# THE PRESENT STATUS AND DISTRIBUTION OF THE WESTSLOPE CUTTHROAT TROUT (*SALMO CLARKI LEWISI*) EAST AND WEST OF THE CONTINENTAL DIVIDE IN MONTANA

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## ABSTRACT

The distribution and abundance of westslope cutthroat trout (Salmo clarki lewisi) has drastically declined over its historic range in the last 100 years. Although previous studies in Montana have identified strongholds, the status of westlope cutthroat statewide continued to be an uncertainty. The purpose of this report was to quantitatively determine the present and historic range as well as identify strongholds of genetically pure westslope cutthroat in Montana.

The historic range of westslope cutthroat in Montana includes all waters west of the continental divide, that portion of the Missouri River drainage upstream from Fort Benton and the headwaters of the Marias, Judith, Musselshell and Milk rivers. Three life history forms are found within this range: 1) adfluvial stocks, 2) fluvial populations and 3) nonmigratory resident fish. Behavioral rather than morphological differences appear to separate these stocks. Migratory adults travel long distances during high streamflows and spawn when water temperatures are near 10 C (50 F). Most migratory adults quickly leave the spawning grounds. Sexual maturity is attained at age III or older. Alternate year spawning is predominant in some drainages. Westslope cutthroat are opportunistic in their food habits, but are not highly predaceous; they tend to specialize as an invertebrate feeder.

The original range of westslope cutthroat in Montana was estimated to be 25,547 km, which was considered a conservative estimate. A total of 655 streams, comprising 6,993 stream km, are currently inhabited by westslope cutthroat trout in Montana; this represents 27.4% of the estimated historic range. However, these figures include waters that contain contaminating species and known introgressed populations. Genetically pure populations were documented in 25 streams, making up 290.3 stream km, which represents 1.1% of the historic range and 4.1% of the current range of stream km. Streams most likely to contain additional pure populations, which are those that received a genetic value rating of 2 or 3, comprised 24.7% of the current stream km. These, combined with the already known pure populations, comprise 2,017.1 stream km or 28.8% of the current and 7.9% of the historic range. These figures represent an optimistic estimation of the current status of genetically pure westslope populations in Montana streams.

The upper Flathead River basin above Flathead Lake represents the largest stronghold of westslope cutthroat in Montana today; 161 streams and approximately 1,903.5 stream km, which is 85% of the historic range in the drainage, was considered westslope cutthroat habitat. Fifty-eight percent of the known pure populations of westslope are found in the drainage. Within the drainage, the S. Fork Flathead River is the largest and most secure stronghold. The Clark Fork River drainage below the mouth of the Bitterroot River could be considered the second largest stronghold in the state, since 1,108.6 stream km were found to be westslope waters. The Smith River drainage is the largest stronghold of native cutthroat east of the divide in terms of total stream km (315.7 stream km) and in terms of the area where contaminants are absent and haven't been planted (86.3 stream km).

Statewide, 259 lakes contain or are believed to contain westslope cutthroat populations. Six percent are known to contain genetically pure populations. Fifteen of the 16 pure populations are found within Glacier National Park; the other population is located on the Flathead Indian Reservation. Only 4 lakes or reservoirs east of the continental divide were found to contain westslope populations.

General factors affecting population abundance as well as existing conservation measures are discussed. Recommendations for future actions are included.

# INTRODUCTION

The distribution and abundance of interior cutthroat trout (Salmo clarki) has declined so drastically that many subspecies are on the brink of extinction as pure populations. Behnke (1972) believed that at least 99 percent of the original populations of interior cutthroat trout have been lost within the last 100 years. The westslope cutthroat trout (S. c. lewisi), designated a Class A species of special concern by the Montana Department of Fish, Wildlife and Parks, was originally widely distributed through-out western Montana. However, the area where it is still the dominant trout today is small and the present status of the westslope cutthroat statewide is uncertain. This assessment represents the first step in determining and quantifying the known and potential strongholds of S. c. lewisi in Montana as well as identifying existing threats to these populations so that future management plans can be implemented to protect and maintain the remaining populations. Survival of the remaining pure populations is essential since they represent the only wild and uncontaminated source of genetic diversity, which is necessary for adaptability to changing environmental conditions or to develop new strains. Also, each individual cutthroat population is valuable since unlike rainbow trout, there is little genetic variation within populations and a large amount between populations (Leary et al. 1984).

## POPULATION EVALUATION

### DISTRIBUTION

Cutthroat trout have a wider distribution in western North America than any other trout species (Behnke 1979). Along the coast their range extends from the Eel River of northern California as far north as Seward, Alaska (Scott and Crossman 1973). They are found in the interior throughout the Great Basin and Rocky Mountain region from central Colorado and New Mexico north into Alberta (Scott and Crossman 1973; Wallace and Behnke 1974).

Fifteen subspecies of cutthroat trout are currently recognized, one of which is the westslope cutthroat (Behnke 1979). Its known distribution east of the continental divide encompasses the upper Missouri River drainage upstream from Fort Benton, Montana, as well as the headwaters of the Marias, Judith, Musselshell, and Milk rivers, which are tributaries that enter the Missouri below Fort Benton (Behnke 1979). It is also found in the South Saskatchewan system south of the Bow River in the Hudson Bay drainage (Behnke 1979). Cutthroat in the upper Missouri River drainage are often referred to as upper Missouri cutthroat in the literature, but are essentially identical to the westslope cutthroat of the upper Columbia river and those in the South Saskatchewan drainage (Roscoe 1974; Phelps and Allendorf 1982). These populations along with those west of the divide will be collectively referred to as westslope cutthroat in this report, regardless of their geographic location. West of the continental divide, their range includes the entire Clark Fork drainage in Montana and Idaho upstream from the falls of the Penn Oreille River, the Kootenai River drainage in Montana, Idaho, and British Columbia, where they occur downstream from the headwaters to below the confluences of the Moyie and

Elk rivers, in the Spokane River basin of Idaho above Spokane Falls, which includes the Coeur d'Alene and St. Joe drainages, and in the Salmon and Clearwater drainages of Idaho. The original range of the westslope (S. c. lewisi) and the Yellowstone (S. c. bouvieri) cutthroat trout, the two subspecies native to Montana, is shown in Figure 1.

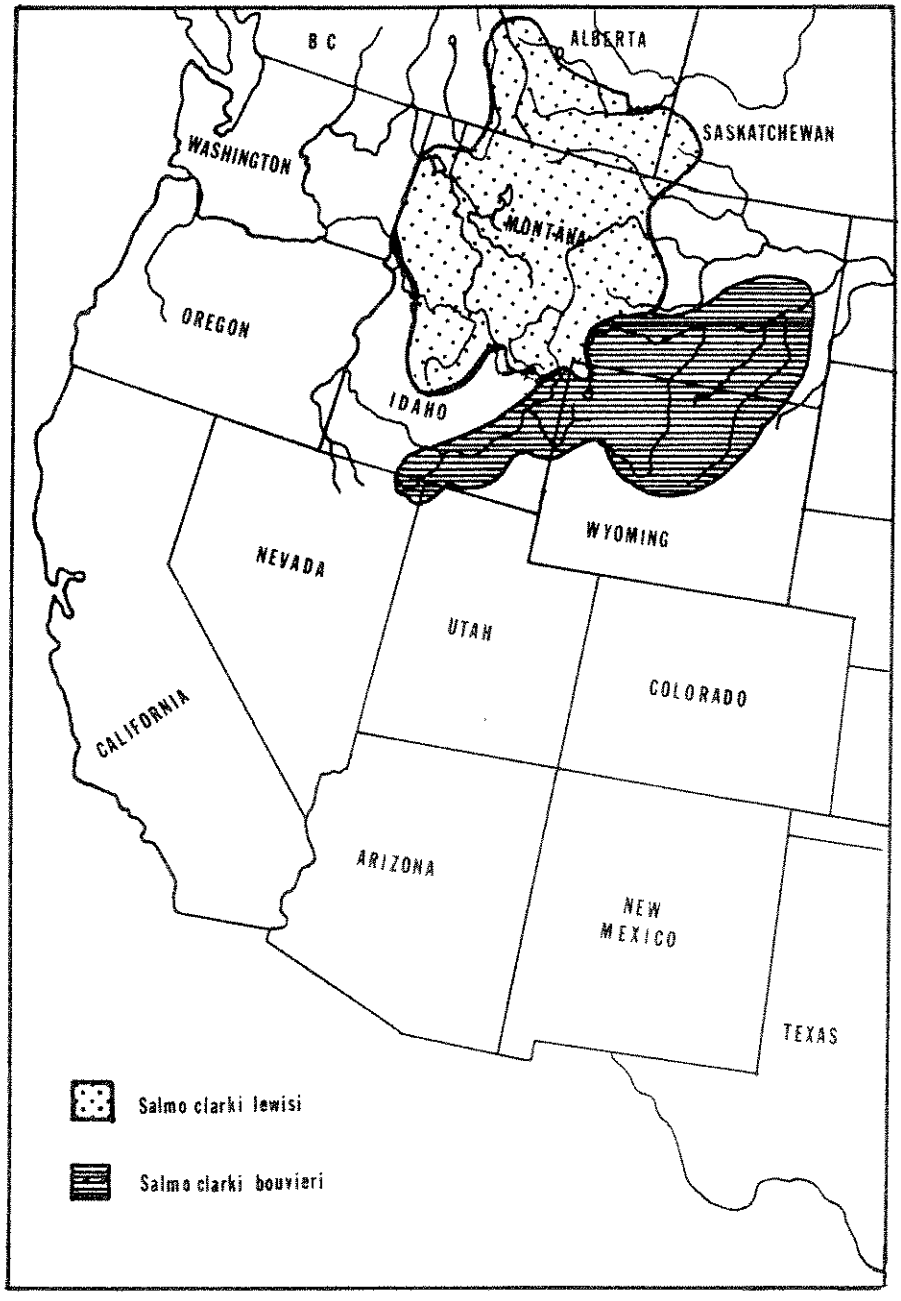


Figure 1. The distribution of the westslope (S. c. lewisi) and Yellowstone (S. c. bouvieri) cutthroat trout in North America (from Behnke 1979).

## POPULATION EVALUATION

### LIFE HISTORY[1]

Three life history forms of westslope cutthroat trout occur in their native range in Montana. Adfluvial stocks migrate between lakes and streams, fluvial populations migrate between the main rivers and tributaries, and nonmigratory resident fish which spend their entire life in the smaller headwater tribuatries. Both adfluvial and fluvial fish may rear as long as three years in the tributary streams. Behavioral rather than morphological differences separate adfluvial and fluvial fish (Averett and MacPhee 1971).

#### Movement

Migrations of considerable magnitude occur within the Flathead basin. These include spawning and smolt migrations, migrations from tributary streams to overwinter, and movement into portions of the lake and river, which may be related to food availability.

During the fall and winter, cutthroat spawners slowly moved into the lower portion of the mainstem and remained until they began rapid movement upstream in the spring. Numbers in the lower portion of the Flathead River may increase as early as October. Also, concentrations of cutthroat have been found during the spring in the northeast portion of Flathead Lake. These concentrations may be due to greater food availability in these areas

1-primary reference was Shepard et al. 1984 unless otherwise noted

than in other areas of the lake. Spawners quickly moved back down into the main river after spawning was completed, arriving by mid-summer. The longest and swiftest upstream movement documented was 212 km in 87 days.

Juveniles emigrate downstream primarily at ages II and III, but the number of age I out-migrants can also be substantial. Most juveniles moved downstream in the spring and early summer. Some juvenile cutthroats overwintered in the North or Middle Fork while migrating but most moved downstream to the main river. They remained in the lower river overwinter or longer before entering Flathead Lake. Emigration has also been documented in the fall (May and Huston 1974 and 1975; Bjornn and Mallet 1964), which may be a result of inadequate overwintering habitat. Trail Creek, a tributary of the North Fork Flathead River, had a high number of juveniles emigrate in the fall. It also appeared that juveniles migrated up into Trail Creek in the spring.

## Reproduction

Both migratory adults that move into the tributaries of the upper Flathead basin during high streamflows and resident adults spawn during May and June. Spawning is dependent on water temperature and occurs from March to July (Roscoe 1974) when water temperatures are near 10 C (50 F) (Scott and Crossman 1973). Most migratory adults spend little time in the tributaries; most left by the beginning of July. The migrants tend to use only the lower reaches of the tributaries (Johnson 1963). Cutthroat may select smaller tributaries for spawning to decrease mortality associated with scouring of the streambed which can occur in larger streams during high water conditions (Johnson 1963).

Cutthroat trout in the Flathead basin attain sexual maturity at age IV

and older, but elsewhere they may mature at age III (Brown 1971). These fish vary widely in size due to their different life history. In general, adult adfluvial fish tend to be greater than 350 mm, fluvial forms average between 250 and 350 mm, and resident fish are usually less than 250 mm in total length. Spawning populations of westslope cutthroat tend to have a higher ratio of females to males; the sex ratio from the Flathead River was 1:2.2. The fecundity of westslope cutthroat appears to be slightly higher than for other subspecies; the fecundity varies between 1000-1500 eggs for females with a mean length and weight of 355 mm and 0.5 kg, respectively (Roscoe 1974).

Alternate year spawning appears to occur in Hungry Horse Creek (Huston 1973). Sampling in Flathead Lake suggests that alternate year spawning is predominant in the drainage. The number of repeat spawners tends to vary greatly. Repeat spawners accounted for 0.7 percent of the fish in the 1975 run into Young Creek, Montana (May and Huston 1975) while they comprised about 24 and 19 percent of the 1970 and 1971 spawning runs into Hungry Horse Creek, respectively (Huston 1972 and 1973). In some populations, there is a high spawning mortality (Scott and Crossman 1973).

Cutthroat spawn in areas primarily composed of gravel that ranges in size from 2 to 50 mm, in mean depths ranging from 17 to 20 cm, and in mean velocities that range between 0.30 and 0.37 m/s. Redds varied in mean length from 0.6 to 1.0 m and from 0.32 to 0.45 m in mean width. Resident cutthroat built smaller redds than the migratory fish. Eggs require 310 temperature units to hatch. Alevins remain in the gravel until absorbtion of the yolk sac. Emergence occurs when they are approximately 20 mm in length. Fry from the Flathead emerge in July and August.

Cutthroat less than 100 mm in length were found to be most numerous in pools and runs; the highest densities of larger juveniles (100-200 mm)

were found in the main channel pools. Dominance hierarchies were maintained in pools.

## Age and Growth

Cutthroat fry emerged when approximately 20 mm in length and first formed scales at lengths of 38 to 44 mm. Approximately 61% and 30-40% of the cutthroat trout sampled in the upper Flathead basin and the mainstem Flathead River - Lake area failed to form annuli their first year, respectively. The average length of cutthroat trout from the upper Flathead basin at each age was: Age I - 55 mm; Age II - 100 mm; Age III - 146 mm; Age IV - 194 mm; Age V - 251 mm; Age VI - 301 mm. Growth rates increased dramatically after emigration from the natal tributaries; fish which had moved out of headwater streams grew an average of 89-119 mm compared to 40-60 mm for those that remained.

## Food Habits

Westslope cutthroat trout, unlike coastal cutthroat and most other subspecies, are not highly predaceous, but instead specialize as an invertebrate feeder (Roscoe 1974; Behnke 1979). Cutthroat trout also tend to be opportunistic in their food habits; the frequency of insects in the diet was dependent on the abundance and availability of food items. Dipterans and ephemeropterans were the most important dietary components in small fish (110 mm of less) while trichopoterans also became an important portion of the diet for larger fish (110 mm or greater) in addition to dipterans and emphemeropterans. Winged insects were not an important component in the diet of smaller fish but became important as the fish increased in size. A greater diversity of food items were used as they

increased in size. The most important food item for cutthroat trout in Flathead Lake during the spring, summer, and fall was terrestrial insects. The majority of stomachs sampled during the winter in the lake were empty (64%). Other studies demonstrate that westslope feed primarily on zooplankton as well as terrestrial and aquatic insects throughout their range (Jeppson and Platts 1959; Carlander 1969). The cutthroat's concentration of feeding on invertebrate fauna is attributed to its evolution in sympatry with two highly predaceous species, the bull trout and northern squawfish. Utilization of aquatic insects in their diet prevented direct competiton (Roscoe 1974; Behnke 1979).

## POPULATION STATUS

### HISTORICAL ABUNDANCE

Cutthroat appear to be the first trout that populated the upper Columbia River basin (Behnke 1979). They are the only species among the native trout and salmons distributed above the major barrier falls on major tributaries of the Columbia River, which is indicative of a primitive pattern of dispersal (Behnke 1979). Westslope cutthroat then crossed the continental divide into the South Saskatchewan system and the upper Missouri River basin.

The first report of westslope cutthroat by white man came from Lewis and Clark's journal on 13 June, 1805. They caught 6 cutthroat while camped near the Great Falls of the Missouri. More recently, a survey (Hanzel 1959) of the cutthroat's distribution in Montana (excluding the Yellowstone drainage) documented that they were the only or predominant game fish in 230 streams and 130 lakes. Hanzel (1959) stated that these populations did not represent the entire range of cutthroat in Montana since his efforts were concentrated east of the continental divide.

In order to determine the reduction in the westslope cutthroat's range caused by competition, introgression, exploitation and habitat degradation, its original range was quantitatively estimated in terms of stream kilometers. The total number of stream kilometers originally inhabited by the westslope cutthroat was estimated to be 25,547 km (Table 1). This figure is based on map measurements by the author or previous measurements made by the MT Dept. of F, W, & P while developing the 1980 stream evaluation map and should be considered a conservative estimate.

Table 1. The estimated original distribution of westslope cutthroat trout in streams from each drainage of Montana.

| Drainage No. | Drainage | Estimated km Occupied |
|---|---|---|
| 1 | Beaverhead R. | 2,681 |
| 2 | Big Hole R. | 1,659 |
| 3 | Bitterroot R. | 1,567 |
| 4 | Blackfoot R. | 1,255 |
| 5 | Clark Fork R. (below Bitterroot R.) | 2,332 |
| 6 | Clark Fork R. (above Bitterroot R.) | 2,017 |
| 7 | Flathead R. (below S. Fork) | 2,374 |
| 8 | Flathead R. (above & including S. Fork) | 2,239 |
| 9 | Gallatin R. | 1,018 |
| 10 | Jefferson R. | 977 |
| 11 | Kootenai R. | 2,112 |
| 12 | Little Missouri R. | 0 |
| 13 | Madison R. | 1,003 |
| 14 | Marias R. | 1,033 |
| 15 | Milk R. | 97 |
| 16 & 17 | Missouri R. (above & below Marias R.) | 2,367 |
| 18 | Musselshell R. | 280 |
| 19 | St. Mary R. | 237 |
| 20 | Sun R. | 299 |
| 21 | Yellowstone R. (below Bighorn R.) | 0 |
| 22 | Yellowstone R. (above & including Bighorn R.) | 0 |
| TOTAL ORIGINAL RANGE | | 25,547 |

PRESENT STATUS

The current status of westslope cutthroat trout in Montana was determined by obtaining information from many sources, including the interagency stream and lake database, fish planting records, Department of Fish, Wildlife and Parks reports, interviews with field personnel, and other available literature. Streams and lakes known to contain westslope or upper Missouri River cutthroat trout are listed in the following tables on a drainage by drainage basis. Factors which may have an effect on the populations within each drainage as well as cutthroat strongholds are identified.

## Methods And Legend To Distribution Tables

Streams in the tables were arranged by drainages beginning at the mouth and progressing upstream. Each tributary of a stream or river was indented to show its relationship to the others. Streams or rivers in parentheses were not known to be inhabited by westslope cutthroat, but were included to facilitate locating streams which were inhabited by westslope cutthroat. Lakes were arranged alphabetically by drainage.

Each water containing westslope cutthroat trout was rated on the basis of existing information concerning the genetic purity of the population. Planting records were examined only for waters that were not known to contain contaminating species.

Genetic Value Rating:

1 - Waters documented to contain genetically pure populations of westslope cutthroat trout through the use of electrophoresis.

2 - Waters designated by field personnel (based on visual examination) as containing pure westslope populations where no record of the presence of contaminating species or competitors[2] exists.[1]

3 - Waters designated by field personnel as containing pure westslope populations where no record of contaminating species exists but competitors are present.

4 - Waters designated by field personnel as containing pure westslope populations where no contaminating species exists, but planting records indicate that a contaminating species was planted in the drainage which could cause introgression. Competitors may/may not be present.

5 - Waters designated by field personnel as containing pure westslope populations where contaminating species are known to exist. Competitors may/may not be present.

a - Waters where westslope cutthroat populations are known to be introgressed based on prior electrophoresis analysis.

6 - Waters where pure westslope cutthroat may exist, but no documentation is available.

7 - Barren water or water where no westslope cutthroat are present.

The "other species present" column lists only contaminants and/or competitors and does not neccessarily include all the species present.

In addition to the stream genetic value rating, waters listed on the stream and lake interagency database were assigned one of the habitat values shown below if westslope cutthroat were present.

Habitat Value Rating[3]:

G - Greatest or highest-value habitat
H - High priority habitat
S - Substantial value habitat
L - Limited value habitat

1 - Contaminating species in this report include rainbow, Yellowstone cutthroat, golden, and any hybrid trout.
2 - Competitors species were considered to be brown trout, brook trout, and northern pike.
3 - Categories are based on those used in the Interagency Stream and Lake Database.

The habitat value, if present, is found in the stream or lake value column and is enclosed in brackets ([]). Caution should be used with the qualitative habitat rating, since different individuals rated the waters. If a reach was listed more than once in the database (i.e., duplicate data for the same reach obtained from different management agencies) the highest habitat rating for that section was used.

Relative Abundance Categories[3]:

A = Abundant
B = Abundant with proportional number of large-sized fish
C = Common
D = Common with proportional number of large-sized fish
U = Uncommon
V = Uncommon with proportional number of large-sized fish
R = Rare
E = Presence not verified but expected
M = Species absent but might be present if habitat problems corrected
N = Not present
P = Species absent, but could be present if introduced (e. g., potential habitat in a barren stream)
Z = Abundance unknown
X = Presence verified, but abundance unknown
S = Population based on stocking at intervals of 4 or more years.

Barrier Categories:

F = Waterfall or cascade
CL = Culvert
BD = Beaver dam
DD = Diversion Dam
B = Undesignated barrier

A dash (-) after a barrier indicates a partial obstruction. Barriers may be present on streams where none are indicated.

3 - Categories are based on those used in the Interagency Stream and Lake Database.

Fish Species Abbreviations:

Ct = Cutthroat trout (Salmo clarki spp.)
WCt = Westslope cutthroat trout (S. c. lewisi)
YCt = Yellowstone cutthroat trout (S. c. bouvieri)
Rb = Rainbow trout (Salmo gairdneri)
RbxCt = Rainbow x Cutthroat trout hybrid
EB = Brook trout (Salvelinus fontinalis)
LL = Brown trout (Salmo trutta)
NP = Northern pike (Esox lucius)

## Musselshell River Drainage

Westslope cutthroat are known to occur in 3 streams (Table 2) that have a combined length of more than 9.6 stream km. This represents only 3.4% of the 280 stream km estimated to be the original range in the drainage. The Collar Gulch population had been determined to be genetically pure (N = 16; Leary and Allendorf 1981), while the cutthroat in Half Moon Creek are the only game fish present. Cutthroat $\geq$ 305 mm (12 inches) are found in Half Moon Creek (Poore personal communication). Cottonwood Creek is influenced by Forest Lake (18-7510) which is known to contain an introgressed population (Poore personal communication 1984). The habitat value of Half Moon Creek was rated as high while Cottonwood Creek was assigned the greatest cutthroat habitat rating.

Both Half Moon Creek and Collar Gulch have intermittent flows throughout the length of cutthroat distribution (Poore personal communication), making the greatest threat to these poulations habitat degradation. In addition to natural intermittent flow, the Half Moon Creek drainage has been subjected to heavy grazing by livestock (Poore personal communication) on Forest Service land, which compounds the low flow problems. Mining activity in Collar Gulch has apparently had detrimental effects on habitat conditions. This includes a white precipitate found in one reach which was not inhabited by fish even after introducing them in the area above a

Table 2. Westslope cutthroat trout streams in the Musselshell River drainage (Hydrologic Units # 10040201 & # 10040203).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Musselshell River<br>4-18-4320-001<br>4-18-4350-000 | | | | | | |
| (Flatwillow Cr)<br>18-2640-002 | | | | | | |
| (Box Elder Cr)<br>18-0630-002 | | | | | | |
| Collar Gulch<br>18-1200-01 | Z | - | 1* | ? | | Leary & Allendorf 1981 |
| (N. Fork Flatwillow Cr)<br>18-4560-001 | | | | | | |
| Half Moon Cr<br>18-2940-001 | C | - | 2[H] | 6.4 | | Database |
| S. Fork Musselshell River<br>18-5670-000 | | | | | | |
| Cottonwood Cr<br>18-1380-003 | B | - | 4[G] | 3.2 | | Database |

* - Based on a sample size (N) = 16

barrier (Poore personal communication). The most important factors affecting the cutthroat population in Cottonwood Creek is the introgressed population in Forest Lake and intensive livestock grazing in the upper portion of the drainage (Poore personal communication).

## Judith River Drainage

Thirteen of the 14 streams listed as containing upper Missouri River or westslope cutthroat trout in the Judith River drainage also contained rainbow trout (Table 3) which strongly suggests introgression. Only Russian Creek, a tributary of the South Fork Judith River, contains cutthroat and no contaminants or competitors. The 14 streams comprised 76% of the estimated original range in the Judith River drainage. However, Russian Creek, the only apparent stronghold in the drainage accounted for only 2.6% of the 182.5 stream km that approximates their original distribution. Cutthroat are more common in the headwater areas of the drainage than rainbows (Poore personal communication). During August 1984, MT Department of F, W, and P and Forest Service personnel collected a sample of cutthroat trout from the S. Fork Judith River above Deadhorse Creek for electrophoretic analysis (Poore personal communication). Results were not available at the time of this writing. The most significant factors that have affected the cutthroat population in the drainge are hybridization with rainbow trout and livestock (horse and cattle) grazing (Poore personal communication). Of the 17 stream reaches assigned a habitat value rating in the drainage, 1, 3, 10 and 3 of the reaches were rated as greatest, high, substantial or limited, respectively.

## Two Medicine River Drainage

A total of 22 streams in the Two Medicine drainage were found to contain westslope cutthroat trout (Table 4). Stream reaches where cutthroat were found along with rainbow trout accounted for 44% of the 181.8 stream km occupied by cutthroat in the drainage. Stream reaches where planting of contaminants could have resulted in hybridization

Table 3. Westslope cutthroat trout streams in the Judith River drainage (Hydrologic Unit # 10040103).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Judith River | | | | | | |
| 4-16-1800-01 | | | | | | |
| 4-16-1820-01 | | | | | | |
| (Wolf Cr) | | | | | | |
| 16-4200-01 | | | | | | |
| Running Wolf Cr | | | | | | |
| 16-3160-001 | U | Rb,EB | 5[L] | 18.9 | | Database |
| 16-3160-002 | U | Rb | 5[S] | 2.3 | | |
| Dry Wolf Cr | | | | | | |
| 16-1260-001 | C | Rb | 5[H] | 5.8 | | Database |
| Mid. Fork Judith River | | | | | | |
| 16-2360-000 | C | Rb,EB | 5[S] | 20.6 | | Database |
| Lost Fork Mid. Fork Judith River | | | | | | |
| 16-2140-001 | U | Rb,EB | 5[L] | 10.2 | | Database |
| 16-2140-002 | U | Rb | 5[S] | 3.8 | | |
| Burris Cr | | | | | | |
| 16-0660-000 | U | Rb | 5[S] | 3.8 | | Database |
| W. Fork Lost Fork Judith River | | | | | | |
| 16-4040-000 | U | Rb | 5[H] | 6.4 | | Database |
| S. Fork Lost Fork Judith River | | | | | | |
| 16-3530-000 | U | Rb | 5[H] | 5.2 | | Database |
| Harrison Cr | | | | | | |
| 16-1660-001 | U | Rb | 5[S] | 10.5 | | Database |
| Weatherwax Cr | | | | | | |
| 16-3940-000 | U | Rb | 5[S] | 5.2 | | Database |
| Cleveland Cr | | | | | | |
| 16-0840-000 | U | Rb | 5[S] | 5.2 | | Database |
| (Warm Springs Cr) | | | | | | |
| 16-3920-000 | | | | | | |
| Hell Cr | | | | | | |
| 16-1740-000 | U | Rb | 5[S] | 8.0 | | Database |

Table 3 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| S. Fork Judith River | | | | | | |
| 16-3520-001 | U | Rb | 5[L] | 10.8 | | Database |
| 16-3520-002 | U | Rb | 5[G] | 13.3 | | |
| Deadhorse Cr | | | | | | |
| 16-1100-000 | U | Rb | 5[S] | 4.0 | | Database |
| Russian Cr | | | | | | |
| 16-3180-000 | U | - | 2[S] | 4.8 | | Database |

Table 4. Westslope cutthroat trout streams in the Two Medicine River drainage (Hydrologic Unit # 10030201).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Marias River | | | | | | |
| 4-14-3280-001 | | | | | | |
| Two Medicine River | | | | | | |
| 4-14-6320-001 | | | | | | |
| (Birch Cr) | | | | | | |
| 14-0240-000 | | | | | | |
| (Dupuyer Cr) | | | | | | |
| 14-1640-000 | | | | | | |
| Sheep Cr | | | | | | |
| 14-5000-001 | U | EB | 4(2) [L] | 34.3 | | Database (2)Planting Rec |
| Scoffin Cr | | | | | | |
| 14-4920-000 | U | EB | 3[H] | 11.3 | | Database |
| N. Fork Dupuyer Cr | | | | | F(3) | (3)Hanzel 1959 |
| 14-3840-001 | U | Rb,EB | 5[L] | 5.0 | | Database |
| 14-3840-002 | C | EB | 4(2)[H] | 4.8 | | (2)Planting Rec |
| S. Fork Dupuyer Cr | | | | | | |
| 14-5480-001 | U | Rb,EB | 5[S] | 6.4 | | Database |
| 14-5480-002 | U | - | 2[H] | 4.3 | | |
| N. Fork Birch Cr | | | | | F(2) | |
| 14-3800-001 | C | Rb | 5[G] | 1.0 | | Database |
| 14-3800-002 | C | Rb | 5[G] | 7.2 | | (2)Nevela 1972 |
| Haywood Cr | | | | | | |
| 14-2360-001 | U | - | 2[S] | 1.6 | | Database |
| S. Fork Birch Cr | | | | | | |
| 14-5400-001 | U | Rb | 5[G] | 11.4 | | Database |
| Mid. Fork Birch Cr | | | | | | |
| 14-3440-001 | U | Rb | 5[S] | 4.3 | | Database |
| Badger Cr | | | | | | |
| 14-0200-003 | U | Rb,EB | 5[S] | 12.1 | | Database |
| N. Badger Cr | | | | | | |
| 14-3760-001 | C | Rb,EB | 5[G] | 10.8 | F(2) | Database (2)Nevela 1972 |

Table 4 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Badger Cabin Cr<br>14-0065-000 | C | - | 2[S] | 1.6 | | Database |
| Lee Cr<br>14-2880-000 | C | - | 4(2)[S] | 3.2 | | Database<br>(2)Planting Rec |
| S. Badger Cr<br>14-5360-001 | C | Rb,EB | 5[G] | 6.4 | F(2) | Database<br>(2)Hill and Wipperman 1978 |
| (Little Badger Cr)<br>14-2960-001 | | | | | | |
| N. Fork Little Badger Cr<br>14-3920-002 | A | - | 2[G] | 2.1 | | Database |
| S. Fork Two Medicine River | | | | | F(3) | |
| 14-5680-001 | C | Rb,Eb | 5[S] | 15.0 | | Database |
| 14-5680-002 | C | - | 4(2)[G] | 15.0 | | (2)Planting Rec<br>(3)Hanzel 1959 |
| Summit Cr<br>14-5960-001 | U | EB | 4(2)[S] | 6.4 | | Database<br>(2)Planting Rec |
| Townsend Cr<br>14-6160-000 | C | - | 2[S] | 3.2 | | Database |
| Benson Cr<br>14-0180-000 | C | - | 2[S] | 3.2 | | Database |
| Lost Shirt Cr<br>14-3200-000 | C | - | 2[S] | 3.2 | | Database |
| Woods Cr<br>14-6760-000 | C | - | 2[S] | 2.4 | | Database |
| Sidney Cr<br>14-5080-000 | C | - | 2[S] | 3.2 | | Database |
| Whiterock Cr<br>14-6600-000 | C | - | 2[S] | 3.2 | | Database |

comprised another 35% of the cutthroat waters, while areas containing cutthroat but no contaminating species and cutthroat and competitors accounted for only 15 and 6%, respectively, of the present distribution of cutthroat in the drainage. It was estimated that the present distribution represents only 33% of the original distribution in the Two Medicine drainage. Presently, the most significant threat to the cutthroat fishery is road building associated with gas and oil development (Hill personal communication 1984). The drainage has been released from wilderness study, so exploration and development as well as an increase in recreational use due to easier access may occur.

