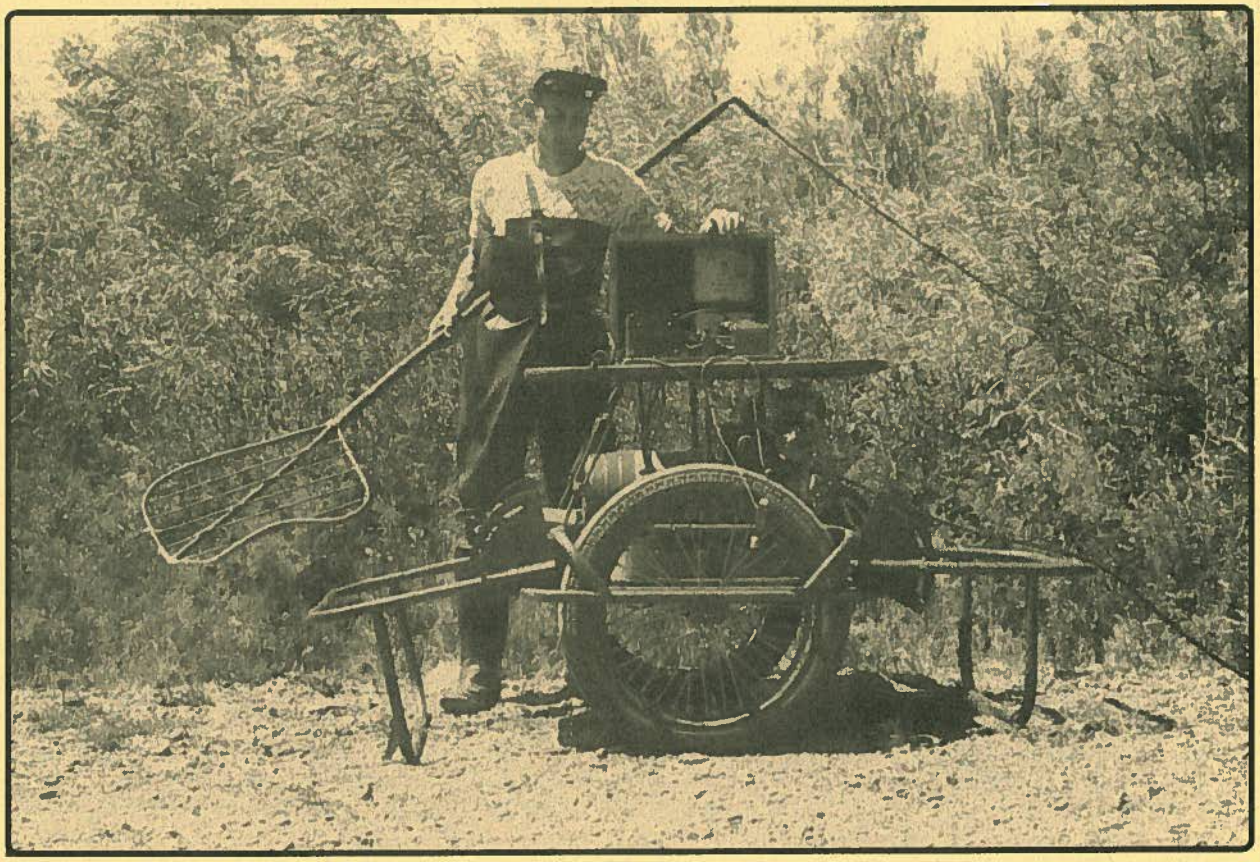
A HISTORY OF MONTANA FISH, WILDLIFE & PARKS FISHERIES DIVISION

1901–2005

By Hugh Zackheim



INTRODUCTION

Montana is a land of fabled fisheries, a destination for anglers seeking a great recreational experience in a spectacular natural setting. The diversity of Montana fishing matches the diversity of its landscape—wild trout thrive in the free-flowing streams and alpine lakes of the mountainous west; paddlefish, catfish, sauger, and sturgeon patrol the cottonwood-lined rivers of the eastern prairies; and productive, mixed-species fisheries populate the glacial lakes and reservoirs of the major valleys.

Although anglers must tackle this wide variety of species and conditions, perhaps the greater challenge facing Montanans is how to maintain the outstanding quality of this fishery resource. The employees of the Fisheries Division of Montana Fish, Wildlife & Parks have accepted that challenge, with a track record going back 100 years and a view that looks forward to the 22nd century. These men and women represent a corps of professionals dedicated to ensuring that Montana's fisheries—and the public's ability to enjoy them—continue long into the future.

This history of the Fisheries Division chronicles the actions of field biologists, hatchery managers, lab researchers, conservation scientists, water resource specialists, administrators, and policymakers in their work to preserve and enhance Montana's diverse fisheries. Their stories are punctuated by episodes of innovation, trial and sometimes error, and ultimately key successes in developing nationally recognized management techniques. This work has been accomplished against a backdrop of ever-changing land use, water management, resource development, population growth, and recreational demand.

Despite the massive social, economic, and environmental changes over the past century, the actions of Montana fisheries workers have been guided by three consistent principles:

- to responsibly manage Montana's fish populations,
- to protect and preserve aquatic habitat, and
- to provide the angling public with great fishing opportunities.

Here then is an opportunity to sample a fascinating slice of Montana history—the first 100 years of the Fisheries Division of the Montana Department of Fish, Wildlife & Parks.

Haynes Foundation collection, Montana Historical Society, Helena, MT

EARLY SPORT FISHING IN MONTANA

A snapshot at the time of statehood in 1889 reveals Montana as a wide-open landscape, dotted with boomtowns rapidly maturing into cities. By this time, Indian tribes had been confined to reservations, largely prevented from applying their centuries-old skills in harvesting the state's abundant native fish populations. The frontier workforce now consisted of trappers, prospectors, railroaders, loggers, homesteaders, and cattlemen, supported by the shop owners, entrepreneurs, and public officials holding down mainstreet jobs. Increasingly, the population was bolstered by new settlers journeying from across the country and across the globe to take on the hard work of developing Montana's seemingly limitless natural resources.

Although Montanans in the late 19th century were preoccupied with making a living, many were also intensely concerned about the well-being of their fish and wildlife resources. This surprising conservation ethic was linked to the American tradition of public hunting and fishing, coupled with firsthand experience of the dramatic depletion of formerly abundant species. Buffalo and beaver, for example, were present in seemingly inexhaustible numbers through the mid-1800s. By the century's end, unregulated commercial harvest had nearly eliminated these species from the Montana landscape. Similarly elk, antelope, and deer had become exceedingly scarce in the brief four-score years since Meriwether Lewis and William Clark led the Corps of Discovery across Montana's wildlife-rich plains.

The impact of early settlement on Montana's fishery resource is less well documented. Early cattleman Granville Stuart reported miners feasting on trout from the upper Clark Fork River in 1863, while scattered historical accounts indicate that at least some fish populations were rapidly depleted during the following decades. News stories from the Flathead Valley around the turn of the 20th century decried the use of dynamite and seines to take fish from area lakes and streams, and expressed concern about the overharvest of vulnerable spawning runs of cutthroat trout and whitefish. In Yellowstone National Park, sport fishing along with commercial harvest to feed the tourists led to drastic fishery declines, and the first harvest limits were enacted in 1908. Habitat damage from dams, mines, overgrazing, irrigation diversions, pollution, and massive log drives compounded the pressures on fish populations in many Montana waters.

One further message rings loud in the accounts of the state's early sport fishing history: Montanans were passionate about their fishing and wanted to make sure their opportunity for high-quality sport would not be compromised as it had been in so many other areas of the country.

This public concern about Montana's declining fisheries prompted responses, first from territorial officials and subsequently from their successors in the Montana legislature. As early as 1864, Montana territorial law established hook and rod as the only legal means to catch fish, and barred the use of nets or poison. This was followed by the 1871 passage of a framework of fish and game laws. Additional laws enacted soon after statehood prohibited the dumping of sawmill waste and mine pollutants into Montana streams, required registration of fish ponds, and called for screening of irrigation ditches and construction of fishways over dams.

Fishery enhancement was also on the minds of Montana's early lawmakers, evidenced by a creative 1879 proposal to remove part of Albeni Falls in northern Idaho and thus provide Pacific salmon with access to Montana's Clark Fork River. However, despite a $1,000 legislative appropriation, the proposal was never implemented, and Montana has remained naturally isolated from the sea-run fish that annually ascend the rivers of nearby northwest states.

With the new laws came the institutions to administer them. In 1895 the Montana legislature established a board of Fish and Game commissioners, a citizen panel charged with setting policy for fish and wildlife management. Morton J. Elrod, professor of biology at the University of Montana, was appointed as the first chair of the commission. Six years later, in April 1901, the legislature established the Montana Department of Fish and Game and placed W. F. Scott in command as the first state Fish and Game warden. The legislature authorized Scott to hire eight deputies to enforce fish and game laws.

To help fund the work of the newly established department, the 1901 legislature enacted a law requiring hunting licenses for nonresidents. Four years later the legislature authorized a combined resident hunting and fishing license that cost $1 annually and covered an entire family. More than 30,000 licenses were sold in the first year, with proceeds used to support the department's hunting and fishing programs. A nonresident fishing license was established in 1907.

THE HATCHERY ERA

The top priority for fish managers around the turn of the 20th century was stocking the region's rivers and streams. In some cases, stocking was intended to restore populations depleted by overfishing, while in other cases the goal was to introduce fish to waters that had no natural populations. In 1889 the U.S. Bureau of Fisheries shipped by railroad the first tanks of rainbow, brown, brook, and lake trout to the region from the Midwest. The lakes and streams of Yellowstone National Park were the first to receive these nonnative species. Stocked trout soon made their way downstream to Montana rivers, where they established quality sport fisheries but also competed for food and space with the native cutthroat trout and grayling.

