FISHERY RESEARCH

SAVING IDAHO'S WESTSLOPE CUTTHROAT TROUT FISHERIES

Prepared by:

Jerry Mallet
Retired

IDFG Report Number 13-14
July 2013

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EDITOR'S NOTE

Jerry Mallet walked into my office last May and asked if the Fisheries Bureau would be interested if he put together a history of how Idaho westslope cutthroat stocks were retrieved from the brink of collapse. As someone who had come across intriguing pieces and parts of that effort for years while reading old IDFG reports in my own Idaho wild trout studies, my response was an enthusiastic yes! What follows is an insightful story of how a small group of IDFG biologists, working in tandem with staff and students at the University of Idaho Coop Unit, labored over about two decades to shore up and restore declining westslope cutthroat trout stocks in many of Idaho's major river systems. To paraphrase Jerry, what follows is part science, part history and part opinion. The amount of work it would have taken for someone who was not there to have mastered this narrative with its nearly 60 citations, would have, in my opinion, made it almost impossible to complete. Thanks to Jerry's drive and love of westslope cutthroat trout, no one will have to try as a definitive summary documenting one of the very first efforts nationwide to implement catch-and-release type regulations on wild trout fisheries has now been put together for posterity. After reading the first draft of this report, I asked Jerry if he would consider giving an oral summary of it to our Fisheries staff at a June retreat in McCall Idaho. Jerry responded favorably and the result was a presentation that proved to be one of the most popular events at the three-day gathering.

Jerry Mallet is uniquely qualified to write this historical report. His career began in 1955 when he started in the hatchery system and concluded in 2000 as the IDFG Deputy Director. During the first quarter century of this long career when the bulk of the westslope narrative below unfolded, Jerry worked for IDFG as a Fish Hatchery Helper, Fishery Biologist, Area Fishery Biologist, Regional Fisheries Biologist, Regional Fisheries Manager, Anadromous Fisheries Manager, and Fisheries Research Supervisor.

SAVING IDAHO'S WESTSLOPE CUTTHROAT TROUT FISHERIES

By Jerry Mallet

I'm going to briefly cover cutthroat trout in general, cutthroat in Idaho and then focus on the work that has been done on westslope cutthroat (WCT). I'll cite a large number of publications and note the research biologists that conducted each program. I'll also add some personal insights and opinions that I've gained throughout my time in fisheries research and management. Today, most WCT populations are protected with either catch-and-release, trophy-trout, or other special regulations. Without this protection, WCT populations would be collapsed and fishing as we know it today would be gone in most locations. The logical question might be: Why didn't this vulnerable species of fish have more protection long ago? The simple answer is that first there had to be someone managing the fish, second there had to be the recognition that there was a problem, third was finding out what would resolve the problem and fourth was bringing the public along to accept the remedial measures that would be necessary. My chief aim with this report is to document how each of these steps was addressed and how we got to the present situation.

IDAHO CUTTHROAT TROUT

Jordan and Evermann (1896) were the first to try to classify the subspecies of cutthroat trout. They utilized *Salmo* as the genus for trout and initially *mykiss* as the species. In 1896 they moved cutthroat to the species *clarki*. They believed that there were two subspecies and classified them as coastal cutthroat (*Salmo clarki clarki*) and inland cutthroat (*Salmo clarki lewisi*). The species and subspecies names were selected to honor Lewis and Clark since their expedition was the first to capture and report this species. This trout classification by Jordan and Evermann persisted essentially unchallenged into recent times (Behnke, 1992). "The confusion that frustrated later workers' attempts to classify inland cutthroat trout in the Columbia and Missouri basins is exemplified by Schultz (1935, 1941). Using Jordan and Evermann's division of cutthroat trout into coastal (*clarki*) and inland forms, Schultz believed he had found various hybrids and transitional types among the cutthroat trout of Washington and of Glacier National Park. Unable to make much sense of the diversity he observed, he concluded that all inland cutthroat should be grouped as the subspecies *lewisi*, to which he assigned the common name "Yellowstone cutthroat trout" (Behnke, 1992).

Although all inland cutthroat were classified as *lewisi* (Yellowstone cutthroat), Montana biologists recognized that the cutthroat native to the westward-draining Clark Fork differed in appearance from the "Yellowstone" cutthroat and used the common name westslope cutthroat trout in referring to the Clark Fork fish. However, *lewisi* was mistakenly believed to be the correct classification for the "Yellowstone" cutthroat and the westslope form was assumed to be an undescribed subspecies (Behnke, 1992). Idaho biologists also recognized differences between cutthroat in lakes and streams from the Salmon River north and cutthroat found in the upper Snake River. They referred to the northern cutthroat as north Idaho cutthroat and the upper Snake River cutthroat as either Snake River large spotted cutthroat or Snake River fine spotted cutthroat.

Most "old time" anglers' common name for cutthroat in any form was "native." It was not until the 1970s that studies based on morphology, electrophoresis and karyotyping all agreed that the Yellowstone cutthroat trout and the westslope cutthroat trout (hereafter referred to as YCT and WCT respectively) represented two long-divergent lines of evolution. The name *lewisi*

was clearly fixed for WCT, so the YCT required a new subspecies designation and it was given the subspecies name ***bouvieri***. The YCT displayed two forms: Snake River large spotted cutthroat and Snake River fine spotted cutthroat. Although they had different phenotypes, researchers were unable to find divergences in meristic characteristics or genotype. Because of the confusion prior to this finding, Idaho publications listed WCT correctly as ***Salmo clarki lewisi*** but either referred to them by the accepted common name of YCT or just referred to them as cutthroat with no further designation. The first Idaho publications to utilize the term WCT were in 1978 in *The Fishes of Idaho* (Simpson and Wallace, 1978) and the publication: *Response of Cutthroat Trout Populations to the Cessation of Fishing in the St. Joe River Tributaries* (Thurow and Bjornn, 1978). Today, WCT is applied to cutthroat in Idaho from the Salmon River north.