Twenty-six stream reaches were rated concerning the habitat value for westslope cutthroat (Table 4). Seven reaches had the greatest value, 3 were of high value, 14 were rated substantial and 2 were considered limited habitat.

## Teton River Drainage

In the Teton River drainage 7 streams are known to be inhabited by westslope cutthroat trout (Table 5). Almost all of the present cutthroat waters (89%) were assigned a rating of 5 since rainbow trout are also present. Three, 5 and 3% of the 93.1 stream km that contain cutthroat were given a rating of 2, 3 and 4, respectively. Today, cutthroat waters in the Teton drainage account for only 23% of the approximate historical range of 404 stream km, while waters where cutthroat are the only game fish present or where cutthroat coexist with brook trout (competitors) represent less than 2% of the original range. Four stream reaches were rated as high value habitat for westslope cutthroat, 5 reaches were rated substantial and 1 reach was listed as limited habitat (Table 5). The most important

Table 5. Westslope cutthroat trout streams in the Teton River drainage (Hydrologic Unit # 10030205).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Marias River<br>4-14-3240-002 | | | | | | |
| Teton River Sec 01<br>4-14-6000-002 | | | | | | |
| (Muddy Cr)<br>14-3600-001 | | | | | | |
| Cow Cr<br>14-1000-001 | C | EB | 3[H] | 4.8 | | Database |
| Teton River Sec 02<br>4-14-6040-001 | | | | | | |
| Deep Cr<br>14-1280-002 | U | Rb,EB | 5[S] | 22.5 | | Database |
| S. Fork Deep Cr<br>14-5460-001 | U | Rb,EB | 5[S] | 6.0 | | Database |
| 14-5460-002 | U | Rb | 5[H] | 2.4 | | |
| N. Fork Deep Cr<br>14-3830-001 | U | Rb,EB | 5[S] | 8.8 | | Database |
| 14-3830-002 | U | - | 2[H] | 3.2 | | |
| N. Fork Teton River<br>14-4000-001 | U | Rb,EB | 5[L] | 8.5 | | Database |
| 14-4000-002 | U | Rb,EB | 5[S] | 29.8 | | |
| Waldron Cr<br>14-6360-001 | C | - | 4(2)[H] | 2.4 | | Database<br>(2)Planting Rec |
| W. Fork Teton River<br>14-6480-000 | U | Rb,EB | 5[S] | 4.7 | | Database |

potential impact on cutthroat in the Teton River drainage, as in the Two Medicine drainage, is habitat related impacts resulting from road building for gas and oil development (Hill personal communication). It is also

apparent from examining Table 5 that introduction of exotic species has been a very important historical impact in the drainage.

## Highwood And Belt Creek Drainages

The Highwood Creek drainage contains two cutthroat streams that comprise a total of 16.4 stream km (Table 6). However, both reaches contain both rainbow and brook trout.

The Belt Creek drainage contains a reported 21 streams inhabited by westslope cutthroat trout representing 131.8 stream km (Table 6). This represents 47% of the cutthroat's original distribution in the drainage. In terms of stream km occupied and absence of contaminating species, the Belt Creek drainage is probably the second most important drainage east of the continental divide for westslope cutthroat trout. (The most important basin being its neighboring drainage, the Smith River). Cutthroat may have a larger range in the Two Medicine drainage than Belt Creek, but cutthroat are present where no trace of contaminants exist in 67.8 stream km in the Belt drainage compared to only 38.5 stream km in the Two Medicine, which is 43% fewer km. Approximately 41% (53.6 stream km) of the total length occupied by cutthroat is also occupied by contaminants.

The most significant factor that has historically and presently is affecting the populations in the Highwood and Belt Creek drainages is hybridization with contaminants (Wipperman, personal communication). However, natural barriers on streams in the Belt Creek drainage is thought to have prevented exotic species from occupying and contaminating some stream reaches. Some streams cited from Mangels (1980) are small streams that go underground before reaching their mouth or are tributaries of streams severely affected by acid mine wastes and thus are isolated.

Table 6. Westslope cutthroat trout streams in the Highwood and Belt creek drainages (Hydrologic Units # 10030102 & 10030105).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Missouri River Sec 07<br>4-17-4864-000 | | | | | | |
| Highwood Cr<br>17-3456-003 | U | Rb,EB | 5[L] | 9.2 | | Database |
| N. Fork Highwood Cr<br>17-5360-000 | U | Rb,EB | 5[L] | 7.2 | | Database |
| (Belt Cr)<br>17-0544-000 | | | | | | |
| Little Belt Cr<br>17-4096-000 | U | Rb,LL,<br>EB | 5[L] | 21.9 | F(2) | Database<br>(2)Nevela 1972 |
| Main Cr<br>17-4456-000 | U | EB | 3[S] | 3.0 | | Database |
| N. Fork Little Belt Cr<br>17-5380-000 | U | EB | 3[G] | 2.4 | | Database |
| (Otter Cr)<br>17-5696-002 | | | | | | |
| Lost Cr<br>16N,9E,20 | Z | - | 2 | 1.8 | F,F | Mangels 1980 |
| Nebel Coulee Cr<br>16N,9E,30 | Z | - | 2 | 2.4 | | Mangels 1980 |
| Logging Cr<br>17-4304-000 | Z | Rb,EB(2) | 5 | 15.1(2) | F | Nevela 1972<br>(2)Database |
| Pilgrim Cr<br>17-5888-000 | C | - | 2[G] | 12.7 | F(2) | Database<br>(2)Nevela 1972 |
| Deer Cr<br>17-2144-001 | Z | - | 2 | 3.7 | | Mangels 1980 |
| Tillinghast Cr<br>17-7680-000 | U | EB | 3[S] | 13.5 | F(2) | Database<br>(2)Nevela 1972 |

Table 6 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| James Cr 14N,7E,05 | Z | - | 2 | 3.7 | | Mangels 1980 |
| Dry Fork Belt Cr 17-2352-002 | C | Rb,EB | 5[H] | 4.7 | | Database |
| Sawmill Cr 15N,8E,08 | Z | - | 2 | 5.5 | | Mangels 1980 |
| Oti Cr 15N,9E,19 | Z | - | 2 | 2.1 | F | Mangels 1980 |
| S. Fork Dry Fork Belt Cr | Z | - | - | --- | F | Nevela 1972 |
| Rafferty Cr 17-6096-001 | Z | EB | 3 | 5.8 | | Mangels 1980 |
| Hoover Cr 17-3568-000 | C | Rb,EB | 5[S] | 6.4 | | Database |
| Crawford Cr 17-1840-001 | Z | - | 2 | 5.1 | | Mangels 1980 |
| Harley Cr 17-3344-000 | C | EB | 4(3)[S] | 5.6 | F(2) | Database (2)Nevela 1972 (3)Planting Rec |
| O'Brien Cr 17-5584-000 | Z | EB | 4(3) | 4.8(2) | | Mangels 1980 (2)Database (3)Planting Rec |
| Jefferson Cr 17-3824-000 | U | Rb,EB | 5[H] | 5.5 | F(2) | Database |
| Chamberlain Cr 17-1424-001 | Z | - | 2 | 6.1 | | Mangels 1980 |

Only 11 streams in the Highwood and Belt Creek drainages were rated in terms of habitat value for westslope cutthroat (Table 6). Two streams each were assigned the greatest and high habitat rating, while 4 other streams

were found to be substantial habitat and 3 were only of limited value.

## Sun River Drainage

Four streams in the Sun River basin are currently thought to contain cutthroat trout (Table 7). However, all 113.2 stream km of these streams are also occupied by contaminants and competitors. Hybridization appears to be widespread through-out the drainage. In fact, the cutthroat populations in two streams, the S. Fork and N. Fork Sun River, were introduced since the drainage upstream from Diversion Dam was historically barren (Hill personal communication and Vincent 1962). The current area occupied by cutthroat is 62% less than the estimated original range of 298.5 stream km. A portion of the S. Fork North Fork Sun River, which is within a wilderness area, is currently barren and could be a potential site to establish an upper Missouri River cutthroat trout population (Wipperman personal communication). Cutrock Creek was considered high priority habitat for westslope cutthroat.

## Smith River Drainage

The Smith River drainage is the largest stronghold of native cutthroat east of the divide in terms of total stream km and in terms of the area where contaminants are absent and have not been planted. Westslope cutthroat were found in 38 streams from the drainage (Table 8). Although cutthroat are present in more than half of the streams, they were found in only 315.7 (30.5%) of the 1034 stream km containing game fish. A genetically pure population is known to exist in the 7.2 km reach of the N. Fork of Deep Creek. Only 86.3 stream km, or 8.3% of the total drainage contains populations where contaminating species are absent and were never planted;

Table 7. Westslope cutthroat trout streams in the Sun River drainage (Hydrologic Unit # 10030104).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Sun River 4-20-6100-002 | | | | | | |
| Elk Cr 20-2000-001 | R | RB,EB,LL | 5 | 36.8(2) | | Hill & Wipperman 1976 (2)Database |
| (Willow Cr) 20-6550-001 | | | | | | |
| Cutrock Cr 20-1500-001 | U | Rb,EB, RbxCt | 5[H] | 8.8 | | Database |
| S. Fork North Fork Sun River 20-5600-000 | R(2) | Rb,EB, RbxCt | 5 | 25.1(2) | | Hill & Wipperman 1976 (2)Database |
| N. Fork Sun River 20-4400-001 | R(2) | Rb,EB, RbxCt | 5 | 42.5(2) | | Hill & Wipperman 1976 (2)Database |

Table 8. Westslope cutthroat trout streams in the Smith River drainage (Hydrologic Unit # 10030103).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Missouri River Sec 08<br>4-17-4880-004 | | | | | | |
| Smith River<br>4-17-6832-000 | | | | | | |
| (Hound Cr)<br>17-3600-000 | | | | | | |
| Middle Cr<br>17-4630-000 | U | EB | 3 | 8.0(2) | | Wipperman 1973<br>Database |
| Deep Cr (Dry Fork)<br>17-2096-001<br>17-2096-002 | U<br>C | Rb,RbxCt<br>- | 5[L]<br>2[G] | 9.6<br>5.0 | F(2) | Database<br>(2)Nevela 1972 |
| N. Fork Deep Cr<br>17-5280-000 | C | - | 1(2)[G] | 7.2 | | Database<br>(2)Phelps & Allendorf 1982 |
| S. Fork Deep Cr<br>17-6944-000 | C | - | 2[G] | 6.8 | | Database |
| (Tenderfoot Cr)<br>17-7536-002 | | | | | F | Hanzel 1959 |
| Fisher Cr<br>17-2768-000 | C | - | 2[S] | 2.1 | | Database |
| Rugby Cr<br>17-6372-000 | C | - | 2[S] | 4.0 | | Database |
| Balsinger Cr<br>17-0200-000 | C | - | 2[H] | 8.2 | | Database |
| Urvi Cr<br>17-7995-000 | C | - | 2[S] | 2.1 | | Database |
| Lost Stove Cr<br>17-4390-000 | C | - | 2[L] | 2.1 | | Database |
| Iron Mines Cr<br>17-3780-000 | C | - | 2[H] | 3.2 | | Database |

Table 8 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Stringer Cr 17-7382-000 | U | - | 2[L] | 2.1 | | Database |
| Rock Cr 17-6224-000 | U(2) | Rb,LL, EB(2) | 5 | 31.4(2) | | Nevela 1972 (2)Database |
| Freeman Cr 17-2864-000 | R | Rb,EB, LL | 5 | 16.1(2) | | Wipperman 1973 (2)Database |
| N. Fork Freeman Cr 17-5335-001 | X | Rb,EB | 5 | 4.3 | | Wipperman 1973 |
| N. Fork Rock Cr 17-5440-000 | U | Rb | 5 | 6.6(2) | | Wipperman 1973 (2)Database |
| French Cr 17-2875-000 | U | Rb | 5[S] | 3.9 | | Database |
| (Spring Cr) 17-7200-000 | | | | | | |
| E. Fork Spring Cr 17-2582-001 | X | EB | 3 | 2.4 | | Wipperman 1973 |
| Eagle Cr 17-2480-000 | R | Rb,EB | 5 | 13.4(2) | | Wipperman 1973 (2)Database |
| N. Fork Eagle Cr 17-5322-221 | Z | - | 2 | 2.5(2) | | Wipperman 1973 (2)Database |
| E. Fork Eagle Cr 17-2535-221 | Z | RbxCt(2) | 5 | 1.6(2) | | Wipperman 1973 (2)Database |
| 17-2535-222 | Z | RbxCt(2) | 5 | 2.9(2) | | |
| (Sheep Cr) 17-6544-001 | | | | | | |
| Butte Cr 17-1104-000 | C | Rb | 5 | 15.1(2) | | Wipperman 1973 (2)Database |

Table 8 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Calf Cr<br>17-1168-000 | R | Rb | 5 | 9.0(2) | | Wipperman 1973<br>(2)Database |
| E. Fork Calf Cr<br>17-2531-221 | Z | - | 2 | 3.3(2) | | Wipperman 1973<br>(2)Database |
| Indian Cr<br>17-3728-000 | U | Rb | 5 | 5.5(2) | | Wipperman 1973<br>(2)Database |
| Moose Cr<br>17-5056-000 | R | Rb,EB | 5 | 14.5(2) | | Wipperman 1973<br>(2)Database |
| Wolsey Cr<br>17-8585-000 | U(2) | - | 2 | 7.2(2) | B(2) | Nevela 1972<br>(2)Database |
| Jumping Cr<br>17-3872-221<br>17-3872-222 | Z<br>Z | EB<br>EB | 4<br>4 | 6.4(2)<br>3.6(2) | | Wipperman 1973<br>(2)Database |
| Whitetail Deer Cr<br>17-8432-000 | R | EB | 3 | 15.3(2) | | Wipperman 1973<br>(2)Database |
| Camas Cr<br>17-1184-002 | U | Rb,EB | 5 | 8.8(2) | | Wipperman 1973<br>(2)Database |
| Benton Gulch<br>17-0560-000 | Z | Rb,EB | 5 | 14.5(2) | | Wipperman 1973<br>(2)Database |
| Keep Cool Cr<br>17-3920-000 | U | Rb,EB | 5 | 2.4(2) | | Wipperman 1973<br>(2)Database |
| Little Sulphur Cr<br>17-4280-001 | Z | - | 2 | 4.8 | | Wipperman 1973 |
| Spring Cr<br>17-7200-000 | R | EB | 4 | 16.7(2) | | Wipperman 1973<br>(2)Database |

Table 8 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Big Birch Cr 17-0576-002 | U | Rb,EB | 5 | 6.3(2) | | Wipperman 1973 (2)Database |
| Little Birch Cr 17-4112-000 | U | EB | 4 | 15.1(2) | | Wipperman 1973 (2)Database |
| (N. Fork Smith River) 17-5472-000 | | | | | | |
| Fourmile Cr 17-2816-002 | U | Rb,EB | 5 | 10.0(2) | F(3) | Wipperman 1973 (2)Database (3)Hanzel 1959 |
| Lake Cr 17-4016-001 | Z | Rb(2) | 5 | 11.7(2) | | Wipperman 1973 (2)Database |

cutthroat and rainbow trout were found together in 187.6 stream km. Cutthroat were the only fish present in 60.6 stream km from 14 streams. Westslope cutthroat are primarily confined to headwater areas of tributaries (Wipperman 1973); occasional cutthroats found in the Smith River are believed to be transients. Most streams have populations large enough to support a sport fishery.

Wipperman (1973) believed that the cutthroat populations of Deep, N. and S. Forks of Deep Creek, Fisher, Rugby, Bolsinger, Urvi, Lost Stone, Iron Mines, Stringer, Wolsey, Little Sulphur and Lake creeks were all indigenous populations.

Twelve reaches were assigned habitat value ratings (Table 8). Three were considered greatest value habitat, 2 high value, 4 substantial and 3

limited value habitat for upper Missouri cutthroat.

Yellowstone cutthroat have been introduced into the area and a review of planting records back to 1948 by Wipperman revealed that cutthroat were planted in two tributaries of the Smith River: Butte and Tenderfoot creeks. Butte Creek was last planted in 1951 and Tenderfoot in 1954. Rainbow trout were planted above a natural falls on Tenderfoot Creek in 1955; 3 years later rainbow trout were found in greater or equal abundance than cutthroat for 8 km above the barrier (Hanzel 1959). The greatest existing threat to this remnant population is hybridization with rainbow trout (Wipperman 1973 and personal communication 1984). A potential area for rehabilitation in the drainage is above the natural falls on Tenderfoot Creek. However, a portion of this area is private land.

## Upper Missouri River Drainage

The upper Missouri River drainage examined here includes portions of both Regions 4 and 3; it extends from Holter Lake to above Toston Dam. A total of 29 streams in the reach were known to be occupied by westslope cutthroat trout. McClellan Creek (5.6 stream km) and a portion of Dutchman Creek above a barrier (1.3 stream km) contain genetically pure populations of westslope cutthroat trout (Table 9). A total of 12.5 stream km in the basin were found to be free of contaminants; 74% (110.6 stream km) of the stream length was or potentially has been contaminated by exotic Salmo spp. An additional 8.9 stream km in the drainage may contain undocumented cutthroat populations and 17.9 stream km are presently barren waters that are potential sites for cutthroat introduction. The total area considered to be occupied by cutthroat trout in the upper Missouri is only 34% of the historical range while those areas where cutthroat but no contaminants are

Table 9. Westslope cutthroat trout streams in the Upper Missouri River drainage (Hydrologic Unit # 10030102).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Holter Lake<br>4-17-9136-005 | | | | | | |
| (Willow Cr)<br>17-8448-001 | | | | | | |
| Elkhorn Cr<br>17-2624-000 | C | Rb,EB | 5[G] | 11.3 | F(2) | Database<br>(2)Nevela 1972 |
| Missouri River<br>4-17-4912-006<br>4-17-4912-007<br>4-17-4928-000<br>4-17-4944-000 | | | | | | |
| Beaver Cr<br>4-17-0496-001 | R | Rb,EB,LL RbxCt | 5 | 9.6 | | Database |
| 4-17-0496-002 | U | Rb,EB,LL RbxCt | 5 | 16.0 | DD | Database |
| Lake Helena<br>4-17-9072-005 | | | | | | |
| Prickly Pear Cr<br>3-17-6032-010 | C | EB | 4(3)[G] | 4.8 | F(2) | Database<br>(2)Hadley 1981a<br>(3)Planting Rec |
| McClellan Cr<br>17-4512-201 | R | EB(2) | 1(3)[L] | 2.8 | | Database |
| 17-4512-202 | C | EB(2) | 1(3)[H] | 2.8 | | (2)Hadley 1981a<br>(3)Phelps & Allendorf 1982 |
| Crystal Cr<br>17-1936-200 | C | EB(2) | 4(2)[S] | 3.4 | | Database<br>(2)Hadley 1981a |
| E. Fork McClellan Cr<br>17-2576-200 | C | EB(2) | 4(3)[H] | 4.5 | CL-,F(2) | Database<br>(2)Hadley 1981a<br>(3)Planting Rec |

Table 9 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Willard Cr<br>17-8438-000 | Z | EB(2) | 3[H] | 0.8 | | Database<br>(2)Hadley 1981a |
| Tepee Cr<br>17-7512-000 | C | - | 2[H] | 1.3 | | Database |
| (Warm Springs Cr)<br>17-8096-001 | | | | | | |
| S. Fork Warm Springs Cr<br>17-7072-200 | C | EB,LL(2) | 2[G] | 0.3 | | Database |
| Hogan Cr<br>17-3496-000 | U | - | 2[H] | 0.3 | | Database |
| Dutchman Cr<br>17-2448-004 | C | Rb,EB | 5 * | 0.2 | | Database |
| -005 | Z | -(2) | 1(3)<br>[G] | 1.3 | F(2) | (2)Hadley 1981a<br>(3)Phelps & Allendorf 1982 |
| S. Fork Dutchman Cr<br>17-6952-000 | C | -(2) | 2[G] | 1.0 | | Database<br>(2)Hadley 1981a |
| N. Fork Dutchman Cr<br>17-5318-000 | C | -(2) | 2[G] | 1.1 | | Database<br>(2)Hadley 1981a |
| Beaver Creek<br>17-0480-201 | Z | EB(2) | 5a(3)<br>[H] | 2.4 | | Database<br>(2)Hadley 1981a |
| 17-0480-202 | Z | EB(2) | 5a(3)<br>[H] | 3.5 | | (3)Phelps & Allendorf 1982 |
| (Antelope Cr)<br>17-0096-010 | | | | | | |
| Staubach Cr<br>17-7312-003 | C | -(2) | 2[G] | 0.8 | | Database<br>(2)Hadley 1981a |
| S. Fork Beaver Cr<br>17-6890-201 | P | - | 7 | 0.8 | | Database |
| 17-6890-202 | P | - | 7 | 1.2 | | (2)Hadley 1981a |

Table 9 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Confederate Gulch<br>17-1664-001 | Z | EB | 4(3) | 4.5(2) | | Rehwinkel 1982<br>(2)Database<br>(3)Planting Rec |
| Whitehorse Cr<br>17-8352-003 | P | - | 7 | 0.1 | | Database<br>(2)Hadley 1981a |
| (Crow Cr)<br>17-1888-000<br>17-1888-003 | E | Rb,EB | 6 | 8.9 | F(2) | (2)Hadley 1981a<br>Database |
| Eureka Cr<br>17-2656-001 | P(2) | Rb,EB(2) | 7(2) | 4.2 | F(2) | Database<br>(2)Hadley 1981a |
| Longfellow Cr<br>17-4336-001 | P(2) | - | 7(2) | 1.3 | | Database<br>(2)Hadley 1981a |
| Hall Cr<br>17-3296-001 | C | Rb,EB(2) | 5[G] | 3.0 | | Database<br>(2)Hadley 1981a |
| Crazy Cr<br>17-1856-001 | P(2) | - | 7(2) | 2.9 | | Database<br>(2)Hadley 1981a |
| (Tizer Cr)<br>17-0672-001 | | | | | | |
| Little Tizer Cr<br>17-4288-200 | P(2) | EB?(2) | 7(2) | 2.6 | | Database<br>(2)Hadley 1981a |
| (Wilson Cr)<br>17-8544-001 | | | | | | |
| Clear Cr<br>17-1552-001 | P(2) | EB(2) | 7(2) | 2.9 | | Database<br>(2)Hadley 1981a |
| Moose Cr<br>17-5024-001 | P(2) | EB(2) | 7(2) | 1.9 | | Database<br>(2)Hadley 1981a |

Table 9 (continued)

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Sixteenmile Cr 17-6736-002 | C | Rb,LL | 5[H] | 22.5 | | Database |
| Mid. Fork Sixteenmile Cr 17-4688-001 | U | Rb,LL | 5[L] | 4.8 | | Database |
| S. Fork Sixteenmile Cr 17-7040-000 | U | Rb,LL | 5[L] | 24.9 | | Database |

* - Based on a sample size (N) = 10

found constitutes less than 3% of the original range.

Eight stream reaches were rated as the greatest habitat for cutthroat, another 8 were considered high value habitat, 1 was considered substantial and 3 reaches were of limited value (Table 9).

Habitat degradation caused by road building, a pipeline, livestock grazing, dewatering and logging has severely affected some of the streams in the drainage, while others have remained relatively unaffected by adverse land practices, particularly some streams in the Elkhorn Mountains of the Helena National Forest. Also, the introduction of exotic species has had a widespread effect on the drainge. Current legislation has been proposed that would designate the Forest Service land in the Elkhorn Mountain portion of the drainage as a special management area. The Elkhorn Mountains should be considered the most important part of the basin in terms of cutthroat trout distribution since all the pure populations as well as the majority of the other cutthroat streams are located there.

## Gallatin River Drainage

Only 2 streams in the Gallatin River system were thought to contain upper Missouri River or westslope cutthroat trout (Table 10); these 2 streams, Taylor Fork and Cache Creek constitute only 24.6 stream km, or 2.4% of the original range in the drainage. Both these streams also are inhabited by rainbow trout and this portion of the drainage has severe erosion problems. Taylor's Fork is considered limited cutthroat habitat, while Cache Creek was rated as substantial (Table 10).

Table 10. Westslope cutthroat trout streams in the Gallatin River drainage (Hydrologic Unit # 10020008).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Gallatin River 3-09-6916-001 | | | | | | |
| Taylor Fork Gallatin River 09-6232-001 | U | Rb,LL | 5[L] | 18.2 | | Database |
| Cache Cr 09-0912-000 | C | Rb | 5[S] | 6.4 | | Database |

## Madison River Drainage

Native westslope cutthroat trout may be present in 3 tributary areas in the headwaters of the Madison River (Table 11). Two of these tributaries originate in Yellowstone National Park, while Teepee Creek is located on National Forest land. The populations are located above barriers. Competitors (brown trout) are present in the same reach as the remnant cutthroat population in Grayling Creek, which is the only potential

threat to these waters known to the author at this time.

Table 11. Westslope cutthroat trout streams in the Madison River drainage (Hydrologic Unit # 10020007).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Madison River 3-13-3520-001 | | | | | | |
| Grayling Cr (Y.N. Park) 13-2440-000 | Z | LL | 6 | - | F | Holton Ct file, 1979 |
| Teepee Cr 13-5850-200 | Z | - | 6 | 4.4 | B | Holton Ct file, 1979 |
| (Duck Cr) 13-1880-000 | | | | | | |
| Cougar Cr tributaries (Y.N. Park) 13-1360-000 | Z | - | 6 | - | B | Holton Ct file, 1979 |

## Boulder River Drainage

Two stream reaches comprising 11 stream km were found to be inhabited by westslope cutthroat trout in the Boulder River drainage (Table 12); both of the populations in these reaches may have been contaminated by previous plantings of *Salmo* spp. in the streams. This represents only 3% of the original range in the Boulder drainage. An additional 12.3 stream km was identified as potential sites for reintroduction of westslope cutthroat trout. Yellowstone cutthroat and brook trout are currently found in 0.8 and 4.0 stream km, respectively, of the areas listed as potential westslope habitat, so rehabilitation of these streams would be necessary

Table 12. Westslope cutthroat trout streams in the Boulder River drainage (Hydrologic Unit # 10020006).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Jefferson River 3-10-3840-001 | | | | | | |
| Boulder River 3-10-0840-001 | | | | | | |
| Elkhorn Cr 10-2640-007 | P | - | 7(2) | 0.8 | | Database (2)Hadley 1981b |
| Queen Gulch Cr 10-5840-003 | P | YCT | 7(2) | 0.8 | | Database |
| 10-5840-004 | P | - | 7(2) | 0.5 | | (2)Hadley 1981b |
| (Turnley Cr) 10-7520-001 | | | | | | |
| Sourdough Cr 10-6720-000 | P | EB | 7(2) | 4.0 | F(2) | Database (2)Hadley 1981b |
| Muskrat Cr 10-5000-010 | R | EB | 4(3)[S] | 1.8 | | Database |
| 10-5000-011 | P | - | 7(2) | 6.3 | F(2) | (2)Hadley 1981b (3)Planting Rec |
| Cataract Cr 10-1600-002 | U | EB | 4(2)[L] | 9.2 | | Database (2)Planting Rec |

before transplanting. One reach of Muskrat Creek was rated as substantial cutthroat habitat while Cataract Creek was considered only limited habitat (Table 12).

Intensive mining during the late 1800's and the early 1900's in the Boulder River drainage heavily impacted the area; high heavy metal concentrations and mine spoils have depressed aquatic life in portions of the drainage (Gardner 1977; Hadley 1981b). An increase in mining interest

could be a potential threat to the area (Hadley 1981b). Reclamation of mine wastes and a reduction of heavy grazing along streams in addition to reintroduction efforts would be beneficial to the native cutthroat fisheries (Hadley 1981b).

## Big Hole River Drainage

Two streams in the Big Hole drainage, which have a combined total length of 33.3 stream km are believed to contain cutthroat trout (Table 13). Moose Creek also contains contaminating species while Elkhorn Creek contains brook trout and has previously been planted with a contaminating species. Moose Creek was considered a stream containing the greatest value habitat for cutthroat and Elkhorn was considered as having high value habitat. These two streams represent only 2% of the estimated original range of westslope cutthroat in the drainage.