In 1896 the Bureau of Fisheries built Montana's first fish hatchery on Bridger Creek north of Bozeman. During the two-year period of 1903–04, this hatchery produced more than a million trout (mostly cutthroat, but also rainbow, steelhead, brook, and lake trout), four million grayling, and 800,000 Lake Superior whitefish that were destined for Flathead Lake. These introductions were seen as crucial to restoring Montana's fisheries, as evidenced by Warden Scott's comment that Montana streams would be practically depleted of fish without the Bridger Creek hatchery (Alvord 1991).

Buoyed by the apparent success of these federal stocking efforts, the department soon launched an ambitious program to develop and operate its own network of hatcheries across Montana. The first state-owned hatchery opened in Anaconda in 1909, raising grayling and rainbow, brook, and cutthroat trout to stock Georgetown Lake and other area waters. The Somers hatchery on the northwest shore of Flathead Lake was completed three years later. By 1914 these two hatcheries produced 12 million trout and lake whitefish for planting in lakes and streams in western Montana.

During the next two decades, the department constructed hatcheries at Big Timber, Emigrant, Georgetown Lake, Great Falls, Hamilton, Lake Ronan,

Lewistown, Libby, Missoula, Ovando, Philipsburg, and Red Lodge, eventually operating 14 hatcheries by 1925. Each hatchery was located at a source of cold, clear spring water. The water was piped into tanks where fertilized eggs completed their early development. The young fish were then transferred to concrete raceways where they reared for several weeks before being released as inch-long fry into area waters.

During the early decades of hatchery development, fish managers filled a veritable shopping list of species considered desirable for introduction to Montana. A sampling of the fish egg shipments received by the department included brook trout from Rhode Island and Pennsylvania, lake trout from Minnesota, cutthroat trout from Yellowstone National Park, landlocked salmon from Maine, rainbow trout from Missouri, steelhead trout and chinook salmon from Oregon, golden trout from California, and walleye from Michigan and Minnesota.

Private fish hatcheries operated by local sportsmen's groups added to fish stocking totals. The most prominent of these efforts was spearheaded by the thousand-member Butte Anglers Club, organized in 1902 to enhance sport fishing in southwestern Montana. The club's Columbia Gardens hatchery and rearing ponds in Butte produced as many as two million trout a year for release into the Big Hole River.

In the 1920s the department established a series of field stations to collect trout eggs for Montana's hatchery system. Fisheries workers set up instream traps and lakeshore nets to capture spawning trout, then stripped the eggs from females and fertilized them with the milt from males. Over the years, fisheries staff learned that survival was greatly enhanced if transport was delayed until the developing fish had reached the "eyed" stage, the point at which dark eye spots appear in the embryo. This discovery led the department to construct on-site holding facilities—called "eyeing stations"—that allowed the fish to complete this critical early development before being taken to the hatcheries for rearing.

The field stations supplied huge numbers of trout to state hatcheries. At the program's apex in 1933, fisheries workers reported taking 22 million brown trout eggs at stream stations in the Madison River drainage, and another 12 million rainbow at Hebgen Lake. Rogers Lake in northwestern Montana supplied up to 12 million grayling. Through the 1940s and 1950s, the program continued to provide most of the eggs for the state hatchery system, using prominent collecting locations such as Georgetown Lake (rainbow, cutthroat, brook trout, grayling), Flathead Lake (kokanee), the Clark Fork River drainage (bull trout), Willow Creek Reservoir (rainbow), and Ashley Lake (cutthroat).

The department's primary fish-rearing facility in eastern Montana was the Miles City Fish Culture Station, whose main feature was a 78-acre pond built in 1928. This facility produced a variety of warmwater species, including walleye, northern pike, bass, crappie, and sunfish, for release in reservoirs, farm ponds, and eastern Montana rivers. The U.S. Bureau of Fisheries assumed management responsibility for the Miles City facility in 1933, a role which it retained for 50 years, until the department again took over operations. In 1944, the McNeil Pike hatchery was constructed at Nelson Reservoir in the Milk River drainage near Malta, providing another source of fish for eastern Montana ponds.

The impressive fish production of Montana's hatcheries was a credit to the dedication of hatchery staff. Most hatchery workers lived on-site so they could respond to the constant challenges posed by unpredictable water supplies, spring floods, winter freezes, high summer temperatures, fish food needs, predators, and livestock trespass. During the national economic depression of the 1930s, Montana fisheries workers accepted half wages to avoid staff cutbacks, and they maintained facility operations with only bare-bones budgets. Through the early decades of the program, hatchery staff had to formulate food from scratch, utilizing meat byproducts from local slaughterhouses or netting and processing carp and suckers. In 1931 the department's superintendent of fisheries proposed raising horses to provide a reliable source of meat for fish food production, but this unpopular idea was never implemented. It was not until the 1950s that commercial fish-food pellets became widely available, and hatchery staff was freed from food-processing chores.

For nearly half a century, operations of the Fisheries Division were dedicated almost exclusively to the production, rearing, and distribution of fish across Montana. The hatchery program, begun in response to dwindling fish populations, helped bring Montana to national prominence for the quality of its fishery resource and angling opportunities. The Yellowstone, Big Hole, East and West Gallatin, and Madison were among the rivers producing great numbers of rainbow and brown trout, with magazine-cover lunkers tipping the scales in double-digit pounds.

Kokanee harvest by sport fishers from Flathead Lake was estimated at a spectacular 100 tons in the early 1930s, while Georgetown, Mary Ronan, and Duck lakes also gained national recognition for their great fishing. Adventurous wilderness stocking expeditions, initially by pack horse and then by air drops, had transformed hundreds of Montana's fishless mountain lakes into anglers' dream destinations, highlighted by south-central Montana's Beartooth Plateau, the crown jewel of backcountry fishing. A daily creel limit of 25 pounds of trout stood as a testimony to the abundance of Montana's fishery resource—coupled perhaps with a dose of angler optimism. And the hatchery program established a tradition of engagement and cooperation between the professionals of the Montana Fish and Game Department and Montana's sporting community.

But the hatchery program as practiced from the early 1900s into the 1950s also had some negative impacts on the quality of Montana's fishery resources. Looking back on the hatchery era, longtime Fisheries staffer Bill Alvord (1991) noted, "Practically every accessible water in the state received fish of some kind at the discretion of the planter and without regard to actual need or desirability. A scientific basis for fish stocking was still well in the future." Misguided stocking efforts included the widespread release of brook trout, which has left many Montana waters with stunted fish in overpopulated conditions; the devastating impacts of brown trout and rainbow trout on native cutthroat and grayling; wasteful attempts to establish exotics like Pacific salmon in unsuitable waters; and repeated planting of hatchery fish in streams that already had the potential to establish self-sustaining trout populations.

In a retrospective on the early history of Montana's hatchery program, Art Whitney wrote that the program had been based on two incorrect concepts: (1) fish must be planted for anglers to catch them, and (2) the capacity of a water to support fish is unlimited. Whitney, who led the Fisheries Division from 1963–1986, noted that by 1950 some professionals in the division had begun to recognize that an effective fisheries program needed to be built on more than just haphazard stocking of fish and enforcing fishing regulations.

For the next 50 years, the crucial issues of stream ecology, habitat conservation, wild trout management and native species recovery would come to the forefront as fisheries staff faced up to the challenges of managing a high-quality, sustainable sport fishery. The advances in fisheries management that were to come during the second half of the 20th century would be based on a recognition of the need to preserve the integrity and natural productivity of Montana's lakes and streams.

SCIENCE FOLLOWS EXPERIENCE

In 1947 the Fish and Game Commission established a biology section in the Fisheries Division, and Charles Phenicie was hired to head the new program. The division finally had the capability to study Montana waters and fish populations, nearly 20 years after fisheries superintendent K. F. MacDonald had unsuccessfully argued to include stream surveys as part of the stocking program.

Fortunately, the division had some key relationships in place while undertaking its new research mission. In 1928 the Fish and Game Commission had entered into a cooperative agreement with the University of Montana's Yellow Bay Biological Station. And in 1936, Montana State University in Bozeman offered the state's first fisheries management course. This immediately popular course drew 215 students in its first year and ultimately led to development of the MSU fishery degree program, which has yielded a steady flow of scientists and graduate students into fisheries research in Montana.

The objective of the new biology section in the late 1940s and early 1950s was to improve the fish-planting program, and the first step was to learn about fish populations in Montana streams. Graduate students were hired to sample waters with hook and line (i.e., to go fishing!), wardens conducted creel censuses, and anglers volunteered log books documenting their catch. This information on species presence, size, and numbers provided biologists with a basis for evaluating stream stocking success.

In 1949 division staff launched a long-term study on a 10-mile canyon stretch of Little Prickly Pear Creek, north of Helena. The goal was to determine how a Montana trout stream functions. For three years biologists repeatedly caught, measured, and released all trout, whitefish, suckers, and carp in the designated stream sections. They also recorded channel and water flow data. The study generated ground-breaking findings on fish population densities, age composition, movement, growth rates, food availability, angler impacts, and habitat structure, as well as information on survival of hatchery trout in a stream with a wild trout population.

The study was aided by two pioneering techniques. The first was electro-shocking, the use of underwater electrodes to attract and stun fish, allowing the fish to be safely netted, measured, marked, and released. The second innovative technique was scale-analysis, the microscopic inspection of fish scales to determine fish ages and growth rates. Decades of fisheries research across Montana would build on the success of the work undertaken at Little Prickly Pear Creek.

Fisheries staff also sought to improve still-water fisheries, cooperating in a detailed study of ranch fish ponds. The results were published in 1951 as Montana State College Agriculture Experiment Bulletin No. 480, which provided guidance on pond construction and management. More than 10,000 copies were distributed to the public, and the bulletin contributed to the development of hundreds of new fishing opportunities on Montana farms and ranches.

The 1950s witnessed a major financial boost to the operation of the Fisheries Division, thanks to congressional passage of the Federal Aid in Fish Restoration Act (also known as the Dingell-Johnson or "D-J" Act). Under the act, state fishing license receipts are matched 3:1 by federal dollars generated from a national excise tax on fishing and boating equipment. These funds began to flow to Montana in 1951, and by the mid-1950s the Fisheries Division was able to hire biologists in each of its five administrative districts across Montana.

