# The History of FWP's Conservation and Management of Cutthroat Trout in Montana

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Meriwether Lewis first described cutthroat trout on June 13, 1805 in his journal based on six fish ranging in length from 16 to 23 inches caught by Private Silas Goodrich at the Great Falls of the Missouri River (Moring 1996). The cutthroat trout described by Lewis are today recognized as the subspecies westslope cutthroat trout (abbreviated as WCT in the rest of this report). In 1836 Richardson formally described a cutthroat trout from a lower Columbia River tributary as *Salmo clarki* (Behnke 1992). All native species of North American trout were originally classified as belonging to the genus *Salmo*. This genus also included the Atlantic salmon and Eurasian trout. However, more recent information has led taxonomists to conclude that North American trout are more closely related to Pacific salmon, classified in the genus *Oncorhynchus,* consequently all North American trout species have been moved to the genus *Oncorhynchus* (Stearly and Smith 1989).

Fisheries biologists from Montana played a significant role in understanding the taxonomy and evolution of cutthroat trout. Montana biologists long recognized that cutthroat trout from the Clark Fork River basin appeared different from cutthroat trout inhabiting the Yellowstone River basin. They used the common name "westslope cutthroat trout" to describe those cutthroat trout inhabiting waters west of the Continental Divide and "Yellowstone cutthroat trout" (abbreviated as YCT in the rest of this report) to describe those cutthroat trout inhabiting the Yellowstone River drainage. Montana biologists also referred to those native cutthroat trout that inhabited the Missouri River basin as "Upper Missouri cutthroat trout", though they appeared to be more similar to "westslope cutthroat trout" than to "Yellowstone cutthroat trout". J.G. Cooper (1870) described and discussed catching WCT from the Missouri River near Fort Benton and reported catching cutthroat trout from mountain streams in the Missouri River basin and taking them across the Continental Divide "... to compare with those on the western slope, and am very doubtful whether these can be considered a distinct species,...."

George Holton of Montana Fish, Wildlife and Parks (FWP) was interested in the distribution and status of cutthroat trout in Montana and this led to a Master's thesis by Delano "Laney" Hanzel completed at Montana State University, Bozeman in 1959. In his thesis Hanzel (1959) provided photographs showing the differences between "westslope" and "Yellowstone" forms of the cutthroat trout, but he did not make specific taxonomic recommendations based on the different forms. It wasn't until much later that WCT (*Oncorhynchus clarki lewisi*) and YCT (*O. c. bouvieri*) were formally recognized as subspecies of cutthroat trout (Behnke 1979, 1988, 1992).

The historical distribution of both WCT and YCT in Montana can never be known with certainty. Hanzel (1959) reported that WCT were distributed in the Missouri River basin

down to the mouth of the Musselshell River and throughout the state west of the Continental Divide. George Liknes (1984) conducted a status review of WCT in Montana for FWP and reported that the known distribution of WCT included the entire portion of Montana west of the Continental Divide and the upper Missouri River and its tributaries downstream to Fort Benton, as well as the headwaters of the Judith, Milk, and Marias rivers. Behnke (1992) concurred with Liknes's assessment of the historical range. WCT are also native to waters in Idaho, Oregon, Washington, and southern British Columbia and Alberta in Canada. Leading to the confusion were early transplants of native (including WCT) and introduced trout to waters surrounding forts in Montana used by U.S. Army troops for use as a food source in the late 1800's. The historical range of YCT in Montana included only the upper Yellowstone River basin and extended from the Wyoming border at Yellowstone National Park down to about the Tongue River according to a status review conducted by Kathleen Hadley (1984) who was contracted by FWP to conduct this review. May (1996) documents that YCT did not occupy the lower Tongue River or Yellowstone River near the Tongue during the earliest documented fish surveys in the region, but speculates that YCT may have occupied these areas much earlier when climatic conditions were cooler.