Table 13. Westslope cutthroat trout streams in the Big Hole River drainage (Hydrologic Unit # 10020004).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Big Hole River Sec 01<br>3-02-0425-001 | | | | | | |
| Moose Cr<br>02-4050-001 | A | Rb,EB,<br>RbxCt | 5[G] | 23.2 | | Database |
| Big Hole River Sec 02<br>3-02-0425-001 | | | | | | |
| Wise River<br>02-7025-001 | | | | | | |
| Elkhorn Cr<br>02-2100-000 | C | EB | 4(2)<br>[H] | 10.1 | | Database<br>(2)Planting Rec |

## Red Rock River Drainage

While 6 streams may contain some form of native upper Missouri River or westslope cutthroat trout in the Red Rock drainage, only 3 of the cutthroat streams are apparently free of contaminants (Table 14). The other 3 contaminated streams contain rainbow and/or yellowstone cutthroat trout. Of the 3 "pure" streams, 2 contain no competitors while Hellroaring Creek is also inhabited by brook trout. The three uncontaminated reaches extend over a combined length of 4.9 stream km, which is only 0.3% of the historical range in the drainage. Even when all the presently known cutthroat waters in the Red Rock drainage are included, they represent only 4% of the original range. The two streams free of exotic trout, Cabin and Indian creeks, were rated as high and the highest-value habitat for cutthroat, respectively. The most important factor presently affecting the cutthroat populations in the Red Rock drainage is habitat degradation caused by livestock overgrazing; severe dewatering also occurs on some reaches during the irrigating season (Decker-Hess et al. 1981). Introduction of exotic species was historically a very important factor contributing to the decline of native species in the drainage (Nelson 1954). The influence of exotics is also reflected in Table 14, since either rainbow, yellowstone cutthroat or brook trout are present in almost all of the waters listed.

Table 14. Westslope cutthroat trout streams in the Red Rock River drainage (Hydrologic Unit # 10020001).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Red Rock River | | | | | | |
| 3-01-6140-002 | | | | | | |
| 3-01-6160-000 | | | | | | |
| (Big Sheep Cr) | | | | | | |
| 01-6740-003 | | | | | | |
| Deadman Cr | | | | | | |
| 01-1940-000 | Z | Rb,YCt RbxCt | 5 | 21.9 | | Decker-Hess et al. 1983 |
| Cabin Cr | | | | | | |
| 01-1080-400 | C | - | 2[H] | 1.0 | | Database |
| Indian Cr | | | | | | |
| 01-3620-400 | U | - | 2[G] | 2.1 | | Database |
| Long Cr | | | | | | |
| 01-4570-001 | A | EB,YCt | 5 | 14.0 | | Decker-Hess et al. 1983 |
| Odell Cr | | | | | F(2) | |
| 01-5600-002 | R | RbxCt,EB | 5 | 2.9 | | Decker-Hess et al. 1983 (2)Hanzel 1959 |
| 01-5600-401 | R | RbxCt,Eb | 5 | 10.5 | | |
| Hellroaring Cr | | | | | F(2) | |
| 01-3340-001 | U | EB | 3 | 1.8 | | Decker-Hess et al. 1983 (2)Hanzel 1959 |

## Lower Clark Fork River of Region 1

The lower Clark Fork River drainage in Region 1 extends from the Idaho border to the mouth of the Flathead River. Sixty-eight streams in this portion of the Clark Fork basin, comprising 642.3 stream km, were believed to contain westslope cutthroat trout (Table 15). Genetically pure populations of westslope cutthroat have been documented in 3 streams, Marten Creek, the N. Branch Marten Creek and the Vermillion River (Leary et al. 1983b; Leary 1984). The Vermillion River is an interesting stream in that it contains a pure westslope population above while rainbow trout are present below a barrier falls. So, if electrophoretic analysis had not been performed, the river would have received a rating of 5. This demonstrates that in some cases, streams assigned a rating of 5 may not be lost to introgressive hybridization but information concerning the actual status was lacking. Other waters containing westslope cutthroat where no contaminants or competitors exist includes another 17 streams representing 120.3 stream km. Thirteen streams (109.5 stream km) were found to contain both westslope and competitors but no contaminants. The 18 streams where previous plantings of contaminating species may have resulted in hybridization with indigenous cutthroat make up 27.4% (174 stream km) of the westslope waters. Ten streams or 131.9 stream km are known to contain contaminating species and 2 streams contain introgressed westslope populations (Leary et al. 1983b). The introgressed W. Fork Trout Creek population is made up of 98.8% westslope cutthroat and 1.2% rainbow genes while the Cataract Creek population consisted of 48.6% westslope and 51.4% yellowstone cutthroat trout genes (Leary et al. 1983b). An additional 41.1 stream km of waters in the drainage are expected to contain westslope cutthroat but confiramtion is lacking. Stream km from this section will be combined with the cutthroat waters of the Clark Fork within Region 2 below the Bitterroot River and

Table 15. Westslope cutthroat trout streams in the Lower Clark Fork River drainage of Region 1 (Hydrologic Unit # 17010213).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Clark Fork River | | | | | | |
| 1-05-1440-000 | | | | | | |
| 1-05-1440-003 | V | Rb,LL,NP | 5[S] | 8.0 | | Database |
| Elk Cr | | | | | | |
| 05-2560-000 | | | | | | |
| W. Fork Elk Cr | | | | | | |
| 05-7920-000 | E | EB | 6[L] | 4.8 | | Database |
| E. Fork Elk Cr | | | | | | |
| 05-2336-000 | C | EB | 3[L] | 12.9 | | Database |
| Bull River | | | | | | |
| 05-0864-001 | U | Rb,EB,LL | 5[L] | 13.2 | | Database |
| 05-0864-002 | U | Rb,EB,LL | 5[S] | 12.9 | | |
| 05-0864-003 | C | EB,LL | 3[S] | 10.8 | | |
| E. Fork Bull River | | | | | | |
| 05-2272-000 | C | - | 4(2) [L] | 11.3 | | Database (2)Planting Rec |
| 05-2272-200 | E | Rb(E) | 6[H] | 0.5 | | |
| 05-2272-202 | E | Rb(E) | 6[H] | 0.3 | | |
| 05-2272-206 | E | Rb | 6[H] | 0.3 | | |
| S. Fork Bull River | | | | | | |
| 05-6640-000 | C | EB,LL | 3[S] | 7.4 | | Database |
| 05-6640-201 | E | Rb(E) | 6[H] | 0.4 | | |
| 05-6640-202 | E | Rb(E) | 6[H] | 0.8 | | |
| 05-6640-204 | E | Rb(E) | 6[H] | 1.0 | | |
| 05-6640-208 | E | Rb(E) | 6[S] | 0.8 | | |
| 05-6640-210 | E | Rb(E) | 6[L] | 0.6 | | |
| 05-6640-214 | E | Rb(E) | 6[L] | 0.8 | | |
| Mid. Fork Bull River | | | | | | |
| 05-4736-000 | C | EB,LL | 4(2)[S] | 8.5 | | Database |
| N. Fork Bull River | | | | | | |
| 05-5200-000 | C | EB,LL | 4(2)[L] | 8.0 | | Database (2)Planting Rec |
| Rock Cr | | | | | | |
| 05-5920-000 | C | - | 4(2) [L] | 13.0 | | Database (2)Planting Rec |

Table 15 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Swamp Cr | | | | | | |
| 05-7088-001 | C | Rb,RbxCt | 5[S] | 7.6 | | Database |
| 05-7088-002 | A | - | 4(2) [L] | 12.4 | | (2)Planting Rec |
| Marten Cr | | | | | | |
| 05-4432-000 | C | Rb,EB | 1 | 12.6 | | Leary et al. 1983b |
| N. Branch Marten Cr | | | | | | |
| 05-5184-001 | X | ? | 1 | 6.1(2) | | Leary 1984 (2)Map |
| Trout Cr | | | | | | |
| 05-7424-000 | C | EB | 4(2) | 13.0 | | Database |
| E. Fork Trout Cr | | | | | | |
| 05-2448-000 | B | - | 2[L] | 11.3 | | Database |
| W. Fork Trout Cr | | | | | | |
| 05-8096-001 | Z | | 5a | 7.0(2) | | Leary et al. 1983b (2)Map |
| Vermillion River | | | | | | |
| 05-7712-000 | U | Rb,EB,LL | 1(2) [S] | 30.3 | F(3) | Database (2)Leary et al. 1983b (3)Huston pers com |
| Cataract Cr | | | | | | |
| 05-1232-001 | Z | YCt? | 5a | 9.5(2) | F(3) | Leary et al. 1983b (2)Map (3)Huston pers com |
| Lyons Gulch | | | | | | |
| 05-4304-000 | C | - | 2[L] | 4.8 | | Database |
| Willow Cr | | | | | | |
| 05-8240-000 | U | EB | 4(2)[L] | 6.4 | | Database (2)Planting Rec |
| Miller Cr | | | | | | |
| 05-4848-000 | C | EB | 3[L] | 3.2 | | Database |
| Deep Cr | | | | | | |
| 05-1872-000 | C | Rb | 5[L] | 8.0 | | Database |
| Mosquito Cr | | | | | | |
| 05-4992-000 | U | Rb,EB | 5[L] | 9.7 | | Database |
| Graves Cr | | | | | | |
| 05-3184-000 | C | Rb | 5 | 12.9 | F(2) | Database (2)Huston pers com |
| Thorne Cr | | | | | | |
| 05-7280-000 | C | - | 2[L] | 8.0 | | Database |

Table 15 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Squaw Cr<br>05-6880-000 | E | - | 6[L] | 1.6 | | Database |
| (Prospect Cr)<br>05-5648-000 | | | | | | |
| Dry Cr<br>05-2128-000 | C | EB | 3[L] | 6.4 | | Database |
| E. Fork Dry Cr<br>05-2320-000 | C | EB | 4(2)<br>[L] | 11.3 | | Database |
| Clear Cr<br>05-1472-000 | E | Rb,EB | 6[L] | 16.4 | | Database |
| Daisy Cr<br>05-1808-000 | C | - | 2[L] | 5.8 | | Database |
| Crow Cr<br>05-1760-000 | C | EB | 3[L] | 1.6 | | Database |
| E. Fork Crow Cr<br>05-2304-000 | C | EB | 3[L] | 4.8 | | Database |
| Cherry Cr<br>05-1360-000 | U | EB | 4(2)<br>[L] | 17.4 | | Database<br>(2)Planting Rec |
| (Thompson River)<br>05-7248-000<br>05-7264-000 | | | | | | |
| (W. Fork Thompson River)<br>05-8080-000 | | | | | | |
| Honeymoon Cr<br>05-3488-000 | U | - | 2 | 4.8 | | Database |
| Bighole Cr<br>05-0544-000 | U | - | 2[L] | 6.4 | | Database |
| Calico Cr<br>05-1088-000 | C | - | 2[L] | 9.7 | | Database |
| Deerhorn Cr<br>05-1984-000 | R | - | 2[L] | 6.4 | | Database |

Table 15 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| (Fishtrap Cr) 05-3744-001 | | | | | | |
| Jungle Cr 05-3744-001 | C | - | 2[L] | 6.1 | | Database |
| Basin Cr 05-0176-000 | C | - | 2[L] | 3.2 | | Database |
| Beatrice Cr 05-0368-001 | A | EB | 3[L] | 6.0 | | Database |
| W. Fork Fishtrap Cr 05-7952-000 | E | EB | 6[S] | 8.0 | | Database |
| Radio Cr 05-5760-000 | A | - | 2[L] | 4.8 | | Database |
| Cool Cr 05-1616-000 | C | - | 2[L] | 4.0 | | Database |
| (Little Thompson River) 05-4112-000 | | | | | | |
| Little Rock Cr 05-4080-001 | A | - | 4(2)[L] | 5.5 | | Database (2)Planting Rec |
| Mudd Cr 05-5024-000 | C | EB | 3 | 11.3 | | Database |
| McGinnis Cr 05-4576-000 | C | EB | 4(2)[L] | 8.0 | | Database (2)Planting Rec |
| Alder Cr 05-0048-000 | C | Rb | 5[L] | 8.0 | | Database |
| Bear Cr 05-0272-001 | A | EB | 3[S] | 6.4 | | Database |
| Big Prairie Cr 05-0560-000 | U | Rb,EB | 5[L] | 4.8 | | Database |
| Chippy Cr 05-1408-001 | A | EB | 4(2)[L] | 8.0 | | Database (2)Planting Rec |

Table 15 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Semen Cr 05-6176-000 | U | Rb,EB | 5[L] | 9.7 | | Database |
| Meadow Cr 05-4688-000 | U | Rb,EB | 5[L] | 9.7 | | Database |
| Big Rock Cr 05-0576-001 | A | EB | 4(2) [L] | 11.7 | | Database (2)Planting Rec |
| Shroder Cr 05-6304-000 | C | Rb | 5[L] | 9.7 | | Database |
| Murr Cr 05-5072-001 | A | EB | 4(2)[L] | 7.4 | | Database (2)Planting Rec |
| N. Fork Murr Cr 05-5296-001 | E | - | 6[L] | 4.8 | | Database |
| Boiling Springs Cr 05-0736-000 | C | EB | 4(2)[L] | 8.0 | | Database (2)Planting Rec |
| Slimmer Cr 05-6416-000 | C | - | 4(2)[L] | 3.2 | | Database (2)Planting Rec |
| Davis Cr 05-1824-000 | C | - | 4(2)[L] | 8.0 | | Database (2)Planting Rec |
| Eddy Cr 05-2496-000 | A | - | 2[L] | 9.7 | | Database |
| Swamp Cr 05-7104-000 | C | Rb,EB | 5[L] | 17.7 | | Database |
| E. Fork Swamp Cr 05-2416-000 | C | - | 2[L] | 6.4 | | Database |
| W. Fork Swamp Cr 05-8064-000 | R | - | 4(2) [L] | 12.9 | | Database (2)Planting Rec |
| Buffalo Bill Cr 05-0848-000 | U | - | 2[L] | 16.1 | | Database |

Table 15 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Weeksville Cr 05-7808-000 | C | EB | 3[S] | 9.7 | | Database |
| Lynch Cr 05-4272-000 | C | EB | 3[L] | 17.7 | | Database |
| Combpest Cr 05-1568-000 | R | NP | 3[L] | 11.3 | | Database |
| W. Fork Combpest Cr 05-7872-000 | R | - | 2[L] | 4.8 | | Database |
| Miller Cr 05-4850-000 | A | - | 2[L] | 8.0 | | Database |

compared with the historic range in the section entitled "Lower Clark Fork River Drainage of Region 2".

Seventy-three stream reaches in this portion of the Clark Fork were rated as habitat for westslope cutthroat (Table 15). Six reaches were rated as high priority habitat, 11 as substantial and 56 as habitat of limited value.

Historically, the Lower Clark Fork River was a major corridor and spawning area for adfluvial westslope cutthroat trout thought to number more than 20,000 as well as several other species from Lake Pend Oreille in Idaho (Graham et al. 1981; Anonymous 1984). Spawning migrations from the lake could have exceeded 483 km to the headwaters of the Clark Fork (Anonymous 1984). Fishing in the lower drainage was usually only productive during periods of fish migration out of the lake, which is thought to have been from March to June for cutthroat (Graham et al. 1981). The construction of Thompson Falls, Cabinet Gorge and Noxon Rapids Dams eliminated upstream fish migration. Graham et al. (1981)

lists the streams that were probably important spawning areas for migratory trout. Current threats/problems in the lower drainage include the proposed ASARCO silver mine near Chicago Peak, US Borax mining claims, placer mining (Huston personal communication) on tributaries, which increases sediment loads and usually destroys the stream channel, and some tributaries go underground before reaching their mouth. Potential water quality problems from heavy metal concentrations in sediments and effluents from the Missoula sewage treatment plant and Champion International's pulp mill also exist (Anonymous 1984).

Graves and Cataract creeks both contain barrier falls (Huston personal communication); upstream from these falls, rehabilitation of the stream reach and transplanting of pure westslope cutthroat trout may be feasible.

## Flathead River Drainage Downstream From Flathead Lake

Two streams comprising 51.5 stream km are known to contain westslope cutthroat trout in that portion of the Flathead River drainage downstream from Flathead Lake (Table 16). These 2 streams, the Jocko and Little Bitterroot Rivers, also contain both contaminating and competing species. The Jocko River was rated as limited habitat for westslope cutthroat while the Little Bitterroot River was considered substantial habitat. Another 6 streams may be inhabited by westslope cutthroat, but no documentation is currently available. A letter dated 9 March, 1976 from Larry C. Peterson, Fisheries Biologist at the Creston hatchery to the BIA Superintendent of the Flathead Agency stated that electrophoretic samples of cutthroat had been taken from Revais Creek and sent to the University of Washington, but didn't clarify whether the population was pure.

The most important threat to potential cutthroat streams on the Flathead Indian Reservation is dewatering for irrigation (LFSFS* personal

Table 16. Westslope cutthroat trout streams in the Flathead River drainage downstream from Flathead Lake (Hydrologic Unit # 17010212).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Flathead River 1-07-1540-001 | | | | | | |
| Magpie Cr 07-2620-010 | Z | ? | 6 | 11.3(2) | | LFSFS* (2)Map |
| Revais Cr 07- | Z | ? | 6 | 14.9(2) | | LFSFS* (2)Map |
| Jocko River 07-2260-000 | C | Rb,LL | 5[L] | 40.2 | | Database |
| Finley Cr 07-1480-000 | Z(1) | Rb,EB,LL | 6 | 22.5(2) | | LFSFS* (2)Database |
| Mid. Fork Jocko River 07-2800-001 | Z | Rb | 6 | 18.5(2) | | LFSFS* |
| N. Fork Jocko River 07-3180-001 | Z | Rb | 6 | 8.0(2) | | LFSFS* |
| S. Fork Jocko River 07-4160-001 | Z | ? | 6 | 22.2(2) | | LFSFS* |
| Little Bitterroot River 07-2460-001 | C | Rb,EB | 5[S] | 11.3 | B | Database |

* - LFSFS = Lower Flathead System Fisheries Study Biologists (B.P.A., Flathead Indian Reservation), P.O. Box 98, Pablo MT 59855

communication). The mainstem river is subjected to water level fluctuations caused by operation of the Kerr Dam facility in a peaking power mode (Graham et al. 1981), but it does not appear to be a factor currently affecting cutthroat populations.

## Swan River Drainage

A total of 43 streams in the Swan River drainage are known to be inhabited by westslope cutthroat trout (Table 17). Two streams with a combined total length of 12 km contain genetically pure populations of westslope cutthroat; the 2 "pure" streams are Groom and Sixmile creeks. Another 5 streams which haven't been tested electrophoretically contain reaches totaling 19.9 stream km that are inhabited by westslope cutthroat and free of contaminants as well as competitors. Another 7.8 stream km in the Swan drainage contain both westslope cutthroat and a potential competitor, brook trout. As in several other drainages, the majority of the westslope waters (194.8 stream km; 72.6%) are streams that planting records indicate could have introgressed populations. Westslope waters known to contain contaminants and known to have introgressed cutthroat populations total 24.5 and 2.1 stream km, respectively. Two additional streams comprising 7.4 stream km may contain westslope cutthroat, but adequate documentation is lacking. All 65 stream reaches were rated for their suitability as westslope cutthroat habitat (Table 17). Twelve reaches were rated as high priority habitat, 28 as substantial and 25 as limited value habitat.

Historically, cutthroat from Flathead Lake probably made extensive use of the Swan drainage for spawning, as is presently done in the upper Flathead basin (Graham et al. 1981). However, Big Fork Dam, constructed in 1902 near the mouth, prevented adfluvial fish from using the drainage since a fish ladder at the dam site wasn't operative until 1959 (Leathe and Graham 1983). Use of the ladder has been limited since it appears it was designed poorly and failure to render it operative for 57 years (Leathe and Graham 1983). The isolation of the basin along with the introduction of exotics were important historical factors contributing to the decline of the westslope. The tributary streams

Table 17. Westslope cutthroat trout streams in the Swan River drainage (Hydrologic Unit # 17010211).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Swan River | | | | | | |
| 1-07-4560-000 | | | | | | |
| 1-07-4580-001 | | | | | | |
| Wolf Cr | | | | | | |
| 07-5080-001 | A | EB | 4(2)[L] | 8.0 | | Database (2)Planting Rec |
| Bear Cr | | | | | | |
| 07-0200-000 | A | - | 2[L] | 2.4 | | Database |
| Sixmile Cr | | | | | | |
| 07-3960-001 | A | - | 1(2)[S] | 6.0 | | Database (2)Leary 1983a |
| Hall Cr | | | | | | |
| 07-1860-001 | C | EB | 4(2)[H] | 2.0 | | Database |
| 07-1860-002 | A | EB | 4(2)[H] | 4.0 | | (2)Planting Rec |
| Groom Cr | | | | | | |
| 07-1820-001 | A | - | 1(2)[H] | 3.0 | | Database |
| 07-1820-002 | C | - | 1(2)[S] | 3.0 | | (2)Leary 1983a |
| Yew Cr | | | | | | |
| 07-5160-001 | C | EB | 3[S] | 2.2 | | Database |
| Bond Cr | | | | | | |
| 07-0480-001 | C | EB | 4(2)[S] | 4.3 | | Database |
| 07-0480-002 | U | EB | 4(2)[L] | 4.2 | | (2)Planting Rec |
| (Lost Cr) | | | | | | |
| 07-2560-000 | | | | | | |
| N. Fork Lost Cr | | | | | | |
| 07-3200-001 | C | EB | 4(2)[S] | 7.3 | | Database |
| 07-3200-002 | U | - | 4(2)[S] | 4.2 | | (2)Planting Rec |
| S. Fork Lost Cr | | | | | | |
| 07-4200-001 | U | EB | 4(2)[S] | 3.0 | | Database |
| 07-4200-002 | C | - | 4(2)[S] | 7.0 | | (2)Planting Rec |
| Soup Cr | | | | | | |
| 07-4020-002 | C | - | 5a(2)[H] | 2.1 | | Database (2)Leary 1983a |

Table 17 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Woodward Cr | | | | | | |
| 07-5100-001 | R | Rb,EB | 5[L] | 3.5 | | Database |
| S. Woodward Cr | | | | | | |
| 07-4230-003 | U | - | 2[L] | 6.0 | | Database |
| S. Woodward Cr tributary | | | | | | |
| 07-4231-001 | U | EB | 3[L] | 1.0 | | Database |
| Cedar Cr | | | | | | |
| 07-0740-001 | U | Rb,EB | 5[S] | 9.5 | | Database |
| 07-0740-002 | A | - | 4(2)[H] | 5.1 | | (2)Planting Rec |
| Goat Cr | | | | | | |
| 07-1720-002 | U | EB | 4(2)[L] | 3.7 | | Database (2)Planting Rec |
| Squeezer Cr | | | | | | |
| 07-4340-002 | U | - | 4(2)[L] | 5.5 | | Database (2)Planting Rec |
| Lion Cr | | | | | | |
| 07-2420-001 | R | EB | 4(2)[L] | 10.0 | | Database (2)Planting Rec |
| Piper Cr | | | | | | |
| 07-3440-001 | U | EB | 4(2)[L] | 2.0 | | Database |
| 07-3440-002 | C | EB | 4(2)[S] | 10.0 | | (2)Planting Rec |
| Moore Cr | | | | | | |
| 07-2940-000 | E | - | 6[H] | 3.4 | | Database |
| Jim Cr | | | | | | |
| 07-2240-003 | E | EB | 6[L] | 4.0 | | Database |
| Pony Cr | | | | | | |
| 07-3500-001 | U | EB | 4(2)[L] | 2.9 | | Database |
| 07-3500-002 | C | EB | 4(2)[S] | 3.9 | | (2)Planting Rec |
| 07-3500-003 | C | - | 4(2)[H] | 2.3 | | |
| Condon Cr | | | | | | |
| 07-0880-002 | A | EB | 4(2)[S] | 3.0 | | Database |
| Dog Cr | | | | | | |
| 07-1180-001 | U | EB | 4(2)[L] | 5.5 | | Database |
| 07-1180-002 | C | - | 4(2)[S] | 4.0 | | (2)Planting Rec |

Table 17 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Cat Cr | | | | | | |
| 07-0720-001 | C | EB | 4(2)[S] | 2.5 | | Database |
| 07-0720-002 | C | - | 4(2)[S] | 2.0 | | (2)Planting Rec |
| Simpson Cr | | | | | | |
| 07-3920-001 | R | - | 4(2)[S] | 4.0 | | Database (2)Planting Rec |
| Smith Cr | | | | | | |
| 07-4000-003 | C | - | 4(2)[L] | 2.0 | | Database (2)Planting Rec |
| Falls Cr | | | | | | |
| 07-1420-000 | A | EB | 3[L] | 2.6 | | Database |
| Cold Cr | | | | | | |
| 07-0860-002 | R | EB | 4(2)[L] | 9.0 | | Database (2)Planting Rec |
| S. Fork Cold Cr | | | | | | |
| 07-4080-001 | U | EB | 4(2)[L] | 3.5 | | Database |
| 07-4080-002 | C | - | 4(2)[S] | 3.5 | | (2)Planting Rec |
| N. Fork Cold Cr | | | | | | |
| 07-3160-000 | A | - | 4(2)[H] | 5.3 | | Database (2)Planting Rec |
| Elk Cr | | | | | | |
| 07-1340-002 | U | Rb,EB | 5[S] | 7.2 | | Database |
| N. Fork Elk Cr | | | | | | |
| 07-3140-001 | R | - | 2[L] | 1.5 | | Database |
| 07-3140-002 | U | - | 2[L] | 3.0 | | |
| Glacier Cr | | | | | | |
| 07-1700-002 | U | Rb,EB | 5[S] | 4.3 | | Database |
| 07-1700-003 | U | EB | 4(2)[L] | 7.2 | | (2)Planting Rec |
| 07-1700-004 | C | EB | 4(2)[S] | 1.5 | | |
| Kraft Cr | | | | | | |
| 07-2340-001 | C | EB | 4(2)[S] | 3.0 | | Database |
| 07-2340-002 | C | EB | 4(2)[H] | 4.0 | | (2)Planting Rec |
| Hemlock Cr | | | | | | |
| 07-2000-000 | C | - | 4(2)[H] | 6.0 | | Database (2)Planting Rec |

Table 17 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Red Butte Cr | | | | | | |
| 07-3640-001 | A | - | 2[H] | 4.0 | | Database |
| Cooney Cr | | | | | | |
| 07-0900-001 | C | - | 4(2)[S] | 4.5 | | Database |
| 07-0900-002 | C | - | 4(2)[S] | 3.5 | | (2)Planting Rec |
| Rumble Cr | | | | | | |
| 07-3760-001 | U | EB | 4(2)[L] | 2.0 | | Database (2)Planting Rec |
| S. Fork Rumble Cr | | | | | | |
| 07-4220-001 | U | EB | 3[L] | 2.0 | | Database |
| 07-4220-002 | C | - | 2[L] | 3.0 | | |
| Buck Cr | | | | | | |
| 07-0620-002 | U | EB | 4(2)[S] | 3.0 | | Database |
| 07-0620-003 | C | - | 4(2)[S] | 1.0 | | (2)Planting Rec |
| Barber Cr | | | | | | |
| 07-0180-002 | C | - | 4(2)[S] | 8.9 | | Database (2)Planting Rec |
| Holland Cr | | | | | | |
| 07-2120-003 | C | - | 4(2)[L] | 0.8 | | Database |
| 07-2120-004 | C | - | 4(2)[L] | 3.2 | | (2)Planting Rec |
| Beaver Cr | | | | | | |
| 07-0240-001 | R | EB | 4(2)[S] | 7.0 | | Database |
| 07-0240-002 | C | EB | 4(2)[S] | 4.5 | | (2)Planting Rec |
| 07-0240-003 | A | - | 4(2)[H] | 1.0 | | |

changed from nursery and spawning areas for adfluvial cutthroat stocks to primarily resident brook trout populations in the slower gradient areas (Domrose personal communication). Adfluvial cutthroat migrations from Swan Lake still occur in the drainage (Leathe and Graham 1983). Cutthroat are still found in the high gradient areas (Domrose personal communication). Rainbow are now the most abundant trout in the main river (Domrose personal communication).

One of the most important threats to the westslope populations in the Swan is the tributary development of micro-hydro projects which not only could impact the populations within the diversion reaches, but also in downstream areas (Leathe and Graham 1983). Potential impacts of micro-hydro development include stream dewatering, changes in water temperatures, higher siltation rates, turbine entrainment and preventing upstream movement of fish (Leathe and Graham 1983). Of the 20 proposed micro-hydro sites, 8 had cutthroat as the dominant species; reaches likely to be dominated by cutthroat trout are also apparently preferred micro-hydro locations, since they tend to have a higher gradient (Leathe and Graham 1983). If all proposed projects were developed, approximately 54 km of streams would be diverted, or 13% of the length of the tributary system (Leathe and Graham 1983). The worst case scenario shows that 23% of the high quality rearing habitat for westslope cutthroat would be lost (Leathe and Graham 1983).

