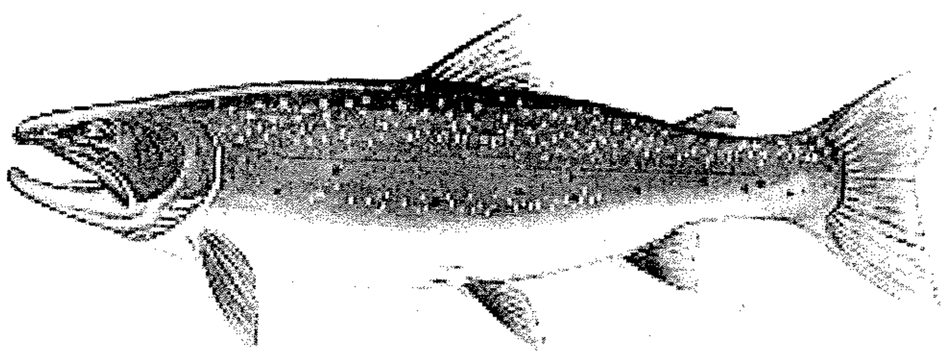
MIDDLE CLARK FORK RIVER DRAINAGE
BULL TROUT STATUS REPORT
(From Thompson Falls to Milltown, including the Lower Flathead River to Kerr Dam)



April 1996

Prepared for

The Montana Bull Trout Restoration Team

By

The Montana Bull Trout Scientific Group

Montana Bull Trout Restoration Team

Bonneville Power Administration
Confederated Salish & Kootenai Tribes
Department of State Lands
Montana Chapter American Fisheries Society
Montana Fish, Wildlife & Parks
National Wildlife Federation
Plum Creek Timber Co.
US Fish & Wildlife Service
US Forest Service

TO: Bull Trout Restoration Interested Parties

Bull trout, a native Montana fish, has been the subject of extensive study and broad discussion since Governor Racicot appointed the Bull Trout Restoration Team in early 1994.

The bull trout status reports reflect a portion of both the study and discussion which has occurred during the last two years. These status reports, prepared by the Bull Trout Scientific Group, are designed to provide information about bull trout populations, habitat needs, and threats.

Status Reports have been prepared for bull trout populations in 11 restoration/conservation areas:

- Bitterroot River
- Lower Clark Fork River, downstream of Thompson Falls
- Middle Clark Fork River from Thompson Falls to Milltown, including the lower Flathead River to Kerr Dam
- Upper Clark Fork River, including Rock Creek
- Blackfoot River
- Flathead Lake, including the North and Middle Forks of the Flathead River, Stillwater and Whitefish rivers
- South Fork Flathead River, upstream of Hungry Horse Dam
- Swan Lake/River
- Lower Kootenai River, below Kootenai Falls
- Middle Kootenai River, between Kootenai Falls and Libby Dam
- Upper Kootenai River/Lake Koocanusa, upstream of Libby Dam

Each of these 11 restoration/conservation areas consist of a number of critical populations. The areas have been delineated on the basis of natural barriers and dam-caused fragmentation of historically connected river systems.

These status reports are **working documents**; they are the result of a collaboration of biologists, hydrologists, and other scientists and have drawn on information and research done by people working within each management area.

These documents are intended to provide the most current and accurate information available to the Bull Trout Restoration Team (see Introduction, p. 1) and the local bull trout watershed groups, which will assist them in making informed decisions affecting

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the restoration and conservation of bull trout in Montana. It is hoped that the watershed groups will develop specific recovery actions to help restore bull trout in watersheds throughout western Montana.

The status reports describe risks to bull trout in each watershed. This description of threats and risks to the fish is the best scientific judgement of the Scientific Group and is based on information provided by the local biologists. New and additional information provided by the public, the watershed groups, and the field biologists will add to our understanding of these risks as recovery proceeds. A status review is a continuous process, hence the description of these reports as "working documents."

Likewise, the restoration goal described in each status report is based on the best science available. The goal describes what would be necessary to recover fully functioning bull trout populations in each watershed and may not reflect what is realistically practical in all watersheds, considering time, budget, local interest, and/or other overriding constraints. It is presented as a goal, not necessarily as an inflexible expected outcome.

It is the sincere hope of the Restoration Team and Scientific Group that these documents will assist the watershed groups in "going forth and doing good things" for bull trout.