The division could now tailor fisheries management to biological findings, evidenced by a 1953 overhaul of fish-planting policies. The new policy limited stream stocking to cutthroat trout, rainbow trout, and grayling, and to enhance survival, these stocked fish were to be at least six inches long. River planting of brown trout was halted in 1954, as biologists learned that established brown trout populations reproduced effectively without the need for further stocking. Streams with dominant brook trout populations were taken off the stocking list because introductions of other species met little success. Biologists also began to assess the adverse impacts of illegal fish introductions by anglers, finding many cases where warmwater fish were damaging trout populations in lakes. Armed with this information, the department shepherded through the legislature a ban on unauthorized stocking of Montana waters.

Through these program adjustments, the Fisheries Division was striving to increase angler success by making the most of limited hatchery dollars. Equally important, the division had established the principle that fisheries management in Montana would be guided by solid biological research.

WHAT'S HAPPENING TO OUR FISHERIES?

With increased staffing and sharpened focus on aquatic biology in the 1950s, the Fisheries Division began to address a crucial and long-neglected issue—the mounting environmental damage to Montana's fishery resources. Biologists had come to understand that the most serious threat to fishing quality was not from anglers harvesting too many fish. Rather, they realized that the future of Montana fishing was inextricably linked to how society treats the water and the habitat on which the fish populations depend.

Concern about the impacts of water pollution on Montana fisheries was far from new—even before statehood, the 1881 Territorial Legislature made it illegal to dump sawdust and mill wastes that might harm fisheries. In 1901 the department advocated a ban on the dumping of coal washings and cyanide wastes from gold mining and called for construction of settling ponds to help alleviate the impacts of these pollutants.

By the 1950s the scale of development was picking up, and fisheries staff recognized that Montana was at a crossroads for preserving its quality fishing. One road was to ignore the problem and witness continued deterioration. The other road was to bring the issues to public attention.

For an agency charged with preserving and managing the fishery resource, the choice was clear.
In a 1955 article in its magazine, *Montana Wildlife*, the department editorialized:

> " . . . Montana's best waters are gradually disappearing. Pollution is taking its toll . . . whole channels are being changed by the road builders, through agricultural practices and flood control . . . streams are being completely dewatered for irrigation purposes . . . or flooded by impoundments . . . their vital cover is being destroyed through brush clearing for cultivation, grazing or logging. As long as Montana can preserve its aquatic habitat, the state will enjoy excellent fishing. When the habitat is gone, there will be no more fishing."

The department's message drew a positive response from Montana's sporting public. Many called for new laws and programs to control water pollution and give appropriate consideration to fish and wildlife in development projects.

In 1955 the legislature passed the Water Pollution Control Act, and two years later the Fisheries Division hired its first pollution control biologist. Certainly there was no shortage of issues to address, among them fish kills caused by Forest Service spraying of the insecticide DDT; pulp mill and sewage pollution; and mining wastes, which periodically colored the upper Clark Fork River red for 100 miles and devastated aquatic life from Butte to Missoula. In too many cases, the pollution control biologist could only document the damage and try to convince unresponsive bureaucrats from other public agencies to enforce the laws. But despite these frustrations, the division remained committed to applying professional staff, scientific studies, and informed policy advocacy on behalf of clean water and fisheries. This represented a ground-breaking role in Montana state government.

The 1950s also saw a burgeoning of research by Fisheries Division staff to quantify the effects of habitat alteration on fish populations. On Trout Creek in the Gallatin Valley, biologists documented that removal of brush cover and loss of undercut banks reduced trout populations by more than 40 percent. A study on Bluewater Creek showed how agriculturally generated sediments damaged stream ecology and reduced trout numbers. Perhaps most telling were the findings on a section of Flint Creek in Powell County, where the trout population suffered a 94 percent decline when a section of the stream was straightened as part of a highway construction project.

Another long-standing issue that drew renewed attention was the dewatering of streams for irrigation. In the water-short late summer period, entire stream flows could be diverted onto hay fields with an obvious and distressing result—the elimination of fish and other aquatic life from that section of stream. Consistent with western water law and traditional practice, such stream dewatering was not considered illegal.

A related problem was the fate of trout that entered irrigation canals each summer, only to be stranded to die in dry ditches when the irrigation gates were closed each fall. This loss of fish had long been a concern of Montanans, as evidenced by a never-enforced 1890 law that called for screening of irrigation intakes. Although sportsmen and department officials periodically raised this issue throughout the following decades, on-the-ground irrigation practices remained little changed. In the 1950s, however, research conducted by the Fisheries Division's William Clothier showed that a gradual flow reduction to irrigation canals, rather than an abrupt cutoff, would signal fish to leave the canal and return to the river. As irrigators began to apply these findings, the number of fish stranded in ditches was greatly reduced.

Coincident with studies on water pollution, habitat destruction, and water diversion, Fisheries Division staff were moving forward on a proactive conservation initiative. In concert with partners from Montana State University and the U.S. Fish and Wildlife Service, biologists developed a stream classification system and packaged it with county-fair appeal. Trout streams were ranked as "blue ribbon" (signifying national significance), "red ribbon" (state significance), "yellow ribbon" (district importance), and "gray ribbon" (local importance), based on fishery productivity, public availability and use, and aesthetic characteristics. Armed with America's first stream rating map, Montana fisheries division staff could provide solid information on the biological, social, and economic values of stream resources when participating in water resource planning decisions.

The stream classification findings also shattered the myth of an inexhaustible fishery resource. In 1950, for example, promotional text accompanying the Montana highway map proclaimed 32,000 miles of good fishing streams in the state. Stream classification proved this was highly overstated. Only 410 miles of Montana trout streams rated as blue ribbon, with about 1,000 miles colored red; 2,400 miles yellow; and 5,000 gray. According to fisheries biologist Liter Spence, "The term 'Blue Ribbon trout stream' became a designation of excellence familiar to anglers, conservationists, and developers," serving both to highlight outstanding river reaches and to underscore the importance of protecting them.

The 1950s had witnessed tremendous progress by the Fisheries Division in habitat research and resource documentation. Unfortunately, damage to the fishery resource was progressing even more rapidly. Spence noted, "By 1962, the accumulative effects of dam building, stream straightening, pollution of all kinds (including silt), removing excessive amounts of water from streams for irrigation, stream bank trampling by livestock, and other abuses were reducing trout stream habitat at an alarming rate."

THE RESPONSE

Understanding that policy changes must start with an informed and energized public, the department continued to explain the problem of fish habitat destruction through magazine stories, news features, and presentations to hunting and fishing clubs. In 1962 Fisheries Division staff published a thought-provoking brochure titled "Montana Trout Streams: Will We Have Tomorrow What We Have Today?" The brochure summarized 13 studies on the devastating impact of habitat alteration on fish populations. It also brought attention to one compelling fact—Montana had no laws protecting trout stream habitat.

To the angling community, it was clear that fishing quality would continue to suffer without tangible reforms in the management of Montana's land and water resources. And the wider public also got the message. The Montana State Jaycees and the Billings Jaycees, business-based service organizations, took the lead in promoting legislation to protect Montana trout streams, and were joined in this effort by the Montana Wildlife Federation, the Western Montana Fish & Game Association and many local sporting groups.

Thanks to this citizen lobby, the 1963 Montana legislature narrowly approved the Stream Protection Act, requiring public agencies to consider the impacts of highway construction and other development projects on stream channels. This legislation was timely, as interstate highway construction was gearing up across Montana, and the well-studied Little Prickly Pear Creek and several other stream courses had already suffered significant damage. Crucially, the law did not regulate activities by private landowners. But even with its limited scope, the law was effective in modifying state construction projects to prevent the kinds of damage previously commonplace. The Clark Fork, St. Regis, Beaverhead, Boulder, Smith, Missouri, Blackfoot, and Madison were among the rivers benefiting from extra consideration in construction design. Certainly Montanans deemed America's first stream conservation law a success; in 1965 the legislature resoundingly reauthorized the law, with only one dissenting vote.

Ten years later the legislature filled the regulatory gap in stream bank conservation with passage of the Natural Streambed and Land Preservation Act, known as the "310 Law" because of its origin as House Bill 310. Under the 310 Law, private landowners must obtain a permit from the conservation district for any activity that would alter streambeds and banks. The department's local fisheries biologist is accorded a formal role in the project review team. This cooperative on-the-ground review has made the 310 Law one of Montana's most important legal tools for conserving stream habitat.

The progression of stream bank laws—from no regulation to permit requirements with oversight by fisheries biologists—symbolized the rapid advances of the mid-1960s through mid-1970s in protecting Montana's environment. Riding the wave of public conservation sentiment, the legislature enacted a series of laws regulating water use, mine reclamation, water quality, utility siting, subdivisions, and air quality. The 1971 Montana Environmental Policy Act gave all Montanans a seat at the table to review and comment on how proposed resource management activities would impact fish, wildlife, and other resources. This progressive era in Montana conservation history was capped by the 1972 passage of a new state constitution, which guaranteed citizens the right to a clean and healthful environment.

This new legal framework coincided with a variety of large-scale resource development schemes, including proposed Army Corps of Engineers dams on the Big Hole, Yellowstone, Missouri, and North and Middle Fork Flathead rivers, and at the spectacular Kootenai Falls. Also on the drawing board were scores of new eastern Montana strip mines and coal-fired power plants, whose operations would consume huge volumes of Yellowstone River water. The Anaconda Company proposed a major open-pit copper mine in the Blackfoot River drainage near Lincoln. And the development proposals were not confined to Montana or even national borders, as evidenced by a Canadian proposal to establish a major open-pit coal mine at Cabin Creek, a tributary to the pristine North Fork of the Flathead.