## Lower Flathead River Drainage Above Flathead Lake

Sixty-one streams comprising 532.5 stream km are inhabited by westslope cutthroat in the mainstem of the Flathead River drainage between Flathead Lake and the confluence of the Middle and North Forks, which includes the Stillwater and Whitefish River drainages (Table 18). No streams in the drainage have been documented to contain genetically pure westslope populations but reaches on 27 streams with a length of 129.7 stream km contain cutthroat and are free of both contaminants and competitors. Competitors (brook trout) coexist with cutthroat in 83.5 stream km within the drainage, while 44% of the cutthroat waters (234 stream km) may contain introgressed populations due to prior planting of potential contaminants. Two waters, one of which is the mainstem Flathead River, contain contaminating species (rainbow trout) in addition to westslope

Table 18. Westslope cutthroat trout streams in the Lower Flathead River drainage above Flathead Lake (Hydrologic Unit # 17010208).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Flathead River | | | | | | |
| 1-07-1560-001 | D | Rb | 5[G] | 28.2 | | Database |
| 1-07-1560-002 | D | Rb | 5[G] | 38.0 | | |
| 1-07-1560-003 | C | Rb | 5[G] | 14.3 | | |
| Noisy Cr | | | | | | |
| 07-3060-000 | A | EB | 4(2)[H] | 3.2 | | Database (2)Planting Rec |
| Mill Cr | | | | | | |
| 07-2820-000 | U | Rb,EB | 5[H] | 4.8 | | Database |
| McMannamy Draw (O'Neil Cr) | | | | | | |
| 07-3320-000 | C | EB | 3[L] | 9.7 | | Database |
| Stillwater River | | | | | | |
| 07-4420-000 | | | | | | |
| 07-4420-004 | C | - | 4(2) [H] | 17.4 | | Database (2)Planting Rec |
| (Whitefish River) | | | | | | |
| 07-4980-000 | | | | | | |
| Trumbull Cr | | | | | | |
| 07-4820-000 | C | EB | 4(2) [L] | 30.6 | | Database (2)Planting Rec |
| Haskill Cr | | | | | | |
| 07-1940-000 | C | EB | 4(2) [L] | 16.1 | | Database (2)Planting Rec |
| Lazy Cr | | | | | | |
| 07-2380-000 | C | EB | 3[L] | 11.3 | | Database |
| Smith Cr | | | | | | |
| 07-4005-000 | C | EB | 3[L] | 4.8 | | Database |
| Brush Cr | | | | | | |
| 07-0605-000 | U | - | 2[L] | 1.6 | | Database |
| (Swift Cr) | | | | | | |
| 07-4960-001 | | | | | | |
| Antice Cr | | | | | | |
| 07-0100-000 | C | - | 2[L] | 6.4 | | Database |

Table 18 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Swede Cr 07-4640-000 | C | - | 2[L] | 3.2 | | Database |
| W. Fork Swift Cr 07-4900-000 | C | - | 2[L] | 11.3 | | Database |
| E. Fork Swift Cr 07-1300-000 | C | - | 4(2) [L] | 12.9 | | Database (2)Planting Rec |
| Lost Cr 07-2580-000 | C | EB | 4(2) [L] | 24.1 | B | Database (2)Planting Rec |
| (Logan Cr) 07-2500-000 | | | | | | |
| Evers Cr 07-1380-000 | C | EB | 4(2)[L] | 9.7 | | Database (2)Planting Rec |
| N. Fork Evers Cr 07-3150-000 | C | - | 2[L] | 4.8 | | Database |
| Johnson Cr 07-2300-000 | C | EB | 4(2)[L] | 1.6 | | Database (2)Planting Rec |
| Smoke Cr 07-4010-000 | C | EB | 3[L] | 3.2 | | Database |
| Sanko Cr 07-3820-000 | C | EB | 3[L] | 4.8 | | Database |
| E. Sanko Cr 07-1310-000 | C | EB | 3[L] | 3.2 | | Database |
| Reid Cr 07-3680-000 | C | EB | 3[L] | 4.8 | | Database |
| Griffin Cr 07-1800-000 | A | EB | 4(2) [S] | 24.9 | | Database (2)Planting Rec |
| Sheppard Cr 07-3900-001 | C | EB | 4(2) [S] | 13.4 | | Database (2)Planting Rec |

Table 18 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Sinclair Cr 07-3940-000 | C | EB | 3[L] | 3.2 | | Database |
| Star Cr 07-4350-000 | C | EB | 3[L] | 3.2 | | Database |
| Swanson Cr 07-4620-000 | C | EB | 3[L] | 4.8 | | Database |
| Swaney Cr 07-4600-000 | C | EB | 3[L] | 3.2 | | Database |
| Listle Cr 07-2440-000 | C | EB | 4(2)[L] | 3.2 | | Database (2)Planting Rec |
| Dunshire Cr 07-1260-000 | C | EB | 4(2)[L] | 3.2 | | Database (2)Planting Rec |
| Ingalls Cr 07-2200-000 | C | - | 2[L] | 4.8 | | Database |
| Hand Cr 07-1880-000 | C | EB | 3[L] | 6.4 | | Database |
| Squaw Meadows Cr 07-4330-000 | C | EB | 3[L] | 6.4 | | Database |
| Oettiker Cr 07-3260-000 | C | - | 2[L] | 4.8 | | Database |
| Taylor Cr 07-4700-000 | C | - | 2[L] | 4.8 | | Database |
| Bill Cr 07-0380-000 | C | - | 2[L] | 3.2 | | Database |
| Cyclone Cr 07-1070-000 | C | - | 2[L] | 4.8 | | Database |
| Meadow Cr 07-2720-000 | C | - | 2[L] | 4.8 | | Database |
| Good Cr 07-1760-001 | A | EB | 4(2)[S] | 32.2 | | Database (2)Planting Rec |

Table 18 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Miller Cr 07-2860-000 | C | - | 2[L] | 6.4 | | Database |
| Trixie Cr 07-4790-000 | U | - | 2[L] | 4.8 | | Database |
| Gergen Cr 07-1660-000 | U | - | 2[L] | 4.8 | | Database |
| Corduroy Cr 07-0940-000 | C | - | 2[L] | 4.8 | | Database |
| Gregg Cr 07-1780-000 | C | - | 2[L] | 8.0 | | Database |
| Alder Cr 07-0060-000 | C | - | 4(2)[L] | 9.7 | | Database (2)Planting Rec |
| Dagget Cr 07-1080-000 | C | - | 2[L] | 4.8 | | Database |
| Plume Cr 07-3480-000 | C | - | 4(2)[L] | 6.4 | | Database (2)Planting Rec |
| Robertson Cr 07-3725-000 | C | - | 2[L] | 4.8 | | Database |
| Bowen Cr 07-0540-000 | C | - | 2[L] | 6.4 | | Database |
| Martin Cr 07-2660-000 | C | EB | 4(2) [S] | 14.2 | F(3) | Database (2)Planting Rec (3)Huston pers com |
| Spring Cr 07-4240-000 | C | - | 4(2)[L] | 4.8 | | Database (2)Planting Rec |
| Sunday Cr 07-4540-000 | A | EB | 3[S] | 14.5 | | Database |
| Louis Cr 07-2600-000 | C | - | 2[L] | 4.8 | | Database |

Table 18 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Harvey Cr 07-1920-000 | C | - | 2[L] | 4.8 | | Database |
| Paul Cr 07-3390-001 | C | - | 2[L] | 3.2 | | Database |
| Blessed Cr 07-0420-000 | C | - | 2[L] | 3.2 | | Database |
| Advent Cr 07-0020-000 | C | - | 2[L] | 4.8 | | Database |
| Tom Cr 07-4770-000 | C | - | 2[L] | 3.2 | | Database |
| Chepat Cr 07-0780-000 | U | - | 2[L] | 3.2 | | Database |
| Fitzsimmons Cr 07-1500-000 | A | EB | 4(2)[S] | 6.4 | | Database (2)Planting Rec |
| Rusky Cr 07-3780-000 | C | - | 2[L] | 3.2 | | Database |

populations.

All 63 stream reaches inhabited by westslope populations in the drainage were rated to assess their value as habitat for the species (Table 18). The greatest or highest-value and the high priority habitat categories both had 3 reaches rated as such and 6 reaches were considered substantial habitat. A total of 51 stream reaches were rated as habitat of limited value.

The mainstem river upstream from the South Fork is designated a Recreational River under the Wild and Scenic Rivers Act of 1976 (Frazer 1982). A dam site has been proposed near Coram, but construction of the dam appears

unlikely (Frazer 1982). Irrigators divert water in the Flathead Valley but apparently don't severely impact the river (Frazer 1982). Impoundment of the South Fork by Hungry Horse Dam has impacted the mainstem (Graham et al. 1981). Seasonal flow patterns, water level flucuations, due to the operating regime of the Hungry Horse Project, and alteration of water temperatures by the hypolimnial release have affected the lower river (Graham et al. 1981). The average of historical minimum flows is much greater than the current minimum flows (Frazer 1982). The operation of Hungry Horse Dam and its impact is of extreme importance to westslope cutthroat in the mainstem Flathead since adfluvial juveniles overwinter in the river and adults begin concentrating in the reach as early as October (Graham et al. 1981). Historically, adfluvial cutthroat from both Flathead Lake and lakes within the Stillwater and Whitefish drainages utilized those areas for spawning (Huston 1979). A dam once present at the mouth of the Stillwater River apparently was a barrier for adfluvial stock from Flathead Lake (Huston and Domrose personal communication). Today, neither the Stillwater or Whitefish system contains substantial adfluvial populations of any kind (Huston 1979). However, efforts by the MT Dept. of F, W & P to reestablish adfluvial westslope cutthroat runs in the drainage has apparently met with some success (Huston 1979). Huston (1979) believed that neither the Stillwater or the Whitefish River had historic populations of fluvial cutthroat trout. Currently, competitors in the drainage include northern pike as well as brook trout, which are present in the upper Stillwater tributaries (Huston and Domrose personal communication). A reach of Martin Creek above a waterfall may contain a pure westslope population, but complete information concerning the section is currently unavailable (Huston and Domrose personal communication). Most of the Whitefish drainage above the lake is primarily cutthroat waters (Huston and Domrose personal communicaton). The

principal threats to westslope populations in the drainages are habitat related which might be expected since 81% of the stream reaches were rated as limited habitat (Table 18). Development of subdivisions, oil and gas exploration as well as unstable banks are current problems in the basin (Huston and Domrose personal communication). However, the most important single factor in the Stillwater drainage appears to be logging of mountain pine beetle infested lodgepole pine (Domrose personal communication). Not only would erosion increase and water yield patterns change, but far reaching impacts due to conversion of forest lands to agricultural usage could occur (Domrose personal communication).

## Lower Flathead River Drainage Summary

Currently, 112 streams and rivers are thought to be inhabited by westslope cutthroat in the lower Flathead River drainage as shown in Tables 16-18. These waters account for a total of 949.9 stream km, or only 40% of the estimated historic range of 2,374 stream km (Table 1). If one does not include potential cutthroat waters (streams rated 6), then only 35.6% of the original range is now inhabited. Twelve stream km, all in the Swan drainage and representing 1.4% of the known westslope distribution in the basin, have pure populations. Other westslope waters free of both contaminants and competitors comprise 17.7% (149.6 stream km) of the drainage and westslope coexist with competitors in 10.8% of the waters (91.3 stream km). Potentially introgressed populations, as indicated by planting records, inhabit 50.7% (428.8 stream km) of the waters while contaminants are found in 19.1% or 161.3 stream km. Known introgressed populations are found in 0.2% (2.1 stream km) of the known cutthroat waters. Waters where westslope cutthroat are expected to occur total 104.8 stream km.

## South Fork Flathead River Drainage

The South Fork Flathead River is probably the largest and most secure stronghold for westslope cutthroat trout in Montana today. A total of 67 westslope cutthroat streams, which comprise 791.9 stream km, were identified in the drainage (Table 19). Eight streams, which have a total length of 128.8 stream km, are known to contain genetically pure westslope populations. These streams are the S. Fork Flathead River (reach 3), Emery, Hungry Horse, Felix, Sullivan, Quintonkon, Dudley and Tin creeks (Table 19). An additional 234.7 stream km contain cutthroat and are free of contaminants and competitors but the populations have not been tested electrophoretically. No streams were rated 3, the value assigned streams with cutthroat and competitors present, but no contaminants. So, 46.3% or 366.7 stream km of the drainage is free of exotic trout and could be considered westslope strongholds. Forty-one percent of the cutthroat waters (328.8 stream km) in the drainage are known to have been planted with a contaminating species. Waters with rainbow and rainbow x cutthroat hybrid trout present include 51.8 stream km (6.5%) of the drainage. Six streams (48.4 stream km) have been determined to contain introgressed cutthroat populations.

Of the 84 stream reaches listed, 81 were rated as westslope cutthroat habitat. Four reaches were considered as the greatest value habitat, 63 were rated as high value, 11 were listed as substantial and 3 were rated as limited value habitat.

Historically, spawning migrations of adfluvial and fluvial westslope cutthroat from Flathead Lake and the Flathead River utilized the South Fork along with the fluvial and tributary resident populations (Graham et al. 1981). However, the construction of Hungry Horse Dam isolated the South Fork from the rest of the Flathead drainage. The spawning migrations of adfluvial

Table 19. Westslope cutthroat trout streams in the South Fork Flathead River drainage (Hydrologic Unit # 17010209).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| S. Fork Flathead River | | | | | | |
| 1-08-6660-001 | R | - | 4(2)[L] | 8.0 | B | Database |
| 1-08-6660-002 | D | RbxCt | 5[G] | 27.4 | | (2)Phelps 1982 |
| 1-08-6660-003 | B | RbxCt | 1(2)[G] | 53.1 | | (3)Planting Rec |
| Emery Cr | | | | | | |
| 08-2560-000 | B | - | 1(2)[H] | 11.7 | | Database<br>(2)Leary et al. 1983b |
| Doris Cr | | | | | | |
| 08-2300-001 | D | - | 2[H] | 3.9 | | Database |
| Hungry Horse Cr | | | | | | |
| 08-3580-000 | B | - | 1(2)[H] | 9.7 | | Database<br>(2)Leary et al. 1983b |
| Margaret Cr | | | | | | |
| 08-4500-000 | B | - | 4(2)[H] | 6.4 | | Database<br>(2)Planting Rec |
| Tiger Cr | | | | | | |
| 08-7260-000 | B | - | 2[H] | 6.4 | | Database |
| Lost Mare Cr | | | | | | |
| 08-4370-000 | B | - | 2[H] | 4.8 | | Database |
| Lost Johnny Cr | | | | | | |
| 08-4360-001 | D | - | 4(2)[H] | 1.2 | | Database |
| 08-4360-002 | C | - | 4(2)[S] | 9.3 | | (2)Planting Rec |
| Wounded Buck Cr | | | | | | |
| 08-7920-000 | B | - | 4(2)[H] | 8.0 | | Database |
| Wildcat Cr | | | | | | |
| 08-7860-000 | C | - | 2[H] | 6.4 | | Database |
| Ryle Cr | | | | | | |
| 08-6020-000 | U | - | 2[H] | 4.8 | | Database |
| (Tent Cr) | | | | | | |
| 08- ? | | | | | | |
| Dudley Cr | | | | | | |
| 08-2380-000 | U | - | 1(2)[H] | 3.2 | | Database<br>(2)Leary 1984 |

Table 19 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Trout Cr 08-7390-000 | C | - | 2[H] | 4.8 | | Database |
| Riverside Cr 08-5860-000 | D | - | 4(2)[S] | 4.8 | | Database (2)Planting Rec |
| Murray Cr 08-4980-000 | D | - | 4(2)[H] | 4.8 | | Database (2)Planting Rec |
| Clayton Cr 08-1540-000 | C | - | 5a(2) [L] | 8.0 | | Database (2)Leary et al. 1983b |
| McInernie Cr 08-4660-000 | D | - | 2[H] | 4.8 | | Database |
| Canyon Cr 08-1180-000 | V | - | 2[H] | 4.8 | | Database |
| Harris Cr 08-3260-000 | V | - | 2[H] | 4.8 | | Database |
| Felix Cr 08-2700-000 | Z | - | 1 | 4.3(2) | | Leary et al. 1983b (2)Map |
| Graves Cr 08-3100-000 | B | - | 5a(2) [H] | 14.5 | | Database (2)Leary et al. 1983b |
| Aeneas Cr 08-0080-000 | C | - | 5a(2) [S] | 9.7 | | Database (2)Leary et al. 1983b |
| Jones Cr 08-3720-000 | C | - | 5a(2) [H] | 3.2 | | Database (2)Leary et al. 1983b |
| Logan Cr 08-4260-000 | V | - | 4(2)[H] | 6.4 | F(3) | Database (2)Planting Rec (3)Hanzel 1959 |
| S. Fork Logan Cr 08-6670-000 | V | - | 2[H] | 5.6 | | Database |

Table 19 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Forest Cr<br>08-2820-000 | D | - | 5a(2)<br>[H] | 6.4 | | Database<br>(2)Leary et al. 1983b |
| Wheeler Cr<br>08-7720-001<br>(above & below falls) | B | - | 5a(2)<br>[H] | 6.6 | F | Database<br>(2)Leary et al. 1983b |
| Trapper Cr<br>08-7360-000 | C | - | 2[H] | 4.8 | | Database |
| Hoke Cr<br>08-3480-000 | D | - | 4(2)[H] | 4.8 | | Database<br>(2)Planting Rec |
| Sullivan Cr<br>08-7080-000 | B | - | 1(2)<br>[G] | 25.4 | | Database<br>(2)Leary et al. 1983b |
| Quintonkon Cr<br>08-5660-000 | D | - | 1(2)<br>[H] | 15.0 | | Database<br>(2)Leary et al. 1983b |
| Ball Cr<br>08-0400-000 | D | - | 2[H] | 8.0 | | Database |
| (Clark Cr)<br>08-1520-001 | | | | | | |
| Taylor Cr<br>08-7190-000 | D | - | 2[L] | 1.6 | | Database |
| Brush Cr<br>08-0940-000 | C | - | 2[H] | 3.2 | | Database |
| Soldier Cr<br>08-6560-000 | C | - | 2[H] | 3.2 | | Database |
| Lower Twin Cr<br>08-4380-000 | C | - | 4(2)<br>[H] | 16.1 | | Database<br>(2)Planting Rec |
| Twin Cr<br>08-7500-000 | C | - | 4(2)<br>[H] | 24.1 | | Database<br>(2)Planting Rec |

Table 19 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Tin Cr | | | | | | |
| 08-7280-000 | C | - | 1(2)[H] | 6.4 | | Database<br>(2)Leary et al. 1983b |
| Spotted Bear River | | | | | | |
| 08-6740-001 | B | - | 4(2)[G] | 31.5 | | Database |
| 08-6740-002 | C | - | 4(2)[S] | 22.5 | | (2)Planting Rec |
| Sergeant Cr | | | | | | |
| 08-6260-000 | C | - | 2[H] | 4.8 | | Database |
| Whitecomb Cr | | | | | | |
| 08-7780-000 | C | - | 2[H] | 6.4 | | Database |
| Silvertip Cr | | | | | | |
| 08-6360-000 | C | - | 4(2)[H] | 16.1 | | Database<br>(2)Planting Rec |
| Wall Cr | | | | | | |
| 08-7620-000 | C | - | 4(2) | 9.7 | | Database<br>(2)Planting Rec |
| Addition Cr | | | | | | |
| 08-0060-000 | C | - | 2[H] | 8.0 | | Database |
| Bruce Cr | | | | | | |
| 08-0920-000 | A | - | 4(2)[H] | 4.8 | | Database<br>(2)Planting Rec |
| Bunker Cr | | | | | | |
| 08-0980-001 | B | - | 4(2)[H] | 11.2 | | Database |
| 08-0980-002 | C | - | 4(2)[S] | 14.5 | | (2)Planting Rec |
| Gorge Cr | | | | | | |
| 08-3060-001 | C | - | 4(2)[H] | 12.9 | | Database<br>(2)Planting Rec |
| Stadium Cr | | | | | | |
| 08-6940-000 | C | - | 2[H] | 4.8 | | Database |
| Black Bear Cr | | | | | | |
| 08-0760-000 | C | - | 4(2)[H] | 11.3 | | Database<br>(2)Planting Rec |

Table 19 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Little Salmon River | | | | | | |
| 08-4220-001 | U | - | 2 | 10.8 | | Database |
| 08-4220-002 | A | - | 2[H] | 8.7 | | |
| 08-4220-003 | A | - | 2[S] | 14.5 | | |
| Big Salmon River | | | | | | |
| 08-0740-001 | C | Rb,RbxCt | 5[H] | 6.3 | | Database |
| 08-0740-002 | U | Rb,RbxCt | 5[S] | 10.1 | | |
| 08-0740-003 | R | Rb,RbxCt | 5[S] | 4.8 | | |
| Tango Cr | | | | | | |
| 08-7140-000 | C | - | 2[H] | 3.2 | | Database |
| Pendant Cr | | | | | | |
| 08-5440-000 | C | Rb | 5[H] | 3.2 | | Database |
| White River | | | | | | |
| 08-7820-001 | C | - | 2[H] | 8.8 | | Database |
| 08-7820-002 | A | - | 2[H] | 4.8 | | |
| 08-7820-003 | C | - | 2[S] | 20.9 | | |
| Holbrook Cr | | | | | | |
| 08-3500-000 | C | - | 4(2)[H] | 12.9 | | Database (2)Planting Rec |
| Burnt Cr | | | | | | |
| 08-1000-000 | C | - | 2[H] | 11.3 | | Database |
| Bartlett Cr | | | | | | |
| 08-0460-000 | C | - | 4(2)[H] | 11.3 | | Database (2)Planting Rec |
| Gordon Cr | | | | | | |
| 08-3040-001 | U | EB | 4(2)[H] | 11.9 | | Database |
| 08-3040-002 | C | - | 4(2)[H] | 3.4 | | (2)Planting Rec |
| 08-3040-003 | C | - | 4(2)[H] | 4.7 | | |
| 08-3040-004 | C | - | 4(2)[H] | 2.6 | | |
| Shaw Cr | | | | | | |
| 08-6280-000 | C | - | 4(2)[H] | 5.6 | | Database (2)Planting Rec |
| Youngs Cr | | | | | | |
| 08-7960-001 | U | - | 2[S] | 5.8 | | Database |
| 08-7960-002 | A | - | 2[H] | 13.0 | | |

Table 19 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Babcock Cr | | | | | | |
| 08-0360-001 | C | - | 2[H] | 11.3 | | Database |
| Danaher Cr | | | | | | |
| 08-1900-001 | U | - | 4(2)[S] | 6.8 | | Database |
| 08-1900-002 | C | - | 4(2)[H] | 10.9 | | (2)Planting Rec |
| 08-1900-003 | C | EB | 4(2)[H] | 13.7 | | |
| Camp Cr | | | | | | |
| 08-1120-000 | C | - | 2[H] | 8.0 | | Database |
| Basin Cr | | | | | | |
| 08-0480-000 | C | - | 2[H] | 11.3 | | Database |
| Calf Cr | | | | | | |
| 08-1100-000 | C | - | 4(2)[H] | 8.0 | | Database (2)Planting Rec |
| Bar Cr | | | | | | |
| 08-0440-000 | C | - | 2[H] | 6.4 | | Database |
| Limestone Cr | | | | | | |
| 08-4160-000 | C | - | 4(2)[H] | 8.0 | | Database (2)Planting Rec |

cutthroat probably extended as far upstream as Meadow Creek Gorge (Graham et al. 1981). Meadow Creek Gorge is considered a gradient barrier to fish passage (Huston personal communication). Adfluvial populations of cutthroat developed in Hungry Horse Reservoir in addition to the fluvial and resident populations that remained (Graham et al. 1981).

Hungry Horse Reservoir extends 56.3 km upstream from the dam. Although several exotic species have been planted in the drainage, westslope cutthroat are by far the dominant trout in the reservoir. Gill net sampling in the reservoir during 1980 produced 2,366 fish; three of these were grayling and

one was a rainbow (Graham et al. 1982). Huston (personal communication) estimated that out of 1,000 Salmo spp. sampled from the reservoir, about 5 would be yellowstone cutthroat and 2 rainbow trout. Westslope cutthroat have been the only species planted in the drainage since about 1970; however, the fish population in the reservoir is unique in that it is maintained by natural reproduction. Most of the reservoirs tributaries are used by adfluvial cutthroat for spawning. These tribuatries include Sullivan, Hungry Horse, Margaret and Tiger creeks, all of which have been intensively monitored (Graham et al. 1982). The principal threats to the westlope cutthroat populations of Hungry Horse Reservoir are barriers on tributary streams that prevent fish passage during spawning migrations and drawdowns of the reservoir, especially when the drawdown exceeds 85 feet (Graham et al. 1981). The MT F, W, and P, the Bureau of Reclamation and the U S Forest Service have cooperated to remove barriers, most of which were improperly installed culverts where the perimeter road crosses tributary streams or else log jams. This has resulted in about 96.5 km once again being available to cutthroat spawning (Grahm et al. 1982). Fish passage problems still reoccur on a regular basis and a major flood could have a severe impact on tributary availability to the adfluvial cutthroat (Graham et al. 1981).

Above the reservoir, the South Fork is classified as a recreational river for 11.6 km from the reservoir to the Spotted Bear River and a wild river from Spotted Bear upstream 83.5 km to its headwaters (Frazer 1982). The majority of the drainage above the reservoir is within the Bob Marshall Wilderness.

The primary threat to populations in the upper portion of the drainage is hybridization with exotic Salmo's. The genetic integrity of westslope populations in the drainage can be predicted by the presence or absence of a lake in the sub-drainage. If any tributary has a lake on it, it's cutthroat

population has probably undergone introgression while if no lake is present, the cutthroat population has a much better chance of being genetically pure (Huston personal communication).

The MT F, W, and P has plans to collect approximately 40 samples for electrophoretic analysis from tributaries in the South Fork drainage during 1984 (Huston personal communication). If this work shows that most tributaries are genetically pure, the fisheries resource in the drainage should be managed exclusively for westslope cutthroat and other native species. This includes rehabilitation of contaminated waters, either chemically or by obstructing fish passage to spawning grounds, where feasible. Also, daily and possession limits should be higher for exotic species whenever possible to encourage harvest of non-native trout.

## Middle Fork Flathead River Drainage

The Middle Fork Flathead River drainage contains 50 streams that comprise 576 stream km which are inhabited by westslope cutthroat trout (Table 20). None of the streams in the drainage have had samples taken for electrophoretic analysis, but 21 of the streams, which accounted for 151.1 stream km, reportedly contain only westslope cutthroat and no other Salmo spp. Four streams (63.1 stream km) contain both cutthroat and competitors. More than 62% of the stream km (358.5 km) occupied by cutthroat in the Middle Fork are waters designated as containing no comtaminants but planting records indicate that that the cutthroat population could be introgressed. McDonald Creek is the only known stream to actually contain a contaminating species in the drainage. Contaminants are present in lakes. One hundred stream reaches containing westslope cutthroat were evaluated regarding their habitat value (Table 20). Thirty of the reaches were rated as the greatest or highest-value habitat, 45

Table 20. Westslope cutthroat trout streams in the Middle Fork Flathead River drainage (Hydrologic Unit # 17010207).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Middle Fork Flathead River | | | | | | |
| 1-08-4740-01 | C | - | 4(2)[G] | 22.5 | | Database |
| 1-08-4740-02 | A | EB | 4(2)[G] | 40.2 | | (2)Planting Rec |
| 1-08-4740-03 | C | EB | 4(2)[G] | 85.3 | | |
| McDonald Cr | | | | | | |
| 08-4630-01 | C | Rb | 5[H] | 3.3 | | Weaver et al. 1983 |
| Lincoln Cr | | | | | | |
| 08-4170-01 | U | EB | 3[S] | 8.0 | | Weaver et al. 1983 |
| 08-4170-02 | C | EB | 3[S] | 8.0 | F | |
| Walton Cr | | | | | | |
| 08-7630-01 | C | EB | 3[S] | 3.7 | | Weaver et al. 1983 |
| 08-7630-02 | A | EB | 3[H] | 3.2 | F | |
| Deerlick Cr | | | | | | |
| 08-2080-01 | N | EB | - | 5.1 | | Weaver et al. 1983 |
| Harrison Cr | | | | | | |
| 08-3290-01 | U | EB | 3[S] | 5.3 | | Weaver et al. 1983 |
| Nyack Cr | | | | | | |
| 08-5130-01 | N | - | - | 11.4 | | Weaver et al. 1983 |
| 08-5130-02 | U | - | 2[S] | 1.9 | F | |
| Coal Cr | | | | | | |
| 08-1630-01 | U | EB | 3[H] | 5.6 | F | Weaver et al. 1983 |
| 08-1630-02 | U | EB | 3[G] | 12.5 | | |
| 08-1630-03 | U | EB | 3[H] | 7.6 | F | |
| Pinchot Cr | | | | | | |
| 08-5530-01 | U | EB | 3[H] | 1.8 | F | Weaver et al. 1983 |
| 08-5530-02 | C | - | 2[H] | 3.7 | F | |
| Stanton Cr | | | | | | |
| 08-6980-01 | U | EB | 4(2)[H] | 2.4 | CL-,F | Weaver et al. 1983 (2)Planting Rec |
| Tunnel Cr | | | | | | |
| 08-7440-01 | R | - | 4(2)[L] | 1.4 | CL,BD- | Weaver et al. 1983 |
| 08-7440-02 | R | - | 4(2)[L] | 4.3 | | (2)Planting Rec |

Table 20 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Muir Cr | | | | | | |
| 08-4950-01 | A | - | 2[G] | 1.9 | | Weaver et al. 1983 |
| 08-4950-02 | C | - | 2[G] | 2.4 | | |
| 08-4950-03 | A | - | 2[G] | 2.9 | | |
| Paola Cr | | | | | | |
| 08-5340-01 | N | - | - | 1.2 | CL | Weaver et al. 1983 |
| Park Cr | | | | | | |
| 08-5365-01 | U | - | 2[S] | 3.5 | F | Weaver et al. 1983 |
| 08-5365-02 | U | - | 2[H] | 8.4 | | |
| 08-5365-03 | U | - | 2[S] | 7.6 | | |
| 08-5365-04 | C | - | 2[H] | 3.2 | F | |
| Dickey Cr | | | | | | |
| 08-2180-01 | N | EB | - | 4.4 | F | Weaver et al. 1983 |
| Ole Cr | | | | | | |
| 08-5150-01 | C | EB | 3[G] | 7.4 | | Weaver et al. 1983 |
| 08-5150-02 | C | - | 2[G] | 4.0 | | |
| 08-5150-03 | C | - | 2[G] | 15.6 | F | |
| Essex Cr | | | | | | |
| 08-2620-01 | A | - | 4(2)[H] | 1.9 | F | Weaver et al. 1983 |
| 08-2620-02 | - | - | - | 1.6 | F | (2)Planting Rec |
| Marion Cr | | | | | | |
| 08-4520-000 | C | - | 2[H] | 3.2 | | Database |
| Sheep Cr | | | | | | |
| 08-6300-000 | C | - | 4(2)[S] | 9.7 | | Database<br>(2)Planting Rec |
| Bear Cr | | | | | | |
| 08-0540-01 | U | EB | 4(2)[S] | 5.9 | | Weaver et al. 1983 |
| 08-0540-02 | U | EB | 4(2)[S] | 7.7 | | (2)Planting Rec |
| 08-0540-03 | U | EB | 4(2)[S] | 10.1 | F- | |
| Geifer Cr | | | | | | |
| 08-2960-01 | A | EB | 4(2)[S] | 3.7 | | Weaver et al. 1983<br>(2)Planting Rec |
| Skyland Cr | | | | | | |
| 08-6420-01 | U | - | 4(2)[S] | 3.4 | | Weaver et al. 1983<br>(2)Planting Rec |

Table 20 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Dirtyface Cr | | | | | | |
| 08-2200-001 | V | - | 2[H] | 4.2 | | Database |
| Elk Cr | | | | | | |
| 08-2520-001 | V | - | 4(2)[L] | 1.0 | | Database<br>(2)Planting Rec |
| Charlie Cr | | | | | | |
| 08-1440-01 | U | - | 4(2)[H] | 2.9 | F- | Weaver et al. 1983 |
| 08-1440-02 | U | - | 4(2)[L] | 2.8 | F- | (2)Planting Rec |
| 08-1440-03 | X | - | 4(2)[H] | 2.0 | F- | |
| Long Cr | | | | | | |
| 08-4280-01 | X | - | 4(2)[H] | 2.7 | | Weaver et al. 1983 |
| 08-4280-02 | U | - | 4(2)[G] | 1.3 | | (2)Planting Rec |
| 08-4280-03 | R | - | 4(2)[H] | 4.6 | | |
| Bergsicker Cr | | | | | | |
| 08-0640-01 | U | - | 4(2)[S] | 4.3 | | Weaver et al. 1983 |
| 08-0640-02 | N | - | - | 4.3 | | (2)Planting Rec |
| Twenty-five Mile Cr | | | | | | |
| 08-7480-01 | X | - | 2[S] | 1.0 | F | Weaver et al. 1983 |
| 08-7480-02 | X | - | 2[S] | 5.4 | | |
| 08-7480-03 | C | - | 2[H] | 2.0 | | |
| Granite Cr | | | | | | |
| 08-3080-01 | U | - | 2[G] | 7.9 | | Weaver et al. 1983 |
| 08-3080-02 | C | - | 2[G] | 5.5 | | |
| Challenge Cr | | | | | | |
| 08-1420-01 | A | - | 2[S] | 4.5 | | Weaver et al. 1983 |
| Dodge Cr | | | | | | |
| 08-2260-01 | C | - | 2[H] | 3.7 | | Weaver et al. 1983 |
| Lake Cr | | | | | | |
| 08-3956-01 | C | - | 2[H] | 2.5 | F | Weaver et al. 1983 |
| 08-3956-02 | U | - | 2[S] | 4.9 | | |
| Miner Cr | | | | | | |
| 08-4780-01 | C | - | 4(2)[S] | 2.5 | | Weaver et al. 1983 |
| 08-4780-02 | C | - | 4(2)[S] | 1.9 | | (2)Planting Rec |