It was in 1991 that cutthroat were moved from the genus ***Salmo***. Behnke (1992) explains as follows. "All the native species of North American trout, as well as Kamchatkan rainbow trout, were placed in the genus ***Salmo*** when they were described originally. Salmo also includes Atlantic salmon and Eurasian species of trout. Systematists have concluded recently that the North American trout have a greater affinity with Pacific salmon, genus ***Oncorhynchus***, than with Eurasian trout. Consequently, all species described in this monograph have been moved to ***Oncorhynchus***." The American Fisheries Society's list of the established scientific names of fish included this change.

Currently there are three recognized subspecies of cutthroat in Idaho with slightly altered spelling from their historical scientific names. Those from the Salmon River north are WCT (***Oncorhynchus clarkii lewisii***), YCT (***Oncorhynchus clarkii bouvierii***) reside in the upper Snake River and Bonneville cutthroat (***Oncorhynchus clarkii Utah***) are found in the Bear River drainage including Bear Lake and its Idaho tributary, St. Charles Creek as well as other small streams in Southeastern Idaho (Wallace, 1979; Behnke, 1992 and Schill, 2013). There is some debate as to whether the fine spotted Snake River cutthroat is a separate subspecies. Authorities generally consider it a variety of the Yellowstone cutthroat because of their identical meristic and genetic makeup. However, Behnke lists it as an undescribed subspecies (Behnke, 1992) while others have listed it as the subspecies, ***Oncorhynchus clarkii behnkei.***

THE EARLY DAYS

In 1805, the Lewis and Clark expedition first recorded cutthroat along the upper Missouri River at the "Great Falls of the Missouri." One of the men on the expedition caught a half dozen trout that were between 16- and 23-inches long.

In 1858, Captain Mullen described Coeur d'Alene Lake as a noble sheet of water filled with an abundance of delicious salmon trout (Ellis, 1932). The Bunker Hill strike on the South Fork of the Coeur d'Alene River occurred in 1885 and very soon the large and abundant cutthroat trout of Coeur d'Alene Lake were being harvested and transported to the mining camps to help feed the influx of miners. By the late 1800s, severe mine pollution had taken the South Fork of the Coeur d'Alene River out as productive fish habitat and the main Coeur d'Alene River and Coeur d'Alene Lake were also being adversely affected.

Behnke (1992) tells us that the first reference to the name cutthroat was in 1884. Charles Hallock used the name in the October 4, 1884 issue of the American Angler (Volume 6, Number 14), for a fish that he had caught. The use of the term cutthroat to describe this species immediately came under fire as a poor name for this beautiful fish, but it stuck.

The Idaho Department of Fish and Game was established in 1889 and its first Director was called the State Game Warden. Charles Arbuckle assumed that position in 1889. He listed his major accomplishment in his first years as stopping the shipment of game and trout from Idaho to other states and the sale of such in open markets in the state. In a single instance, traffic in the taking and shipment of enormous quantities of Henry's Lake cutthroat was estimated from 50,000-90,000 pounds every winter. These fish had been marketed in Salt Lake City, Butte and other locations (Idaho Fish and Game Department annual report, 1890).

In 1901 to 1905, the St. Maries Courier newspaper frequently reported catches of 7- to 9-pound trout taken from the St. Joe River and fishing trips where anglers caught 50-100 cutthroat averaging 3-5 pounds each in a few hours. Examination of the photos that accompanied the articles confirmed that the trout were cutthroat (Rankel, 1971).

In 1906, citizens were dynamiting cutthroat in the North Fork of the Snake River (Henry's Fork) and seining cutthroat spawners in St. Charles Creek as they left Bear Lake.

In 1913 and 1914, the trout bag limit was 20 pounds per day and 30 pounds in possession.

Ellis (1932) reported that in 1932 there had been a definite decline in cutthroat in Coeur d'Alene Lake since the days of Captain Mullen in 1858. Ellis reports that in 1932 trout are rarely taken off Harrison, but many causes were attributed to this change in the fish populations of the lake.

Despite these early problems, Idaho's human population was small and many areas were inaccessible, allowing cutthroat populations in those areas to remain in good condition. This changed as fishing pressure increased after World War II (1946). A large number of veterans returned to civilian life and had considerable leisure time, roads were being built into more remote areas to access the timber resource, gasoline was no longer rationed, boats and outboard motors were more readily available and there were innovations in fishing gear with the availability of modern spinning reels. A French company introduced the Mitchell 300 spinning reel in 1948. By the early 1950s, cutthroat populations were being impacted by this increase in fishing pressure. The Idaho Department of Fish and Game had only three biologists on staff in 1950. With the passage of the Dingell-Johnson Act, Idaho acquired enough funds in 1952 to put a management biologist in six regions of the state. These biologists could see that cutthroat were very vulnerable to fishing pressure and added to the stream degradation that was occurring, was resulting in declines in cutthroat populations. It was not until the mid-1950s that cutthroat populations were extensively studied and added protection was given them starting in the early 1960s.

SAVING THE WESTSLOPE CUTTHROAT TROUT FISHERIES

The early impetus to understand and maintain WCT populations came from Ted Bjornn. His study of the cutthroat populations in Priest Lake was the first in-depth look at WCT populations. When he became a fishery management biologist for the Idaho Fish and Game Department's Salmon Region, he became concerned about the cutthroat population of the Middle Fork of the Salmon River and designed the first fishery study there. He continued his concern for cutthroat as he moved into the job of supervising the Department's fishery research section and then as Assistant Leader of the Idaho Cooperative Fishery Research Unit. At the Coop Unit, he was united with its leader, Don Chapman, who had many of the same concerns

regarding maintenance of WCT stocks. Bjornn was able to spearhead cutthroat work on the St. Joe River, while Chapman led the work on Kelly Creek and the North Fork of the Clearwater River. Upon Chapman's departure from the Coop Unit in 1972, Bjornn became Unit leader and also took the lead on the North Fork Clearwater River and Kelly Creek.