As always, we welcome your comments regarding bull trout restoration. Please send your thoughts or call Glenn Marx, Governor's Office, Capitol Station, Helena, MT 50620 (444-5506) or Shelley Spalding, Montana Fish, Wildlife and Parks, P.O. Box 20071, Helena, MT 59620 (444-7409).

Sincerely,

Larry P. Peterman

Larry Peterman, Chairman
Bull Trout Restoration Team

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EXECUTIVE SUMMARY

This report discusses the status of bull trout in the Middle Clark Fork River (MCFR) drainage that includes the Clark Fork River and its tributaries from Thompson Falls Dam upstream to Milltown Dam and the Flathead River drainage from the confluence with the Clark Fork River upstream to Kerr Dam. The Bitterroot, Blackfoot, and upper and lower Clark Fork rivers are discussed in separate status reports.

Bull trout were one of three salmonids native to the Clark Fork River. It is believed bull trout were once widely distributed in the Clark Fork River and its tributary streams. The present distribution of bull trout is much reduced from historic levels in this drainage.

Risks

The primary risks in this system are the mainstem river dams, which limit bull trout migration, and water quality degradation related to agricultural practices and past and potential timber harvest. Five hydroelectric dams have fragmented and isolated the Clark Fork and Flathead river systems. Three of these dams (Cabinet Gorge, Noxon, and Thompson Falls) are on the mainstem Clark Fork River and have completely eliminated migration of bull trout from Lake Pend Oreille in Idaho. Although, the migratory life form still persists and continues for have access to some tributaries, many tributaries are no longer accessible or are no longer used. Other risks include; illegal introductions, fish management, mining, dam operations, transportation systems, illegal harvest, and population trends.

Core Areas and Nodal Habitats

Core areas in the Middle Clark Fork River drainage include the Fish Creek, St. Regis River, Trout Creek, Cedar Creek, Petty Creek, Rattlesnake Creek, West Fork of the Thompson

River and Fishtrap Creek drainages. In the Flathead portion of the Middle Clark Fork River drainage, core areas are the Jocko River drainage, the Mission Creek drainage above Mission Dam, and the Post Creek drainage above McDonald Dam. Nodal habitats are the Thompson River, the Flathead River, and the Clark Fork River.

The Restoration Goal

The first component of the restoration goal is maintenance of self-sustaining bull trout populations in all the core areas where they presently exist, including the migratory life history form, with maintenance of the population genetic structure throughout the watershed. Under this goal, all existing populations should at least remain stable or increase from current numbers in the future. In addition, the reestablishment of connectivity within the Clark Fork River drainage and between the Clark Fork and Flathead rivers and their tributaries is considered imperative for the long term survival of this species.

Due to the large size of the Middle Clark Fork River drainage (as described for this report), the restoration goals are individually described for three segments of the drainage: the Clark Fork River above the St.Regis River, the Clark Fork River from Thompson Falls Dam up to, and including, the St.Regis River, and the Flathead River portion of the drainage. Within each of these areas, the goal is to have at least 100 redds or 2,000 total individuals in the migratory populations over a period of 15 years (or at least three generations), with spawning distributed among all the core areas.

Once a restoration plan is finalized and implemented, a monitoring program will need to be developed to determine the success of the program.