Table 20 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Morrison Cr | | | | | | |
| 08-4940-01 | U | - | 4(2)[H] | 7.5 | | Weaver et al. 1983 |
| 08-4940-02 | U | - | 4(2)[H] | 3.8 | | (2)Planting Rec |
| 08-4940-03 | C | - | 4(2)[G] | 8.8 | | |
| 08-4940-04 | N | - | - [H] | 2.3 | | |
| Lodgepole Cr | | | | | | |
| 08-4240-01 | U | - | 4(2)[H] | 6.5 | | Weaver et al. 1983 |
| 08-4240-02 | C | - | 4(2)[H] | 4.1 | | (2)Planting Rec |
| Whistler Cr | | | | | | |
| 08-7760-01 | C | - | 4(2)[H] | 3.1 | | Weaver et al. 1983 (2)Planting Rec |
| Puzzle Cr | | | | | | |
| 08-5620-000 | C | - | 2[H] | 6.4 | | Database |
| Schafer Cr | | | | | | |
| 08-6160-01 | R | - | 4(2)[G] | 4.6 | | Weaver et al. 1983 |
| 08-6160-02 | U | - | 4(2)[G] | 1.1 | | (2)Planting Rec |
| 08-6160-03 | C | - | 4(2)[G] | 4.8 | | |
| 08-6160-04 | U | - | 4(2)[H] | 3.7 | F | |
| Dolly Varden Cr | | | | | | |
| 08-2280-01 | R | - | 4(2) [H] | 13.1 | F | Weaver et al. 1983 (2)Planting Rec |
| Argosy Cr | | | | | | |
| 08-0300-01 | U | - | 2[H] | 1.5 | F | Weaver et al. 1983 |
| 08-0300-02 | U | - | 2[H] | 3.7 | | |
| Roaring Cr | | | | | | |
| 08-5880-000 | C | - | 2[H] | 6.4 | | Database |
| W. Fork Schafer Cr | | | | | | |
| 08-7670-01 | C | - | 2[G] | 3.3 | F | Weaver et al. 1983 |
| Calbick Cr | | | | | | |
| 08-1080-01 | U | - | 4(2)[G] | 4.3 | | Weaver et al. 1983 (2)Planting Rec |
| Cox Cr | | | | | | |
| 08-1740-01 | U | - | 4(2)[G] | 3.3 | | Weaver et al. 1983 |
| 08-1740-02 | A | - | 4(2)[G] | 6.1 | | (2)Planting Rec |

Table 20 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Clack Cr | | | | | | |
| 08-1500-01 | X | - | 2[G] | 2.8 | | Weaver et al. 1983 |
| 08-1500-02 | X | - | 2[H] | 2.7 | | |
| 08-1500-03 | U | - | 2[H] | 5.1 | | |
| Bowl Cr | | | | | | |
| 08-0820-01 | R | - | 4(2)[H] | 2.6 | | Weaver et al. 1983 |
| 08-0820-02 | U | - | 4(2)[H] | 4.2 | | (2)Planting Rec |
| 08-0820-03 | C | - | 4(2)[G] | 1.6 | | |
| 08-0820-04 | U | - | 4(2)[H] | 6.4 | F- | |
| 08-0820-05 | R | - | 4(2)[S] | 2.4 | | |
| Scalp Cr | | | | | | |
| 08-6120-000 | C | - | 2[H] | 4.0 | | Database |
| Basin Cr | | | | | | |
| 08-0500-01 | A | - | 4(2)[G] | 2.1 | | Weaver et al. 1983 |
| 08-0500-02 | C | - | 4(2)[G] | 6.6 | | (2)Planting Rec |
| 08-0500-03 | A | - | 4(2)[H] | 1.8 | F | |
| Strawberry Cr | | | | | | |
| 08-7020-01 | R | - | 4(2)[H] | 4.9 | | Weaver et al. 1983 |
| 08-7020-02 | C | - | 4(2)[G] | 7.5 | BD- | (2)Planting Rec |
| 08-7020-03 | R | - | 4(2)[G] | 5.1 | | |
| 08-7020-04 | R | - | 4(2)[G] | 2.3 | | |
| Trail Cr | | | | | | |
| 08-7320-01 | U | - | 4(2)[G] | 7.7 | F- | Weaver et al. 1983 |
| 08-7320-02 | U | - | 4(2)[H] | 4.0 | F- | (2)Planting Rec |
| S.F. Trail Cr | | | | | | |
| 08-6700-01 | C | - | 2[H] | 4.8 | | Weaver et al. 1983 |
| Gateway Cr | | | | | | |
| 08-2940-01 | U | - | 2[H] | 2.5 | | Weaver et al. 1983 |
| 08-2940-02 | C | - | 2[H] | 2.2 | F | |
| 08-2940-03 | C | - | 2[H] | 1.8 | | |
| 08-2940-04 | A | - | 2[G] | 1.0 | | |
| E.F. Strawberry Cr | | | | | | |
| 08-2460-01 | A | - | 2[H] | 3.0 | F | Weaver et al. 1983 |

were determined to be high priority habitat, 21 were considered substantial and 4 were only of limited habitat value.

Migratory cutthroat utilize the Middle Fork drainage for spawning and rearing areas. Shepard et al. (1982) reported that Granite, Challenge, Dodge, Morrison and Bear creeks were used by migratory cutthroat while McDonald and Ole creeks were used by cutthroat considered to be adfluvial fish. Deerlick, Stanton, Tunnel, Paola and Dickey creeks were not considered as streams used by adfluvial westslope cutthroat trout (Shepard et al. 1982). Thirteen reaches on Walton, Muir, Essex, Gateway, Basin, Challenge, Twenty-five Mile, Argosy, Cox and the East Fork of Strawberry creeks were determined to be critical rearing areas (Shepard et al. 1982). A habitat model was developed by the MT F, W and P that can predict cutthroat densities in the North and Middle Fork drainages using measurements of trout cover, measurements of bed material (D-90) and stream order (Fraley and Graham 1981).

That portion of the Middle Fork above the mouth of Bear Creek was designated a wild river under the Wild and Scenic Rivers act, while the lower Middle Fork is classified as a recreational river (Graham et al. 1980). The upper portion of the drainage is roadless and part of the Bob Marshall and Great Bear Wilderness Areas (Graham et al 1980). Due to current protection of lands in the Middle Fork, only 33% of the river's length, which is 325 km, could be developed or logged (Graham et al. 1980).

The primary threat to cutthroat populations in the drainage is physical habitat perturbations (Huston personal communciation). The upper portion of the drainage above Bear Creek has steep sidewalls and erosion was accelerated by the 1964 flood; the lower drainage was heavily scoured (Graham et al. 1980). Most logging in the lower portion of the drainage has occurred on the lower reaches of tributaries in the Flathead Range between Essex and the John

F. Stevens Canyon while in the upper part of the drainage, logging occurred in the Twenty-five Mile, Granite and Morrison Creek drainages (Graham et al. 1980). Most of the development along the lower river has been in the West Glacier and Nyack Flats areas (Graham et al. 1980). Another important factor in the drainage is the potential for hybridization between westlope cutthroat populations and contaminants, such as yellowstone cutthroat, which are found in lakes (Huston personal communication). The Granite, Morrison, Lodgepole and Long creek drainages, which includes Dodge, Challenge, Whistler, Lodgepole, Puzzle and Bergsicker creeks, have been closed to fishing since 1962 (Weaver et al. 1983) to protect the migratory fishery. Information from a voluntary creel card survey from 1979 to 1981 showed that cutthroat trout dominated the catch all three years (Shepard et al. 1982). Oil and gas exploration also continues to be a threat in the basin (Graham et al. 1980). A high-head dam site at Spruce Park 9 km above Bear Creek has been proposed but the Wild and Scenic River Act should prevent construction of the dam (Frazer 1982).

## North Fork Flathead River Drainage

Forty-four streams and 535.6 stream km in the North Fork Flathead River drainage are known to contain westslope cutthroat populations (Table 21). Three streams in the drainage, Moose, Colts and Teepee creeks, have been documented to contain pure populations of westslope cutthroat (Leary 1984). Also, the South Fork of Red Meadow Creek contains a pure westslope population (Leary 1984), but the author couldn't locate this water on a map or the MT F, W & P water codes listing and thus it was not included in any table. No streams were listed as containing only cutthroat and competitors. However, 24 streams with a total length of 219.5 stream km were found to contain westslope cutthroat and no contaminants or competitors. Another 213.7 stream km from 16

Table 21. Westslope cutthroat trout streams in the North Fork Flathead River drainage (Hydrologic Unit # 17010206).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| N. Fork Flathead River | | | | | | |
| 1-08-5100-001 | B | Ct | 5[G] | 29.0 | | Database |
| 1-08-5100-002 | B | Ct | 5[G] | 37.0 | | |
| Canyon Cr | | | | | | |
| 08-1160-001 | C | - | 4(2)[H] | 2.2 | | Database (2)Planting Rec |
| McGinnis Cr | | | | | | |
| 08-4640-001 | C | - | 4(2)[H] | 1.3 | | Database (2)Planting Rec |
| Kimmerly Cr | | | | | | |
| 08-3820-001 | C | - | 4(2)[G] | 4.2 | | Database (2)Planting Rec |
| Big Cr | | | | | | |
| 08-0680-001 | U | - | 2[L] | 10.4 | | Database |
| 08-0680-002 | U | - | 2[L] | 7.9 | | |
| Langford Cr | | | | | | |
| 08-4000-001 | A | - | 4(2)[G] | 1.2 | | Database |
| 08-4000-002 | A | - | 4(2)[G] | 2.0 | | (2)Planting Rec |
| Lookout Cr | | | | | | |
| 08-4300-000 | C | - | 2[H] | 4.8 | | Database |
| Hallowat Cr | | | | | | |
| 08-3240-001 | U | - | 4(2)[H] | 4.1 | | Database |
| 08-3240-002 | U | - | 4(2)[H] | 8.7 | | |
| Werner Cr | | | | | | |
| 08-7660-001 | U | - | 2[L] | 3.2 | | Database |
| Kletomas Cr | | | | | | |
| 08-3840-001 | U | - | 2[L] | 5.6 | | Database |
| Skookoleel Cr | | | | | | |
| 08-6400-001 | C | - | 2[H] | 4.6 | | Database |
| 08-6400-002 | U | - | 2[L] | 3.4 | | |
| Camas Cr | | | | | | |
| 08-1110-001 | R | - | 4[H] | 3.7 | | Database |
| 08-1110-002 | U | - | 4[H] | 8.3 | | |
| 08-1110-003 | U | - | 4[H] | 8.7 | | |

Table 21 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Dutch Cr | | | | | | |
| 08-2390-001 | A | - | 2[G] | 7.6 | | Database |
| 08-2390-002 | C | - | 2[H] | 5.5 | | |
| 08-2390-003 | C | - | 2[H] | 4.9 | | |
| Anaconda Cr | | | | | | |
| 08-0210-001 | C | - | 2[G] | 18.4 | | Database |
| 08-0210-002 | C | - | 2[H] | 6.1 | | |
| Logging Cr | | | | | | |
| 08-4270-001 | U | - | 4(2)[H] | 7.2 | | Database (2)Planting Rec |
| Coal Cr | | | | | | |
| 08-1620-001 | C | - | 4(2)[H] | 10.1 | | Database |
| 08-1620-002 | U | - | 4(2)[G] | 8.4 | | (2)Planting Rec |
| 08-1620-003 | A | - | 4(2)[H] | 10.5 | | |
| 08-1620-004 | U | - | 4(2)[H] | 2.0 | | |
| Cyclone Cr | | | | | | |
| 08-1840-001 | A | - | 4(2)[G] | 2.5 | | Database |
| 08-1840-002 | C | - | 4(2)[G] | 4.0 | | (2)Planting Rec |
| Deadhorse Cr | | | | | | |
| 08-1980-001 | A | - | 2[H] | 6.1 | | Database |
| 08-1980-002 | C | - | 2[H] | 1.2 | | |
| S. Fork Coal Cr | | | | | | |
| 08-6620-001 | C | - | 2[G] | 9.0 | | Database |
| 08-6620-002 | C | - | 2[H] | 2.0 | | |
| Mathias Cr | | | | | | |
| 08-4580-001 | U | - | 2[H] | 1.5 | | Database |
| 08-4580-002 | U | - | 2[H] | 2.8 | | |
| Quartz Cr | | | | | | |
| 08-5650-001 | C | - | 2[H] | 10.1 | | Database |
| Cummings Cr | | | | | | |
| 08-1810-001 | A | - | 2[G] | 11.8 | | Database |
| Hay Cr | | | | | | |
| 08-3340-001 | A | - | 4(2)[H] | 10.7 | | Database |
| 08-3340-002 | A | - | 4(2)[H] | 7.2 | | (2)Planting Rec |
| 08-3340-003 | C | - | 4(2)[G] | 7.5 | | |
| 08-3340-004 | U | - | 4(2)[L] | 1.9 | | |

Table 21 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Moran Cr | | | | | | |
| 08-4920-001 | A | - | 4(2)[G] | 7.1 | | Database |
| 08-4920-002 | C | - | 4(2)[H] | 1.4 | | (2)Planting Rec |
| 08-4920-003 | U | - | 4(2)[H] | 1.8 | | |
| Bowman Cr | | | | | | |
| 08-0830-001 | C | - | 2[H] | 8.2 | | Database |
| Akokala Cr | | | | | | |
| 08-0110-001 | C | - | 2[G] | 8.0 | | Database |
| 08-0110-002 | A | - | 2[G] | 8.8 | | |
| Parke Cr | | | | | | |
| 08-5370-001 | C | - | 2[H] | 1.8 | | Database |
| 08-5370-002 | C | - | 2[H] | 4.6 | | |
| Long Bow Cr | | | | | | |
| 08-4275-001 | C | - | 2[H] | 6.4 | | Database |
| Red Meadow Cr | | | | | | |
| 08-5760-001 | C | - | 4(2)[H] | 7.7 | | Database |
| 08-5760-002 | C | - | 4(2)[G] | 11.0 | | (2)Planting Rec |
| 08-5760-003 | C | - | 4(2)[H] | 3.0 | | |
| Moose Cr | | | | | | |
| 08-4880-001 | C | - | 1(2)[G] | 5.2 | | Database |
| 08-4880-002 | A | - | 1(2)[H] | 4.9 | | (2)Leary 1984 |
| 08-4880-003 | A | - | 1(2)[H] | 7.1 | | |
| Whale Cr | | | | | | |
| 08-7700-001 | U | - | 4(2)[H] | 13.9 | | Database |
| 08-7700-002 | C | - | 4(2)[H] | 11.5 | | (2)Planting Rec |
| Shorty Cr | | | | | | |
| 08-6320-001 | U | - | 2[H] | 4.5 | | Database |
| 08-6320-002 | R | - | 2[H] | 4.6 | | |
| Ford Cr | | | | | | |
| 08-2810-001 | C | - | 2[G] | 6.9 | | Database |
| 08-2810-002 | C | - | 2[G] | 2.1 | | |
| 08-2810-003 | C | - | 2[G] | 3.8 | | |
| Teepee Cr | | | | | | |
| 08-7200-001 | A | - | 1(2)[L] | 4.8 | | Database |
| 08-7200-002 | C | - | 1(2)[L] | 12.8 | | (2)Leary 1984 |

Table 21 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Kintla Cr | | | | | | |
| 08-3830-001 | C | - | 2[H] | 3.5 | | Database |
| Trail Cr | | | | | | |
| 08-7330-001 | U | - | 2[H] | 11.4 | | Database |
| Ketchikan Cr | | | | | | |
| 08-3790-001 | A | - | 2[G] | 3.0 | | Database |
| 08-3790-002 | A | - | 2[G] | 1.5 | | |
| 08-3790-003 | A | - | 2[G] | 3.7 | | |
| Tuchuck Cr | | | | | | |
| 08-7400-001 | A | - | 4(2)[G] | 6.5 | | Database (2)Planting Rec |
| Yakinikak Cr | | | | | | |
| 08-7940-001 | U | - | 4(2)[L] | 3.0 | | Database |
| 08-7940-002 | C | - | 4(2)[G] | 3.2 | | (2)Planting Rec |
| 08-7940-003 | C | - | 4(2)[H] | 3.3 | | |
| 08-7940-004 | C | - | 4(2)[H] | 3.6 | | |
| 08-7940-005 | C | - | 4(2)[H] | 2.7 | | |
| Starvation Cr | | | | | | |
| 08-6990-001 | C | - | 2[H] | 8.0 | | Database |
| 08-6990-002 | R | - | 2[L] | 3.2 | | |
| Kishenehn Cr | | | | | | |
| 08-3835-001 | R | - | 2[H] | 8.7 | | Database |
| Spruce Cr | | | | | | |
| 08-6845-001 | A | - | 2[G] | 2.0 | | Database |
| 08-6845-002 | C | - | 2[G] | 3.4 | | |
| Sage Cr | | | | | | |
| 08-6030-001 | C | - | 2[H] | 2.1 | | Database |
| Colts Cr | | | | | | |
| 08-1640-000 | C | - | 1(2)[G] | 1.6 | | Database (2)Leary 1984 |

streams were determined to be free of contaminating species, but planting records indicate that these waters could be introgressed populations. The

North Fork itself was assigned a rating of 5, since the database listed cutthroat trout as a species present in addition to westslope cutthroat. Contaminating species as well as introgressed cutthroat populations are present in lakes in the drainage. Eighty-five stream reaches in the North Fork drainage were evaluated to determine their habitat potential for westslope cutthroat (Table 21). Twenty-nine reaches were determined to be the greatest or highest value habitat, 46 were considered high value and 10 reaches were habitat of limited value.

Many tributaries of the North Fork are important spawning areas for adfluvial cutthroat trout. Westside tributaries of the North Fork that are known to be utilized by adfluvial cutthroat include McGinnis, Big, Langford, Hallowat, Kletomus, Werner, Skookoleel, Coal, Cyclone, South Fork Coal, Mathias, Moran, Red Meadow, Moose, Whale, Shorty, Trail, Ketchikan, Yakinikak and Tuchuck creeks (Shepard et al. 1983; Fraley et al. 1981). Known adfluvial cutthroat streams in the North Fork drainage within Glacier National Park include Camas, Dutch, Anaconda, Akokala, Starvation, Kishenehn, Spruce and Sage creeks (Shepard et al. 1983). Howell, Cabin and Cauldrey creeks are Canadian streams used by adfluvial cutthroat trout (Shepard et al. 1983). Nine streams in the drainage may be used by migratory cutthroat, but data is lacking. These streams are Deadhorse, Hay, Logging, Quartz, Cummings, Parke, Long Bow, Ford and Kintla creeks (Fraley 1981; Graham et al. 1980; Shepard et al. 1982). Seventeen reaches in Langford, Moose, Ketchikan, Moran, Cyclone, Tuchuck, Bowman, Red Meadow, Sage, Dutch and the South Fork Coal creeks were designated critical cutthroat rearing areas (Shepard et al. 1982).

The North Fork from the Canadian border downstream to the Camas Creek bridge is designated scenic by the 1976 National Wild and Scenic Rivers Act (Frazer 1982). From Camas Creek bridge to the mouth of the Middle Fork, it is

classified as recreational (Frazer 1982). For 92 km the North Fork is the western boundary of Glacier National Park, so the eastern portion of the drainage has remained essentially undisturbed by development (Graham et al 1980). The Quartz Creek drainage of the North Fork is the most ecologically intact aquatic system in Glacier Park and is unique in that it has no exotic species in the drainage (Marnell 1981).

The major threats to the westslope cutthroat fishery in the North Fork are habitat related. The two most important factors currently affecting cutthroat populations are logging and development (Graham et al. 1980). The acceleration of logging mountain pine beetle infested lodgepole pine timber in both the U S and Canada could increase the spring water yield, which would widen the stream channel, reduce summer and fall streamflow and new roads would increase the sediment load (Frazer 1982; Fraley et al. 1981). Other potential habitat threats in the drainage include the Cabin Creek Coal Mine, the Lodgepole and the Lily Bird Mine sites in Canada, oil and gas exploration and development, and two high-head hydroelectric sites, one of which is the Smoky Range site located 12.9 km upstream from the mouth (Graham et al. 1980; Fraley et al. 1981; Frazer 1982). In addition to these threats, upgrading of the road system in the drainage may increase recreational use (Fraley et al. 1981).

Regulations imposed by the State of Montana have closed Big Creek, Coal Creek and all of their tributaries, Whale Creek and its tributaries downstream from Whale Creek Falls, Trail Creek (Yakinikak) and its tributaries downstream from the mouth of Thoma Creek to fishing (MT fishing regulations, 1984-85).

## Upper Flathead River Drainage Summary

The original range of westslope cutthroat trout in the upper Flathead drainage, which includes the South Fork and all the waters upstream, was

estimated to be 2,239 stream km (Table 1). The present distribution in the drainage, which was determined from streams listed in Tables 19, 20 and 21, is 161 streams or approximately 1,903.5 stream km, representing 85% of the historic range in the drainage. The 15% reduction represents a small decrease in the cutthroat's range within the drainage; in fact, most of the apparent range reduction could actually be due to map measurement error. The continued well being of westslope cutthroat in Montana is intimately associated with the upper Flathead River basin, since quantitatively, it is their greatest stronghold in the state. The drainage contains 613 more stream km inhabited by westslope cutthroat than all the drainages east of the divide combined.

Of the 1,903.5 stream km considered to be inhabited by cutthroat, 8.8% (168.4 stream km) were known to contain genetically pure populations, 31.8% (605.3 stream km) contain westslope cutthroat and no contaminating or competing species and 3.3%, or 63.1 stream km, are known to contain both cutthroat and competitors. Stream reaches which apparently contain westslope cutthroat and no contaminants but could have introgressed populations, since planting records indicate a potential contaminating species was placed in the subdrainage, accounted for the largest portion (47.3% or 900.4 stream km) of cutthroat waters in the basin. Contaminating species were known to inhabit 6.4% (121.1 stream km) of the westslope cutthroat waters and 2.4% (45.2 stream km) of the westslope's range in the drainage contains introgressed populations.

## Lower Clark Fork River Drainage of Region 2

That portion of the Lower Clark Fork River within Region 2 has 44 streams which are inhabited by westslope cutthroat trout; they comprise 443.8 stream km (Table 22). O'Keefe Creek is the only stream in this portion of the drainage known to contain a genetically pure population of westslope cutthroat. Reaches of another 13 streams, making up 84.9 stream km are considered cutthroat waters free of both contaminants and competitors. Competitors but no contaminating species were present along with cutthroat in 57.8 stream km. Reaches on 13 streams, totaling 178.5 stream km, were determined to contain westslope populations which may have become introgressed since contaminants had been planted in them. No streams are known to contain introgressed cutthroat populations, but 111.3 stream km currently have contaminating species found in the same reach as westslope cutthroat. One stream, Trout Creek, may be a westslope cutthroat stream, but confirmation is lacking.

Of the 46 stream reaches listed as cutthroat waters, 31 were rated for suitability as westslope cutthroat habitat (Table 22). Three reaches were listed as being the greatest or highest-value habitat, 2 were rated as high priority, 15 were described as substantial and 11 were determined to be of limited value.

Although westslope cutthroat are primarily limited to the headwater areas in the drainage, a population estimate was apparently obtained from the main river near Superior during spring 1984 (Peters personal communication). Factors affecting the mainstem river population include water quality problems due to toxic metals present in sediments and effluents from the Champion pulp and paper mill and the Missoula sewage treatment plant (Anonymous 1984). Also, at least twelve dam sights have been identified or proposed in the stretch of river between Alberton and the Flathead River (Anonymous 1984). Mining and

Table 22. Westslope cutthroat trout streams in the Lower Clark Fork River drainage of Region 2 (Hydrologic Unit # 17010204).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Clark Fork River<br>2-05-1456-002<br>2-05-1456-003 | | | | | | |
| St. Regis River<br>05-6064-002<br>05-6064-001 | U(3)<br>R(2) | EB(2)<br>Rb,LL, EB(2) | 4(4)<br>5 | 29.1<br>24.5 | | Database<br>(2)Lund 1976<br>(3)Lere 1982<br>(4)Planting Rec |
| Deer Cr<br>05-1938-001 | C | EB | 3[S] | 4.5 | | Database |
| Little Joe Cr<br>05-4096-001 | A | Rb,LL, RbxCt | 5 | 3.7 | | Database |
| S. Fork Little Joe Cr<br>05-6672-001 | A | - | 4(2)[L] | 8.7 | | Database<br>(2)Planting Rec |
| N. Fork Little Joe Cr<br>05-5248-001 | A | - | 4(2)[L] | 9.7 | | Database<br>(2)Planting Rec |
| (Big Cr)<br>05-0464-001 | | | | | | |
| E. Fork Big Cr<br>05-2240-001 | C | EB | 4(2)[S] | 2.4 | | Database<br>(2)Planting Rec |
| W. Fork Big Cr<br>05-7840-001 | C | EB | 4(2)[S] | 1.6 | | Database<br>(2)Planting Rec |
| Dry Cr<br>05-2160-002 | C | Rb,EB | 5[S] | 10.5 | | Peters pers com<br>Database |
| Flat Cr<br>05-2816-000 | U | EB | 4(2)[L] | 9.3 | | Database<br>(2)Planting Rec |
| Cedar Cr<br>05-1280-000 | C | EB,LL(2) | 4(2)[S] | 24.8 | | Database<br>(2)Planting Rec |

Table 22 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Trout Cr<br>05-7408-000 | C(2) | Rb,EB(2) | 6 | 22.5(2) | | Peters pers com<br>(2)Database |
| First Cr<br>05-2752-001 | U | EB | 3[L] | 5.0 | | Database |
| Fish Cr<br>05-2768-001 | A | Rb,EB,LL | 5[G] | 23.3 | | Database<br>Peters, 1981 |
| S. Fork Fish Cr<br>05-6656-001 | C | EB | 4(2)<br>[H] | 15.6 | | Database<br>(2)Planting Rec |
| Cache Cr<br>05-1072-200 | A | EB | 4(2)<br>[S] | 20.9 | | Database<br>(2)Planting Rec |
| White Cr<br>05-8128-200 | C | - | 2[S] | 6.4 | | Database |
| W. Fork Fish Cr<br>05-7936-001 | C | - | 4(2)<br>[G] | 20.9 | | Database<br>(2)Planting Rec |
| Cedar Log Cr<br>05-1312-200 | C | - | 2[S] | 16.0 | | Database |
| Indian Cr<br>05-3616-200 | C | - | 2[G] | 3.2 | | Database |
| N. Fork Fish Cr<br>05-5232-001 | C | Rb,EB | 5[H] | 16.7 | | Database |
| Petty Cr<br>05-5552-000 | U | Rb | 5[S] | 18.2 | | Database |
| Bill Cr<br>05-0624-200 | Z | - | 2[L] | 7.0 | | Database |
| (Ninemile Cr)<br>05-5168-001 | | | | | | |
| Stony Cr<br>05-6992-200 | C | Rb,EB | 5 | 8.0(2) | | Peters 1981<br>(2)Database |

Table 22 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Butler Cr<br>05-1008-001 | C | EB(2) | 3[S] | 11.3 | | Peters 1981<br>Database |
| Cedar Cr<br>05-1264-200 | U | EB | 3[L] | 6.4 | | Database |
| Kennedy Cr<br>05-3792-200 | U | EB | 4(2)[L] | 8.8 | | Database<br>(2)Planting Rec |
| Fire Cr<br>05-2720-200 | U | EB | 3[L] | 8.0 | | Database |
| McCormick Cr<br>05-4544-001 | C | EB | 4(3)<br>[S] | 16.1 | | Database<br>Peters 1981<br>(3)Planting Rec |
| Bird Cr<br>05-0640-200 | A | - | 2[S] | 4.8 | | Database |
| Little Blue Cr<br>05-4032-200 | U | EB | 3[L] | 5.2 | | Database |
| Big Blue Cr<br>05-0496-200 | X | EB(2) | 2 | 6.4 | | Peters 1981<br>(2)Database |
| Camp Cr<br>05-1168-200 | A | EB | 3[S] | 5.6(2) | | Peters 1981<br>(2)Database |
| Soldier Cr<br>05-6560-001 | C | EB | 3[S] | 8.0(2) | | Peters 1981<br>(2)Database |
| (Burnt Fork Cr)<br>05-0944-200 | | | | | | |
| E. Fork Burnt Fork Cr<br>05-2280-200 | Z | - | 2 | 6.4(2) | | Peters 1981<br>(2)Database |
| W. Fork Burnt Fork Cr<br>05-7858-201 | Z | - | 2 | 1.0(2) | | Peters 1981<br>(2)Database |

Table 22 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Beecher Cr | | | | | | |
| 05-0416-201 | Z | - | 2 | 2.2(2) | | Peters 1981<br>(2)Database |
| W. Fork Beecher Cr | | | | | | |
| 05-7832-201 | X | EB | 3 | 1.1 | | Peters 1981<br>(2)Database |
| St. Louis Cr | | | | | | |
| 05-6048-201 | X | - | 2 | 2.5 | | Peters 1981 |
| 05-6048-202 | X | - | 2 | 1.3 | | |
| Sixmile Cr | | | | | | |
| 05-6368-000 | X | - | 4(3) | 10.6(2) | | Peters 1981<br>(2)map<br>(3)Planting Rec |
| Sixmile Cr tributary | | | | | | |
| ? | X | EB | 3 | 2.7(2) | | Peters 1981<br>(2)map |
| Roman Cr | | | | | | |
| 05-6016-000 | X | - | 2 | 6.9(2) | | Peters 1981<br>(2)map |
| Mill Cr | | | | | | |
| 05-4800-002 | U | Rb,LL | 5[L] | 6.4 | | Peters 1981<br>(2)Database |
| Bear Cr | | | | | | |
| 05-0288-200 | A | - | 2[L] | 6.4 | | Database |
| O'Keefe Cr | | | | | | |
| 05-5344-002 | C(2) | - | 1(2)<br>[S] | 11.3 | | Peters 1981<br>(2)Leary et al. 1983c |
| Butler Cr | | | | | | |
| 05-0992-001 | E | - | 2 | 14.6(2) | | Peters 1981<br>(2)map |

timber harvesting appear to be the principal threats to other streams in the drainage. Placer mining, a very destructive force on most streams, is occurring in the Cedar and Ninemile drainages (Workman personal communication). Potential mining areas include the Trout Creek and St. Regis River drainages, which are also potential cutthroat strongholds (Workman and Peters personal communication). Severe channel alterations have occurred on the mainstem of the St. Regis River. Fish Creek, a high quality trout stream, has very high fishing pressure and low productivity (Peters personal communication), which could potentially depress cutthroat populations. It's tributaries contain good populations of cutthroat and a portion of the drainage is within the proposed Hoodoo wilderness area (Peters personal communication). The 500-KV BPA powerline and service road right of way may impact some streams along its route by increasing sedimentation. Currently, field surveys are being conducted along the route, which will provide further information on cutthroat distribution in tributary streams. O'Keefe Creek, which parallels U S Highway 93 up Evaro Hill, and as previously stated contains a genetically pure westslope population, is threatened by both highway construction and a subdivision along its banks. An accident involving a tanker truck carrying hazardous materials could literally wipe out this population. The Nature Conservancy has explored possibilities of further protection for this unique stream but the current status of these plans are unknown.