The burden of evaluating these and many other development proposals fell to the department, which had both the legal responsibility and the expertise to assess impacts on Montana's fish, wildlife, and habitat. Staff from the Fisheries Division played the key role in impact assessment, first within the division's Water Resources Development Section and, beginning in 1969, in the FWP's newly organized Environmental Resources Division. For nearly two decades Jim Posewitz led the Environmental Resources Division and its successor divisions, Environment & Information and Ecological Services. Posewitz's group pioneered scientific techniques to evaluate the potential effects of the myriad development proposals on Montana's aquatic and terrestrial ecosystems. The department also worked to ensure that the costs of evaluating environmental impacts were borne by project proponents, not by Montana anglers and hunters.

Throughout the political storms that raged around these controversial development proposals, FWP professionals anchored their work to one objective: to provide solid information to Montanans on the impacts of proposed developments on fish, wildlife, and related public recreational opportunities. And while the department had no decision-making authority for any of these proposals, Montana citizens came to understand the resource tradeoffs. Leaders from local communities courageously and articulately carried the message to the decision makers that Montanans cared deeply about their fisheries, rivers, and natural landscapes.

How successful were these efforts? To this day the Big Hole, Yellowstone, North and Middle Forks of the Flathead, Kootenai Falls, and Wild & Scenic section of the Missouri River remain free flowing, providing world-class fishing and recreation. The scores of water-thirsty power plants envisioned for southeastern Montana were not constructed, and no major new mines were developed in the sensitive watershed of the Blackfoot River or North Fork Flathead. Montanans by and large stood up for their fish and wildlife heritage in the heady atmosphere of mega-development proposals that characterized the 1960s and 1970s.

STREAM FLOW

With the spate of new environmental laws in the 1960s and early 1970s, Montana had made significant progress in protecting water quality and preventing the destruction of stream channel habitat. Water quantity, however, presented an even more difficult challenge, as evidenced by the state's hundreds of miles of chronically dewatered streams and the absence of any legal or administrative framework to protect Montana's renowned trout fishery.

Like other western states, Montana grants water rights in accordance with the doctrine of prior appropriation, or "first in time, first in right." A person who first puts water to a legally recognized beneficial use (such as irrigation, domestic supply, stock water, industrial purpose, or hydropower) is granted the right to use that amount of water for that purpose forever. In the case of water shortage, priority of use is based on whose water right is older and whether that use has continued through time. Many of Montana's largest private water rights date from the late 1800s. While these rights were crucial to establishing productive farms and ranches, they often were exercised without consideration of other environmental values. Water flowing naturally through a streambed was simply not recognized as a beneficial use in the developing West, so water rights holders were faced with the legal ultimatum to "use it or lose it."

As times and values changed, many Montanans came to realize that flowing streams—with their associated fish, wildlife, and recreational opportunities—represent an important part of their way of life. In response, the Fisheries Division began to work on ways to keep water in Montana's rivers. In 1958 the department made its first water purchase for instream uses, joining with two local sportmen's groups to secure a flow of 5,000 cubic feet per second (cfs) to be released from Painted Rocks Reservoir into the Bitterroot River to augment low summer flows. A decade later the 1969 legislature passed a bill, sponsored by Representative James Murphy of Kalispell, granting authority to the Fish and Game Commission to claim limited instream water rights on 12 of Montana's top trout streams. The logic behind these so-called Murphy Rights was based on an increasingly evident biological reality: Montana's world-class fishery could only be sustained by having enough water in rivers and streams to support fish.

The most important statutory breakthrough came with the legislature's passage of the Montana Water Use Act in 1973. For the first time in state history, instream flows for fish, wildlife, and recreation were accorded legal protection as "beneficial uses." The Water Use Act also established a water reservation system as the means through which public entities (state agencies, local governments, and conservation districts) could apply to the Montana Board of Natural Resources and Conservation to maintain unappropriated water in rivers and streams to meet future societal needs.

The Water Use Act was crafted to protect Montana's ability to control its water resources against anticipated claims by downstream states and major industrial interests. The national energy crisis of the early 1970s precipitated this concern, as developers eyed western coal as the foundation for an energy boom. The federally commissioned North Central Power Study called for construction of dozens of coal-fired power plants in eastern Montana, and energy companies were busy developing plans for coal gasification facilities and coal slurry pipelines.

These development schemes had a common need: vast quantities of water from the Yellowstone River and its tributaries. Inevitably, such massive water use—one-third of the river's flow—would require a major storage facility. The U.S. Bureau of Reclamation had previously sought to build a huge dam on the Yellowstone River at Allenspur, just south of Livingston, where the canyon walls narrow. But Montanans rejected the federal plan, unwilling to accept the flooding of 50 miles of spectacular river and valley bottom nearly all the way to Yellowstone Park. Now the proposed industrial water demands had brought back the specter of Allenspur Dam.

Fortunately, Montana's innovative water reservation system provided the legal footing to hold off the "water rush" so that Montana could plan for its water future, including the needs of fish and wildlife. To allow the reservation process time to work, the 1974 legislature passed the Yellowstone Moratorium, suspending action on industrial water-use applications for three years.

Fisheries biologists and other specialists with Montana Fish, Wildlife & Parks (FWP) worked intensively to document the amount of water needed in the Yellowstone River and its tributaries to sustain fish, wildlife, recreational uses, and natural hydrologic regime. In November 1976 their research findings were incorporated into the department's 300-page application for Yellowstone instream flow reservations and submitted to the Board of Natural Resources and Conservation. The application defined the water requirements of paddlefish, sauger, and sturgeon in the lower river and native Yellowstone cutthroat trout in the upper watershed, while also documenting the seasonal water needs of waterfowl, river otters, stonefly nymphs, cottonwood forests, and other components of this remarkable river system.

Department staff also worked to inform the Montana public about the need for Yellowstone instream flows. The centerpiece of this effort was the award-winning 30–minute film *Yellowstone Concerto*, which used spectacular photography and a thought-provoking narrative to highlight the river's exceptional fish and wildlife resources, as well as the agricultural, municipal, and recreational uses that depend on a healthy Yellowstone River system. A special edition of the department's *Montana Outdoors* magazine backed up this message. Finally, working with Trout Unlimited and Glenmore Distillers (makers of Yellowstone Mellow Mash Whiskey), a national public awareness campaign was added to the mix.

Montanans rallied to the cause, testifying in large numbers in support of instream reservations at the many hearings around the state. Finally in December 1978, the board issued its precedent-setting decision on future water use in the Yellowstone, reserving to Montana Fish, Wildlife & Parks an annual instream flow of 5.5-million acre-feet of water in the Yellowstone River and its tributaries. This significant reservation, representing about half of the river's natural average flow, was a tremendous victory for fish and wildlife and for Montanans concerned about conserving the state's natural heritage. Fish and wildlife were granted second priority in the upper Yellowstone watershed, behind municipal uses; in the lower watershed, fish and wildlife received third priority behind municipal and agricultural reservations.

The board's action not only recognized the public interest in a healthy and free-flowing Yellowstone, it also validated the many scientific studies undertaken by fisheries biologists and others in the department. Thanks to these cutting-edge studies, the Yellowstone River—the longest free-flowing river in the contiguous 48 states—was given a substantial level of protection against development proposals that might jeopardize its natural flow regime.

In the 1980s and early 1990s, the water reservation process played out in the upper Missouri River system and in the Clark Fork drainage of western Montana. Again, FWP biologists carefully documented fishery resources, stream ecology, and water flows needed to sustain the aquatic system. And, again, Montana Fish, Wildlife & Parks was allocated substantial instream flow reservations. In 1992 the Madison, Big Hole, Gallatin, Beaverhead and Smith rivers were among the blue-ribbon streams that received bottom-line protection against future withdrawals through the reservation process. In 1994 the Board of Natural Resources and Conservation granted the department instream flow reservations for the lower Missouri River, the Little Missouri River and 16 of their tributaries, providing a crucial layer of legal protection against future depletion of these unique prairie waterways.

An innovative water leasing program, enacted by the legislature in 1985, allows state agencies or nonprofit organizations to enter voluntary lease agreements with private water rights holders. Water subject to a lease remains instream, serving fish and wildlife purposes rather than consumptive uses, but the landowner's legal right to use that water in the future is not jeopardized. Under this authorization, the Fisheries Division has worked closely with landowners and nonprofit partner organizations, such as Montana Trout Unlimited, to keep water in key stream reaches, especially those critical for native species conservation and seasonal spawning runs.

In the water-short West, there are no guarantees. The specter of drought looms nearly every year, evidenced by the pattern of mild winters with below-normal snowpack that dominated the 1980s and 1990s. Nevertheless, the last third of the 20th century saw remarkable advances in the complex laws and administrative framework that govern water use in Montana, giving legal standing to the practice of keeping water instream to benefit fisheries and other resources that Montanans value deeply.

WILD FISH, NATIVE FISH

While water policy commanded the attention of many FWP professionals during the 1960s and 1970s, field biologists continued to address how best to manage state fisheries resources for Montana anglers. The focus of their attention was the stormy public debate over whether to continue releasing tens of thousands of hatchery-raised, "catchable"-sized trout into Montana's nationally recognized rivers and streams.

For more than 50 years, Montana anglers had become accustomed to reaping the rewards of the stocking truck. Many claimed there simply would not be enough fish to go around if rivers and streams were no longer planted with hatchery trout. Others, however, praised the sporting qualities and size of "wild" trout—the browns and rainbows produced through natural instream spawning and descended from generations of trout naturalized to Montana rivers.

Wild Trout Management:

Richard Vincent, a department fisheries biologist based in Bozeman, took on the challenge of scientifically evaluating hatchery stocking versus wild trout management. Vincent chose Montana's most famous river, the Madison, as the crucible for the study, and proposed a 10-mile test section near Ennis where no stocking would occur for a period of six years, beginning in 1966. A comparable study section would continue to receive thousands of hatchery trout, as had been the practice for decades in the upper Madison. Additionally, a nearby spring creek that was populated with wild fish would, for purposes of the study, be stocked to assess population impacts.