Priest Lake

Bjornn (1957) conducted a fishery study on Priest and Upper Priest lakes in 1955 and 1956. This was at the same time that Ray Corning was looking at cutthroat populations on the Lochsa River. Work on the Lochsa will be discussed later. Work at Priest Lake was undertaken due to demands of local sportsmen. They wanted improved cutthroat fishing that resembled what it was like in the "good old days." Sportsmen remembered the 13- to 15-inch red bellies that they had caught throughout the lake in the past. They said that fishing was good in the spring and early summer, dropped off in the middle of the summer and picked up slightly in the fall as waters cooled. Bjornn found that anglers caught about 5,000 cutthroat per year during 1955 and 1956 from Priest and Upper Priest lakes. The fishery had changed after the introduction of lake trout (mackinaw) in 1925 and kokanee in 1942. Priest Lake tributary streams had been degraded by poor logging practices and some had been stocked with brook trout that competed with young cutthroat for living space. Bjornn recommended that brook trout be eliminated from streams tributary to Priest Lake and those streams restocked with cutthroat. He also recommended that the daily limit of cutthroat in the lakes be reduced to three fish and that the tributaries closed to fishing to provide more fish to the lake.

At the conclusion of Bjornn's study of Priest Lake fish populations (Bjornn, 1957), Paul Jeppson acted on Bjornn's recommendations to improve cutthroat populations in Priest Lake. Jeppson removed brook trout from some of the streams that fed Priest Lake and were nursery streams for cutthroat. His removal of brook trout from Lamb Creek resulted in an outcry from the public. They wanted better cutthroat populations in Priest Lake but they enjoyed fishing for brook trout in Lamb Creek and were angry that they had been removed. Streams on the east side of Priest Lake had been clogged with logging debris to the extent that they were not passable for fish moving up to spawn. Jeppson employed a two-man crew in 1961 and 1962 to cut up logging debris and throw it up on shore to clear the stream channels. Participants at a state forestry summer work camp carried the debris up above the high water line. I continued this program in 1963 and 1964. Some logjams were so massive that they had to be removed with large amounts of dynamite.

Jeppson also attempted to establish a broodstock lake for WCT to be used to enhance populations in Priest Lake. In 1957 he eradicated the fish in Cocolalla Lake and its tributaries and had placed barriers to prevent fish from moving upstream into the lake. The treatment was successful and WCT were obtained from King's Lake, Washington to restock the lake. This stock was an ideal source for WCT broodstock because the Kings Lake stock was descended from Priest Lake, Idaho. The fish survived well but did not enter any of the streams entering or leaving the lake to spawn. He was unable to collect spawning cutthroat and the project was abandoned (Jeppson, 1962). Meanwhile, 300,000 year-old Henry's Lake cutthroat were being released in upper Priest Lake each spring to enhance cutthroat populations in the lake. This stock of cutthroat was being used until we could develop a source of WCT eggs. Jeppson then eradicated Hidden Lake (a 50-acre lake in the Selkirk mountains) with toxaphene in 1962. This lake was about a 5-mile hike by trail. I replaced Jeppson as fishery manager for the Panhandle Region in the fall of 1962 and carried fish and live boxes into Hidden Lake the next two summers and all fish died after a short time in the lake. The lake finally detoxified in 1965 and we stocked it with WCT from King's Lake that summer. Hidden Lake did not have an inlet and

we set up a trap on the outlet to capture the spawning fish. We caught fish on hook and line and they had spawning colors and were mature. Fish did not enter our trap in the outlet and we were not able to capture fish for egg collection. The program at Hidden Lake was abandoned.

Due to a number of factors discussed below, including habitat and exotic fish issues, along with mysid introductions and their positive effect on piscivorous lake trout, the Priest Lake WCT fishery would not show marked improvement.

Middle Fork Salmon River

The first WCT study on a major stream occurred in 1959 and 1960 on the Middle Fork Salmon River (Mallet, 1960, 1961, 1963). This study established the migratory nature of fluvial WCT populations in large river systems. Cutthroat move out of the upper reaches of the Middle Fork in the fall to overwinter in large pools of the lower Middle Fork and in the Salmon River, above and below the mouth of the Middle Fork. They move back upstream in the spring. Young fish spend the first two years of their life in tributary streams, move into the Middle Fork and spend the next three years in the main stem and spawn in the tributaries in their sixth year of life. The fish are thus exposed to fishing pressure for three years in the Middle Fork prior to spawning. Anglers were believed to be releasing 85% of the fish they caught but were still having an impact in that large fish were less available late in the summer. There was an estimated 5% hooking mortality on the fish caught and released. The river was starting to become more heavily used and this raised a concern for the long-term viability of the cutthroat population. At the conclusion of the study, it was recommended that the regulations be changed to allow a 3-cutthroat limit and to close the wintering areas in the Salmon River to trout fishing from the early fall through the late spring. The 3-cutthroat limit was adopted in 1963 but the Salmon River wintering areas were not closed to trout fishing until 1973. The 3-cutthroat limit was an effort to lead the public toward more restrictive regulations for cutthroat but we did not believe that more severe restrictions would pass muster with the public or have a chance of being adopted.

Ortmann (1969, 1970) conducted a follow-up study of the Middle Fork in 1968 and 1969. Ortmann found that float trips and the resulting fishing pressure had tripled since 1960. Half of the floaters were fishermen and they were keeping half of the cutthroat that they caught. Ortmann estimated that anglers killed an estimated 2,000 cutthroat in 1969. The overall population structure had not changed too much but the older fish that would spawn were being cropped. Ortmann recommended that the daily bag limit of cutthroat be reduced to two fish and no bait could be used and fishing must be accomplished with single barbless hooks. It was not felt that the public was yet ready for a catch-and-release fishery.

