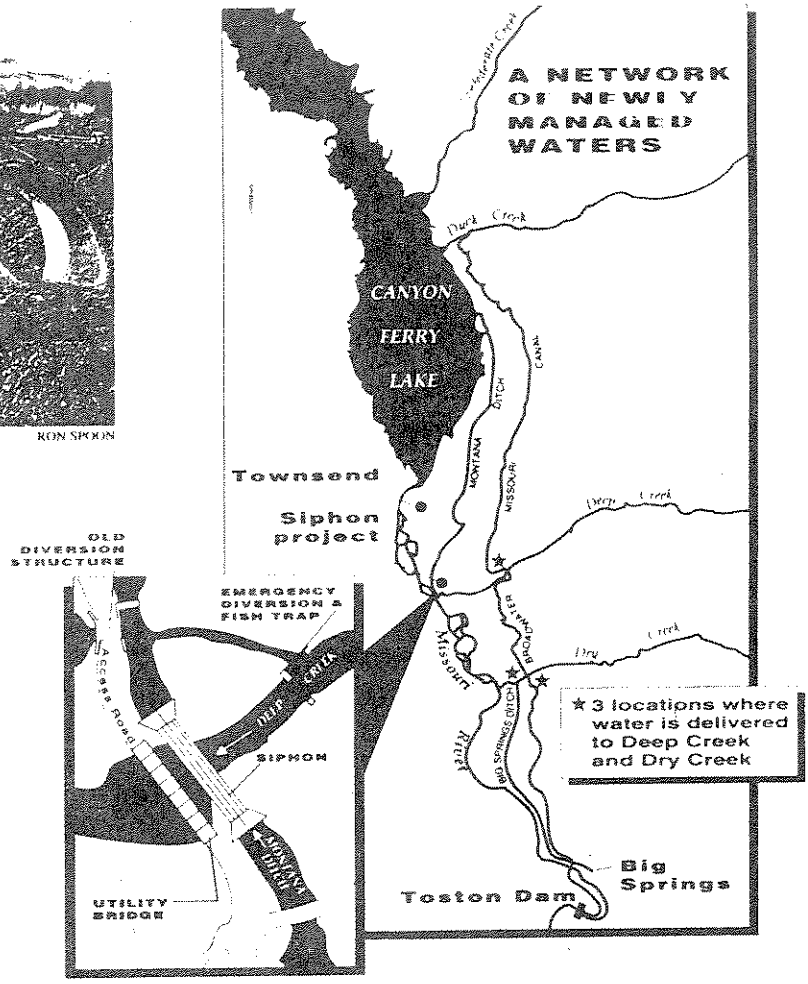
"If it hadn't been for Ray Doig," Spoon says with emotion in his voice, "this would have been a bust. We wouldn't have been able to do a thing."

Ray Doig died in an automobile accident in January 1992. He did not get the chance to see what his single act—the unauthorized opening of a head gate—would ultimately do for the upper Missouri River trout fishery. His wishes, however, are being followed by landowners along the Missouri, and his legacy can be found swirling beneath the surface of Broadwater County waters this year, a new trout population with a chance.



RON SPOON

An underpass of sorts was built in January of 1992 when a siphon tunnel moved the Montana Ditch beneath the natural route of Deep Creek. In years past, the creek was intercepted by the canal and severed from its mouth. Now, water and fish can pass the canal without obstruction.



FROM MISSOURI TO MISSOURI-- FISH ON A JOURNEY

In the fall of 1991, Goose Bay Marina concessionaire Jerry Reller and Radersburg landowner Maurice Ferrat joined biologists on a unique fishing trip up the Missouri River between Canyon Ferry Reservoir and Toston Dam. Using an electrofishing device, the group gathered hundreds of spawning browns and took them to Marsh Creek on Ferrat's ranch property near Radersburg. There, fish were held in captivity until they were ready to lay eggs. Ferrat helped biologists milk more than 180,000 eggs from the spawners.

The eggs were then trucked to the federal Fish Technology Center in Bozeman where biologists waited for them to "eye up"—develop to a point where the fish eye is visible inside the egg. When the eggs were deemed sturdy enough for another road trip, they were taken from Bozeman to Lewistown and the Big Springs Hatchery, where they were raised into fingerlings. Then it was back on the road for 95,000 tiny browns. Stocked in staggered phases due to summer drought conditions, the browns were planted in the Missouri River and Deep Creek, the waters of their ancestry, having come back in a hatchery truck. Unlike browns born in natural streams, these fish did not have to run the gauntlet of irrigation diversions and natural predators, both fish and fowl.

"We incubated in controlled conditions and reared them in controlled conditions and then returned them to the Missouri," says FW&P fisheries biologist Ron Spoon. "The unique part is that they came from the Missouri River, their ancestral waters. The idea was that by supplementing these browns, we would accelerate the spawning runs. This is not the typical stocking of water bodies with fish adapted to hatchery living, which hasn't been successful in Montana's rivers. And we would not be supplementing hatchery brown trout if the project was not closely tied to habitat modification. These fish have been on a journey."