The lower Clark Fork drainage includes portions of both Regions 1 and 2 and extends from the mouth of the Bitterroot River downstream to the Idaho border. It contains a total of 107 streams inhabited by westslope cutthroat (Tables 15 and 22); these 107 streams comprise 1,045 stream km, which is 44.8% of the estimated historic range in the drainage (Table 1). Stream reaches

totaling 60.3 stream km, or 5.8% of the present distribution in the drainage are inhabited by genetically intact westslope populations. Other westslope waters free of both contaminants and competitors constituted 19.6% of the present range (205.2 stream km). Competitors and westslope cutthroat currently coexist in 167.3 stream km (16.0%), while 33.9% of the present westslope distribution (352.5 stream km) consist of waters where potentially contaminating species have been planted. Contaminating species are present in 23.3% of the waters (243.2 stream km) and introgressed westslope cutthroat populations were known to exist in 1.6% (16.5 stream km) of the present range. A total of 6 streams in the drainage comprising 63.6 stream km may contain westslope cutthroat but confirmation is not available.

## Bitterroot River Drainage

Fifteen streams with a total length of 387 stream km were identified in the Bitterroot River drainage as being inhabited by westslope cutthroat (Table 23). The historic range in the Bitterroot was estimated to be 1,567 stream km (Table 1). The range reduction within the drainage exceeds 75%. Granite Creek, which is 12 km in length, is the only stream in the drainage determined to contain a pure westslope population. Another westslope stream, Blue Joint Creek, is free of both contaminants and competitors; it is 27.7 km in length. The West Fork Butte Creek, with a total length of 9.4 stream km, currently contains brook trout in addition to westslope cutthroat. Six streams, representing 88.4 stream km, may contain introgressed westslope populations since contaminants were once planted in the sub-drainage. Rainbow trout are listed as co-inhabitants with westslope cutthroat in 4 streams, comprising 49.8% of the westslope waters or 209.4 stream km. The South Fork Lolo and Tin Cup creeks have both been determined to have introgressed

Table 23. Westslope cutthroat trout streams in the Bitterroot River drainage (Hydrologic Unit # 17010205).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Bitterroot River<br>2-03-0475-000<br>2-03-0500-000 | | | | | | |
| Miller Cr<br>03-3975-002 | C | EB | 4(2) [S] | 12.2 | | Database<br>(2)Planting Rec |
| Plant Cr<br>03-4750-200 | C | EB(?) | 4(2)[L] | 3.3 | | Database<br>(2)Planting Rec |
| (Lolo Cr)<br>03-3475-001 | | | | | | |
| S. Fork Lolo Cr<br>03-5800-000 | C | - | 5a(2) [S] | 18.7 | | Database<br>(2)Leary et al. 1983c |
| W. Fork Butte Cr<br>03-6825-200 | C | EB | 3[S] | 9.4 | | Database |
| Granite Cr<br>03-2375-200 | C | - | 1(2) [S] | 12.0 | | Database<br>(2)Leary et al. 1983c |
| Bass Cr<br>03-0200-002 | U | Rb,EB | 6 | 11.3 | | Peters, personal communication |
| Big Cr<br>03-0425-001 | Z | - | 6 | 4.9(2) | | Peters, personal communication |
| Blodgett Cr<br>03-0550-000 | C | Rb,EB,LL | 5[S] | 36.2 | | Database |
| (Skalkaho Cr)<br>03-5475-002 | | | | | | |
| Daly Cr<br>03-1600-001 | Z | - | 6 | 17.5(2) | | Peters, personal communication |

Table 23 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Sleeping Child Cr | | | | | | |
| 03-5550-000 | C | EB | 4(2) [S] | 31.4 | | Database (2)Planting Rec |
| Lost Horse Cr | | | | | | |
| 03-3500-000 | C | Rb,EB,LL | 5[S] | 36.0 | | Database |
| Tin Cup Cr | | | | | | |
| 03-6425-001 | C(2) | Rb(2) | 5a | 21.4 | | Leary et al. 1983c (2)Database |
| E. Fork Bitterroot River | | | | | | |
| 03-1950-001 | U | Rb,EB | 5[H] | 11.4 | | Database |
| 03-1950-002 | C | Rb,EB | 5[G] | 59.5 | | |
| Moose Cr | | | | | | |
| 03-4075-000 | D | EB | 4(2) [G] | 13.8 | | Database (2)Planting Rec |
| Martin Cr | | | | | | |
| 03-3625-001 | C | EB | 4(2)[H] | 1.6 | | Database (2)Planting Rec |
| W. Fork Bitterroot River | | | | | | |
| 03-6800-001 | V | Rb,EB,LL | 5[H] | 31.5 | | Database |
| 03-6800-002 | A | Rb,EB | 5[H] | 34.8 | | |
| Blue Joint Cr | | | | | | |
| 03-0575-000 | C | - | 2[H] | 27.7 | ?(2) | Database (2)Peters, personal communication |
| Hughes Cr | | | | | | |
| 03-2775-000 | C | EB | 4(2) [L] | 26.1 | | Database (2)Planting Rec |

westslope populations (Leary et al. 1983c).

Of the 20 stream reaches listed in Table 23, 16 were rated regarding their habitat value for westslope cutthroat. Two were considered the greatest or highest-value habitat, 5 as high priority habitat, 7 as substantial and 2 were determined to be of limited value.

Currently, the principal threats to westslope populations in tributaries of the Bitterroot River are dewatering of the stream channel due to irrigation withdrawl and competition of exotic species (Peters personal communication). The areas dewatered by irrigators tends to be downstream from the forest boundary and may not be an important impact on most tributary westslope populations. However, proposed micro-hydro projects could have a severe impact (Peters personal communication). Water for micro-hydro power generation would be diverted at the boundary of the Bitterroot National Forest and the Selway Bitterroot Wilderness area (Missoulian, 9/18/83), which is more likely to be cutthroat habitat. Although plans for several of the sites may have been abandoned, an Idaho group applied for permits on Blodgett and Big creeks, as well as Rock, Sweeney, Kootenai, Skalkako and Roaring Lion creeks (Missoulian, 9/18/83). Blodgett Creek is a known cutthroat stream and Big Creek is currently rated as a potential westslope water (Table 23). The entire project would impact approximately 38.6 km of these streams (Missoulian, 9/18/83). Plans called for a steel pipe to carry waters up to 8 km from the diversion site to a powerhouse (Missoulian, 9/18/83). Placer mining is occurring along Hughes Creek (Workman personal communication) and intensive logging activity, such as in the Lolo Creek area, has also occurred in the drainage (Peters personal communication). Portions of Forest Service land on the western side of the drainage bordering the Selway-Bitterroot Wilderness area have been proposed as wilderness additions and the Blue Joint area is still a wilderness study area.

## Upper Clark Fork River Drainage

A total of 22 streams encompassing 352.4 stream km were identified as westslope waters in the Clark Fork drainage above the Bitterroot River (Table

24). The current range represents only 17.5% of the historic distribution of 2,017 stream km. Only 1 stream, German Gulch, is known to have a genetically "pure" westslope population. Eight streams comprising 81.0 stream km were listed as potential westslope waters but currently documentation is lacking. Two other streams, Brock and Dog creeks (10.7 stream km), have brown trout coexisting with a westslope population; Brook trout also inhabit Dog Creek. Fourteen streams, totaling 219.5 stream km, have been planted with contaminating species and may have hybridized westslope populations. Three westslope streams representing 90.9 stream km are inhabited by rainbow trout as well as competitors. Both Welcome and Stony creeks contain introgressed westslope populations; Welcome Creek, a tributary of Rock Creek has a population consisting of 97% westslope cutthroat and 3% rainbow trout genes (Leary 1983b).

Out of the 32 stream reaches listed as cutthroat waters, 18 have been rated concerning their habitat value (Table 24). Eight reaches were listed as high priority habitat, 9 substantial and 1 was determined to be limited value habitat.

Mining has occurred in the upper Clark Fork since 1864 which, along with smelting facilities and the associated tailings, seriously affected all aquatic life in the main stem above the mouth of Rock Creek (Graham et al. 1981). Silver Bow Creek, which historically was probably a westslope cutthroat stream is now completely dead and an EPA superfund site (Graham et al. 1981). A tributary of Silver Bow Creek, German Gulch, contains a genetically pure population of westslope cutthroat with a proportionally greater number of fish > 7 inches (Anonymous 1984; Leary and Allendorf 1984). A proposed gold mine and mill, the Montoro Project, have been planned in the headwater area of the Gulch; they would involve rerouting of the creek (Anonymous 1984). Since

Table 24. Westslope cutthroat trout streams in the Upper Clark Fork River drainage (Hydrologic Units # 17010201 & 17010202).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Clark Fork River<br>2-06-1121-000<br>2-06-1140-001 | | | | | | |
| Grant Cr<br>06-2698-001 | C | EB(2) | 4(3)<br>[S] | 16.9 | | Peters 1981<br>(2)Database<br>(3)Planting Rec |
| Rattlesnake Cr<br>06-5149-000 | C | EB,LL | 4(2)<br>[H] | 32.5 | | Database<br>(2)Planting Rec |
| Schwartz Cr<br>06-5605-000 | A | Rb,EB,LL | 5[S] | 5.6 | | Database |
| Rock Cr<br>06-5263-000<br>06-5282-000 | R<br>U | Rb,EB,LL<br>Rb,EB,LL | 5<br>5 | 47.0<br>33.3 | | Database<br>Peters 1983 |
| Welcome Cr<br>06-6916-001 | C | Rb | 5a(2)<br>[H] | 5.5 | | Database<br>(2)Leary 1983b |
| Hogback Cr<br>06-3078-000 | C | Rb,EB | 5[S] | 5.0 | | Database |
| Williams Gulch<br>06-7125-200 | C | - | 4(2)<br>[S] | 5.6 | | Database<br>(2)Planting Rec |
| Stony Cr<br>06-6308-000 | X | RbxCt,<br>EB(2) | 5a | 14.5(2) | | Leary et al. 1983c<br>(2)Database |
| Upper Willow Cr<br>06-6783-002 | C | - | 4(2)[H] | 8.0 | | Database<br>(2)Planting Rec |
| W. Fork Rock Cr<br>06-7030-000 | U | EB | 4(2)<br>[S] | 29.4 | | Database<br>(2)Planting Rec |
| Ross Fork Rock Cr<br>06-5320-001 | C | EB | 4(2)<br>[H] | 13.2 | | Database<br>(2)Planting Rec |

Table 24 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| S. Fork Ross Fork Rock Cr<br>06-6023-000 | E | | 6 | 9.3(2) | | Vashro pers com<br>(2)map |
| E. Fork Rock Cr<br>06-1938-001 | C | EB | 4(2)<br>[H] | 12.9 | | Database<br>(2)Planting Rec |
| Mid. Fork Rock Cr<br>06-4085-001 | U | EB | 4(2)<br>[H] | 23.7 | | Database<br>(2)Planting Rec |
| Cramer Cr<br>06-1444-000 | C(2) | EB | 4(3)<br>[S] | 14.5 | F | Spoon pers com<br>(2)Database<br>(3)Planting Rec |
| Harvey Cr<br>06-2945-001 | X | - | 4(3) | 24.0(2) | B | Peters pers com<br>(2)map<br>(3)Planting Rec |
| (Flint Cr)<br>06-2242-000 | | | | | | |
| Lower Willow Cr<br>06-3724-001<br>06-3724-002 | U<br>Z | -<br>- | 4(2)[H]<br>4(2)[S] | 11.5<br>8.0 | | Database<br>(2)Planting Rec |
| Boulder Cr<br>06-0646-000 | C | EB,LL | 4(2) | 17.7 | | Database<br>(2)Planting Rec |
| Douglas Cr<br>06-1729-001 | U | EB,LL | 4(2)[L] | 1.5 | | Database<br>(2)Planting Rec |
| Hoover Cr<br>06-3116-000 | E | | 6 | 10.6(2) | | Vashro pers com<br>(2)map |
| Gold Cr<br>06-2584-000 | U | LL | 4(3)[S] | 0.1 | B(2) | Database<br>(2)Vashro pers com<br>(3)Planting Rec |
| Brock Cr<br>06-0703-000 | C | LL | 3[S] | 1.0 | | Database |

Table 24 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Rock Cr<br>06-5244-201 | X | Rb,LL(2) | 6 | 5.7(3) | F | Vashro pers com (2)Peters pers com (3)Database |
| (Little Blackfoot River)<br>06-3591-000 | | | | | | |
| Dog Cr<br>06-1691-001 | U(2) | EB,LL(2) | 3 | 9.7(2) | | Vashro pers com Database |
| Hope Cr<br>06-3135-001 | U | LL(1), EB(2) | 6 | 2.6(2) | | Vashro pers com (2)Database |
| Cottonwood Cr<br>06-1368-000 | E(2) | EB(2) | 6 | 9.6(2) | | Vashro pers com (2)Database |
| Peterson Cr<br>06-4845-002 | E(2) | EB(2) | 6 | 9.6(2) | | Vashro pers com (2)Database |
| Dempsey Cr<br>06-1615-000 | E(2) | LL | 6 | 19.3(2) | | Vashro pers com (2)Database |
| Racetrack Cr<br>06-5073-000 | X | - | 6 | 14.3(2) | | Vashro pers com (2)map |
| (Silver Bow Cr) | | | | | | |
| German Gulch<br>06-2470-000 | X | EB | 1(2) | 11.3 | | Vashro pers com (2)Leary and Allendorf 1984 |

available data indicate that westslope cutthroat trout are in danger of extinction (Leary and Allendorf 1984), development of the Montoro Project should only occur if the project poses absolutely no threat to the westslope population. Although water quality problems have devastated aquatic life in

the mainstem, it might have isolated tributaries and prevented contamination of some westslope populations. Isolation of some tributaries also occurs due to their flow going underground before reaching their mouth (Vashro personal communication). Active mining is occurring in the Flint Creek Range; also, there is a proposed micro-hydro development on Boulder Creek (Peters personal ommunication). Bad logging practices have been utilized for operations on private land in the Flint Creek drainage (Peters personal communication). Irrigation dewatering is also a problem on the mainstem of the upper Clark Fork (Peters personal communication). Perturbations in the Little Blackfoot include stream alterations, dewatering of tributary streams for irrigation and some mining (Peters personal communication).

Streams considered likely "strongholds" in the drainage include Harvey Creek above a railroad structure barrier (Peters personal communication), the S. Fork Ross Creek (Vashro personal communication) and Cramer Creek (Spoon personal communication). Cramer Creek was found to contain only westslope cutthroat for approximately 3.2 stream km above an old mine site and cascades, which appear to be a brook trout barrier (Spoon personal communication). Several areas, including the Quigg and Flint Range study areas, are proposed wilderness additions; the Sapphires tract is still designated as a wilderness study area.

Upper Rock Creek should be considered a high priority area for monitoring of the cutthroat population on a regular basis. Creel census data from the upper reaches and population estimates from the Hogback Section have indicated that fishing pressure, which is about 31.1 days/km, was depressing the cutthroat population. Special regulations were implemented on Rock Creek in 1979, which include both a catch and release area below Hogback Creek and a 3 trout limit with 1 fish > 14 inches above Hogback (Peters 1983). The cutthroat

population between 1972 and 1978 averaged about 16 fish (size group = 203-430 mm), which represents the population level prior to the special regulations (Peters 1983). Cutthroat numbers increased to about 131 for the same size group during the post-implementation years between 1979 and 1982 (Peters 1983). This represents a 719% increase in cutthroat population levels after implementing the special regulations. A corresponding 33% decrease (N = 792 to 527) occurred in rainbow trout population levels for the 178-302 mm size range (Peters 1983). However, rainbow $\geq$ 305 mm increased in numbers 15% (Peters 1983).

Without the monitoring program, the low levels of cutthroat could easily have been attributed to competition, rather than to fishing pressure and differential vulnerability of the two species to angling. This is probably also occurring on many other waters in the state, where data is lacking. In addition to continuing the current monitoring program on upper Rock Creek, electrophoretic analysis should be performed on the cutthroat population.

## Blackfoot and Clearwater River drainages

Twenty-three streams with a total length of 343.7 stream km are inhabited by westslope cutthroat in the Blackfoot and Clearwater River drainages (Table 25). This represents 27.4% of their historic range within the drainage. Only 2 streams, Daisy and McDermott creeks, contain westslope populations and are free of both contaminating and competing species. Eleven streams, representing 45.5% (156.3 stream km) of the cutthroat waters, have been planted with potential contaminants and thus may have introgressed populations. Another 158.8 stream km identified as westslope waters are also inhabited by contaminating species and may be "lost". Blanchard Creek, 19.0 stream km long, has been tested electrophoretically and is known to contain an introgressed

Table 25. Westslope cutthroat trout streams in the Blackfoot and Clearwater River drainages (Hydrologic Unit # 17010203).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Blackfoot River<br>2-04-0600-001<br>2-04-0630-002<br>2-04-0660-003 | | | | | | |
| Johnson Gulch<br>04-3000-000 | U | Rb | 5[S] | 0.1 | | Database |
| Bear Cr<br>04-0330-000 | U | Rb,LL | 5[S] | 0.2 | | Database |
| Gold Cr<br>04-2610-001 | C | Rb,LL | 5[S] | 17.4 | | Database |
| W. Fork Gold Cr<br>04-5760-200 | C | Rb,LL | 5 | 9.8 | | Database |
| Daisy Cr<br>04-1600-000 | C | - | 2[S] | 6.4 | | Database |
| (Clearwater River)<br>04-1290-000 | | | | | | |
| Blanchard Cr<br>04-0690-000 | U(2) | Rb(3),<br>EB(2) | 5a[S] | 19.0 | | Leary et al. 1983c<br>(2)Database<br>(3)Peters pers com |
| (Owl Cr)<br>04-4110-000 | | | | | | |
| Placid Cr<br>04-4230-001 | R | Rb,EB,LL<br>RbxCt,Kok | 5 | 13.8(2) | | Peters pers com<br>(2)Database |
| Boles Cr<br>04-0750-001 | E | Rb(2),EB | 5[L] | 9.0 | | Database<br>(2)Peters pers com |
| Finley Cr<br>04-2370-000 | U | EB | 4(2)[L] | 5.5 | | Database<br>(2)Planting Rec |
| Trail Cr<br>04-5520-001 | C | EB | 4(2)[S] | 8.2 | | Database<br>(2)Planting Rec |

Table 26. Westslope cutthroat trout streams in the Kootenai River drainage (Hydrologic Units # 17010101, 17010102 & 17010103).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Kootenai River<br>1-11-3500-000 | | | | | | |
| (Yaak River)<br>11-7740-000<br>11-7760-000 | | | | | F | Hanzel 1959 |
| Seventeenmile Cr<br>11-5800-000 | A | Rb,EB | 5[S] | 18.3 | | Database |
| Pete Cr<br>11-5040-201 | E | Rb,EB(E) | 6[H] | 1.6 | | Database |
| 11-5040-202 | E | Rb,EB(E) | 6[H] | 2.0 | | |
| 11-5040-204 | E | Rb,EB(E) | 6[H] | 2.4 | | |
| 11-5040-206 | E | Rb,EB(E) | 6[H] | 1.8 | | |
| 11-5040-208 | E | Rb,EB(E) | 6[H] | 1.9 | | |
| 11-5040-210 | E | Rb,EB(E) | 6[H] | 1.9 | | |
| 11-5040-212 | E | Rb,EB(E) | 6[H] | 1.8 | | |
| 11-5040-214 | E | Rb,EB(E) | 6[S] | 1.8 | | |
| Lang Cr<br>11-3600-000 | C | Rb,EB | 5[L] | 9.7 | | Database |
| N. Fork Yaak River<br>11-4800-201 | E | Rb,EB(E) | 6[H] | 1.8 | | Database |
| 11-4800-202 | E | Rb,EB(E) | 6[H] | 2.1 | | |
| 11-4800-204 | E | Rb,EB(E) | 6[H] | 1.9 | | |
| 11-4800-206 | E | Rb,EB(E) | 6[H] | 1.6 | | |
| Ruby Cr<br>11-5660-001 | U | Rb,EB, RbxCt | 5[S] | 4.8 | | Database |
| 11-5660-002 | C | - | 2[L] | 1.6 | | |
| (Lake Cr)<br>11-3540-000 | | | | | | |
| Keeler Cr<br>11-3380-000 | A | EB | 4(2)[L] | 30.4 | | Database<br>(2)Planting Rec |
| N. Fork Keeler Cr<br>11-4680-001 | C | - | 2[L] | 6.7 | | Database |
| S. Fork Keeler Cr<br>11-6240-000 | A | - | 2[L] | 5.8 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| W. Fork Keeler Cr | | | | | | |
| 11-7440-000 | A | - | 2[L] | 3.7 | | Database |
| Dry Cr | | | | | | |
| 11-1880-000 | C | - | 2[L] | 9.7 | | Database |
| Noggle Cr | | | | | | |
| 11-4600-000 | C | - | 4(2)[L] | 3.2 | | Database<br>(2)Planting Rec |
| Ross Cr | | | | | | |
| 11-5640-001 | C | EB | 4(2)[L] | 4.0 | | Database |
| 11-5640-002 | A | - | 4(2)[H] | 7.2 | | (2)Planting Rec |
| (O'Brien Cr) | | | | | | |
| 11-4820-001 | | | | | | |
| N. Fork O'Brien Cr | | | | | | |
| 11-4720-000 | C | EB | 3[S] | 9.7 | | Database |
| Quartz Cr | | | | | | |
| 11-5320-001 | A | Rb,EB | 5[S] | 14.7 | | Database |
| W. Fork Quartz Cr | | | | | | |
| 11-7460-001 | U | - | 2[L] | 8.0 | | Database |
| Bobtail Cr | | | | | | |
| 11-0520-001 | C | Rb,EB,<br>RbxCt | 5[S] | 14.7 | | Database |
| Pipe Cr | | | | | | |
| 11-5160-001 | C | Rb,EB,<br>RbxCt | 5[S] | 25.3 | | Database |
| 11-5160-002 | C | EB | 4(2)[S] | 18.7 | | (2)Planting Rec |
| (Flower Cr) | | | | | | |
| 11-2440-001 | | | | | | |
| S. Fork Flower Cr | | | | | | |
| 11-6230-000 | C | Rb,EB | 5[L] | 3.2 | | Database |
| (Libby Cr) | | | | | | |
| 11-3660-000 | | | | | | |
| Big Cherry Cr | | | | | | |
| 11-0400-001 | R | Rb,EB | 5[L] | 23.3 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Granite Cr 11-2700-000 | E | Rb | 6[S] | 14.7 | | Database |
| Snow Cr 11-6140-000 | C | Rb | 5[L] | 4.8 | | Database |
| No Cr 11-4580-000 | C | Rb | 5[S] | 8.0 | | Database |
| Deep Cr 11-1720-000 | A | Rb | 5[L] | 6.6 | | Database |
| Smearl Cr 11-6060-000 | C | Rb | 5[S] | 6.4 | | Database |
| Leigh Cr 11-3640-000 | C | Rb | 5[L] | 6.4 | | Database |
| Hoodoo Cr 11-3060-000 | C | Rb | 5[L] | 8.0 | | Database |
| Bear Cr 11-0280-000 | C | Rb | 5[L] | 9.7 | | Database |
| Cable Cr 11-0840-000 | C | Rb | 5[L] | 4.8 | | Database |
| Little Cherry Cr 11-3900-000 | C | Rb | 5[L] | 4.8 | | Database |
| Midas Cr 11-4360-000 | C | Rb | 5[L] | 4.8 | | Database |
| Poorman Cr 11-5240-000 | C | Rb | 5[L] | 8.0 | | Database |
| Ramsey Cr 11-5400-000 | C | Rb | 5[L] | 8.0 | | Database |
| Fisher Cr 11-2320-001 | R | Rb | 5[S] | 18.0 | | Database |
| 11-2320-002 | R | Rb | 5[S] | 51.8 | | |
| Cow Cr 11-1400-000 | C | Rb | 5[L] | 7.2 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Miller Cr | | | | | | |
| 11-4420-000 | A | EB | 3[L] | 8.0 | | Database |
| W. Fisher Cr | | | | | | |
| 11-7400-001 | C | Rb,EB | 5[S] | 19.3 | | Database |
| 11-7400-002 | C | - | 4(2)[S] | 7.4 | | (2)Planting Rec |
| Trail Cr | | | | | | |
| 11-6940-000 | C | - | 2[L] | 4.8 | | Database |
| Fourth of July Cr | | | | | | |
| 11-2500-001 | U | Rb(E) | 5[L] | 2.9 | | Database |
| E. Fisher Cr | | | | | | |
| 11-1980-000 | R | EB | 4(2)[S] | 20.4 | F(3) | Database<br>(2)Planting Rec<br>(3)Hanzel 1959A |
| Silver Butte Cr | | | | | | |
| 11-5979-000 | C | - | 4(2)[L] | 12.6 | | Database<br>(2)Planting Rec |
| Pleasant Valley Fisher River | | | | | | |
| 11-5200-001 | U | Rb,EB | 5[S] | 19.3 | | Database |
| (Elk Cr) | | | | | | |
| 11-2120-000 | | | | | | |
| McGinnis Cr | | | | | | |
| 11-4220-000 | R | Rb,EB | 5[L] | 15.1 | | Database |
| Canyon Cr | | | | | | |
| 11-0920-001 | D | EB | 3[L] | 2.4 | | Database |
| Jackson Cr | | | | | | |
| 11-3260-000 | B | EB | 4(2)[L] | 1.6 | | Database<br>(2)Planting Rec |
| N. Fork Jackson Cr | | | | | | |
| 11-4670-000 | B | EB | 3[L] | 8.0 | | Database |
| S. Fork Jackson Cr | | | | | | |
| 11-6235-000 | B | EB | 3[L] | 4.8 | | Database |
| Cripple Horse Cr | | | | | | |
| 11-1520-001 | B | EB | 3[L] | 2.4 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Barron Cr<br>11-0200-000 | C | EB | 3[S] | 10.9 | | Database |
| Bristow Cr<br>11-0640-000 | C | Rb,EB,<br>RbxCt | 5[S] | 11.6 | | Database |
| Fivemile Cr<br>11-2340-001 | B | EB | 4(2)[H] | 8.4 | | Database<br>(2)Planting Rec |
| Tenmile Cr<br>11-6800-000 | U | - | 2[L] | 8.4 | | Database |
| Big Cr<br>11-0420-000 | U | Rb | 5a[L] | 11.7 | | Database<br>(2)Leary pers com |
| Little N. Fork Cr<br>11-3970-000 | B | Rb | 5[L] | 9.7 | | Database |
| N. Fork Big Cr<br>11-4660-200<br>11-4660-202 | E<br>E | -<br>- | 6[H]<br>6[L] | 0.4<br>0.8 | | Database |
| Roberts Cr<br>11-5540-000 | B | Rb | 5[L] | 4.8 | | Database |
| Mesler Cr<br>11-4340-000 | B | Rb | 5[L] | 1.6 | | Database |
| S. Fork Big Cr<br>11-6220-001<br>11-6220-002 | U<br>C | Rb<br>Rb,EB | 5[L]<br>5[S] | 9.6<br>11.2 | | Database |
| Maxine Cr<br>11-4200-000 | B | Rb | 5[L] | 1.6 | | Database |
| Charlie Cr<br>11-1035-000 | B | Rb | 5[L] | 3.2 | | Database |
| Lookout Cr<br>11-4000-000 | B | Rb | 5[L] | 6.4 | | Database |
| Sutton Cr<br>11-6700-001 | C | Rb | 5[L] | 1.6 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Boulder Cr<br>11-0540-000 | C | - | 5a(2) [L] | 8.7 | | Database<br>(2)Leary et al 1983b |
| Pinkham Cr<br>11-5140-001 | D | Rb,EB | 5[S] | 9.7 | | Database |
| Sullivan Cr<br>11-6620-000 | C | - | 4(2) [S] | 10.1 | | Database<br>(2)Planting Rec |
| Tobacco River<br>11-6920-000 | B | Ct,Rb, RbxCt,EB | 5a(2) [S] | 24.0 | | Database<br>(2)Leary pers com |
| Indian Cr<br>11-3200-001 | R | - | 2[L] | 6.4 | | Database |
| 11-3200-002 | R | - | 2[L] | 3.4 | | |
| Therriault Cr<br>11-6860-001 | U | EB | 4(2)[S] | 5.0 | | Database<br>(2)Planting Rec |
| Mud Cr<br>11-4502-000 | C | EB | 3[L] | 5.9 | | Database |
| Fortine Cr<br>11-2460-001 | D | Ct,Rb, RbxCt,EB | 5[H] | 37.7 | | Database |
| 11-2460-002 | C | EB | 3[S] | 7.4 | | |
| Deep Cr<br>11-1740-000<br>201-228 | C | Rb,EB | 5[H] | 16.2 | | Database |
| (Murphy Cr)<br>11-4540-000 | | | | | | |
| Laughing Water Cr<br>11-3630-000 | R | Rb,EB | 5[L] | 3.5 | | Database |
| (Brimstone Cr)<br>11-0360-000 | | | | | | |
| Cripple Cr<br>11-1500-000 | U | - | 2[L] | 11.3 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Swamp Cr | | | | | | |
| 11-6720-000 | E | Rb,EB | 6[S] | 14.6 | | Database |
| Grave Cr | | | | | | |
| 11-2720-000 | D | Rb | 5[H] | 27.8 | F(2) | Database<br>(2)Hanzel 1959 |
| Clarence Cr | | | | | | |
| 11-1100-000 | U | - | 4(2)[H] | 3.5 | | Database<br>(2)Planting Rec |
| Stahl Cr | | | | | | |
| 11-6440-201 | C | - | 4(2)[S] | 1.6 | | Database |
| 11-6440-202 | C | - | 4(2)[S] | 0.8 | | (2)Planting Rec |
| 11-6440-204 | C | - | 4(2)[S] | 0.7 | | |
| 11-6440-206 | C | - | 4(2)[S] | 0.5 | | |
| 11-6440-208 | C | - | 4(2)[S] | 0.5 | | |
| 11-6440-210 | C | - | 4(2)[S] | 0.4 | | |
| 11-6440-212 | C | - | 4(2)[S] | 0.5 | | |
| 11-6440-214 | C | - | 4(2)[L] | 0.6 | | |
| 11-6440-216 | C | - | 4(2)[L] | 0.7 | | |
| Blue Sky Cr | | | | | | |
| 11-0500-000 | C | - | 2[S] | 9.7 | | Database |
| Lewis Cr | | | | | | |
| 11-3650-000 | C | - | 2[L] | 6.4 | | Database |
| Foundation Cr | | | | | | |
| 11-2480-000 | C | - | 4(2)[L] | 3.2 | | Database<br>(2)Planting Rec |
| Dodge Cr | | | | | | |
| 11-1820-000 | U(2) | EB | 1 | 12.2(2) | | Leary et al. 1983b<br>(2)Database |
| Young Cr | | | | | | |
| 11-7780-001 | B | EB | 5a(2)[G] | 10.0 | | Database |
| 11-7780-002 | C | - | 5a(2)[S] | 4.8 | | (2)Leary pers com |
| S. Fork Young Cr | | | | | | |
| 11-6310-000 | C | - | 2[S] | 4.0 | | Database |
| Wigwam River | | | | | | |
| 11-7540-000 | C | - | 2[S] | 8.4 | | Database |

Table 26 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | STREAM VALUE | LENGTH (Km) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Weasel Cr 11-7295-000 | C | - | 2[S] | 6.4 | | Database |
| Snowslide Cr 11-6165-000 | C | - | 2[L] | 3.2 | | Database |
| Divide Cr 11-1785-000 | C | - | 2[L] | 4.8 | | Database |

habitat value (Table 26). Reach 1 on Young Creek, which contains an introgressed population, was the only water in the basin to be assigned the greatest or highest value habitat rating. Eighteen other reaches were rated as high priority habitat, 38 were considered substantial and unfortunately, 49.6% or 56 of the stream reaches were deemed habitat of limited value.