Since all cutthroat trout subspecies were identified and managed as a single species until the 1970's, YCT were often stocked into drainages that supported WCT prior to 1980. YCT eggs were first taken from the West Thumb of Yellowstone Lake (Yellowstone National Park) in 1899, and from then to 1957 over 818 million eggs were gathered from Yellowstone Lake cutthroat trout (Gresswell and Varley (1988). Fish from some these eggs were distributed to Montana for stocking and records show that 400,000 of these YCT were planted out in 1903 and 600,000 were planted in 1904 (Alvord 1991). In 1908 Montana Fish and Game constructed the Washoe Park Hatchery and by 1912 this hatchery was raising over 2 million YCT for release throughout the state. Most of these fish were distributed to individuals and groups at railroad stops by a rail car called the "Thymallus" specially designed to transport fish.

In 1956 YCT egg-taking operations at Yellowstone Lake ended. Montana wanted a cutthroat trout to stock in high mountain lakes, so in 1969 gametes from 15 spawning pairs of YCT from McBride Lake in Yellowstone National Park were brought into the state's hatchery system (McMullin and Dotson 1988). Thus began the Department's brood of McBride strain YCT. These cutthroat trout can survive, spawn successfully, and grow well in mountain lakes and remain one of the primary sources of fish for stocking mountain lakes today.

The abundance and distribution of WCT have been on a long-term decline and WCT are now estimated to occupy less than 20% of their historical habitats in Montana. Their status is even worse in the Missouri River basin where they occupy less than 10% of their historical range. YCT have declined in a similar fashion in Montana and are now believed to occupy less than 650 miles of stream habitat and about 32% of main river habitats of the approximately 2,000 miles of river and stream habitats they were believed to historically occupy in the Yellowstone River basin from Yellowstone National Park down to about the Big Horn River (May 1996). Factors that have led to declines in

distribution and abundance of cutthroat trout include over-harvest, habitat loss, and introduction of nonnative fish into waters historically occupied by cutthroat trout. Over-harvest was probably a major impact in the late 1800's and early 1900's, but fish regulations presently restrict harvest for cutthroat trout to "catch-and-release" in streams and rivers where populations need protection. Habitat loss has occurred due to poor land management practices, de-watering of streams to divert water for human or agricultural use, construction of dams and diversions, and human development of flood plains. Nonnative fish introductions, especially brown, rainbow and brook trout, have led to serious consequences for cutthroat trout. Rainbow trout can interbreed with cutthroat trout and their progeny can reproduce. These hybrid crosses change the genetic make-up of the original cutthroat population; thus they are no longer pure WCT or YCT. YCT can hybridize with WCT and since YCT were stocked into many waters within the historic range of WCT this type of hybridization is common. In addition, nonnative trout can compete with and prey on both subspecies of cutthroat, and eventually nonnative trout will replace native cutthroat trout in most waters where they occur together.

George Holton and Joe Huston of FWP began collaborating with Dr. Fred Allendorf of the University of Montana to determine the genetic status of cutthroat trout in Montana using allozyme electrophoresis around 1978. This collaboration continues and has made Montana the leader in using genetic information for the management and conservation of native fishes. This information also led to the recognition that those native cutthroat trout inhabiting the Missouri River basin referred to as "Upper Missouri cutthroat trout" were indistinguishable from WCT and thus were the same subspecies.

FWP biologists and fish culturists have been actively conserving cutthroat trout throughout the Department's history. Unfortunately, the lack of scientific and management distinction between the two cutthroat trout subspecies prior to the 1970's led to a mixing of the two subspecies. A 1971 article in Montana Outdoors by Vern Campbell (Vol.2, Number 3:7-9) cites Hanzel's (1959) study and concludes that the greatest need is for the "immediate preservation and restoration of as much natural habitat as possible". FWP designated the WCT as a "Species of Special Concern" within Montana in 1972 based on a recommendation from the Montana Chapter of the American Fisheries Society. The cutthroat trout was designated as the "state fish" of Montana in 1977. This designation did not differentiate between the two subspecies, westslope and Yellowstone, native to the state. The USDA Forest Service designated the WCT as a "Sensitive Species" in 1988. These designations recognized the unique stature of WCT as a native fish species that requires clean, cold waters to survive. These designations also recognized that special management emphasis was needed to slow their decline. In June of 1998 the USDI Fish and Wildlife Service (FWS) was petitioned, under the Endangered Species Act, to list WCT and "threatened" throughout its range. The FWS has determined [SHOULD BE DONE BY PUBLICATION]?????