Corley (1971) captured 185 cutthroat from the Middle Fork in 1970 and transported them to the Hayden Creek Hatchery in an effort to establish a WCT broodstock. Reingold (1979) reports that the fish were so wild that the hatchery men couldn't get close enough to feed them without pure panic. The fish wouldn't eat even when offered hand collected shrimp. Most of the fish died before spring and those that lived did not produce viable eggs or sperm. The effort was abandoned.

Corley (1972) established the first snorkel trend counts in the Middle Fork in 1971. In the 21 transects he counted 210 cutthroat of which only 13% were over 12-inches long. Corley recommended that the Department adopt catch-and-release regulations for the Middle Fork in 1972. This regulation was adopted along with a regulation in the tributary streams of 10 trout, no more than 2 of which could be cutthroat. There was some concern that there would be a

backlash from the public on this regulation, but it did not happen. Reingold (1979) stated that "Fishermen were beginning to accept the fact that resources were limited and one didn't necessarily have to kill and eat wildlife to enjoy it."

In 1976, Ball (Jeppson and Ball, 1979) reported that after five summers of catch-and-release regulations on the Middle Fork we were beginning to see results. The total number of cutthroat in snorkel counts only increased by 4% but the number of cutthroat over 12 inches was 300% greater than in the 1971.

Ball (Jeppson and Ball, 1979) again snorkeled the Middle Fork transects in 1977 and found 550 cutthroat where 210 had been counted seven years earlier (a 172% increase). The number of cutthroat greater than 12 inches went up 6-fold to 31% of the population. The spawners were not being killed before they could reproduce. The public was showing support for the improved fishing due to the catch-and-release regulations.

Thurow (1982) snorkeled the transects in conjunction with a steelhead study he was conducting on the Middle Fork in 1981. Thurow found cutthroat in all transects in 1981, with 62% of the fish exceeding 12 inches. He also noted that 55% of the cutthroat caught by angling exceeded 12 inches in length. He found the greatest densities of cutthroat in the Middle Fork above Marble Creek.

Thurow (1983) snorkeled the transects again in 1982. He observed cutthroat in all transects with 61% of the fish exceeding 12 inches. Fifty percent of the fish caught with hook and line exceeded 12-inches long.

Since 1982, the transects have been snorkeled regularly. Counts have varied, year to year, depending somewhat on river flow and temperature but cutthroat abundance and size has remained well above the pre catch-and-release levels in most years (Schill, 2013). Catch-and-release fishing has worked on the Middle Fork to increase cutthroat size and abundance and maintain the cutthroat population at a high level. Once the public started to experience the greatly improved fishing, they endorsed the program.

St. Joe River/Coeur d'Alene Lake Complex

Averett (1963) studied cutthroat in the St. Joe River/Coeur d'Alene Lake complex in 1961 and 1962. He identified what he called two races of cutthroat inhabiting the St. Joe River drainage. They were separated by their behavior. One race was adfluvial cutthroat that spent the first 1-3 years of their life in the St. Joe River and its tributaries and then moved downstream into Coeur d'Alene Lake where they spent 1-3 years in the lake (over half spent 2 years in the lake) before returning to their natal streams to spawn. Adfluvial cutthroat were found as much as 75 miles above the mouth of the St. Joe River. The other race was referred to as resident cutthroat that spent their entire life in a stream environment.

When we connect Averett's findings with those of Mallet (1961), we can identify three distinct behavioral patterns for WCT: 1) adfluvial fish that spend portions of their life in a stream environment and a portion in a lake environment and travel considerable distances traveling to and from the lake; 2) fluvial fish that spend a portion of each year in a major stream or tributary stream and then travel downstream considerable distances to overwinter in the deep pools of that river or a larger river and return upstream in the spring and 3) resident fish that spend their entire life in a relatively small section of a stream.

St. Joe River

In the mid-1960s there was increasing displeasure with the St. Joe River cutthroat fishery by local citizens and by local legislators. They were demanding that the Idaho Department of Fish and Game construct and operate a cutthroat hatchery on the St. Joe River. They were reflecting on the "good-old-days" when large catches of 3-5 pound cutthroat were the norm in the St. Joe River. Cutthroat populations were declining and the fishery was being supported by large releases of catchable rainbow trout. The Department took its first detailed look at the St. Joe River fishery in 1967 (Mallet, 1968). We conducted an intensive creel survey of the river and found that anglers caught 4,617 rainbow trout (58%), 3,329 cutthroat trout (42%) and 18 bull trout. Cutthroat abundance was greatest in the river above Avery. Fire closures on the forest that year limited access to the river in early August and stopped use of the river in late August and September.

In the late 1960s Dr. MacPhee and Department personnel utilized the chemical squoxin to eradicate squawfish (pike minnow) from the St. Joe River. Squawfish were considered to be a competitor and predator on cutthroat and this experimental program was undertaken in an effort to enhance cutthroat survival (MacPhee and Ruelle, 1969).

In lieu of a fish hatchery on the St. Joe River, a 1/3-acre pond (designed by Ted Bjornn) was constructed on Rochat Creek, a tributary to the lower St. Joe River, approximately 22 miles above the mouth of the river in 1966 (Mallet, 1968). This pond was designed to be stocked with yearling cutthroat in the summer, held over winter and released the following spring. Capacity of the pond would be 50,000 fish. In the first year of the operation, about 25,000 Henry's Lake cutthroat (37 fish/pound) were stocked in the pond in early August of 1967. The fish had been adipose clipped prior to moving them to the pond. The fish grew to 9.4 fish/pound by December 1. The fish were released in the spring of 1968. The program was carried on for a few years with no measurable results. Later it was used to raise WCT. Overall results were negligible and costs were relatively high. As a result, the program was abandoned. It did serve the purpose of holding the public at bay until the cutthroat fishery could be properly studied and meaningful ways to improve the fishery could be devised.

In early 1968, the Department asked the Idaho Cooperative Fishery Research Unit to assess the status of cutthroat stocks in the St. Joe River and determine which management alternatives might be available (Bjornn, 1975).