Despite his carefully conceived research plan, Vincent faced some steep hurdles. First, he needed to develop an effective method to sample Madison River fish populations. To meet this challenge, he adapted the hand-held "electrofishing" gear (used to survey trout on small streams) to a boat-mounted setup with the power and capability to operate in a large river. Second, there was the matter of public opposition. Even before the study could get underway, some elements of the public reacted vehemently to the prospect of eliminating fish stocking. As Vincent recalled in a 1994 interview, "The meetings were wild . . . almost to the point of violent at times, certainly abusive as far as verbal abuse goes."

Despite the controversy, the Fisheries Division and Vincent persisted. In 1972 the results were in, and they represented a stunning setback to the decades-long management philosophy of planting fish in Montana rivers. The study proved that stocking catchable-sized trout into a high-quality trout stream actually reduced the overall trout population and resulted in a smaller average size of the fish. On the previously unstocked spring creek, the experimental planting of catchable trout reduced the trout population by half. On the Madison River, Vincent found that numbers of larger brown and rainbow trout increased two- to four-fold within three years of the cessation of stocking.

What was happening? The artificial and instant introduction of thousands of hatchery fish apparently caused intense competition for food and space, displacing many of the wild fish from their home reaches. But the hatchery-reared fish were ill-adapted to living in the difficult conditions of a free-flowing Montana river, and few survived even a year. Stocking, while providing a temporary boost to the angler's creel, had the overall effect of reducing trout populations.

The controversy didn't end with the study findings. The angling community remained sharply polarized, and some even accused FWP biologists of falsifying the data. Throughout the fray, Fisheries Division administrator Art Whitney demonstrated exceptional professional courage and an unwavering commitment to his staff and their scientific techniques, even to the point of agreeing to resign if wild trout management failed. In 1974 the Fish and Game Commission adopted a statewide policy that trout would no longer be stocked in rivers and streams with self-sustaining populations of wild trout.

With that bold step, Montana became the national leader in wild trout management. To this day, the state is recognized worldwide for the size, number, and sporting quality of its stream-borne trout. And, as Dick Vincent noted in a 1994 interview, anyone who now suggests returning to the days of stocking the Madison River just might be run out of town.

Focus on Native Species:

As biologists recognized the benefits of sport fisheries that could reproduce naturally in the wild, they increasingly turned their attention to those species that had evolved within Montana's lakes, rivers, and streams. This effort was spurred by the 1973 congressional passage of the Endangered Species Act, marking a national commitment to conserve America's native plants and animals.

In western Montana, this attention to native fish conservation has resulted in three decades of research and management focused on four coldwater members of the trout family—westslope cutthroat trout, Yellowstone cutthroat trout, bull trout, and grayling—and the endangered white sturgeon. In eastern Montana, the Fisheries Division has worked to ensure the survival of paddlefish, sauger, and pallid sturgeon.

Cutthroat Trout:

The westslope cutthroat was first described in the 1805 journal entries of the Lewis and Clark Expedition from a specimen caught on the Missouri River near present-day Great Falls. The fish was subsequently bestowed the scientific name, *Oncorhynchus clarki lewisi,* acknowledging its historic pedigree. Despite the "westslope" label, this trout once thrived in streams and rivers in the upper Missouri River system on the east side of the Continental Divide as well as those draining west to the Columbia River. The Madison River, for example, was an exceptional westslope cutthroat and grayling fishery through the 1920s, while in western Montana anglers eagerly anticipated the spring run of tens of thousands of 2- to 4-pound "flats," the large westslopes that undertook an annual spring spawning migration from Flathead Lake upstream to its river and stream tributaries.

By the early 1970s, however, the westslope cutthroat had fallen on hard times in most of its range. Introduced brook trout outcompeted them for food and space in headwater tributaries; brown trout were a major predator in valley rivers; and rainbow trout interbred with the natives, yielding a progeny of rainbow-cutthroat hybrids. Cutthroat populations were further compromised by habitat destruction from streamside logging and road building, channel damage from highway construction, irrigation withdrawals and diversions, water pollution, and dams. These pressures practically eliminated pure-strain westslopes from rivers east of the divide, while west-side populations were greatly reduced. The wilderness watersheds of the North, Middle and South Forks of the Flathead River system were the primary remaining strongholds for westslope cutts. In 1972 the department acted on a recommendation of the Montana Chapter of the American Fisheries Society and designated the westslope cutthroat trout as a "Species of Special Concern," a first step in recognizing its vulnerability and the need for management attention.

Biologists had long noticed differences in the appearance of cutthroat trout populating the Yellowstone River system compared to the typical westslope cutthroat. In the late 1950s MSU graduate student Laney Hanzel, under the guidance of the Fisheries Division's George Holton, documented physiological differences and geographic distribution of cutthroat trout populations in Montana. Further research during the next 20 years led to the formal classification of Yellowstone cutthroat as a separate subspecies.

Yellowstone cutthroat have suffered from the same array of impacts as the westslopes, and populations are well below historical levels. Even in Yellowstone Lake at the wilderness core of its range, Yellowstone cutthroat numbers have been sharply reduced in recent years. The causes there are a growing population of lake trout, a nonnative and highly predatory fish that was illegally introduced into the lake in the 1990s, and the presence of whirling disease.

Beginning in the late 1970s, staff from the Fisheries Division began to work closely with biologist Fred Allendorf of the University of Montana to investigate the genetic status of Montana's cutthroat trout populations. Allendorf's pioneering lab work in "allozyme electrophoresis" revealed whether or not local fish populations had been impacted by hybridization. Over 30 years of scientific collaboration and increasing sophistication, this research has identified the genetically pure strains of both westslope and Yellowstone cutthroat trout remaining in Montana.

Bull Trout:

Montana anglers have historically exhibited a split personality about another native western Montana fish, the bull trout. Some disparaged the sporting qualities or taste of the fish, others condemned it as a predator of more desirable game fish. Even biologist Morton J. Elrod, first chairman of the Montana Board of Fish and Game and founder of the Flathead Lake Biological Station, wrote in 1901 that the fish-eating bull trout needed to be controlled.

But the bull trout also developed a devoted sport following. Newspaper stories from early in the 20th century feted anglers who landed particularly large bull trout, including the still-standing state record 25-pounder caught in 1916. And for decades hardy anglers in northwestern Montana would cast hand-made wooden plugs into the cold, spring-swollen flows of the Flathead River in hopes of catching a monster bull trout.

Angler harvest, however, has not been the cause of the decline of Montana's bull trout over the past century. Rather, populations have been adversely affected by dams that block seasonal migration routes, destruction and pollution of spawning streams, localized poaching, predation by introduced species (primarily lake trout), and hybridization (by brook trout). These factors have been compounded by the bull trout's narrow range of spawning habitat: only a limited number of stream reaches meet its requirements for spring-influenced flows, clean cobble bottoms, and a complex structure of pools, riffles, and runs created by downed timber. In 1998 Montana's bull trout was listed as a threatened species under the Endangered Species Act.

Arctic Grayling:

Before statehood Montana's Arctic grayling thrived in the waters of the upper Missouri River system upstream from Great Falls. The fish, native only to Montana and Michigan among the lower 48 states, had even captured national sporting attention, as first evidenced by an 1874 article in the national magazine *Forest and Stream*. But by the 1950s grayling numbers had declined sharply, prompting a status investigation by the Fisheries Division and the followup designation of Red Rock Creek in the Centennial Valley as a state grayling refuge.

By the 1980s Montana's native stream-dwelling (fluvial) grayling had been reduced to a single population in the Big Hole River. Again, competition and predation by introduced trout played a big part in the decline, as did human-generated changes in water quality, water quantity, and habitat structure. The drought years of the 1980s and 1990s further aggravated the situation, bringing the fluvial arctic grayling to the brink of extinction in Montana.

Recovery Efforts:

In the 1990s the Fisheries Division began systematic efforts to recover the populations of these four native Montana salmonids: westslope cutthroat, Yellowstone cutthroat, bull trout, and grayling. For each species, the Fisheries Division committed significant staff and financial resources for research and management, participated in key technical committees, led public forums, and initiated cooperative conservation ventures with state, private, and federal land managers. These efforts generated a series of conservation strategies and on-the-ground projects, with the common goal of restoring self-sustaining native fish populations in their historic watersheds.

For westslope and Yellowstone cutthroat, the Fisheries Division has targeted its conservation response on saving the irreplaceable populations of pure-strain fish, as identified by genetic studies. Key conservation tools include harvest restrictions, habitat protection and enhancement, reconnection of flows from spawning tributaries to mainstem rivers, maintenance of genetically diverse native broodstock, hatchery rearing of pure-strain fish, removal of non-native species in localized areas, and cutthroat reintroductions. Biologists have also installed fish-passage barriers in streams to isolate headwater cutthroat populations and protect them from inter-breeding with rainbow trout. For bull trout, interagency recovery efforts are focusing on identifying and monitoring of spawning populations in the Flathead, Swan, and other important drainages; protecting the spawning streams; limiting bull trout harvest; and encouraging angler take of predatory lake trout. And for grayling, the Fisheries Division has focused on cooperative projects with ranchers to maintain instream flows, development of genetically pure populations of fluvial grayling that can be maintained in isolated lakes, and reintroduction of the species to other historic grayling streams in the upper Missouri watershed. Over the next several decades, Montanans will be able to assess whether the Fisheries Division has been successful in its goal to restore self-sustaining native fish populations to Montana waters.

Native Sturgeon:

Recovering Montana's population of the endangered white sturgeon has posed a different set of challenges, not the least of which has been the difficulty of finding wild specimens of this fish to study. Pat Graham, an FWP biologist who later became Fisheries Division administrator and then director of the department, was part of a 1970s crew that scuba dived nearly 100 feet down into the Kootenai and caught a glimpse of this rare fish. Only a handful of white sturgeon have been seen since. Despite success in raising white sturgeon in hatcheries, the future of this fish in Montana is in question. White sturgeon spawning has not been documented since the construction of Libby Dam in 1972, indicating that dam-induced changes to the hydrology of the Kootenai River system may have raised an impassable barrier to the species' recovery.