Westslope Cutthroat Trout

Joe Huston, a retired FWP Fisheries Biologist who was instrumental in initiating numerous conservation actions for WCT, and the Conservation Genetics Committee

(Leary et al. 1991) provided the following synopsis of Montana's effort to culture WCT. There is no evidence that WCT were raised in FWP or federal fish hatcheries prior to 1952. The first attempt to bring WCT into a hatchery occurred when Bob Mitchell, Jim Lucas, and an unidentified game warden from Great Falls flew horses into Big Praire within the South Fork of Flathead River basin in 1952 and collected 32 live WCT from Big Salmon Lake by angling. These WCT were flown out and kept in FWP's Jocko River (Arlee) Hatchery. Eggs were taken from these fish in 1953 and 1954, but only spawning success was low. Fish raised from these eggs were transferred to the FWP Hamilton Fish Hatchery in May of 1955 to start a WCT brood. There is a question whether this brood maintained its genetic integrity because either rainbow trout were present in Big Salmon Lake or were also held at this hatchery. Genetic testing of WCT in North Bigelow Lake that originated from this hatchery found the fish population was 97% WCT and 3% rainbow. In 1961 the Hamilton Hatchery was closed and its WCT brood was moved to the FWP Libby Hatchery. Both westslope and Yellowstone cutthroat were raised at the Libby Hatchery and it is likely that the WCT became even more introgressed during its use at Libby. All WCT brood were planted out from the Libby Hatchery in 1969.

In 1954 personnel from FWP, the U.S. Fish and Wildlife Service (FWS), and several anglers from Kalispell captured 135 adult WCT from Hungry Horse Reservoir tributaries (Felix, Hungry Horse, Murray, Quintonkon, and Sullivan creeks) during the spawning season. These fish were taken to the federal FWS Creston Hatchery. It is likely that this brood became contaminated with YCT because male WCT ripened much later than female WCT and YCT males were sometimes used to fertilize eggs from WCT females. This WCT brood and all WCT were moved to FWP's Anaconda Hatchery in the spring of 1957 and subsequently all fish were planted out sometime in late 1957. However, eggs from two or three pairs from the Creston Hatchery were transferred to FWP's Somers Hatchery. These eggs were used to found a Laurie Lake WCT brood in 1958 after it had been chemically treated to eliminate all fish. The Somers Hatchery started taking WCT eggs from Lauri Lake in 1960. This brood was also released into Spoon Lake (Ninemile) in 1965. From 1960 to 1970 WCT eggs were taken by the Somers Hatchery crew from Laurie or Spoon lakes for rearing and planting. In 1964 some WCT from Laurie Lake were moved back to the FWS's Creston Hatchery where they were maintained until 1971 when they had to be destroyed due to a furunculosis disease outbreak.

The first documented genetically pure WCT brood stock was collected by Joe Huston and Bob Mitchell. They collected about 23,000 eggs from Hungry Horse Creek and 2,000 from Emery Creek in 1965 and another 4,000 in 1967. Fertilized eggs from these two creeks were taken to FWP's Arlee Hatchery. Vern Campbell was the Hatchery Manager of Arlee at the time. Ironically, the first 23,000 eggs taken in 1965 were destined for the Anaconda Hatchery, but Bob Mitchell stopped at the Arlee Hatchery and he and Vern Campbell decided to keep the WCT brood stock at Arlee. This brood remained in Arlee until 1980. It was then moved to the Murray Springs Hatchery, after its construction by the U.S. Army Corps of Engineers as partial mitigation for impacts of Libby Dam on the Kootenai River fishery.