MIDDLE CLARK FORK RIVER DRAINAGE
BULL TROUT STATUS REPORT

INTRODUCTION

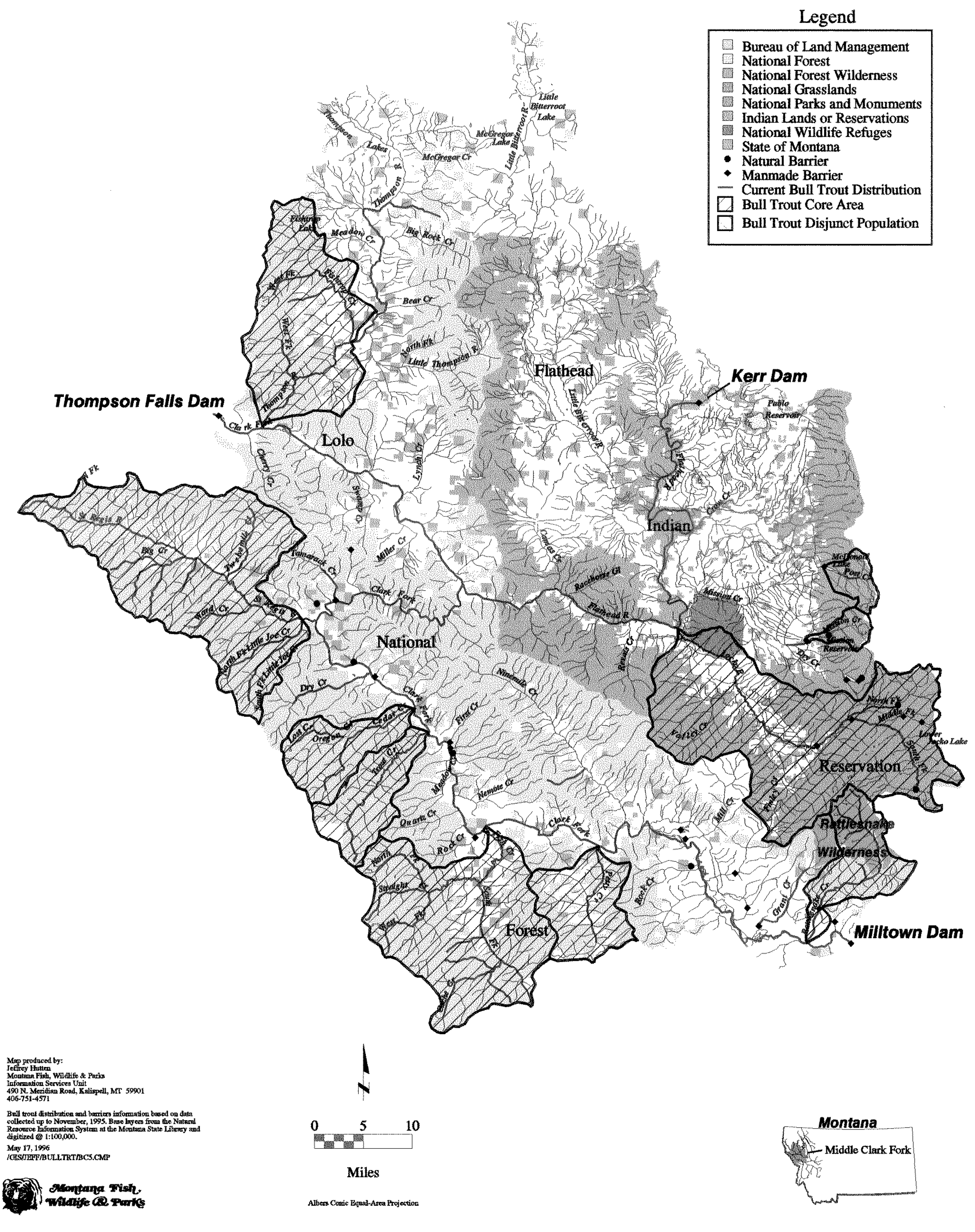
In January, 1994, the Governor of Montana established a Bull Trout Restoration Team to develop a restoration plan for bull trout (*Salvelinus confluentus*) in Montana. The Restoration Team created a Scientific Group to provide guidance on technical issues related to the restoration of this fish.

The Scientific Group reviewed the status of bull trout and risks to the survival of the species in Montana. In addition, the Scientific Group prepared reports on three of the most significant issues in bull trout restoration - land use impacts, removal and suppression of introduced species, and the use of hatcheries in restoration. Because the threats facing bull trout vary widely across the state, separate status reports were prepared for each of twelve bull trout restoration/conservation areas in Montana, except Rock Creek which is included in the Upper Clark Fork report. These areas have been delineated largely due to their fragmentation from historically connected systems (Figure 1). Loss of interconnectivity results from migration barriers like dams or other habitat changes, such as altered thermal regimes or dewatering.

This report discusses the status of bull trout in the Middle Clark Fork River drainage between Thompson Falls Dam and Milltown Dam and the lower Flathead River drainage from the confluence with the Clark Fork River upstream to Kerr Dam (Figure 2). The Bitterroot, Blackfoot, and upper and lower Clark Fork rivers are discussed in separate status reports. The report describes the current and historic status of bull trout in the MCFR, core areas and nodal habitats for bull trout, risks to bull trout survival, and research needs.