In eastern Montana the pallid sturgeon, a federally listed endangered species since 1990, is also on the verge of extinction. Two river reaches comprise the last remaining habitat for this ancient fish: an estimated 30 adult pallids survive in the free-flowing prairie section of the Missouri River between the Marias River and Fork Peck Reservoir, and another 200 adult pallids remain in the lower Yellowstone and Missouri rivers between Fort Peck Dam and North Dakota's Sakakawea Reservoir. These surviving fish are all more than 40 years old, testifying to their decades-long failure to reproduce in the wild.

The crisis facing the pallid sturgeon stems from construction of a series of dams on the Missouri River system during the past century, a wink in time for a species that has endured for 150 million years. Pallid sturgeon eggs and developing young apparently need long, free-flowing sections of prairie river to develop and mature. The dams and resulting impoundments, however, have drastically altered seasonal flows, water temperature, and water quality. If efforts fail to restore a hydrologic regime that more closely mirrors historic conditions, experts predict the ancient, bottom-dwelling pallid sturgeon will die out by 2016.

Montana Fish, Wildlife & Parks is now working with the U.S. Fish and Wildlife Service and other partners in a race against time to restore the population of the endangered pallid sturgeon. Fisheries workers capture and spawn Yellowstone River pallids, returning the adults to the river and raising the young in hatcheries for eventual release back into the Yellowstone, Missouri, and Marias rivers. And agencies are trying to address river flows so that pallid sturgeon may again reproduce successfully in the wild. But whether the recovery effort can produce a self-sustaining new generation may not be known until today's last wild survivors are gone from Montana's rivers.

Other At-Risk Natives:

The prehistoric-looking, plankton-eating paddlefish is another native of Montana's lower Missouri and Yellowstone rivers whose population is closely monitored and managed. Although the paddlefish was the target of an active sport fishery in the 1910s, anglers stopped paddlefishing for more than four decades. However, in the early 1960s sportsmen took notice of a spring concentration of paddlefish stacked up on the Yellowstone River below the Intake diversion dam near Glendive. Research by fisheries biologists showed that these "new" fish were running upstream to spawn from their rearing area in North Dakota's Garrison Reservoir. The Intake site and a stretch of the Missouri River above Fort Peck Reservoir have evolved into popular spring fisheries, with anglers seeking to snag trophy paddlefish in the 100-pound class. The Fisheries Division has imposed strict harvest limits and tagging requirements to ensure that this vulnerable and—with its caviar-like eggs—increasingly valuable fish remains a vibrant part of Montana's native fish community.

The sauger is a third native river-dwelling fish of eastern Montana that is drawing considerable research attention. While this member of the perch family looks very similar to its close relative, the walleye, the sauger appears to have lost out in some habitats where the non-native walleye has been introduced. Adding to biologists' concerns, sauger are known to hybridize with walleye. Fisheries Division researchers are now working to better understand the sauger's habitat requirements and life cycle, so they can better plan for its conservation.

The Fisheries Division is also working to head off potential endangered species listings by inventorying fish populations in a strategic sample of the small streams that drain the prairies of eastern Montana. In 2003 the fisheries staff began this multi-year effort to determine the species composition in more than 500 stream reaches, including many waters never surveyed. Initial results show unexpectedly high levels of native fish diversity, including brook stickleback, fathead minnows, emerald shiners, and other small fish well suited for the sometimes murky waters, low flows, and extreme temperatures of prairies streams. Having a representative sample of fish communities in these study reaches will help fisheries staff learn the status and conservation needs of these species.

A NEW ROLE FOR HATCHERIES

Common to many of these efforts to conserve and ultimately restore Montana's native fish has been the crucial role of Montana's hatchery system. Hatchery managers and technicians with the Fisheries Division, as well as researchers at the University of Montana's Wild Trout and Salmon Genetics Lab, have worked to maintain healthy, genetically diverse brood stocks of fluvial Arctic grayling, cutthroat trout, sturgeon, and other species. These hatchery stocks play an important role in Montana's multi-faceted efforts to recover native fish populations.

In 2006 Montana's warmwater fisheries will receive a huge boost from a major new hatchery, as the congressionally funded $25 million Fort Peck Fishery Hatchery comes on line. The hatchery is intended to produce large numbers of walleye, smallmouth bass, and other sport fish for stocking lakes and reservoirs in central and eastern Montana, as well as support recovery efforts for native species such as sturgeon and sauger. Constructed by the U.S. Army Corps of Engineers, the Fort Peck hatchery incorporates a unique design that constantly draws outside surface water from Fort Peck, providing natural temperature and nutrient conditions for rearing fish.

Staff from the FWP Fisheries Division will operate and maintain the hatchery. Located adjacent to Montana's largest water body and one of its most popular sport fisheries, the hatchery fulfills long-standing wishes of Montana's dedicated warmwater fishing enthusiasts.

FISH HEALTH AND AQUATIC NUISANCE SPECIES

While Montana's big fish capture the angler's imagination, the art of maintaining healthy fisheries in Big Sky Country can also require managing threats of microscopic proportions. In 1955 the American Fisheries Society first issued national recommendations to reduce the potential for disease transmission from fish transported from one state to another. State biologists took these ideas to heart, but initially had very limited resources to address the issue. In 1969, however, the Montana legislature acted to ban the import of infected fish and thus provided direction for a Montana fish health program to begin in earnest. Through the 1970s and 1980s, Fisheries Division scientists worked in partnership with the U.S. Fish & Wildlife Service to develop lab capabilities to detect fish diseases, inspect hatcheries, and apply advances in treatments to bacterial kidney disease and other population-threatening infections. Jim Peterson, hired as Montana's second Fish Health Coordinator in 1977, guided the progress of Montana's nationally recognized program into the 21st century. The Fish Health Laboratory moved from Bozeman in 1985 to its current location at FWP's Giant Springs Hatchery.

Whirling Disease:

In 1994 the issue of fish disease moved from the relative obscurity of the laboratory onto the front page of the newspaper. Fisheries Division staff confirmed the presence of "whirling disease" in the Madison River, which explained the precipitous decline in the Madison's rainbow trout population and sent shockwaves across America's sporting community. Whirling disease derives from a minute aquatic parasite, *Myxobolus cerebralis,* which was accidentally introduced into American waters in the 1950s through a shipment of trout from Europe. *Myxobolus* has a complex life cycle that includes several different developmental stages, as well as the need for a host species, the streambottom–dwelling tubifex worm. In its infectious form, the free-swimming *Myxobolus* "tam" attaches to the skin of a juvenile trout and then burrows into the head and spinal cartilage. Under lab conditions, infected trout are unable to swim normally and spin aimlessly in the water. In the wild, infected fish quickly die. Rainbow and cutthroat trout are particularly susceptible to the whirling disease parasite. Brown trout, which apparently evolved with *Myxobolus* in European waters, are more resistant to its effects.

The public response to the confirmation of whirling disease in the Madison River was immediate and unprecedented in the annals of fish health science. Trout anglers and their organizations rallied in support of the efforts of the Fisheries Division to understand the disease and determine steps that might be taken to control it or mitigate its effects. Montana's Governor Marc Racicot appointed a Whirling Disease Task Force, bringing together key participants from the public and private sectors. The high level of cooperation and interest in turn led to establishment of the Bozeman-based Whirling Disease Foundation, which since 1995 has raised critically needed research funds, served as a clearinghouse of information about the problem, and hosted symposia and scientific exchanges. According to the foundation, more than 200 scientists are now working on whirling disease nationwide, and various avenues of research are offering promise on how to control the disease in the wild.

In the 10 years since whirling disease was diagnosed in wild Montana trout, Fisheries Division researchers have confirmed its presence in more than 100 of the state's rivers and streams. In some of these waters, trout populations have suffered severe declines; in others, numbers have remained nearly stable. While any solution to the whirling disease problem is likely years away, to the surprise and delight of anglers the Madison River trout population has recovered significantly, allowing the river to reclaim its place as one of America's top trout streams.

Alien Invaders:

Coincident with the whirling disease saga, additional threats to Montana's fisheries and aquatic ecosystems have appeared on the biological radar screen. Like whirling disease, these threats come in the form of aquatic organisms accidentally brought to Montana from other parts of the world; once here, they thrive in the absence of their own native predators, parasites, and other natural controls. Many have the potential to wreak environmental havoc by taking over lake and stream habitats and displacing Montana fish.

One example is the New Zealand mud snail, which has become established in reaches of the Madison River near Three Forks and in Yellowstone National Park. These minute snails carpet the stream bottom—reaching densities of more than 300,000 per square meter—and have the potential to severely impact food and space for the mayflies, caddisflies, and stoneflies that comprise the diet of trout and other fish species. At present, there is no effective control for this tiny but extremely hardy pest.

In October 2002 the Fisheries Division released its first Montana Aquatic Nuisance Species (ANS) Management Plan, setting forth a statewide goal to "minimize the harmful ecological, economic, and social impact of ANS through prevention and management of introduction, population growth, and dispersal into, within, and from Montana." The plan lists more than 70 nonindigenous aquatic species in Montana, and notes that more are expected to arrive. Key components of the plan include identification of priority threat species, prevention of introductions through public information and regulation, targeted control efforts, interagency communication and cooperation, and allocation of adequate staff and resources to combat this enormous but often unseen threat to Montana sport fishing.

The plan highlights the ironic reality that aquatic nuisance species are spread primarily by human recreational activities, especially the boats, bait buckets, live wells, and waders that allow these unwanted plants and animals to hitch a ride from waterway to waterway. But public education can help. In one documented case, an alert Montana angler noticed a cluster of zebra mussels on a boat he was bringing in from Michigan. He contacted Fisheries Division staff for assistance and cleaned the boat, thus averting the ecological tragedy experienced in many Midwest lakes where zebra mussels have increased to immense numbers and filtered waters clean of important nutrients.