This original WCT brood was found to have had a significant reduction in its genetic variation compared to the wild source WCT in Hungry Horse Creek after 14 years in the hatchery (Allendorf and Phelps 1980). The hatchery stock had (1) a 57% reduction in the proportion of polymorphic loci, (2) a 29% reduction in the average number of alleles per locus, (3) a 21% reduction in the average heterozygosity per individual, and (4) significant changes in allelic frequencies between age-classes. The loss of variation was attributed to both a limited number of founders of the hatchery stock and the effects of genetic drift in the maintenance of the hatchery stock because of non-random matings. By 1983 this lack of genetic variation was adversely affecting hatching success and developmental problems including morphological deformities were prevalent (Leary et al. 1985). Because of these problems it was decided that this broodstock would be terminated and all these fish were stocked out in 1986.

Based on the genetic problems that occurred with this brood FWP worked with the Salmon and Trout Genetics Laboratory at the University of Montana to develop a new "wild" brood that was designed to preserve as much genetic diversity from the wild as possible. The present WCT brood stock was founded in 1983-84 from 6,445 fish collected from 12 South Fork Flathead River tributaries and two Clark Fork tributaries. Prior to collecting these fish, genetic electrophoretic analyses were conducted on individuals from all donor populations and all donor populations were found to be 100% pure WCT. In addition, disease testing was conducted on all populations and no detectable fish pathogens were found. This new brood was housed at FWP's Murray Springs Hatchery. Part of the genetic breeding program for this wild brood was that the source of fish for this brood were obtained from many different WCT populations that exhibited different life history strategies - lake stocks, river stocks, and stream stocks. There was no and continues to be no intentional selection at the hatchery for domesticate characteristics, such as fast growth or early spawning. In addition, matings between fish are done randomly and wild fish are to be brought into the hatchery at periodic intervals to ensure domestication is kept to a minimum. In addition, the plan calls for the infusion of enough wild fish from aboriginal populations to contribute at least 5-10% contribution to the brood stock for three successive years every 10 years. This infusion has not yet been done, even though it was scheduled for 1995.

It was soon discovered that the water source at the Murray Springs Hatchery was not ideal for spawning and raising the wild WCT brought into that hatchery because it was too warm, so this brood was moved to the Washoe Park Hatchery in Anaconda in 198

where it resides today.

FWP has formed strong collaborative partnerships with Forest Service and Bureau of Land Management Fisheries Biologists to survey WCT populations and collect fish for genetic testing. Genetic testing of WCT populations that began around 1978, primarily by Joe Huston out of the Kalispell Regional Office, have intensified through time resulting in some genetic testing being done for a majority of know WCT populations.

Forest Service Fisheries biologists that have been leaders in this effort include Bruce May of the Gallatin National Forest, Len Walch and Archie Harper of the Helena National Forest, Mike Enk of the Flathead and Lewis and Clark National Forests, Pat VanEimeren of the Flathead National Forest, Dick Kramer of the Lolo National Forest, Doug Perkinson of the Kootenai National Forest, David Browning Kathy Thompson, Denise Vore, and Bruce Roberts of the Beaverhead National Forest, Brian Sanborn of the Deerlodge National Forest, Rick Stowell of the Forest Service's Region One Office, and David Kampwerth of the Dillon Resource Area of the BLM. FWP biologists that have contributed significantly to this effort include Joe Huston, Bob Domerose, Bruce May, Scot Rumsey, Ladd Knotek, Steve Leathe, John Fraley, Tom Weaver, Mike Hensler, Scott Snelson, Ron Pierce, Don Peters, Dennis Workman, Chris Clancy, Rod Berg, David Schmetterling, Wayne Hadley, Jim Vashro, Pat Byorth, Jim Brammer, Dick Oswald, Ian Chisholm, Mark Delray, Wade Fredenberg, Les Everts, and Brad Shepard.