Figure 1. Bull Trout Restoration/Conservation Areas in Montana

Figure 2. Bull trout distribution and core areas in the Middle Clark Fork drainage.



The Middle Clark Fork River extends for 120 river miles from Milltown Dam to Thompson Falls Dam. The average annual flow of this reach is 7,145 cfs (upstream of the confluence with the Flathead River) (USGS 1995). Major tributaries are the Bitterroot, St. Regis, lower Flathead, and Thompson rivers.

Water quality in the Middle Clark Fork River is much improved over that of the upper Clark Fork primarily because of dilution by large tributaries such as the Blackfoot and Bitterroot rivers. The major water quality issue in this reach is the addition of nutrients and other pollutants to the river from sources like the Missoula municipal sewage plant and from the Stone Container Corporation kraft mill. There has been a growing concern over increases in algae levels in the river, which are stimulated by nutrients, and depressed mid-summer dissolved oxygen concentrations (Ingman and Kerr 1990).

The lower Flathead River is one of Montana's largest rivers, with a drainage area of 8,795 mi^2 and an annual average discharge of 11,190 cfs (USGS 1995). Flow in this portion of the river is regulated by Kerr Dam, located four miles downstream from the original outlet of Flathead Lake. The river flows south and west for 72 miles to its confluence with the Clark Fork River near Paradise, Montana (DosSantos et al. 1988).

The Flathead Indian Reservation is the 1.2 million acre home of the Confederated Salish and Kootenai Tribes (CSKT), established by the Hellgate Treaty in 1855. The Reservation lies within the area encompassed by this report and includes the southern half of Flathead Lake, approximately 68 miles of the Flathead River, and its associated tributary streams.

HISTORIC AND CURRENT STATUS OF BULL TROUT IN THE MIDDLE CLARK FORK RIVER DRAINAGE

Historic Distribution

Sources of information on the historical distribution of bull trout in Montana are limited. However, from the information available, it is clear that migratory bull trout were historically distributed throughout the Middle Clark Fork River drainage. The two other salmonid species native to the drainage are westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and mountain whitefish (*Prosopium williamsoni*).

Fish from Lake Pend Oreille had access to the Clark Fork up to its headwaters for spawning and rearing (Evermann 1892). In addition, bull trout from Flathead Lake may have moved downstream out of the lake into the lower Flathead River and potentially into the Clark Fork River. Although unusual, downstream migrations of bull trout have been documented in other locations in Montana (e.g. Bull Lake, Upper Kintla Lake, Cyclone Lake).

Evermann (1892), who traveled through Montana in the late 1890's sampling fish, states that bull trout were common in most of the larger affluents of the Columbia River in Montana, particularly the Hellgate, Missoula, Pend Oreille, Flathead, Bitterroot, and Big Blackfoot rivers and in Flathead and Swan lakes. In today's terminology, this would be the Clark Fork River above and below Missoula and the Flathead River above and below Flathead Lake as well as the Bitterroot and Blackfoot rivers. He collected bull trout from Rattlesnake Creek (at Missoula) and states in his report that he was told that 'salmon-trout' [bull trout] are found in the Jocko River.

The ethnographic literature (reports describing the socio-economic systems of technologically primitive societies) also provides some information about historic bull trout distribution. Chalfant (1974), in describing the aboriginal territory of the Kalispel Indians, stated that bull trout were found in the Jocko River, Clark's Fork River, Bitterroot River, Mission Creek, Flathead River, Flathead Lake, St. Mary's Lake (east of Ravalli), and McDonald Lake (on Post Creek). Malouf (1952) also mentioned bull trout presence in the Jocko and Flathead rivers. Weisel (1957) states that some of the older Flathead Indians remember taking [bull trout] in numbers from Rattlesnake Creek in Missoula and from the Jocko River.

Before the turn of the century, mining operations in the Butte area impacted fishes in the Clark Fork River, at least as far downstream as Missoula. Evermann (1892) wrote that "by the time Missoula is reached the amount of solid matter in suspension is probably not enough to prove wholly destructive to fish, though there is no doubt that the number of fish in the river even here is very greatly reduced on account of this contamination".