Historically, fluvial fish from the Kootenai River utilized Young creek and the Tobacco River for spawning (Huston et al. 1984). Many of the reservoirs tributaries are now used by adfluvial fish from Lake Koocanusa, some of which is due to imprint plants using fish from Hungry Horse Creek (Huston et al. 1984). Tributaries identified as spawning streams include Young Creek and the Tobbaco River drainage streams (Sinclair, Therriault, Grave, Fortine and Deep creeks) as well as Big, Good, N. and S. Fork Big, Pinkham and Fivemile creeks (Huston et al. 1984). Canyon, Cripple Horse, Bristow and Sullivan creeks are also probably used by cutthroat for spawning. Spawning populations have also been found in the Canadian waters of Linklater, Kikomum and Gold creeks (Huston et al. 1984).

Although there are many current or potential threats to westslope populations in the Kootenai drainage, the most important factor historically

and today has been introgression and hybridization with contaminating species (Huston personal communication), as is shown by Table 26. Hybridization between rainbow and westslope cutthroat is a major factor within the Lake Koocanusa system, because of overlapping spawning seasons in some tributaries (Huston et al. 1984). The river population below Libby Dam has declined since impoundment in 1973 (Graham et al. 1981). Other potential threats in the drainage include a proposed ski resort on Great Northern Mountain and logging such as in the Yaak drainage, where lodgepole pine stands have been infested by the mountain pine beetle.

## Stream Summary

A combined total of 655 streams, comprising a distance of 6,993 stream km, are known to be currently inhabited by westslope cutthroat trout in Montana (Tables 27 and 28). The total length of these streams represents only 27.4% of the estimated historic range of 25,547 stream km (Table 1). Another 39 streams (425.3 stream km) were thought to contain westslope cutthroat, but since adequate documentation wasn't available, they were assigned a rating of 6. Eleven additional streams currently barren of westslope cutthroat (30.2 stream km) may be potential sites where reintroduction would be feasible. If all these additional waters were established as westslope cutthroat streams, then the current range would increase to 29.2% of the historic range. However, one must remember that these distances include contaminated waters and introgressed westslope populations. Waters which have been found to contain genetically pure westslope populations make up 290.3 stream km on 25 streams (Table 27 and 28). These streams are the known westslope cutthroat strongholds in Montana today and represent only 1.1% of the historic range, 4.1% of the current range of stream km and 3.8% of the cutthroat streams. Those streams assigned a rating of 2 or 3 are the most likely to contain additional pure populations; they represent 24.7 and 40.5% of the current stream km and number of streams, respectively. All other categories (4-5) could be considered "possibly lost" in regard to genetic purity. So, the length of all streams which were rated 1, 2 or 3 is 2,017.1 stream km which is 28.8% of the current and 7.9% of the historic range. This is probably a fairly accurate, albeit a somewhat optimistic, estimation of the current status of genetically pure westlope populations in the state of Montana. It's the author's opinion that at least 1,000 stream km (4% of historic range) of pure westslope waters would be found if an extensive electrophoretic analysis sampling program was undertaken. The

Table 27. The number of westslope cutthroat streams assigned to each genetic value category in each drainage of Montana.

| Drainage No. | Drainage | Genetic Value Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | Total |
| 1 | Beaverhead R. | 0 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 6 |
| 2 | Big Hole R. | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 3 | Bitterroot R. | 1 | 1 | 1 | 6 | 4 | 2 | 3 | 0 | 18 |
| 4 | Blackfoot R. | 0 | 2 | 0 | 11 | 9 | 1 | 5 | 0 | 28 |
| 5 | Clark Fork R. (below Bitterroot R.) | 4 | 30 | 23 | 31 | 17 | 2 | 6 | 0 | 113 |
| 6 | Clark Fork R. (above Bitterroot R.) | 1 | 0 | 2 | 14 | 3 | 2 | 8 | 0 | 30 |
| 7 | Flathead R. (below S. Fork) | 2 | 32 | 17 | 46 | 6 | 1 | 8 | 0 | 112 |
| 8 | Flathead R. (above & including S. Fork) | 12 | 73 | 4 | 63 | 4 | 5 | 0 | 0 | 161 |
| 9 | Gallatin R. | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| 10 | Jefferson R. | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 5 |
| 11 | Kootenai R. | 1 | 17 | 9 | 14 | 36 | 4 | 5 | 0 | 86 |
| 12 | Little Missouri R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | Madison R. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| 14 | Marias R. | 0 | 11 | 2 | 6 | 10 | 0 | 0 | 0 | 29 |
| 15 | Milk R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 & 17 | Missouri R. (above & below Marias R.) | 3 | 29 | 8 | 10 | 43 | 1 | 1 | 8 | 103 |
| 18 | Musselshell R. | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| 19 | St. Mary R. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | Sun R. | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 |
| 21 | Yellowstone R. (below Bighorn R.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | Yellowstone R. (above & including Bighorn R.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | | 25 | 198 | 67 | 205 | 142 | 18 | 39 | 11 | 705 |

Table 28. The number of stream km of each genetic value category presently or potentially inhabited by westslope cutthroat in each drainage of Montana.

| Drainage No. | Drainage | Genetic Value Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | Total |
| 1 | Beaverhead R. | 0.0 | 3.1 | 1.8 | 0.0 | 49.3 | 0.0 | 0.0 | 0.0 | 54.2 |
| 2 | Big Hole R. | 0.0 | 0.0 | 0.0 | 10.1 | 23.2 | 0.0 | 0.0 | 0.0 | 33.3 |
| 3 | Bitterroot R. | 12.0 | 27.7 | 9.4 | 88.4 | 209.4 | 40.1 | 33.7 | 0.0 | 420.7 |
| 4 | Blackfoot R. | 0.0 | 9.9 | 0.0 | 156.3 | 158.5 | 19.0 | 75.8 | 0.0 | 419.5 |
| 5 | Clark Fork R. (below Bitterroot R.) | 60.3 | 205.2 | 167.3 | 352.5 | 243.2 | 16.5 | 63.6 | 0.0 | 1108.6 |
| 6 | Clark Fork R. (above Bitterroot R.) | 11.3 | 0.0 | 10.7 | 219.5 | 90.9 | 20.0 | 81.0 | 0.0 | 433.4 |
| 7 | Flathead R. (below S. Fork) | 12.0 | 149.6 | 91.3 | 428.8 | 161.3 | 2.1 | 104.8 | 0.0 | 949.9 |
| 8 | Flathead R. (above & including S. Fork) | 168.4 | 605.3 | 63.1 | 900.4 | 121.1 | 45.2 | 0.0 | 0.0 | 1903.5 |
| 9 | Gallatin R. | 0.0 | 0.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | 0.0 | 24.6 |
| 10 | Jefferson R. | 0.0 | 0.0 | 0.0 | 11.0 | 0.0 | 0.0 | 0.0 | 12.3 | 23.3 |
| 11 | Kootenai R. | 12.2 | 112.7 | 59.5 | 142.0 | 484.1 | 59.2 | 53.1 | 0.0 | 922.8 |
| 12 | Little Missouri R. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | Madison R. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 | 0.0 | 4.4 |
| 14 | Marias R. | 0.0 | 30.4 | 16.1 | 66.1 | 162.3 | 0.0 | 0.0 | 0.0 | 274.9 |
| 15 | Milk R. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 & 17 | Missouri R. (above & below Marias R.) | 14.1 | 106.1 | 51.2 | 64.6 | 483.9 | 5.9 | 8.9 | 17.9 | 752.6 |
| 18 | Musselshell R. | * | 6.4 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 9.6 |
| 19 | St. Mary R. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | Sun R. | 0.0 | 0.0 | 0.0 | 0.0 | 113.2 | 0.0 | 0.0 | 0.0 | 113.2 |
| 21 | Yellowstone R. (below Bighorn R.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 22 | Yellowstone R. (above & including Bighorn R.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | | 290.3 | 1256.4 | 470.4 | 2442.9 | 2325.0 | 208.0 | 425.3 | 30.2 | 7448.5 |

* - Length of reach inhabited not determined but a pure population is present in the drainage.

percent distribution of stream km and streams within each genetic value rating category are presented in Figures 2 and 3, respectively. Percentages are slightly different than those previously stated in the text due to the addition of categories 6 and 7 in the figures, which were not considered occupied westslope habitat.

A point of clarification is needed here in order to avoid confusion in regard to what the number of streams listed in Table 27 and Figure 3 really means. Some streams with multiple reaches have a different rating for the various reaches. An example is Ruby Creek (water code # 1-11-5660) in the Kootenai drainage, which is shown in Table 26 on page 108. Reach 1 was assigned a genetic value rating of 5 while reach number 2 received a rating of 2. The numbers shown in Table 27 are optimistic since a stream was listed according to the lowest number (or highest genetic value rating) found on any reach of that stream. In other words, Ruby Creek was listed as a (2) stream in Table 27 rather than under the (5) rating. However, each different reach was placed in the appropriate rating category in Table 28, since the total distance could be broken down.

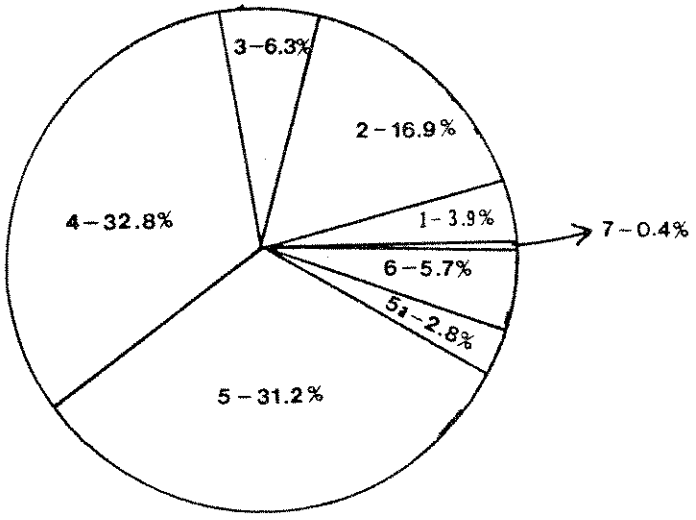


Figure 2. The percent distribution of total stream km inhabited by westslope cutthroat trout within each genetic value rating category.

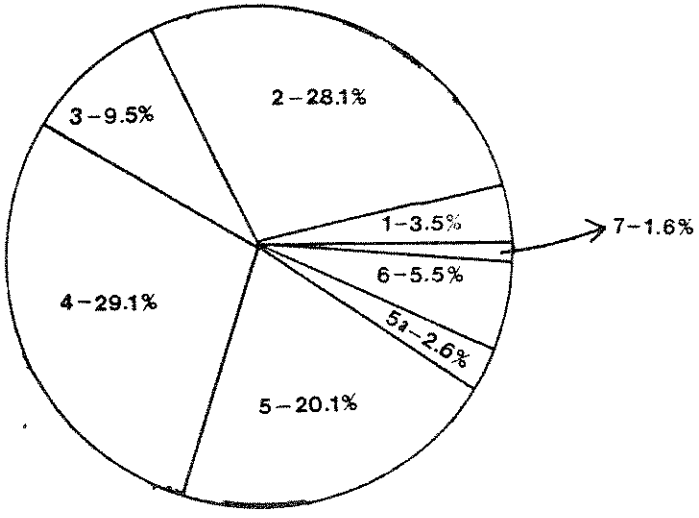


Figure 3. The percent distribution of westslope cutthroat trout streams within each genetic value rating category.

## Lakes

### East of the Continental Divide

Four lakes or reservoirs east of the continental divide were found to contain westslope cutthroat trout populations (Tables 29 & 30). Of these four, only 1, the E. Fork Spring Cr Reservoir, appears to be free of contaminating species. Forest Lake has been tested electrophoretically and determined to be an introgressed population (Poore, personal communication). Three additional lakes in the Elkhorn Mountains, Leslie Lake and Lower and Upper S. Fork Crow Cr Lakes, were cited as waters where westslope populations could be reestablished. Only the 3 lakes in Region 4 were assigned a habitat rating; Forest Lake was designated as having the greatest habitat value while the other 2 were described as limited habitat.

### West of the Continental Divide

A total of 230 lakes west of the continental divide (excluding Glacier National Park) are believed to contain westslope cutthroat trout (Tables 29 and 31-36). Fifty percent of these lakes have had some form of contaminating species planted in them according to the planting records. However, 23% (52) appear to be free of contaminants and could contain pure populations. One lake, Crazy Fish Lake, which is located on the Flathead Indian Reservation, contains a genetically pure population (Leary et al. 1984; Table 34). Habitat value ratings were assigned to 185 lakes. The majority of these lakes (97; 52%) were described as limited habitat while 15, 24 and 9% were designated as having substantial, high and the greatest habitat value, respectively.

Table 29. Genetic value rating summary for lakes inhabited by westslope cutthroat trout in Montana.

| | Genetic Value Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | Total |
| | East of the Continental Divide | | | | | | | | |
| No. of Lakes | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 3 | 7 |
| | West of the Continental Divide | | | | | | | | |
| No. of Lakes | 1 | 52 | 3 | 115 | 54 | 1 | 4 | 0 | 230 |
| | Glacier National Park | | | | | | | | |
| No. of Lakes | 15 | 0 | 0 | 0 | 0 | 6 | 4 | 1 | 26 |
| Total No. of Lakes | 16 | 52 | 4 | 115 | 56 | 8 | 8 | 4 | 263 |

Glacier National Park

Previous work performed by the National Park Service has done much to clarify the genetic composition and integrity of westslope populations in Glacier National Park. Fifteen lakes have been documented to contain genetically pure populations, 6 are known to be introgressed populations, 4 may contain westslope populations and 1 lake was barren (Tables 29 & 37).

Lake Summary

Statewide, 259 lakes contain or are believed to contain westslope cutthroat populations (Table 29). Six percent (16) of these populations are now known to contain genetically pure populations and 25% (64) either contain contaminant species or have been determined to be introgressed populations. An additional 44% (115) of the lakes may contain introgressed

populations since planting records show that contaminants have been placed in these lakes. If all the waters known to contain only westslope cutthroat or westslope and competitors were found to contain pure populations, only 28% of the total number of lakes listed would be refuges for genetically pure westslope cutthroat. A total of 188 westslope cutthroat lakes were given habitat value ratings. The percentages in each category are basically the same as those for lakes west of the continental divide.

Table 30. Lakes inhabited by westslope cutthroat trout (Upper Missouri River cutthroat) east of the continental divide in the Upper Missouri River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| | | REGION 3 LAKES | | | | |
| Hebgen Lake<br>3-13-7720-000 | Z | Rb,YCt, LL | 5 | 5126.7 | | Database |
| Leslie Lake<br>3-10-8840-000 | P | YCt | 7 | 2.6 | | Database |
| Lower S Fk Crow Creek Lake<br>3-17-9227-000 | P | EB | 7 | 0.7 | | Database |
| Upper S Fk Crow Creek Lake<br>3-17-9743-000 | P | Rb | 7 | 0.8 | | Database |
| | | REGION 4 LAKES | | | | |
| E Fk Spring Creek Reservoir<br>4-17-8906-000 | C | EB | 3[L] | 0.4 | | Database |
| Forest Lake<br>4-18-7510-000 | C | - | 5a(2) [G] | 4.0 | B(2) | Database<br>(2)Poore pers com |
| Newlan Cr Reservoir<br>4-17-9330-000 | U | Rb,YCt, EB | 5[L] | 113.3 | | Database |

Table 31. Lakes inhabited by westslope cutthroat trout in the Bitterroot River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Big Creek Lake #3<br>2-03-7327-000 | C | - | 2 | 6.0 | | Database |
| Boulder Lake<br>2-03-7400-000 | C | - | 4(2) | 8.1 | | Database<br>(2)Planting Rec |
| Lake Como<br>2-03-7675-000 | U | Rb | 5 | 304.8 | | Database |
| Crystal Laske<br>2-03-7725-000 | C | - | 4(2) | 3.4 | | Database<br>(2)Planting Rec |
| Dollar Lake<br>2-03-7775-000 | C | - | 2 | 2.0 | | Database |
| Fish Lake<br>2-03-7850-000 | A | - | 2 | 2.2 | | Database |
| Gleason Lake<br>2-03-7975-000 | Z | - | 4(2) | 5.3 | | Database<br>(2)Planting Rec |
| Legend Lake<br>2-03-8400-000 | U | - | 4(2) | 2.8 | | Database<br>(2)Planting Rec |
| Lower Twin Lake<br>2-03-9475-000 | C | Rb | 5 | 20.2 | | Database |
| Middle Camas Lake<br>2-03-8620-000 | C | - | 2 | 2.2 | | Database |
| Painted Rocks Reservoir<br>2-03-8750-000 | C | Rb,EB | 5 | 325.0 | | Database |
| Pearl Lake<br>2-03-8800-000 | Z | - | 4(2) | 5.6 | | Database<br>(2)Planting Rec |
| Piquette Lake<br>2-03-8850-000 | C | - | 4(2) | 2.6 | | Database<br>(2)Planting Rec |

Table 31 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Shadow Lake 2-03-8950-000 | A | - | 4(2) | 2.3 | | Database (2)Planting Rec |
| Shelf Lake 2-03-9025-000 | A | - | 4(2) | 4.2 | | Database (2)Planting Rec |
| S. Fork Lake 2-03-9150-000 | Z | - | 2 | 10.1 | | Database |
| Spud Lake 2-03-9250-000 | A | - | 4(2) | 3.4 | | Database (2)Planting Rec |
| Tenmile Lake 2-03-9350-000 | A | - | 4(2) | 4.6 | | Database (2)Planting Rec |
| Tin Cup Lake 2-03-9400-000 | A | - | 4(2) | 51.4 | | Database (2)Planting Rec |
| Twelvemile Lake 2-03-9450-000 | A | - | 4(2) | 2.9 | | Database (2)Planting Rec |

Table 32. Lakes inhabited by westslope cutthroat trout in the Blackfoot River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Lake Alva<br>2-04-6120-000 | C | - | 4(2) [L] | 118.2 | | Database<br>(2)Planting Rec |
| Bull Lake<br>2-04-6225-000 | Z | - | 4(2)[S] | 3.7 | | Database<br>(2)Planting Rec |
| Canyon Lake<br>2-04-6270-000 | U | - | 2 | 0.0 | | Database |
| Clearwater Lake<br>2-04-6300-000 | C | - | 4(2) [S] | 43.5 | | Database<br>(2)Planting Rec |
| Colt Lake<br>2-04-6320-000 | C | - | 4(2) | 6.8 | | Database<br>(2)Planting Rec |
| Coopers Lake<br>2-04-6330-000 | C | Rb,EB, YCt | 5 | 110.8 | | Database |
| Elsina Lake<br>2-04-6540-000 | A | - | 4(2) | 6.3 | | Database<br>(2)Planting Rec |
| Fly Lake<br>2-04-6596-000 | A | - | 2[L] | 4.4 | | Database |
| Gold Cr Lake<br>2-04-6598-000 | C | - | 2 | 6.7 | | Database |
| Harpers Lake<br>2-04-6660-000 | C | Rb | 5 | 7.2 | | Database |
| Hidden Lake<br>2-04-6705-000 | C | - | 2 | 16.0 | | Database |
| Lake Inez<br>2-04-6720-000 | C | - | 4(2) | 116.0 | | Database<br>(2)Planting Rec |
| Lake Marshall<br>2-04-6930-000 | U | Rb,EB | 5 | 32.4 | | Database |

Table 32 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Mud Lake (Penny Lake) 2-04-7000-000 | C | - | 2 | 2.0 | | Database |
| Placid Lake 2-04-7140-000 | C | Rb,EB,LL | 5 | 449.2 | | Database |
| Rainy Lake 2-04-7170-000 | C | - | 4(2) [H] | 33.1 | | Database (2)Planting Rec |
| Salmon Lake 2-04-7230-000 | C | Rb,LL | 5 | 248.1 | | Database |
| Smith Lake 2-04-7335-000 | C | Rb,EB | 5 | 8.1 | | Database |
| Spook Lake 2-04-7350-000 | C | - | 4(2) | 4.0 | | Database (2)Planting Rec |
| Summit Lake 2-04-7380-000 | C | - | 4(2) | 11.4 | | Database (2)Planting Rec |
| Upper Little Crystal Lake 2-04-7515-000 | Z | - | 2 | 1.6 | | Database |
| Upsata Lake 2-04-7560-000 | C | - | 4(2) | 34.6 | | Database (2)Planting Rec |
| W. Fork Gold Cr Lake 2-04-7630-000 | C | - | 2[L] | 2.9 | | Database |

Table 33. Lakes inhabited by westslope cutthroat trout in the Clark Fork River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Acorn Lake 1-05-8368-200 | C | - | 2[S] | 2.8 | | Database |
| Alpine Lake 2-06-7315-000 | C | Rb | 5 | 9.1 | | Database |
| Arrowhead Lake 1-05-8384-000 | A | - | 4(2)[H] | 5.1 | | Database (2)Planting Rec |
| Buck Lake 1-05-8480-000 | A | - | 2[H] | 0.4 | | Database |
| Cabin Lake 1-05-8496-000 | C | - | 4(2)[L] | 5.6 | | Database (2)Planting Rec |
| Copper Lake 2-05-8607-000 | C | - | 2[L] | 1.5 | | Database |
| Crater Lake 2-05-8624-000 | Z | - | 2[S] | 6.4 | | Database |
| Dalton Lake 2-05-8672-000 | Z | - | 4(2)[L] | 2.4 | | Database (2)Planting Rec |
| Eagle Peak Lake 2-05-8742-000 | C | - | 2 | 0.2 | | Database |
| Elk Lake 1-05-8768-000 | A | - | 4(2)[L] | 5.6 | | Database (2)Planting Rec |
| Engle Lake (Engle Peak Lake) 1-05-8784-000 | A | - | 4(2)[L] | 3.0 | | Database (2)Planting Rec |
| Fishtrap Lake 1-05-8800-000 | A | - | 4(2)[S] | 15.6 | | Database (2)Planting Rec |
| Hazel Lake 2-05-8912-000 | C | - | 4(2)[L] | 3.2 | | Database (2)Planting Rec |

Table 33 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Heart Lake 2-05-8928-000 | C | EB | 4(2) | 27.7 | | Database (2)Planting Rec |
| Hub Lake 2-05-9024-000 | U | - | 4(2)[S] | 2.1 | | Database (2)Planting Rec |
| Lawn Lake 1-05-9085-000 | A | - | 4(2)[L] | 1.9 | | Database (2)Planting Rec |
| Lower Thompson Lake 1-05-9152-000 | C | Rb,EB | 5[L] | 97.1 | | Database |
| McGregor Lake 1-05-9216-000 | A | Rb,EB | 5[L] | 537.4 | | Database |
| Mid. Thompson Lake 1-05-9232-000 | C | Rb,EB | 5[L] | 243.6 | | Database |
| North Cache Lake 2-05-9323-000 | C | - | 2 | 2.6 | | Database |
| Outlaw Lake 1-05-9350-000 | A | - | 2[L] | 2.2 | | Database |
| Pearl Lake 2-05-9360-000 | C | - | 2[H] | 6.3 | | Database |
| Poacher Lake (Quartz Lake) 1-05-9370-000 | A | - | 2[L] | 2.6 | | Database |
| Quartz Lake 1-05-9384-200 | A | - | 2[S] | 2.3 | | Database |
| Rattlesnake Lake #3 2-06-7505-200 | C | - | 2[S] | 7.3 | | Database |
| Rattlesnake Lake #17 2-06-8980-000 | A | - | 2[S] | 3.4 | | Database |
| Siamese Lake (Lower) 2-05-9535-000 | C | Rb,RbxCt | 5 | 15.1 | | Database |
| Siamese Lake (Upper) 2-05-9536-000 | A | - | 2 | 8.8 | | Database |

Table 33 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Square Lake<br>2-05-9568-000 | S | - | 4(2)[L] | 4.1 | | Database<br>(2)Planting Rec |
| Stony Lake<br>1-05-9584-000 | A | _ | 2[H] | 3.4 | | Database |
| Straight Peak Lake<br>2-05-9605-000 | U | - | 2 | 3.0 | | Database |
| Tadpole Lake<br>2-05-9640-000 | S | - | 2[L] | 1.6 | | Database |
| Terrace Lake<br>1-05-9648-000 | A | YCt | 5[L] | 10.0 | | Database |
| Triangle Pond<br>1-05-9685-000 | A | - | 4(2)[L] | 3.4 | | Database<br>(2)Planting Rec |
| Trio Lake East<br>2-05-9696-000 | Z | Rb | 5[L] | 4.8 | | Database |
| Upper Thompson Lake<br>1-05-9760-000 | C | Rb,EB | 5[L] | 93.9 | | Database |
| Whetstone Lake<br>2-06-9728-200 | Z | - | 2[S] | 4.4 | | Database |

Table 34. Lakes inhabited by westslope cutthroat trout in the Upper Flathead River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Ashley Lake 1-07-5220-000 | C | Rb,EB RbxCt | 5[L] | 1312.9 | | Database |
| Ashley Lake (Hidden) 1-07-5222-000 | Z | - | 4(2) [S] | 18.6 | | Database (2)Planting Rec |
| Beaver Lake 1-07-5295-000 | A | - | 4(2) [S] | 10.8 | | Database (2)Planting Rec |
| Beaver Lake 1-07-5300-000 | A | - | 4(2) [L] | 56.7 | | Database (2)Planting Rec |
| Lake Blaine 1-07-5380-000 | C | Rb,EB,NP | 5[L] | 150.6 | | Database |
| Blast Lake 1-07-5410-000 | A | - | 4(2)[L] | 1.4 | | Database (2)Planting Rec |
| Boot Jack Lake 1-07-5480-000 | B | - | 4(2) [L] | 26.3 | | Database (2)Planting Rec |
| Bull Lake 1-07-5540-000 | A | - | 4(2) [L] | 42.9 | | Database (2)Planting Rec |
| Bunyan Lake 1-07-5560-000 | A | - | 2[H] | 2.6 | | Database |
| Cabin Lake 1-07-5600-000 | C | - | 4(2)[L] | 6.8 | | Database (2)Planting Rec |
| Canyon Lake 1-07-5620-000 | C | Rb,EB | 5[L] | 8.9 | | Database |
| Cat Lake 1-07-5660-000 | A | - | 4(2)[S] | 5.2 | | Database (2)Planting Rec |

Table 34 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Cedar Lake 1-07-5680-000 | Z | - | 4(2) [H] | 18.9 | | Database (2)Planting Rec |
| Church Slough 1-07-5710-000 | V | NP | 3[L] | 81.7 | | Database |
| Cliff Lake 1-07-6440-000 | A | - | 4(2)[L] | 3.6 | | Database (2)Planting Rec |
| Crazy Fish Lake 1-07-5840-000 | Z | ? | 1 | - | | Leary et al. 1984 |
| Crystal Lake 1-07-5940-000 | A | - | 4(2) [G] | 70.6 | | Database (2)Planting Rec |
| Disappointment Lake 1-07-5960-000 | Z | - | 4(2)[S] | 7.4 | | Database (2)Planting Rec |
| Dog Lake 1-07-5980-000 | U | EB,NP | 4(2) [L] | 39.9 | | Database (2)Planting Rec |
| Dollar Lake 1-07-6000-000 | A | - | 4(2) [L] | 3.3 | | Database (2)Planting Rec |
| Elk Lake 1-07-6200-000 | Z | - | 4(2) [H] | 48.7 | | Database (2)Planting Rec |
| Emmert Slough (Fennnon) 1-07-6260-000 | A | - | 2[L] | 9.7 | | Database |
| Fatty Lake 1-07-6300-000 | A | - | 4(2)[L] | 9.7 | | Database (2)Planting Rec |
| First Lake 1-07-6380-000 | Z | - | 4(2) [S] | 21.2 | | Database (2)Planting Rec |
| Flathead Lake 1-07-6400-000 | A | Rb,EB,NP | 5[G] | 50995.0 | | Database |