In addition to survey work and genetic testing, FWP has completed rehabilitation projects to remove nonnative trout from several streams and lakes in the state that were then populated by WCT, either from WCT remaining in the stream drainage or from WCT brought in from another stream. The two earliest projects were completed in the early 1970's. Joe Huston, a leader in WCT conservation for FWP, rehabilitated Young Creek, a tributary stream to the Kootenai River following the creation of Libby Reservoir (Lake Koocanusa), to create a spawning run of WCT from the reservoir into Young Creek. Young Creek was treated with rotenone to remove nonnative brook trout and then WCT that had been collected from Young Creek and held in FWP's Somers Hatchery were stocked back into Young Creek.

FWP formed a WCT Conservation Genetics Committee in the late 1980's to develop a plan for conserving and restoring WCT in the state. This committee consisted of Dr. Robb Leary (chairperson), Kathy Knudsen, and Kevin Sage from the Wild Salmon and Trout Genetics Laboratory at the University of Montana, Thurston Dotson, Bill Hill, George Holton, Joe Huston, and Scott Rumsey from FWP, and Dave Genter from the Montana Natural Heritage Program. This committee developed recommendations for a rating system for conservation and management of WCT that relied on genetic status and threats from introgression or competition, and recommended brood stock development, maintenance, and stocking policies. While these recommendations were incorporated into FWP's database system and as policy for managing the WCT brood, no further actions were taken by FWP to implement these recommendations into a conservation/ restoration strategy until 1994.

In 1994 FWP formed another Technical Committee to recommend strategies for conserving WCT in Montana that were strictly based on biological criteria. The initial emphasis of this committee was to conserve WCT in the Missouri River basin. The Technical Committee was made up of fish professionals from throughout Montana and included representatives from FWP (Dick Oswald, Jim Brammer, Anne Tews, Ladd Knotek, Mark Delray, Brad Shepard [chairperson]), the Forest Service (Mike Enk and Brian Sanborn), the Bureau of Land Management (David Kampwerth), the FWS (Lynn Kaeding, Pat Dwyer, and Robon Wagner), and the Wild Salmon and Trout Genetics

Laboratory at the University of Montana (Dr. Robb Leary). In 1998 this technical committee published their recommendations for genetic conservation of WCT in the Upper Missouri River basin (Leary et al. 1998). In 1997 a Steering Committee was formed by FWP to develop formal recommendations to conserve WCT throughout the state using biological strategies developed by the Technical Committee. The Steering Committee was open to all interested parties and letters soliciting members for this committee were sent to a wide group of interests. The Steering Committee included representatives from the agriculture (Montana Stockgrowers and Farm Bureau), timber (Intermountain Forest Industry Association), land and fish conservation (American Wildlands, Montana Chapter of the American Fisheries Society), and angling (Trout Unlimited and Montana Wildlife Federation) communities, as well as federal (FWS, Forest Service, BLM) and state (FWP, DNRC, DEQ, and NRCS) agencies in the state.

This Steering Committee agreed upon an overall conservation goal for conserving WCT in Montana (Montana Department of Fish, Wildlife and Parks 1999). **The management goal for westslope cutthroat trout in Montana is to ensure the long-term, self-sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana (Clark Fork, Kootenai, Flathead, Missouri, and Saskatchewan), and to maintain the genetic diversity and life history strategies represented by the remaining local populations.** The Steering Committee also developed five objectives to reach the goal:

1. Protect all genetically pure WCT populations.
2. Protect slightly hybridized populations (<10% hybrid) until a basin-wide conservation plan has been developed. Basin planning will occur by river basin (ie. Big Hole, Smith, Blackfoot, Stillwater, Yaak).
3. Ensure the long-term persistence of westslope cutthroat trout within their native range.
4. Provide technical information, administrative assistance, and financial resources to assure compliance with these listed objectives and to encourage conservation of WCT.
5. Design and implement an effective monitoring program by the year 2002 to document persistence and demonstrate progress towards the goal.