Rattlesnake Creek is mentioned by several authors as a site where bull trout were caught (Evermann 1892, Anonymous 1929). In fact, Evermann (1892) states that the species of fish caught [in Rattlesnake Creek] "were the common trout, salmon trout, and blob [sculpin]. All of these were quite common, the salmon trout being, perhaps, the most abundant." Cooper (1869) reported collecting a bull trout at the mouth of St. Regis Borgia Creek (the St. Regis River).

Unpublished data collected prior to 1970 by Montana Fish, Wildlife, and Parks (FWP) documents bull trout in the following streams (date of collection in parenthesis): Cedar Creek (1957), Dry Creek (1957, 1968), North Fork of Fish Creek (1957), Little Joe Creek (1953), South Fork Little Joe Creek (1970), Ninemile Creek (1959, 1960, 1961, 1962, 1968), Rattlesnake Creek (1961, 1962), St. Regis River (1969), Spring Gulch (1960), Trout Creek (1957), and Ward Creek (1963).

In 1960, bull trout made up 12.4% of the fish sampled (by number) in Rattlesnake Creek below the Missoula water supply dam. The proportion was greater in samples from upstream areas - 38.2% of the above Franklin Bridge (Huston 1961). Opheim (1966) collected bull trout in Twelvemile Creek in July 1963. More recent studies in this stream have not found any bull trout, but brook trout (*Salvelinus fontinalis*) were numerous (K. Walker, Lolo National Forest, Missoula, Montana, personal communication).

Current Distribution

Kerr Dam blocks fish passage between the lower Flathead\ Clark Fork River systems and Flathead Lake. There was a natural cascade at the outlet of Flathead Lake that had an unknown impact on upstream fish passage between Flathead Lake and the lower Flathead River. However, Evermann (1892) states that, "So far as we were able to determine, there are no natural obstructions anywhere above Lake Pend Oreille in this river system - the Clark Fork of the Columbia and its tributaries - which interfere seriously with the free movement of fishes. There are certainly no falls in the larger streams, and we know of none of any importance in the smaller ones.."

Milltown Dam blocks passage between the Middle Clark Fork River and the upper Clark Fork and the Blackfoot rivers. Dams on the lower Clark Fork River (Thompson Falls, Noxon, and Cabinet Gorge) blocked passage from Lake Pend Oreille. (Note: The Lower Clark Fork River drainage status report includes more information about Cabinet Gorge and Noxon reservoirs bull trout populations).

The Mountain Water Company Dam on Rattlesnake Creek blocks fish passage from the Clark Fork River into upper Rattlesnake Creek. It is not known if Clark Fork River bull trout successfully utilize the reaches of Rattlesnake Creek below the dam, although adult bull trout congregate annually below the dam in an attempt to migrate upstream (D.J. Peters, Montana Fish, Wildlife, and Parks, Missoula, Montana, personal communication). Above the dam, Rattlesnake Creek supports resident bull trout.

The Flathead Agency Irrigation Division (FAID), which was constructed beginning about

1910, broke the connection between many of the tributary streams and the Flathead River. Construction of irrigation diversions, canals, and dams on the tributaries eliminated access to more than 62 miles of spawning and rearing habitat (Cross and DosSantos 1988) .

During extensive electrofishing surveys on the lower Flathead River between 1983 and 1986, 17 bull trout were captured, ranging in length from 7.5 to 33.5 inches. These fish averaged 19 inches in length and 2.9 pounds in weight. The authors noted that bull trout were the least common of the seven salmonid species found in the river (DosSantos et al. 1988).

Bull trout are rare in the mainstem Clark Fork River between Milltown Dam and the confluence of the Flathead River. During extensive electrofishing surveys conducted on six study sections in this reach between 1983 and 1993, 127 bull trout were captured (Berg pers. comm. 1995). They ranged in length from 7.9 to 30.7 inches and in weight from 0.15 to 12.57 pounds. A total of 28,896 trout were sampled during 240 days of electrofishing in this 11-year period. Bull trout comprised 0.44 percent of the total number of trout sampled. Bull trout electrofishing catch rates averaged 0.53 fish per sampling day or 0.09 fish per electrofishing hour. An average of 11.51 electrofishing hours was required to collect one bull trout and densities were too low to estimate population numbers in any study section. During four nights of electrofishing effort on the Clark Fork River over a four year period between Plains and Paradise, only one bull trout was captured. It was 21 inches in length (Huston personal communication 1995).