Other potential invaders of concern include several European carp species, the predatory northern snakehead fish, rusty crayfish, and spiny water flea, as well as various fish pathogens. Among aquatic plant species, concern centers on preventing the introduction of Eurasian watermilfoil and hydrilla. These species proliferate in lakes, growing to dense mats that interfere with boating, swimming, water quality, and fisheries.

During the past decades, Fisheries Division professionals charged with maintaining the health of Montana fish populations have seen their mission expand greatly. From an initial focus on containing hatchery-related diseases, this vital work now also encompasses the complexities of controlling introduced plants, animals, and pathogens in the wild. Through all the challenges, Montana's hatchery system is recognized as one of the best managed and disease-free operations in the country. Looking toward the future, its seems clear that the struggle to manage aquatic nuisance species will be a crucial and growing part of the Fisheries Division's program to ensure the future of Montana's aquatic ecosystems and fishery resources.

RECREATIONAL ACCESS AND MANAGEMENT

In the 1950s Fisheries Division staff assessed the fishing access opportunities provided by publicly owned lands in Montana. This process led FWP to recommend that the State of Montana and the federal Bureau of Land Management retain nearly 250,000 acres that might otherwise be sold to private interests. By 1960 the Fisheries Division had undertaken its own programmatic effort to acquire key properties on Montana waterways to ensure that the public would always have the ability to access and fish important lakes and rivers. The program got off to a quick start and was further boosted when federal passage of the Land and Water Conservation Act in 1965 made additional funds available. By 1971 FWP had acquired more than 100 fishing access sites statewide.

Another significant program advancement came in 1977, when the Montana legislature permanently earmarked a portion of fishing license revenue for access sites. Some 30 years later, this highly successful program provides about $750,000 a year for FWP's purchase of fishing access sites, which now include more than 320 locations on rivers and lakes statewide. On most of the larger rivers in western Montana, the public can launch a boat or wade fish from a series of fishing access sites, typically separated by a day's float of 5 to 10 miles.

The courts have also played an important role in securing fishing access. In 1981 the U.S. Supreme Court ruled that the bed and banks of the Bighorn River are owned by the State of Montana, not held in federal trust for the Crow Tribe. This decision, which culminated six years of legal proceedings, provides public access to the Bighorn's brown and rainbow trout, which grow to trophy size in the cold, clear waters flowing from Yellowtail Dam.

Equally contentious during the 1980s was the question of stream access—more specifically, what legal right does the Montana public have to recreate on the state's rivers, lakes, and streams? The issue came to a head when private landowners along the Beaverhead and Dearborn rivers acted to block the public from floating or wading the waters that flowed through their ranches. Lawsuits followed, and in 1984 the Montana Supreme Court issued two parallel and precedent-setting rulings. In both cases, the court held that the waters of the State of Montana are held in trust by the state for the people, and that the public may make recreational use of state waters up to the normal high water mark. These decisions mean that anglers can legally wade, float, and fish Montana's lakes, rivers, and streams, as long as the angler can get to the water by legal access (such as a fishing access site or other public land).

In 1985 the Montana legislature codified the court decision by adding into state law the following phrase: "all surface waters that are capable of recreational use may be so used by the public without regard to the ownership of the land underlying the waters" (Section 23-2-302, Montana Code Annotated). The legislation further defined the public's recreational rights, placed limits on streamside hunting and camping, and provided rulemaking authority to the Montana Fish, Wildlife & Parks Commission. The Fisheries Division has played a key role in administering the law, evaluating petitions for closure of specific stream sections, coordinating development of portage routes, and working with FWP information staff to educate the public on stream access rights and responsibilities. And FWP legal staff has provided strong representation in various administrative and judicial venues to maintain Montanans' precious access rights.

With Montana's low population density and abundance of water, anglers generally had little problem finding a secluded place to fish in the first half of the 20th century. However, the early 1970s saw a strong increase in Montana's population through in-migration, along with an upsurge in outdoor recreation that reflected a national trend of increased leisure time and travel. These forces, coupled with growing interest in fly fishing and expanding numbers of commercial outfitters, brought a flood of anglers to Montana waters.

The blue-ribbon rivers of southwest Montana bore the brunt of that pressure, amid increased rumblings from the locals about too many guides and out-of-state fishermen. In 1992 Hollywood featured Montana's landscape and fly fishing tradition in the award-winning adaptation of Norman Maclean's novella, *A River Runs Through It*. The movie spawned another surge in nonresident angler numbers.

For the first time, Montana had to face the issue of whether to limit the amount of recreational use on waterways in order to maintain the quality of recreational experience. The initial focus was on the popular 59-mile stretch of the Smith River, a four-day canyon float with quality fishing and a series of float-in campsites managed by the department. Signs of overuse were evident, and floater numbers were growing nearly exponentially. Through coordinated efforts by the Fisheries and Parks divisions, the department brought the issue to the public. The predominance of opinion was to limit use and maintain the quality of the experience. The department subsequently adopted a permit system, restricting the number of daily launches, allocating most trips for non-outfitted groups drawn by lottery, and requiring floaters to use designated campsites.

The complex issue of allocating public use and outfitted use has also come to the fore on the blue-ribbon Beaverhead and Big Hole rivers. To meet public and private needs, the FWP Commission adopted rules that restrict guided fishing trips to certain sections of these rivers on specific days of the float-fishing season, while leaving other sections exclusively for non-commercial floating by resident anglers. On the popular Blackfoot River near Missoula, limits have not been imposed, but FWP employs a river ranger to monitor use and manage potential conflicts between floaters and landowners. As interest in Montana's quality fisheries continues to rise, recreational use allocation promises to remain a significant management issue for the Fisheries Division.

Ralph Cooper, Fish and Game Department Pilot, displaying fish planting tank built in 1956 for air planting trout into Tiber Reservoir following the Marias Drainage rough fish removal project.

TURN OF THE 21ST CENTURY: RESTORATION AND COOPERATION

From the 1980s through the early years of the 21st century, the Fisheries Division has taken on major programs to mitigate the impacts of past environmental damage to Montana lakes, rivers, and streams. This restoration role, spurred by federal initiatives and innovative state programs, has allowed biologists to plan and undertake projects to recover fish habitat, rather than simply reacting to new environmental threats. Notably, these efforts have been characterized by a spirit of cooperation, often partnering agency, industry, and citizen groups to complete on-the-ground conservation projects.

Hydropower Mitigation:

In the hydropower arena, as proposals for new dams waned, the contentious battles of the 1960s and 1970s gave way to cooperative mitigation efforts. Working through the Northwest Power and Conservation Council, established by the Northwest Power Act of 1980, Montana FWP secured about $15 million over a 20-year period from the Bonneville Power Administration to address the loss of fisheries and fish habitat caused by the development of Hungry Horse Dam on the South Fork of the Flathead and Libby Dam on the Kootenai River. Montana's BPA-funded fisheries projects researched fish populations and ecology, improved conditions in stream and reservoir habitats of the Kootenai and Flathead drainages, reconnected spawning streams made inaccessible to fish by human activities, and modified dam operations to improve flow regimes and water temperatures. Species targeted for these recovery efforts are bull trout, westslope cutthroat trout, white sturgeon, and burbot, a native freshwater cod also referred to as ling.

The relicensing of major hydropower facilities, under the auspices of the Federal Energy Regulatory Commission (FERC), represents another national program that has generated important fisheries mitigation opportunities in Montana. PPL Montana, a private energy company that operates eight hydroelectric facilities and a major storage dam on the Madison-Missouri river system, worked closely with FWP, other public agencies, and a range of interest groups throughout its dam relicensing process in the 1990s. The final license terms submitted by PPL Montana and approved by FERC in 1999 provide for development of dozens of public recreation sites along the river and reservoirs, water quality monitoring and improvement, fish and wildlife inventory, research and habitat conservation projects, and fisheries-friendly operational procedures, such as pulsed flows intended to moderate summer water temperatures in the lower Madison River. Overall, PPL Montana committed nearly $20 million for fisheries, riparian wildlife habitat, and water-related recreation in the Madison-Missouri system, and the company estimates that these funds will leverage another $50 million in state, federal, and private contributions to conservation and recreation projects.

In 1999 the Avista Corporation, which was renewing its federal hydropower licenses on two major dams in western Montana, entered into the innovative Clark Fork Settlement Agreement with Montana FWP and 25 other state, federal, tribal, local, and conservation agencies and organizations. The agreement, incorporated by FERC into its 2001 renewal of Avista's operating licenses for the Noxon Rapids and Cabinet Gorge dams, establishes a participatory and collaborative framework—termed a "living license"—through which Avista commits to work closely with these other participants, as well as underwrite about $5 million worth of comprehensive protection, mitigation, and enhancement activities each year over the 40-year license duration. Under this framework, Avista will fund fisheries and wildlife research, acquire important habitat and recreation sites, improve fish passage to spawning areas, educate anglers on bull trout conservation, and modify dam operations to improve fisheries on the lower Clark Fork River system.

FWP fisheries biologists play crucial roles in project planning, design, review, and implementation in each of these major hydropower mitigation efforts. They also work on a regular basis with other agency and private dam operators to balance the needs of fisheries with those of electric generation and irrigation. Despite differences in organizational missions and the strains brought on by drought-induced water shortages, there has been some progress in balancing reservoir and flow management to benefit fisheries on a number of waters, including the Bitterroot, Beaverhead, and Bighorn rivers.

Clark Fork Reclamation:

The largest, and perhaps the most complex program to mitigate the impacts of historic damage to Montana's environment, is underway in the Clark Fork drainage. The legacy of 100 years of mining and smelting in the Butte-Anaconda area has spread millions of tons of toxic sediments downstream through the watershed, severely damaging the fishery and other resources of the upper Clark Fork.

During the past 30 years, biologists with the Fisheries Division have participated extensively in a range of projects to restore Clark Fork water quality and fisheries, working with the Anaconda Company and its successor ARCO, as well as with other state agencies and the federal Environmental Protection Agency. The major boost to the effort came with the 1980 passage of the federal Superfund hazardous waste cleanup law, which firmly established corporate liability for past pollution, mandated waste cleanup, and provided funding mechanisms. Efforts to recover fisheries in the Clark Fork have focused on stabilization and local removal of toxic sediments from the floodplain. Water quality is improving, and the upper Clark Fork, a river that periodically ran red with iron and other heavy metals even into the 1980s, now holds a realistic prospect to again become a quality fishery.