In 1968, a creel census survey was conducted on the St. Joe River, above the slack water area, to be used as a full-season evaluation that could be used as a comparison in future years (Dunn, 1968). Anglers removed 3,868 cutthroat from the St. Joe River in 1968.

Rankel (1971) investigated the St. Joe River cutthroat populations and fishery in 1969 and 1970. He examined the life history, abundance, population structure and harvest of cutthroat. He also included an investigation of angler preferences for the fishery by interviewing anglers fishing the stream and in public meetings in local communities. He concluded that cutthroat populations had declined due to over-fishing of this extremely vulnerable species. MacPhee (1966) observed that cutthroat trout were nearly twice as vulnerable to angling as were brook trout. Rankel also concluded that unless we reduced the mortality rate of cutthroat trout in the river that it seemed likely that the stock would be economically, if not biologically extinct. While in hindsight, extinction itself seems improbable; WCT fishing quality had collapsed and was certainly in risk for the future. For example the modal length of WCT in the harvest was 6.9 inches in 1969 (n=598) and 6.5 (n=554) in 1970 and fish in the creel were as small as 3.5

inches. When given a choice, 88% of local anglers preferred to save the cutthroat, fishery even though severe harvest restrictions might be necessary. Rankel recommended a trophy-fish program in the upper half of the river (above Prospector Creek). As a result of public comment and this recommendation, in 1971, anglers could keep only three cutthroat that were 13 inches or longer and no bait fishing was allowed in this section. Catchable rainbow releases were discontinued in this trophy-trout section of the river. The lower half of the river continued on general regulations (15 fish) and catchable rainbow releases were continued in this section. Rankel believed that by restricting the number of harvested cutthroat to a few large ones that we could achieve the same results with the trophy-fish regulations that we could with catch-and-release regulations. He also saw an opportunity to provide greater angler satisfaction.

Sportsmen were requesting closure of lower St. Joe River tributaries to increase abundance of cutthroat in the main St. Joe River (Thurow and Bjornn, 1978). Starting in 1973, four lower St. Joe River tributaries were closed to fishing (Reeds, Bond, Trout and Mica creeks). Thurow (1976) evaluated these closures in 1973-1975 (Thurow, 1976). He found most of the cutthroat in these St. Joe tributaries, particularly in the upper stream sections, were resident cutthroat which remained in that tributary for their entire life cycle. Few of these fish attained lengths over 12 inches. Many resident cutthroat retained home ranges no larger than a single pool-riffle complex. Resident fish in the upper sections of tributaries matured at a relatively small size, whereas fish shorter than 8 inches in the lower sections of tributaries were mostly immature and may have been predominately progeny of migrating parents that matured in the lake or river. Resident cutthroat are present throughout the streams while migratory stocks are primarily in the lower three miles of streams. Closure of tributary angling increased abundance and density of cutthroat in accessible stream sections (Thurow, 1976). In the lower portions of tributaries, anglers had been harvesting juvenile migratory cutthroat before they entered the St. Joe River. Reduction of this harvest would provide additional cutthroat to the St. Joe River and/or Coeur d'Alene Lake.

During Rankel's study, an upriver tributary, Red Ives Creek, was closed to fishing for a year and then reopened. Rankel (1971) found that after Red Ives Creek was closed, cutthroat populations increased. When this stream was reopened, cutthroat abundance dropped 59% and cutthroat trout longer than 8 inches virtually disappeared. A majority of the anglers who fished the tributaries eventually favored restrictive regulations on tributary streams if these regulations would improve the fishery in the St. Joe River.

In 1975, Johnson (Johnson and Bjornn, 1978) did an evaluation five years after trophy-trout regulations were imposed on the upper St. Joe River. He found 3-5 times more cutthroat in snorkel transects than were counted in 1970. The increased abundance of small cutthroat (<6 inches) was evidence of increased recruitment to the population and fishery. Increased numbers of large cutthroat (>10 inches) was evidence that many small fish caught and released by anglers became available to anglers at a larger size. Spawner-sized cutthroat increased 10-fold in the St. Joe River. Angler effort initially decreased but within three years had increased to pre-special regulation levels with trophy-fish regulations. On the St. Joe, angler catch rates increased from 0.2 cutthroat per hour in 1968 to about 2.5 cutthroat per hour in 1975. Trophy-fish regulations worked on the upper St. Joe River and after an initial drop in effort, interest increased as the regulations took effect until fishing pressure reached pre-special regulation levels.

Today, (2013) the regulation is catch-and-release for cutthroat for the entire St. Joe River and tributaries.

Kelly Creek

Kelly Creek, a tributary of the North Fork of the Clearwater River, was selected as an experimental catch-and-release area in 1970, the first in the state. Ball (1971) evaluated the special regulations in the lower 10.6 miles of Kelly Creek and the standard regulations in the 10.8 miles of the North Fork above Kelly Creek. In 1969, he set up snorkel transects on Kelly Creek and the North Fork. He evaluated both stream sections in 1969 when they were both on standard regulations and in 1970 when Kelly Creek was on catch-and-release regulations. He also conducted a creel census in both years. Juvenile steelhead made up 90% of the catch on both streams in both years. Ball found that only 3.5% of the cutthroat exceeded 12 inches in length.

In 1971 and 1972, Pettit (Chapman, Ball and Pettit, 1972 & 1973) snorkeled transects and evaluated the fishery. He found a 3- to 6-fold increase in cutthroat abundance in Kelly Creek and a 0- to 2-fold increase in the North Fork. Young-of-the-year cutthroat were beginning to appear in both streams as Dworshak Dam denied steelhead access to the area for spawning.