Several strategies to conserve and restore WCT will be implemented. Existing populations will be conserved by 1) protecting and, in some cases, enhancing habitats they now occupy; 2) ensuring that nonnative salmonids cannot invade them by constructing barriers to prevent upstream movement of these nonnative fish; and 3) where nonnative fish are presently threatening existing populations, remove nonnative fishes. WCT populations will also be restored to some areas they do not now occupy. In most cases, wild WCT from a nearby stream will be used to "re-found" these new WCT populations. Using an existing wild stock to "re-found" a new population will help preserve the genetic variability now present in existing wild populations. In addition FWP's Washoe Park Hatchery WCT will also be used to "re-found" some new populations and will continue to be used for stocking mountain lakes. An effort will be made to preserve and restore groups of WCT populations within interconnected habitats

in an attempt to preserve the migratory life history form of this subspecies. These strategies are presently being implemented and evaluated.

Yellowstone Cutthroat Trout

Since YCT historically inhabited only the Yellowstone River drainge from Yellowstone National Park down to about the Big Horn River, conservation and management efforts have focused on this drainage. A number of FWP and Forest Service fisheries biologists have been involved with this effort including Al Wipperman, Larry Peterman, Dennis Workman, Rich Stevenson, Chris Clancy, Brad Shepard, and Joel Tohtz who all were fisheries biologists working on the upper Yellowstone River out of Livingston, Montana for FWP; Rod Berg who did a special inventory of the Yellowstone River basin for FWP; Mike Poore, Jim Darling, Ken Frazier, Steve McMullin, Pat Marcuson, and Clint Bishop of Region 5 FWP; and Bruce May, Jim Lloyd, and Scot Shuler of the Gallatin National Forest. In 1991 a group initiated by the Montana Chapter of the American Fisheries Society formed to make conservation management recommendations for conserving YCT. This group consisted of Bruce May and Ray Zubick of the Forest Service, Brad Shepard and Jim Darling of FWP, Dave Genter of the Nature Conservancy, Lynn Kaeding of the Fish and Wildlife Service, and Robb Leary of the University of Montana's Wild Salmon and Trout Genetics Laboratory. Mike Stone of Wyoming Fish and Game was added to this group in 1994. This group developed a draft conservation management guide by 1994 and presented this guide to FWP. Unfortunately, priorities in FWP at the time prevented the adoption and implementation of this management guide. In 1998 [CHECK WITH JOEL TOHTZ AND KEN MCDONALD] a second effort to develop a conservation strategy for YCT in Montana was initiated. [GET PARTICULARS OF THIS EFFORT FROM KEN MCDONALD, JOEL TOHTZ, BRUCE RICH AND JIM DARLING].

Several conservation efforts to enhance recruitment of YCT to the Yellowstone River have been accomplished. Barriers to stream spawning YCT near the mouths of several spawning tributaries were made passable by the installation of culvert fish ladders. A ladder was initially installed and evaluated in Cedar Creek (Clancy and Reichmuth 1990), similar ladders were subsequently placed in a railroad stream crossing in Mol Heron Creek with assistance from the Yellowstone Fly Fishers out of Gardiner and in a culvert near the mouth of Cinnabar Creek. The Cinnabar Creek ladder was later removed during a flood and debris torrent event in Cinnabar Creek. Instream flow leases to enhance recruitment of YCT to the Yellowstone River have been obtained in Cedar and Mill creeks and leases are pending in Mol Heron and Big creeks. A barrier to upstream fish migration was installed in upper Mill Creek to preseve the genetic integrity of YCT inhabiting the upper basin. [GET OTHER PROJECTS – INCLUDING SHIELDS RIVER FROM JOEL TOHTZ AND SCOT SHULER]. [GET PROJECTS FOR MID-YELLOWSTONE FROM MIKE POORE AND JIM DARLING].

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