An exciting component of the restoration effort is underway at Milltown Dam at the downstream end of the Clark Fork Superfund site. Located at the Clark Fork–Blackfoot River confluence near Missoula, the small Milltown Dam hydropower facility has also served as a sediment trap since it was built in 1906. Plans now call for the removal of the dam and the dredging of much of its metal-laden sediment load. In addition to the water quality benefits from this sediment removal, the project will provide a historic reconnection, allowing for the first time in a century the migratory runs of bull trout and other species to reach spawning habitat in the upper Clark Fork and Blackfoot rivers and their tributaries.

The Superfund law also allows states to recover economic damages for the value of lost natural resources and to use these funds to restore key environmental resources. In the Clark Fork, this has led to the establishment of Montana's Natural Resource Damage Program administered by the governor's office and funded by a $120 million legal settlement from ARCO. Biologists from the Fisheries Division will play an important role in determining how to use the portion of this money that will be directed to fishery and watershed restoration projects in the upper Clark Fork drainage. In a key initial project, the once-dead Silver Bow Creek at the Clark Fork headwaters is being rebuilt over its 22-mile length, freed from its metal-laden channel and again allowed to function as a productive natural stream.

Tribal Cooperation:

Flathead Lake, the largest natural lake in the western U.S., is the focus of a unique cooperative fishery initiative between FWP and the Confederated Salish and Kootenai Tribes of northwest Montana's Flathead Indian Reservation. In 1988 the Fisheries Division and the tribes released a joint Flathead Lake/River fisheries management plan, a first-of-its-kind agreement between the state and tribe. The agreement recognizes the crucial need to work together in a complex watershed characterized by tribal ownership and management of the southern half of Flathead Lake, FWP fishery management in the lake's northern half and its river tributaries, and a private dam operator at the lake's outlet.

Over the years, FWP and the tribes have cooperated to address a number of fisheries challenges on Flathead Lake, including the collapse of the kokanee salmon population (brought on by FWP's ill-fated introduction of a non-native freshwater shrimp into the upper drainage), the expansion of the illegally introduced and highly predatory lake trout population, and the decline of native cutthroat and bull trout. The joint fisheries management plan invokes an adaptive management approach, providing for regular review and revision to incorporate research and monitoring data. Primary goals for the Fisheries Division and tribes include the restoration of Flathead Lake's native fish and the management of quality sport fisheries to meet recreational demand.

River Restoration:

In 1989 the legislature laid the groundwork for significant improvement of Montana fish habitat with passage of the River Restoration Act, sponsored by Rep. Hal Harper of Helena. The bill allocated a share of fishing license proceeds to stream improvement, allowing biologists as well as interested and capable Montanans outside of the Fisheries Division to develop and implement projects. This initiative was expanded in 1995 through legislative passage of the Future Fisheries Improvement Program. The program, administered by the Fisheries Division and a citizen review panel, provides nearly $1 million a year in grants for stream, river, and lake restoration projects, with public and private entities eligible to apply. Project review criteria emphasize long-term benefit to wild fisheries and favor partnerships that use angler dollars to leverage additional funding. More than 400 projects were initiated or completed in the first 10 years of the program, including channel restorations, fish passage facilities, screening of water diversions, bank revegetation, riparian protection, streamflow enhancement, and placement of structures to provide cover and enhance spawning.

Another encouraging development over the last two decades is the growth of watershed groups, through which citizens representing a variety of interests have come together for the common purpose of protecting water quality and the beneficial uses of their local lakes, rivers, and streams. Participants typically include agricultural producers, recreationists, public officials, and natural resource specialists willing to dedicate their time and energy to cooperatively addressing the tough problems related to water supply, land-use, recreational pressure, fishery conservation, weed control, and other watershed issues. By 2005 Montana hosted more than 50 watershed groups statewide, stretching from the Little Missouri Basin in the southeast corner of the state to the Kootenai in the northwest, and including long-standing organizations like the Big Hole River Watershed Committee and the Sun River Watershed Group. FWP fisheries biologists often work closely with watershed groups, bringing up-to-date resource information and helping develop cooperative solutions that will improve fisheries consistent with other water needs.

One of the most successful watershed efforts is the Blackfoot Challenge, a watershed group that has gained national recognition for its part in fishery restoration in the Blackfoot River and tributaries, private land conservation, public recreation management, and natural resource education, all while maintaining agricultural productivity and working forests. Key to this success has been leadership of local landowners, coupled with an attentive and focused effort by private, local, state, and federal resource managers. The cooperative approach has drawn substantial congressional support, providing the financial capacity to fund restoration projects and to conserve tens of thousands of acres through conservation easements and targeted public land acquisition. Fisheries Division staff have played a crucial role in working cooperatively with landowners and other agencies in implementing instream improvement projects, with measurable beneficial results for riparian and wetland habitats and trout populations in the Blackfoot watershed.

Perhaps the most encouraging aspect of the partnership efforts over the past two decades has been a growing spirit of cooperation. While the goals of landowners, industry and various interest groups often differ from the mission of the Fisheries Division, significant fishery recovery has been accomplished, and more projects are planned. Underlying this progress appears to be an increasingly shared recognition of several key tenets: that healthy fisheries benefit recreation and the Montana economy; they can be achieved in a manner that also sustains traditional land and water uses; and they are reflective of the quality of place that Montanans pride themselves in enjoying and maintaining.

DRAWING FROM THE PAST, READY FOR THE FUTURE

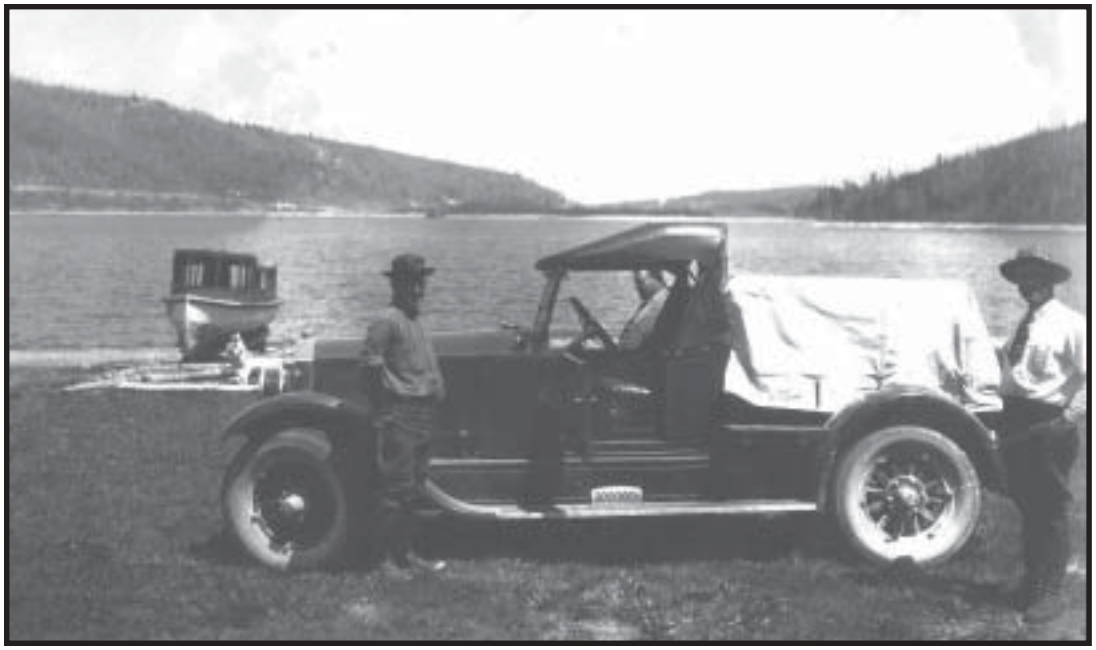
As Montana transformed in its first 100 years from the relative simplicity of frontier days to the incredible complications of modern society, the task of the Fisheries Division of Montana Fish, Wildlife & Parks grew accordingly. The initial duties of managing harvest and raising fish were joined by the need to address habitat destruction, streamflow protection, exotic species management, disease control, endangered species protection, river restoration, watershed conservation, recreational demands, and much more. Over the years, these themes flowed together like tributaries feeding into a river. And like a river absorbing each new stream, the job of the Fisheries Division increased in speed, depth, and complexity.

Recent initiatives in cooperative conservation and stream restoration offer continued promise for fisheries improvement, but major challenges clearly remain. The rapid pace of residential development in western Montana watersheds jeopardizes fish habitat and water quality; recreational access is being lost with changing land ownerships and attitudes; new aquatic nuisance species come ever closer to our borders; climate change scenarios raise the specter of warmer, drier weather; energy development appears set to boom again on the eastern prairies; and ill-advised individuals continue to practice "bucket biology", illegally introducing fish species that damage established lake and stream fisheries.

In the face of these challenges, the staff of the Fisheries Division can draw much from the past: a commitment to understanding and protecting Montana's aquatic systems, a spirit of innovation in fisheries management, and a responsiveness to the angling public. Throughout the years, this approach has served the fisheries resource and the public well.

What condition would Montana's fisheries be in now, without the work chronicled in this history? Would the state's fisheries still be a magnet for those seeking a great recreational experience? Or, through ignorance or inaction, would Montana have suffered the loss of its quality fishery and the public enjoyment of that resource?

The history of the events and the extraordinary individuals who played key parts along way goes a long way to answering these questions. Montana is indeed fortunate for the work of its Fisheries Division, and the Fisheries Division is fortunate for the support and understanding of Montana's informed and passionate angling community. It's a partnership that should have a long and successful future.



Montana's first distribution truck, a converted 1920 Buick, could haul 150lbs. of fish for short hauls.

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"Lassie & Loch Leven of the Madison"

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