The most important spawning tributaries for migratory bull trout in this reach of river are the St. Regis River and Fish, Trout, Cedar and Petty creeks (Berg personal communication 1995). Migratory bull trout have been observed in these drainages during the spawning period. Migratory bull trout have also been observed during the spawning period in Rattlesnake Creek downstream of the Mountain Water Company Dam. Of these streams, the Fish Creek is the most important spawning drainage for migratory bull trout. Spawning migratory bull trout and their redds have been observed in Cache, Montana, West Fork Fish, North Fork Fish and mainstem Fish Creek (Berg 1994 personal communication). Fishtrap Creek is the most important spawning tributary downstream from the confluence with the Flathead River.

In addition to supporting migratory bull trout, the St. Regis River and Fish, Trout, Cedar, Petty and Rattlesnake Creek drainages support resident bull trout populations of moderate to low density (Berg 1986 and 1992). In the Fish Creek drainage Montana, Cache, Straight, Surveyors, White, North Fork Fish, West Fork Fish, South Fork Fish, and mainstem Fish Creeks support resident populations of bull trout. In the St. Regis River drainage, resident bull trout are found in the North Fork, South Fork and mainstem Little Joe, War, Timber and Big Creeks and the mainstem St. Regis River. Oregon Creek, Lost Creek and mainstem Cedar Creek support resident bull trout in the Cedar Creek drainage. Also, resident bull trout are found in Cement Gulch Creek, South Fork Trout, and mainstem Trout Creek in the Trout Creek drainage. Resident bull trout have been found in mainstem Petty and Rattlesnake creeks at various locations and in Spring Gulch Creek, the primary tributary of Petty Creek.

Resident bull trout populations are found at low densities in the Ninemile, Tamarack, Grant and Dry creek (near Superior) drainages (Berg 1986, Berg 1992, and Berg 1995 personal communication). Extensive sedimentation from mining, logging and agricultural practices have severely impacted bull trout in the Ninemile Creek drainage. A highway culvert on Tamarack Creek near its confluence with the Clark Fork River and sediment produced from logging and agricultural practices have impaired Tamarack Creek. Residential and commercial development and irrigation diversions have eliminated the connection of Grant Creek to the Clark Fork River year round. The lower few miles of Dry Creek near Superior are dewatered seasonally, and an irrigation dam on the mainstem of the creek precludes fish passage. It is likely that migratory bull trout populations occurred historically in Ninemile, Tamarack, Grant and Dry creeks. Presently, it appears migratory bull trout have been entirely eliminated from these drainages.

In the Jocko River, resident bull trout are found upstream of the Jocko "K" Canal, 26 miles upstream of the mouth. The Jocko "K" Canal diversion structure is an upstream barrier to fish movement during the irrigation season (DosSantos et al. 1988). The Jocko “S” Canal is 7 miles further upstream from the "K" canal and is a year around upstream migration barrier isolating the Middle and South forks of the Jocko River.

On the Flathead Indian Reservation, the FAID created three disjunct populations of bull trout when they created irrigation reservoirs out of natural lakes. These include Tabor Reservoir (St. Mary's Lake), Mission Reservoir (Mission Lake), and McDonald Reservoir (McDonald Lake). Although, there is still out-migration from these lakes, the construction of these dams has totally eliminated upstream passage, hence isolating these populations from the Flathead and Clark Fork river systems.

Tabor Reservoir supports an isolated population of bull trout that has been separated from the Flathead River system for at least 50 years and possibly longer. Dry Lake Creek, its sole tributary, has been surveyed for spawning activity since 1986 and no redds were found until 1993, when one was located. In 1994, three redds were located. The Tabor Reservoir system is an enigma since it seems to provide no spawning or rearing areas, yet small numbers of several age classes of bull trout persist in the lake. Other possible sources of fish to this population are deliveries from the Jocko River drainage via the Tabor Feeder Canal, or from in-lake spawning, an unlikely occurrence.

Mission Reservoir was isolated from the Flathead River over 60 years ago and continues to support a migratory bull trout population. The stream component of the Mission Reservoir system is in near pristine condition, ideal for bull trout spawning and rearing, however, bull trout populations are low. An average of 2.5 redds/year have been counted in Mission Creek since 1986 (Hansen and DosSantos 1993a).