Johnson (Johnson and Bjornn, 1978) evaluated special regulations on Kelly Creek in 1974 and 1975 via snorkeling. In Kelly Creek he counted 13-times more cutthroat trout of all sizes in the transects in 1975 (n=355) than in 1970 (n=27). Only 11 cutthroat had been counted in 1969 when standard regulations were in place on Kelly Creek. The number of large cutthroat (>10 inches) in their samples increased from four fish in 1970 to 160 in 1975, evidence that small fish were surviving the catch-and-release fishery. Spawner-sized cutthroat (>12 inches) increased from one fish in 1970 to 45 in 1975.

Selway River

Lindland (1974) began a study of the Selway River cutthroat populations in 1973. He established snorkel transects and counted fish in them in 1973. He observed fewer cutthroat in snorkel counts in the Selway than Corley (1972) observed in his transects in the Middle Fork of the Salmon River in 1971. He reported, however, observing more cutthroat over 12-inches long (18.2%) than Corley had seen in the Middle Fork (12.8%). In the least accessible portion of the Selway River (Bear Creek to Moose Creek) 34.4% were over 12 inches. Lindland recommended a 3-cutthroat limit on the Selway River and this regulation was adopted in 1974. He did not believe that catch-and-release was necessary at that time. Catch-and-release regulations were adopted for the Selway River in 1975. Lindland snorkeled his Selway River transects again in 1974, 1975, 1976, 1977 and 1978 (Lindland, 1977, 1978, 1979). In 1976, he found that cutthroat had increased from 1.0 per transect in 1973 to 4.0 in 1976. He saw very few cutthroat in the lower roaded section (Race Creek to the mouth), 0.8 in 1976. Cutthroat abundance increased in his transects each year after 1973. Counts increased from 4.4 per transect in 1973 (general regulations), to 5.5 in 1974 (3-cutthroat limit), to 5.8 in 1975 (catch-and-release), to 6.9 in 1976 (catch-and-release), 15.4 in 1977 (catch-and-release) and 13.1 in 1978 (catch-and-release). Cutthroat over 12 inches made up 12.0% of the cutthroat observed in 1975, 19.2% in 1977 and 26.5% in 1978 (Lindland, 1981).

By 1980, catch-and-release regulations were well established on the Selway River and cutthroat populations had responded well. More cutthroat and larger cutthroat were in the river and fishing was better.

Coeur d'Alene River

Bowler (1974) studied the cutthroat trout populations in the Coeur d'Alene River above its confluence with the South Fork in 1973. He found a depressed cutthroat population and recommended that protective regulations be put into place. He chose trophy regulations rather than catch-and-release probably due to the public's desire to harvest some fish in the river. The 1975 regulations limited the cutthroat harvest to three fish with no fish under 16 inches being kept.

Lewynsky (1986) studied the Coeur d'Alene River cutthroat population in 1980 and 1981 to evaluate the response to the special fishing regulations that were put in place in 1975. He found that: "The change in regulations did not have a detectable effect on trout abundance, reproduction, mortality rates and size structure, nor was a consistent improvement observed in measurable indices of fishing success." He concluded that: "The trout populations appear to be at equilibrium above the critical maintenance level but below the attainable maximum and fishing conditions remained below the expectations of the participating anglers." Lewynsky reported that non-compliance with the special regulations was high and significant enough to limit the cutthroat populations.

Horner (2013) recently told me that after Lewynsky's findings, they tried a series of complex regulations to try to improve cutthroat populations and yet satisfy anglers' desires. They found that within two weeks of the start of fishing on the Coeur d'Alene River that any harvestable surplus was gone. There was still a demand from the public to harvest fish. Finally, the Coeur d'Alene River was put under catch-and-release regulations in 1984. They used several ponds along the river as catch-out-ponds and stocked them with catchable rainbow to satisfy the public's desire to keep some fish. Despite some suspected non-compliance, the catch-and-release regulations resulted in 4 to 5 times as many cutthroat in the river with an occasional 20-inch fish.

Today, the entire Coeur d'Alene River system has catch-and-release regulations for cutthroat and cutthroat populations are at an acceptable level. The Coeur d'Alene River's improvement took longer than that in other steams studied to rehabilitate (Schill, 2013) It's uncertain whether this was due to habitat problems or other factors.

Lochsa River

The first real look at the cutthroat fishery on the Lochsa River came in 1956 when Corning (1957) conducted studies of the Clearwater River system to evaluate steelhead trout populations. The road along the Lochsa River was constructed in 1925, but a 27-mile section above Boulder Creek was left unroaded with only a foot trail connecting the two sections of road. A portion of Corning's study involved a creel census survey on the stream from the mouth upstream to Boulder Creek and the upper section of the river. Fish caught in the unroaded section were checked as they were brought out to the road and included in either the catch from the lower or upper sections. Corning was primarily interested in the harvest of juvenile steelhead but he did record the cutthroat information. His totals for the Lochsa River in 1956 were 26,657 hours fished with a harvest of 5,948 cutthroat. The overall catch rate for cutthroat and other game species was 1.3 fish per hour. The lower section was divided into two subsections: the mouth to Split Creek (15 miles) and from Split Creek to Boulder Creek (15 miles). A total of 22% of the cutthroat taken from the Lochsa River that year were taken from the mouth to Split Creek, 33.4% from Split Creek to Boulder Creek and 43.9% from the upper section. Cutthroat taken from the unroaded section were included either in the catch in the upper section or in the

section above Split Creek, depending on where they were checked. Corning indicated that anglers were releasing 36.6% of the fish they caught. I worked for Corning on this census and I suggest that most of the released fish were juvenile steelhead. I also observed that anglers that hiked up the trail a couple of miles normally came back with good catches of large cutthroat.

In 1962, construction was completed that connected the existing road sections and this became a major route of travel between Idaho and Montana. The increased fishing pressure quickly reduced the cutthroat population in the Lochsa River and large numbers of catchable hatchery rainbow were released in the river to provide a fishery.