Table 34 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Fran Lake 1-07-6435-000 | A | - | 4(2)[L] | 3.6 | | Database (2)Planting Rec |
| Glacier Lake 1-07-6500-000 | A | - | 4(2) [S] | 41.9 | | Database (2)Planting Rec |
| Hemlock Lake 1-07-6680-000 | A | - | 4(2)[H] | 13.4 | | Database (2)Planting Rec |
| Holland Lake 1-07-6780-000 | V | Rb | 5[L] | 173.1 | | Database |
| Jim Lake #2 1-07-6960-000 | A | - | 4(2) [L] | 11.7 | | Database (2)Planting Rec |
| Jim Lake #6 1-07-6964-000 | A | - | 4(2)[H] | 2.3 | | Database (2)Planting Rec |
| Jim Lake #7 1-07-6965-000 | C | - | 4(2)[H] | 4.8 | | Database (2)Planting Rec |
| Jim Lake #12 1-07-6970-000 | C | - | 4(2) [L] | 10.8 | | Database (2)Planting Rec |
| Jim Lake #19 1-07-6975-000 | C | - | 4(2)[H] | 6.7 | | Database (2)Planting Rec |
| Jim Lake #20 1-07-6976-000 | V | - | 4(2)[H] | 2.0 | | Database (2)Planting Rec |
| Lagoni Lake 1-07-7100-000 | U | NP | 3[L] | 8.2 | | Database |
| Lake of the Woods 1-07-7180-000 | C | EB | 4(2) [L] | 25.3 | | Database (2)Planting Rec |

Table 34 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Lindberg Lake 1-07-7260-000 | C | Rb,EB | 5[S] | 331.9 | | Database |
| Little Beaver Lake 1-07-7280-000 | A | Rb | 5[L] | 9.3 | | Database |
| Little Bitterroot Lake 1-07-7300-000 | C | Rb,YCt, EB | 5[L] | 1183.7 | | Database |
| Lookout Lake 1-07-7390-000 | A | - | 4(2)[H] | 1.1 | | Database (2)Planting Rec |
| Louis Lake 1-07-7495-000 | A | - | 4(2)[L] | 6.3 | | Database (2)Planting Rec |
| Lower Fish Lake 1-07-7540-000 | Z | - | 2[H] | 3.0 | | Database |
| Lone Lake 1-07-7360-000 | E | Rb,EB, RbxCt | 6[S] | 53.4 | | Database |
| Lower Stillwater Lake 1-07-7600-000 | V | Rb,EB,NP | 5[G] | 100.4 | | Database |
| Lucifer Lake (Elizabeth) 1-07-7620-000 | C | - | 4(2) [S] | 18.6 | | Database (2)Planting Rec |
| Meadow Lake 1-07-7780-000 | A | - | 2[H] | 7.8 | | Database |
| Mission Reservoir 1-07-7880-000 | A | - | 4(2) [L] | 116.9 | | Database (2)Planting Rec |
| Lake Monroe 1-07-7500-000 | E | Rb,EB, NP,RbxCt | 6[L] | 19.4 | | Database |
| McDonald Lake 1-07-7740-000 | C | Rb,EB | 5[L] | 76.2 | | Database |

Table 34 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Mystery Lake 1-07-8090-000 | A | - | 2[H] | 0.7 | | Database |
| Pablo Lake 1-07-8155-000 | Z | - | 4(2)[S] | 9.7 | | Database |
| Peck Lake 1-07-8220-000 | C | EB | 4(2)[L] | 8.9 | | Database (2)Planting Rec |
| Picture Lake 1-07-8260-000 | C | - | 4(2)[S] | 7.1 | | Database (2)Planting Rec |
| Pierce Lake 1-07-8280-000 | A | Rb | 5[L] | 13.0 | | Database |
| Russ Lake 1-07-8465-000 | A | - | 4(2)[L] | 4.1 | | Database (2)Planting Rec |
| Saint Mary Lake 1-07-8480-000 | A | Rb,EB | 5[L] | 110.9 | | Database |
| Senielem Lake 1-07-8590-000 | Z | - | 4(2)[S] | 9.3 | | Database (2)Planting Rec |
| Shay Lake 1-07-8600-000 | A | - | 4(2)[L] | 7.1 | | Database (2)Planting Rec |
| Skaggs Lake 1-07-8620-000 | C | - | 4(2) [L] | 15.9 | | Database (2)Planting Rec |
| Skyles Lake 1-07-8650-000 | A | - | 4(2) [L] | 15.8 | | Database (2)Planting Rec |
| Smith Lake 1-07-8700-000 | U | Rb,EB,NP | 5[L] | 179.3 | | Database |
| S. Crow Creek Lake #3 1-07-8752-000 | Z | - | 4(2)[S] | 4.1 | | Database (2)Planting Rec |

Table 34 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| S. Crow Creek Lake #5<br>1-07-8754-000 | Z | - | 4(2) [H] | 11.9 | | Database<br>(2)Planting Rec |
| Spencer Lake<br>1-07-8800-000 | A | - | 4(2) [L] | 13.0 | | Database<br>(2)Planting Rec |
| Swan Lake<br>1-07-9000-000 | C | Rb,EB,NP | 5[H] | 1084.6 | | Database |
| Tally Lake<br>1-07-9060-000 | C | Rb,EB | 5[H] | 536.6 | | Database |
| Turtle Lake (Twin)<br>1-07-9160-000 | A | - | 4(2) [L] | 21.9 | | Database<br>(2)Planting Rec |
| Upper Holland Lake<br>1-07-9360-000 | C | - | 4(2) [H] | 14.9 | | Database<br>(2)Planting Rec |
| Upper Stillwater Lake<br>1-07-9440-000 | D | Rb,EB,NP | 5[H] | 254.9 | | Database |
| Upper Whitefish Lake<br>1-07-9460-000 | A | RbxCt | 5[H] | 34.4 | | Database |
| Van Lake<br>1-07-9480-000 | A | - | 4(2) [L] | 23.0 | | Database<br>(2)Planting Rec |
| Whitefish Lake<br>1-07-9540-000 | C | Rb,EB,NP | 5 [H] | 1355.7 | | Database |
| Woods Lake<br>1-07-9580-000 | A | - | 4(2)[L] | 7.9 | | Database<br>(2)Planting Rec |

Table 35. Lakes inhabited by westslope cutthroat trout in the Flathead River drainage upstream from (and including) the S. Fork Flathead River.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Almeda Lake 1-08-8015-000 | A | - | 4(2)[S] | 7.0 | | Database (2)Planting Rec |
| Bailey Lake 1-08-8040-000 | A | - | 4(2)[L] | 6.7 | | Database (2)Planting Rec |
| Blackfoot Lake 1-08-8180-000 | C | Rb | 5[H] | 6.3 | | Database |
| Castle Lake 1-08-8280-000 | A | - | 4(2)[H] | 6.4 | | Database (2)Planting Rec |
| Chain Lake #1 1-08-8311-000 | A | - | 4(2)[L] | 1.1 | | Database (2)Planting Rec |
| Crater Lake 1-08-8400-000 | A | - | 4(2)[H] | 9.3 | | Database (2)Planting Rec |
| Cyclone Lake 1-08-8480-000 | A | - | 4(2) [G] | 58.7 | | Database (2)Planting Rec |
| Dickey Lake 1-08-8510-000 | R | - | 4(2)[L] | 6.2 | | Database (2)Planting Rec |
| Doris Lake #1 1-08-8525-000 | A | - | 4(2)[G] | 1.5 | | Database (2)Planting Rec |
| Doris Lake #2 1-08-8526-000 | A | - | 4(2)[G] | 2.2 | | Database (2)Planting Rec |
| East Tranquil Lake 1-08-8537-000 | A | - | 4(2)[G] | 5.8 | | Database (2)Planting Rec |
| Elk Lake 1-08-8540-000 | A | - | 4(2) [H] | 12.4 | | Database (2)Planting Rec |

Table 35 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Fawn Lake<br>1-08-8545-000 | A | - | 4(2)[G] | 3.0 | | Database<br>(2)Planting Rec |
| Lake Five<br>1-08-8550-000 | E | EB | 6[L] | 63.1 | | Database |
| Frozen Lake<br>1-08-8580-000 | C | - | 2[S] | 14.0 | | Database |
| Hankerchief Lake<br>1-08-8740-000 | A | Rb | 5[G] | 13.0 | | Database |
| Hay Cr Lake<br>1-08-8780-000 | A | - | 2[S] | 1.0 | | Database |
| Hungry Horse Reservoir<br>1-08-8860-000 | C | Rb,YCt | 5[H] | 8903.0 | | Database |
| Huntsberger Lake<br>1-08-8880-000 | A | - | 2[H] | 3.7 | | Database |
| Lion Lake<br>1-08-9140-000 | U | NP | 4(2)[L] | 14.1 | | Database<br>(2)Planting Rec |
| Link Lake<br>1-08-9120-000 | C | YCt | 5[H] | 5.9 | | Database |
| Lower Seven Acres Lake<br>1-08-9630-000 | A | - | 2[H] | 4.8 | | Database |
| Lower Three Eagles Lake<br>1-08-9175-000 | A | - | 4(2)[H] | 3.7 | | Database<br>(2)Planting Rec |
| Moose Lake<br>1-08-9240-000 | A | - | 4(2)[G] | 7.0 | | Database<br>(2)Planting Rec |
| Nasukoin Lake<br>1-08-9350-000 | A | - | 2[G] | 2.6 | | Database |
| Red Meadow Lake<br>1-08-9540-000 | A | - | 4(2)[L] | 6.8 | | Database<br>(2)Planting Rec |

Table 35 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Rubble Lake 1-08-9580-000 | Z | - | 2[G] | 7.1 | | Database |
| Shelf Lake 1-08-9660-000 | A | - | 4(2)[S] | 2.6 | | Database (2)Planting Rec |
| Soldier Lake 1-08-9700-000 | A | - | 2[H] | 1.3 | | Database |
| Spotted Bear Lake 1-08-9740-000 | A | - | 4(2)[L] | 3.5 | | Database (2)Planting Rec |
| Squaw Cr 1-08-9770-000 | C | - | 4(2)[H] | 1.3 | | Database (2)Planting Rec |
| Stanton Lake 1-08-9780-000 | C | - | 4(2) [G] | 32.2 | | Database (2)Planting Rec |
| Sunburst Lake 1-08-9800-000 | A | YCt | 5[L] | 57.6 | | Database |
| Teepee Lake 1-08-9820-000 | U | YCt | 5[L] | 17.5 | | Database |
| Trout Lake 1-08-9930-000 | A | - | 2[H] | 0.7 | | Database |
| Tuchuck Lake 1-08-9933-000 | C | - | 2[G] | 1.5 | | Database |
| Upper Big Hawk Lake 1-08-9955-000 | C | - | 4(2)[H] | 1.3 | | Database (2)Planting Rec |
| Upper Three Eagles Lake 1-08-9958-000 | C | - | 4(2)[H] | 4.5 | | Database (2)Planting Rec |
| W. Tranquil Lake 1-08-9965-000 | A | YCt | 5[G] | 14.5 | | Database |

Table 35 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Wildcat Lake<br>1-08-9970-000 | C | - | 4(2)<br>[H] | 15.6 | | Database<br>(2)Planting Rec |

Table 36. Lakes inhabited by westslope cutthroat trout in the Kootenai River drainage.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Baree Lake 1-11-7855-000 | A | - | 2[S] | 3.5 | | Database |
| Bluebird Lake 1-11-7960-000 | A | - | 4(2)[H] | 1.2 | | Database (2)Planting Rec |
| Boot Jack Lake 1-11-7980-000 | A | - | 4(2)[L] | 4.7 | | Database (2)Planting Rec |
| Brimstone Lake 1-11-8030-000 | A | - | 2[L] | 0.7 | | Database |
| Bull Lake 1-11-8040-000 | C | Rb,YCt, EB,NP | 5[L] | 505.5 | | Database |
| Cad Lake 1-11-8050-000 | A | - | 4(2)[L] | 1.5 | | Database (2)Planting Rec |
| Dickey Lake 1-11-8220-000 | V | Rb,EB,NP | 5[L] | 243.3 | | Database |
| Flower Lake 1-11-8325-000 | A | - | 4(2)[L] | 0.6 | | Database (2)Planting Rec |
| Hawkins Lake (Lower) 1-11-8470-000 | A | - | 2[L] | 5.5 | | Database |
| Hawkins Lake (Upper) 1-11-8471-000 | A | - | 2[L] | 1.9 | | Database |
| Hoskins Lake 1-11-8540-000 | A | - | 4(2) [L] | 15.1 | | Database (2)Planting Rec |
| Island Lake 1-11-8580-000 | E | EB | 6[L] | 83.2 | | Database |
| Lake Koocanusa 1-11-8690-000 | A | Rb,RbXCt EB | 5a* (2) [H] | 10926.9 | | Database (2)Leary et al. 1983a |

Table 36 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Leon Lake 1-11-8760-000 | A | - | 4(2)[L] | 6.8 | | Database (2)Planting Rec |
| Little Bear Lake 1-11-8845-000 | A | - | 2[L] | 0.6 | | Database |
| Little Loon Lake 1-11-8880-000 | U | Rb,EB | 5[L] | 4.7 | | Database |
| Little Therriault Lake 1-11-8920-000 | A | Rb | 5[S] | 19.5 | | Database |
| Loon Lake 1-11-8940-000 | V | Rb,EB,NP | 5[L] | 96.3 | | Database |
| Loon Lake 1-11-8960-000 | V | Rb,EB,NP | 5[L] | 13.0 | | Database |
| Marl Lake 1-11-9120-000 | A | Rb,EB,NP | 5[L] | 41.2 | | Database |
| Mid. Fish Lake 1-11-9173-000 | A | Rb | 5[L] | 1.1 | | Database |
| Moran Lake 1-11-9240-000 | C | EB | 4(2)[L] | 16.7 | | Database (2)Planting Rec |
| Mt. Henry Lake 1-11-9250-000 | A | YCt | 5[L] | 3.4 | | Database |
| Murphy Lake 1-11-9280-000 | U | Rb,EB | 5[L] | 56.3 | | Database |
| Myron Lake 1-11-9290-000 | A | - | 4(2)[L] | 1.6 | | Database (2)Planting Rec |
| N. Fish Lake 1-11-9297-000 | A | - | 2[L] | 2.8 | | Database |
| St Clair Lake 1-11-9470-000 | A | - | 2[L] | 0.8 | | Database |

Table 36 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Savage Lake<br>1-11-9480-000 | U | EB | 4(2)<br>[L] | 28.6 | | Database<br>(2)Planting Rec |
| Skinner Lake<br>1-11-9560-000 | C | - | 2[H] | 9.0 | | Database |
| Sophie Lake<br>1-11-9620-000 | C | Rb | 5[L] | 86.6 | | Database |
| S. Fish Lake<br>1-11-9630-000 | A | RB | 5[L] | 5.9 | | Database |
| Swisher Lake (Spring)<br>1-11-9710-000 | V | EB | 3[L] | 4.8 | | Database |
| Tetrault Lake (Carpenter)<br>1-11-8060-000 | A | - | 4(2)<br>[L] | 37.2 | | Database<br>(2)Planting Rec |
| Tom Poole Lake<br>1-11-9380-000 | A | - | 4(2)<br>[H] | 2.2 | | Database<br>(2)Planting Rec |
| Topless Lake<br>1-11-9830-000 | A | - | 4(2)[L] | 3.7 | | Database<br>(2)Planting Rec |
| Vinal Lake (Helmer)<br>1-11-9940-000 | A | - | 4(2)[L] | 6.3 | | Database<br>(2)Planting Rec |

* - Based on a sample size (N) = 12

Table 37. Lakes inhabited by westslope cutthroat trout in Glacier National Park.

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| **N. Fork Flathead River Drainage** | | | | | | |
| Quartz Cr drainage | | | | | | |
| Akokala Lake | Z | | 1 | 9.3 | | Marnell 1981 |
| Bowman Lake | Z | | 6 | | | Marnell 1981 |
| Cerulean Lake | Z | | 1 | 19.8 | B- | Marnell 1981 |
| Kintla Lake | Z | | 6 | | | Marnell 1981 |
| Lower Quartz Lake | Z | | 1 | 67.1 | | Marnell 1981 |
| Mid. Quartz Lake | Z | | 1 | 19.4 | F- | Marnell 1981 |
| Quartz Lake | Z | | 1 | 333.0 | | Marnell 1981 |
| Logging Cr drainage | | | | | | |
| Grace Lake | Z | | 5a | 32.4 | F- | Marnell 1981 |
| Logging Lake | Z | | 1 | 445.2 | | Marnell 1981 |
| Camas Cr drainage | | | | | | |
| Arrow Lake | Z | | 5a | 24.3 | | Marnell 1981 |
| Camas Lake | Z | | 5a | 7.7 | F | Marnell 1981 |
| Evangeline Lake | Z | | 5a | 28.3 | F | Marnell 1981 |
| Rogers Lake | Z | | 1* | 50.6 | | Marnell 1981 |
| Trout Lake | Z | | 1 | 86.2 | | Marnell 1981 |
| **McDonald Lake Basin** | | | | | | |
| Avalanche Lake | Z | | 1 | | | Marnell 1981 |
| Fish Lake | Z | | 5a | 3.2 | B- | Marnell 1981 |
| Hidden Lake | Z | | 5a | 110.1 | | Marnell 1981 |

Table 37 (continued).

| WATER NAME AND WATER CODE | CUTTHROAT RELATIVE ABUNDANCE | OTHER SPECIES PRESENT | LAKE VALUE | AREA (hec) | BARRIER | INFORMATION SOURCE |
|---|---|---|---|---|---|---|
| Howe Lakes | Z | | 1** | 15.0 | | Marnell 1981 |
| Lower Synder Lake | Z | | 1 | 2.4 | F- | Marnell 1981 |
| McDonald Lake | Z | | 6 | | | Marnell 1981 |
| Upper Synder Lake | Z | | 7 | 4.9 | F | Marnell 1981 |
| | | Mid. Fork Flathead River drainage | | | | |
| Harrison Lake | Z | | 1 | 101.2 | | Marnell 1981 |
| Isabel Lakes | Z | | 1 | 22.7 | | Marnell 1981 |
| Lake Ellen Wilson | Z | | 6 | | | Marnell 1981 |
| Lincoln Lake | Z | | 1 | 14.2 | | Marnell 1981 |
| Ole Lake | Z | | 1 | 2.0 | | Marnell 1981 |

* - based on a sample size (N) = 6
** - based on a sample size (N) = 24

## GENERAL FACTORS AFFECTING POPULATION ABUNDANCE

The decline of westslope cutthroat in a specific water is usually not due to one single factor but rather to a combination of exploitation, introgression, competition and habitat degradation operating simultaneously. While present or historical threats were previously identified for specific streams on a drainage-by-drainage basis, the general effects of those threats were not not discussed. Those factors are addressed here.

### EXPLOITATION

Westslope cutthroat populations can be severely impacted by angling. In fact, cutthroat are the most easily caught trout in Montana. McPhee (1966) found that cutthroat were caught twice as easily as brook trout. Behnke (1979) estimated that fishing pressure of 50 hours per acre per year will result in overexploitation of stream-dwelling westslope populations. In contrast, brown trout populations were not overexploited even with 500 to 800 hours of fishing pressure per surface acre per year (Behnke 1983). Because of their extreme vulnerability to angling, westslope populations which have been depressed by overexploitation respond to special regulations much more dramatically than comparable populations of exotic trout. However, if the limiting factor operating on the population is habitat related, the only thing accomplished by special regulations is a decrease of mortality due to harvesting and increasing natural mortality (Johnson and Bjornn 1978). Response of cutthroat populations to special regulations has been shown conclusively in several studies (Peters 1983; Thurow and Bjornn 1978; Johnson and Bjornn 1978). Five years after implementing catch-and-release regulations on Kelly Creek, 13 times more cutthroat were counted in snorkeling transects (Johnson and Bjornn 1978). A unique opportunity to monitor the effects of exploitation on a previously

unfished cutthroat population with a proportionally greater number of large sized fish will occur when Rattlesnake Creek near Missoula will be opened to fishing.

GENETIC DILUTION

Of all the factors threatening westslope populations, hybridization of westslope cutthroat with contaminating species, such as rainbow and yellowstone cutthroat trout, is probably the most difficult factor to deal with. Westslope cuttthroat have a proclivity to readily hybridize with rainbow, golden and yellowstone cutthroat trout as well as the other cutthroat subspecies. Unfortunately, during its evolution the westslope cutthroat was isolated from rainbow trout and lacks the innate isolating mechanism which would allow them to coexist without hybridization. Even though westslope populations have undergone introgression, phenotypically they can still appear as westslope cutthroat. Leary et al. (1983a) demonstrated that identification by field biologists using morphological characteristics does not accurately reflect the genetic composition of individuals or a population. Another recent test by Chris Clancy, MT Dept. of F, W, & P fisheries biologist in Livingston, using yellowstone cutthroat met with the same results. Problems in field identification result from transitional forms being found in the same drainage that range in appearance from typical westslope to those hybrid swarms which appear as almost typical rainbow trout. Although hybridization has occurred in westslope populations, any population that closely resembles and has the same characteristics as westslope are still of considerable importance for management and sport fishing purposes and should be recognized as such. An excellent example of a rainbow x cutthroat hybrid population of importance is the Ashley Lake population in the Flathead drainage. However, there is still a

need for identification of genetically pure populations, since it would be undesireable to utilize an introgressed population for the establishment or for increasing the genetic variation of a brood stock for propagation and reintroductions. Also, without wild stocks to increase the genetic diversity of a brood stock, the highly selected hatchery stocks can become dangerously vulnerable to disease, competition, predation and changes in the physical environment.

Although introgression of native westslope populations have been widespread over most of its historic range, several areas have had rainbows coexist with cutthroat in the same drainage. The lower portion of the Flathead River above Flathead Lake contains rainbow trout and is also an important reach at various times in the life history of migratory cutthroat. However, rainbow trout have not greatly expanded their range through-out the drainage and haven't extensively hybridized with westslope cutthroat despite the potential to do so. Evidently, spawning by the two species is both spatially and temporally isolated and the drainage may be only marginal habitat for rainbow trout. Different flow and temperature patterns of Tobacco River tributaries and a difference in the timing of cutthroat and rainbow trout spawning runs from Lake Koocanusa (Huston et al. 1984) tend to limit hybridization. However, hybridization between the two species is widespread through-out the rest of the Lake Koocanusa system (Huston et al. 1984). Chris Clancy (personal communication) suggested that pure rainbow and yellowstone cutthroat may not be interbreeding in the Yellowstone drainage, but hybrid trout may be reproducing with each other.

## COMPETITION

Competition is almost always listed as a major reason for the decline of cutthroat populations across their historic range. However, currently there

appears to be little evidence that exotic trout and char have actively displaced cutthroat. Brook trout (Salvelinus fontinalis) is one of the two most common competitors found in cutthroat waters (rainbow trout, also a potential contaminant, would be the other). Griffith (1972) studied the behavior and habitat utilization of brook and cutthroat trout and found no evidence that cutthroat could be displaced by equal-sized brook trout. Results also showed that young-of-the-year (yoy) brook trout dominated yoy cutthroat under laboratory conditions. This was attributed to their larger size due to earlier emergence dates. However, in study streams interspecific social contact was minimized between yoy of the two species due to utilization of different microhabitats based on the size differential. Yearling and older cutthroat actually initiated more aggressive encounters between equal-sized fish than brook trout in laboratory studies. Griffith (1972) believed that the greater aggressiveness of cutthroat more than offset any size advantage maintained by brook trout. The potential for competitive interaction between the two species is greatest for age-groups I and II where habitat utilization overlap is high. Although exotics may have actively displaced westslope cutthroat from some waters, this author believes that in general, brook trout, and perhaps other exotic Salmo and Salvelinus competitors, simply replace westslope populations depressed by other factors, such as high fishing pressure or habitat degradation.

Although competition hasn't been conclusively demonstrated, studies indicate that a high potential exists for competition between cutthroat and other trout as well as mountain whitefish (Prosopium williamsoni) and other non-salmonid species for food. However, food must first be a limiting factor and the two species must also have overlap in their feeding niches. Native species, such as mountain whitefish, which co-evolved with westslope cutthroat

have minimized competitive interactions by partitioning limited resources and introduced species probably tend to become more specialized in their food habits when sympatric with westslope cutthroat.

In the headwater, high gradient areas of many streams where habitat deterioration hasn't occurred, cutthroat apparently have a "competitive" advantage over other salmonids in that they are better adapted to the physical environment. Westslope cutthroat also seem to have a competitive advantage over rainbow trout in the Flathead River drainage above Flathead Lake since rainbow haven't greatly expanded their range after being introduced.

## HABITAT RELATED FACTORS

Platts (1974) found that cutthroat were common only in undisturbed reaches of streams in the Salmon River drainage of Idaho. Behnke (1979) described how clearcutting along two streams in the Smith River drainage increased erosion, sediment loads and water temperatures while eliminating the westslope population in the disturbed area. However, a small portion in the headwaters of one stream was not logged and an indigenous cutthroat population still dominated this reach; primarily brook trout were found in the disturbed areas. Thus, one could justifiably state that protection of high quality habitat is necessary for the continued existence of westslope cutthroat populations in streams. Man's activities which can have detrimental effects on cutthroat habitat include livestock overgrazing, timber harvesting, oil and gas exploration, mining, particularly placer operations, water diversions, subdivisions and development of riparian zones, and construction of dams. While each individual habitat perturbation impacted only a small portion of the westslope cutthroat's historic distribution, the literally thousands of habitat changes distributed over the entire range has severely reduced its range to

current levels. Habitat degradation is probably the second most important factor operating on westslope populations; the most important would probably be hybridization with other Salmo spp.

## EXISTING CONSERVATION MEASURES

The current standard daily and possession limits established for westslope cutthroat trout by the MT Fish and Game Commission are 5 fish with only one fish > 14 inches in the western part of the state while only one fish can be > 18 inches in the central fishing district. Other waters are under more restrictive or special regulations. The daily catch limit of westslope cutthroat in Glacier Park is two fish. Most tributaries comprising the western portion of the North Fork Flathead River drainage within Montana are closed to fishing by the state as are Granite, Morrison, Lodgepole, Long creeks and their tributaries in the Middle Fork Flathead River drainage to protect cutthroat spawning areas. Permanent stream closures have also occurred on tributaries of the North and Middle Forks of the Flathead River within Glacier National Park. Within the Bob Marshall Wilderness complex, the westslope cutthroat limit is only three fish with none > 12 inches except in 10 lakes. In addition to these regulations, there are other regulations on individual waters, such as Rock Creek or the S. Fork Flathead River from Meadow Creek bridge to the Spotted Bear footbridge, which are protecting westslope cutthroat from overexploitation. These additional regulations are listed in the 1984-85 MT fishing regulations.

The 1980 stream evaluation and classification of Montana streams provided another valuable tool to help conserve known westslope populations in the state. One of the criteria used in the evaluation process was the value of a stream reach as habitat for species of special concern, of which westslope

cutthroat is considered a Class A species by the state of Montana. Incorporation of available information concerning westslope populations into the evaluation assists state and federal agencies as well as water users in identifying critical habitat areas so they can be considered and included during the planning process for management of public lands or new developments. Land use policies have also helped to conserve westslope populations. Existing wilderness areas, as well as Glacier National Park, have prevented habitat degradation associated with human activity and development of natural resources; they provided refuges for the sensitive cutthroat species. So it's not surprising that the largest westslope stronghold is within the Bob Marshall Wilderness area. Other proposed wilderness additions such as the Hoodoo area would protect additional cutthroat habitat.

## RECOMMENDATIONS

1) The first step involved in a westslope cutthroat trout recovery plan should be a survey to determine public sentiment regarding the importance of preserving native westslope cutthroat. The results of the census should be used to determine and justify the scope and intensity of a recovery program. A cost-effective method of conducting this survey may be to integrate it into the questionnaires already sent out to determine fishing pressure on waters throughout the state. Along with a survey, information should be made available to the general public regarding the desireable qualities of native westslope populations versus exotic species from both a fish catching point of view and in regard to their unique adaptations that make them ideally suited to the physical habitat conditions with which they co-evolved.

2) Another question needed to be addressed early in a proposed management program is what should be the basis for identification of a pure population -

morphological and meristic characteristics, electrophoretic analysis or some other criteria? The author favors electrophoretic analysis, as shown by other recommendations.

3) The interagency stream database needs to be updated by field personnel on a regular basis as new data becomes available. Also, the current database should be edited since several streams are listed as undesignated cutthroat waters while waters on either side of them are listed as containing westslope cutthroat trout. Some form of a genetic value rating system should be added to the database to reflect the genetic status and knowledge of cutthroat populations in each stream reach. Additionally, an edit program should be developed to retrieve and summarize this information, which would either replace or greatly reduce the cost of future status reports and provide much more up to date figures, since new information is constantly beening gathered.

4) A substantial sampling program utilizing electrophoretic analysis should be undertaken to assess the genetic purity of other untested populations. Although waters likely to contain genetically pure populations, such as those rated 2 or 3, should receive sampling priority, other waters where contaminating species are present or have previously been planted with potential contaminants can not be ignored. They represent the majority of "westslope waters" and could potentially contain pure populations, especially those which had no contaminants present but had previously been planted.

5) The stream evaluation rating for each water or reach shown to contain a genetically pure population should automatically be regarded as highest-value habitat and thus be classified as a Class 1 water.

6) The S. Fork Flathead River above Hungry Horse Dam should be designated a special management area where management decisions would provide preferential

treatment of native species over exotic trout. As mentioned before, this would include rehabilitation of contaminated waters, including trophy populations, where feasible and if possible, species regulations should encourage overexploitation of non-native trout.

7) Other waters containing genetically pure populations should be afforded the maximum protection possible, since each population is unique because genetic variation within the westslope subspecies is between rather than within populations (Leary et al. 1984). This includes considering the value of a pure population when making land management decisions as well as the installation of physical fish barriers to prevent non-native fish from expanding their range into the reach and acquisition of important strongholds or conservation easements by private organizations such as the Nature Conservancy or the Montana Land Reliance.

8) Where feasible, genetically pure populations should be reintroduced into waters above waterfalls and other fish barriers after the waters have been rehabilitated, if necessary. Huston (personal communication) believes that more opportunities exist to establish populations above barriers than people currently realize.

9) If possible, a new westslope brood stock should be established in the State of Montana's hatchery system. Fish from as many of the known genetically pure westslope populations in the state should be incorporated into the new brood stock to maximize genetic diversity. The Arlee westslope cutthroat trout stock from the Creston hatchery contains about only half the genetic variation present in the wild population from which it was derived (Leary and Allendorf 1982). Leary and Allendorf (1982) also indicated that a large amount of inbreeding in the westslope stock was evident. This new brood stock could be considered "genetic insurance", but it must be remembered that while a hatchery

stock is an important tool in management, it can't and shouldn't be considered a replacement for the natural wild fish populations in streams.

10) Special fishing regulations should be implemented on westslope waters which would protect cutthroat populations and encourage the harvest of any exotic fishes present. Unfortunately, the amount of fishing pressure needed to have an effect on most exotic trout would also probably have a detrimental effect on westslope populations. Species regulations designed to benefit westslope cutthroat in waters also inhabited by rainbow trout would tend to be unworkable because of problems in identification.

11) The status of westslope cutthroat should be reevaluated to determine if it should be added to state and/or federal endangered species lists.

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