McDonald Reservoir also supports an isolated, migratory population of bull trout. Redd counts have ranged from 11 to 39 per year during the 1986 - 1994 time period, with an average of 23 redds. This population is believed to be more secure than those in Tabor and Mission reservoirs because of adequate pool volume and longer reach of pristine spawning stream.

CORE AREAS AND NODAL HABITATS FOR BULL TROUT IN THE MIDDLE CLARK FORK RIVER DRAINAGE

Core areas are drainages that currently contain the strongest remaining populations of bull trout. They are usually relatively undisturbed. These watersheds need to have the most stringent levels of protection as they will potentially provide the stock for recolonization.

Core areas in the Middle Clark Fork River portion of the drainage are the Fish Creek, St. Regis River, Trout Creek, Cedar Creek, Petty Creek, Rattlesnake Creek, West Fork of the Thompson River, and Fishtrap Creek drainages. In the Flathead portion of the Middle Clark Fork River drainage core areas are the Jocko River drainage, the Mission Creek drainage above Mission Dam, and the Post Creek drainage above McDonald Dam.

Nodal habitats (waters which provide migratory corridors, over wintering areas, or are otherwise critical to the population at some point during its life history) are the Thompson River, the lower Flathead River, and the Clark Fork River. Since nodal waters are essential for the survival of migratory bull trout, maintenance and enhancement of bull trout habitat in nodal waters is essential for any restoration goal. In the Middle Clark Fork River drainage, migratory bull trout populations have declined. This has undoubtedly occurred due to negative impacts which have occurred in both their core area and nodal habitats.

RISKS TO BULL TROUT IN THE MIDDLE CLARK FORK RIVER DRAINAGE

The primary risks in this system are the mainstem river dams, which limit bull trout migration, and water quality degradation related to agricultural practices and past and potential timber harvest. Five hydroelectric dams have fragmented and isolated the Clark Fork and Flathead river systems. Three of these dams (Cabinet Gorge, Noxon, and Thompson Falls) are on the mainstem Clark Fork River and have completely eliminated migration of bull trout from Lake Pend Oreille in Idaho. Although, the migratory life form still persists and continues for have access to some tributaries, many tributaries are no longer accessible or are no longer used. Other risks include; illegal introductions, fish management, mining, dam operations, transportation systems, illegal harvest, and population trends.

The potential risks to bull trout in the Middle Clark Fork River drainage are listed in Table 2. The risks were evaluated by the Scientific Group based on the degree to which a risk was presumed to contribute to the past and current decline of the species (designated as HISTORIC/CURRENT in Table 1) and the threat the risk factor poses to future restoration of the fish (designated as RESTORATION in Table 1). Those risks which are of greatest concern are noted with a double asterisk. Other high risks are denoted with a single asterisk.

Table 1. **Risks to bull trout**. ** = highest risk, * = high risk.
If risk is high in only some portions of the drainage, this portion is noted in ().

RISK	CURRENT/HISTORIC	RESTORATION
Environmental Instability		
Drought		
Landslide/Geology		
Flood/Rain on Snow		
Fire		
Introduced Species		
Private Ponds		
Legal Introductions	*	**
Illegal Introductions	*	*
Fisheries Management	*	*
Barriers		
Culverts	*	
Diversions	* (Flathead)	
Thermal		*?
Dams	*	*
Habitat		
Rural Residential Development		
Mining	*(Clark Fork)	*(Clark Fork)
Grazing		
Agriculture	*(Flathead)	**(Flathead)
Dam Operations	*(Flathead)	*(Flathead)
Forestry	*	**
Recreational Developments		
Transportation	* (St Regis)	* (St Regis)
Population		
Population Trend	*	*
Distribution/Fragmentation	*	*
Abundance	*	*
Biological Sampling		
Angling	*	*
Illegal Harvest	*	**

Environmental Instability

Drought, Landslide/Geology, Flood/Rain on Snow, Fire

There are two components to the risk from environmental instability. First, the likelihood of a catastrophic event occurring and, second, the risk to the bull trout populations if such an event should occur.