In view of the successful cutthroat programs that were in place on the Middle Fork of the Salmon River, the St. Joe River, Kelly Creek and the Selway River, there was a question on whether or not such a program would work on a readily accessible stream like the Lochsa River. In early 1976, I discussed this option with Wes Cannon (Regional Fishery Manager for the Clearwater Region). Many fishermen were happy with the catchable rainbow program that was occurring in the Lochsa River, the local conservation officer did not believe that restrictive regulations would be enforceable in a stream next to a major highway and worried that a reduction in releases of hatchery rainbow would result in few people staying in all of the new Forest Service campgrounds. I recalled the good catches of large cutthroat taken from the unroaded section of the Lochsa in 1956 and believed it might be worth a try. Wes agreed and we designed a program that we felt that Department administrators would accept and that those happy with the catchable rainbow program might embrace. The proposal was to put catch-and-release regulations in place on the 40 miles of the Lochsa River above Boulder Creek and keep general catch-and-keep regulations on the lower 30 miles of stream from the mouth of the Lochsa to Boulder Creek. No catchable rainbow would be released above Boulder Creek. There would continue to releases of hatchery rainbow below Boulder Creek to provide a fishery for those that wanted to keep fish. The regulations were scheduled to go into effect in 1977.

In the summer of 1976, Lindland (1977) established snorkel transects in the Lochsa River and counted fish in those transects as a control for the new program that would begin in 1977. No cutthroat were observed in any of the transects in 1976. Lindland also conducted a creel survey in the Lochsa River in 1976.

In the first year of the catch-and-release regulations (1977) the fishing effort above Boulder Creek decreased by 88.1% and catch of cutthroat decreased by 75% (Lindland, 1978). In the catch-and-keep section below Boulder Creek, the effort increased by 61.7% and the harvest of catchable rainbow increased 5-fold. An Idaho Cooperative Fishery Research Unit researcher (Brent Mabbott) snorkeled the transects and observed 1.70, 1.67 and 1.55 cutthroat per 100 meters of stream (Mabbott, 1978). These same transects had no cutthroat present in 1976.

In 1978, Lindland (1979) reported that effort in the catch-and-release section increased by 38.5% from that of 1977 (first year of catch-and-release) to 1978. The number of cutthroat trout caught and released increased 4-fold from 541 in 1977 to 2,377 in 1978. Catch rates increased from 0.55 in 1977 to 1.75 in 1978. Mabbott (1979) again snorkeled the Lochsa transects and found a 4-fold increase from 1977 to 1978. In the catch-and-keep section below Boulder Creek, effort decreased by 17.2% but catch rate increased from 0.02 to 0.07 fish per hour.

Pettit (1980) reports that effort in the catch-and-release section remained constant from 1978 to 1979 but the number of cutthroat in the catch-and-release section decreased by 47%.

Catch rates dropped from 1.75 in 1978 to 0.93 in 1979. This was still six times greater than before catch-and-release. Mabbott (1980) found a slight decrease in the number of cutthroat per 100 meters in the Lochsa snorkel transects from 1978 to 1979. Pettit suggests that extremely low river flows and unusually hot weather may have forced cutthroat upstream to higher elevation tributaries until cooler water temperatures occurred in September. Cutthroat were being caught in the catch-and-keep section and size of those fish was larger than in past years.

Lindland and Pettit (1981) reported that the angler effort in the catch-and-release area nearly doubled in 1980 compared to 1979. The number of cutthroat caught and released increased by 63%. There were also significant increases in cutthroat counted in snorkel transects in 1980. More cutthroat were being caught in the catch-and-keep section with an increase of 90% from the previous year. Since 1980, the cutthroat population and fishing have remained good in the Lochsa River. As fishing got better, more anglers endorsed catch-and-release regulations in the Lochsa River. Acceptance of the concept of catch-and-release by the public allowed the Department to eventually include the entire Lochsa River in protective regulations. Since 1994, regulations are catch-and-release fishery above Boulder Creek and from December 1 to Memorial Day weekend on the lower section of the river. Trophy regulations (2 cutthroat over 14 inches) on the lower section are in force from the Memorial Day weekend through November 30 (Schriever, 2013). The work on the Lochsa River illustrates that catch-and-release regulations will work even in an easily accessible stream and that results can come very quickly.

South Fork Salmon River

Cutthroat were very uncommon in the mainstem of the South Fork in 1984. Thurow (1987) saw just 14 cutthroat in 23 snorkel transects in 1984 and 17 cutthroat in 28 transects in 1985. Most cutthroat were downstream from Elk Creek in the most inaccessible reaches of the South Fork. Cutthroat were also uncommon in most streams tributary to the South Fork. Thurow counted 28 cutthroat in 89 tributary transects in 1984 and 27 in 102 transects in 1985. Cutthroat comprised just 3% of the main-stem game fish, 2% of the tributary fish and 2% of the angler catch. He reported a small, remnant cutthroat population (both resident and fluvial) in the South Fork system in 1984 and 1985. As a result of Thurow's findings, Regional Fish Manager, Don Anderson, recommended catch-and-release regulations for the South Fork and tributaries and that took place in 1987. Some scattered follow-up snorkel counts on a subsample of the original transects were conducted in ensuing years and those data have not yet been summarized. Kevin Meyer snorkeled the transects in 2012 and found four times as many cutthroat as Thurow had found in 1984-1985 (Meyer, 2013). Anecdotal information also illustrates the recovery of cutthroat in the South Fork. Thurow fished the lower 2 miles of the South Fork in the early 1990s and caught and released many cutthroat in the 16- to -18 inch class as well as one cutthroat that measured 20 inches. In 2009, Thurow and Dave Burns sampled the South Fork with hook and line near the confluence of the Secesh River and caught 8-10 cutthroat per hour with fish in the 16-inch class (Thurow, 2013). Several outfitters currently sell guided cutthroat fishing trips in the South Fork.

The South Fork of the Salmon River is the last major success story, albeit less well documented, in the recovery of WCT following a reduction in angling mortality.

SPECIAL REGULATIONS ON STREAMS

Regulations that allow two or three cutthroat of any size are not sufficient to sustain these highly vulnerable populations. Either catch-and-release or trophy-trout regulations with a high minimum size work in Idaho streams to produce more fish and larger fish in the streams and to put more fish on the spawning beds. Results can come very quickly, even on heavily fished streams that are extremely accessible. Johnson and Bjornn (Johnson and Bjornn, 1978) compared catch-and-release results with those of trophy-trout regulations. They found that anglers fished more hours under trophy-trout regulations than under catch-and-release regulations. Angler effort on the St. Joe River declined when trophy-trout regulations were initiated in 1971, but angler effort increased to pre-special regulations levels within three years. Angler effort also declined initially with catch-and-release regulations on Kelly Creek and remained low. Apparently the opportunity to keep a few large cutthroat was important to anglers in northern Idaho. Cutthroat survived longer and grew to larger sizes in Kelly Creek under catch-and-release regulations. Trophy-trout regulations allowed anglers to harvest cutthroat longer than 13 inches, leaving few cutthroat larger than 15 inches in the St. Joe. Cutthroat grew to lengths of 17 inches or larger in Kelly Creek since all cutthroat had to be released by anglers. Today, most WCT streams are protected with catch-and-release regulations with a few steam sections maintaining trophy-trout regulations. Many of the small and difficult to reach tributary streams have a 2-cutthroat limit. It has been a long and at times painful process but WCT populations are in good shape and the public has grown to accept the need for very restrictive regulations to experience quality WCT fishing.

LARGE LAKES CONTAINING WESTSLOPE CUTTHROAT TROUT

The large lakes of north Idaho originally had abundant populations of WCT that grew to a large size. Cutthroat were distributed throughout the lakes and shared these waters with bull trout and whitefish. Probably representative of those fish were the catches of cutthroat trout from the St. Joe River from 1901 to 1905 as recorded in the St. Maries Courier (Rankel, 1971). There were frequently reported catches of 7- to 9- pound cutthroat and fishing trips when anglers caught 50 to 100 cutthroat that were 3- to 5- pounds each. These were adfluvial cutthroat that had spent time in Coeur d'Alene Lake. At about the same time, cutthroat were plentiful enough that they were being harvested from Coeur d'Alene Lake and taken over the hill to the "Silver Valley" to feed the miners.

Since the early days, cutthroat populations in Coeur d'Alene Lake have declined due to over fishing, loss of the westside tributaries to agriculture, mine pollution in the Coeur d'Alene River and the introduction of kokanee and Chinook salmon. By 1967, anglers only caught 889 cutthroat from Coeur d'Alene Lake (Mallet, 1968). Cutthroat were either taken incidental to kokanee fishing or by anglers who fished the shorelines in the early morning hours or late evening hours.

Cutthroat harvest from Priest Lake in the mid-1950s was basically by anglers fishing the shoreline in spring or fall in the early morning or late evening hours. Locals wanted a return to the better cutthroat fishing that had occurred in the early years. This spawned Bjornn's mid-1950s research project, large cutthroat releases in Upper Priest Lake, the operation of incubation channels on two tributary streams and the eradication of brook trout from some tributary streams. Kokanee and lake trout had been introduced into the lake since the "good-old-days" and the introduction of Mysis shrimp caused a major change in fish populations in Priest

Lake. Despite Jeppson's efforts, brook trout still inhabit many of the tributary streams (Dupont, Liter and Horner, 2008).

Pend Oreille Lake WCT shared the same fate as those in the other big lakes. Kokanee, Kamloops rainbow trout, lake trout and Mysis shrimp were introduced into the lake. Spawning access was denied to most of the Clark Fork River with the construction of Cabinet Gorge Dam. Other major tributaries were adversely affected by poor logging practices. As in the other big lakes, WCT can still be caught in shoreline areas or are occasionally caught incidental to fishing for other species.

Large sums of money and considerable manpower have been spent over the years trying to establish large fishable WCT populations in the large lakes of northern Idaho. Despite these efforts, little improvement has taken place for them in the big lakes. Anglers can still take an occasional cutthroat in the cooler months along shorelines early in the morning or late in the evening. Wydoski and Whitney (2003) indicate that WCT will use the nearshore, littoral areas when other species are present but otherwise they will disperse throughout the lake. This may explain why the distribution of cutthroat in these large lakes changed after kokanee and large predator species became established in these lakes. Increasing cutthroat populations in these lakes approaching that of the "good-old-days" is an unrealistic goal. Improvement in populations of adfluvial cutthroat in tributaries will add cutthroat to the lakes but I do not believe that this will cause a significant improvement in cutthroat fishing in the lakes.

CONCLUSIONS

There has been an excellent sustained effort by the Idaho Department of Fish and Game to rehabilitate WCT populations in the streams throughout their Idaho range. By the late 1960s to early 1970s, WCT populations in our major drainages were on the brink of collapse. They have been satisfactorily rehabilitated and currently our WCT populations are secure, fishing is good and the public has accepted this program. This is one of the best success stories that we have in Idaho fish research and management.

ACKNOWLEDGEMENTS

Without Dan Schill's encouragement, I probably would not have taken the time to put this paper together. I thank him and Ed Schriever for allowing me to present it to the statewide fishery staff at their 2013 retreat in McCall and for printing copies to be distributed to the participants.

I've cited the many research and management biologists that did the work that led to the understanding and rehabilitation of the westslope cutthroat populations of Idaho. However, I did not mention the many biological aides who worked on these projects and without whose efforts the work would not have been completed. Many of these individuals are now leaders in the Department.

My interest in cutthroat was developed though my interactions with my early mentors, Ray Corning and Ted Bjornn. Along the way I had encouragement from Chief of Fisheries, Jim Simpson, that kept my enthusiasm high.

This effort was truly an act of love that I have for this magnificent fish and for the Department of Fish and Game that has given me so much.

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Prepared by:

Jerry Mallet
Retired

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Daniel J. Schill
Fisheries Research Manager

Edward B. Schriever, Chief
Bureau of Fisheries