Generally, natural catastrophes are relatively uncommon events in the Middle Clark Fork River drainage. Some exceptions include landslides in the West Fork of the Thompson River drainage and possibly drought impacts in the mainstem Clark Fork River. Although not considered a high, the risk from these events is none-the-less elevated due to the fragmentation of the mainstem Clark Fork River and the reliance on fewer remaining spawning tributaries. Under current conditions, if a catastrophic event were to cause a loss of a core area (or spawning tributary), the entire population would be at higher risk of extinction.

Introduced Species

The introduced species found in the Middle Clark Fork River drainage include brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout *(Oncorhynchus mykiss*), lake trout (*Salvelinus namaycush*), Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), largemouth bass *(Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), northern pike (*Esox lucius*), yellow bullheads (*Ictalurs natalis*), black bullheads (Ictalurs melas), pumpkinseeds (*Lepomis gibbosus*), yellow perch (*Perca flavescens*) and the fathead minnow (*Pimephales promelas*).

Of the introduced species, brook trout are believed to be the greatest risk to bull trout. Brook trout are present in nearly all bull trout streams in the drainage, with the possible exception of the headwaters of Fish, Trout, Cedar, Rattlesnake and Post creeks. Bull trout hybridize with brook trout and the offspring are generally sterile. The available data indicate this can be an unstable situation that could result in a dramatic decline or replacement of bull trout (Leary et al. 1993). Brook trout are known to be hybridized with bull trout in Mission Creek (Hansen and DosSantos 1993a).

Lake trout are believed to pose a major risk to bull trout when the two species occur together (Donald and Alger 1992). Lake trout are believed to be one of the most important factors involved in the recent decline of bull trout in the Flathead River drainage (see Flathead Drainage Bull Trout Status Report). Most of the lake trout that are present in the Middle Clark Fork drainage have probably emigrated from Flathead Lake. However, suitable habitat for lake trout is very limited in this drainage, making it unlikely that lake trout will naturally reproduce or become abundant.

Brown trout are suspected to adversely affect bull trout (Nelson 1965; Moyle 1976; Rode 1990; Pratt and Huston 1993). At this point the mechanism of interaction (whether competition or predation) between bull trout and brown trout or other introduced species is not known and more information is needed. However, the result of the interaction may be detrimental to bull trout. Brown trout are common in the Flathead and Jocko rivers.

Northern pike and largemouth bass have become established in the Flathead River. They are also present in low numbers in the Clark Fork River in the Superior and St. Regis areas (R. Berg, Montana Fish, Wildlife, and Parks, Missoula, Montana, personal communication, 1995). Their presence is a concern, but the interaction between these species and bull trout is not known.

Private Ponds

In the past, private ponds have not been a major source of the spread of introduced species throughout this drainage. However, as more people move into the area and more ponds are built, there is an increasing risk from private pond development. Although there is a requirement that private ponds be licensed by FWP before they are stocked with fish, many people are unaware of, or circumvent, the law. The concern is that brook trout or other species may spread from ponds into waters where they do not presently exist.

Legal Introductions (high risk)

Plants of 10,000 hatchery reared juvenile brown trout were made in the Huson study section of the Clark Fork River for three successive years from 1986 through 1988 (Berg 1989). The saturation plants were made to evaluate the potential of using juvenile hatchery brown trout to enhance the existing population of brown trout. No enhancement of catchable brown trout were observed in subsequent years and the plants were discontinued.

At the present time, the fish species stocked in the Middle Clark Fork River drainage by FWP are brown and westslope cutthroat trout. Westslope cutthroat trout are native throughout the drainage and are stocked into some of the high mountain lakes in the basin. Brown trout were stocked in the Clark Fork River in the 1980's and are currently stocked in lakes in the upper Thompson River drainage. This stocking program should be evaluated to determine if it poses risks to bull trout.

In the past, agencies and individuals have stocked a variety of introduced species, including brook, Yellowstone cutthroat, and brown trout, smallmouth bass, and others. Some of these species have established self-sustaining populations in many Clark Fork drainage waters. The legacy of these past stocking practices may pose a significant threat to the survival of bull trout today.

Illegal Introductions (high risk)

The illegal transplants of introduced species is a growing problem in western Montana. In the Middle Clark Fork drainage, most of the risk would be from illegal stocking of brook trout, walleye, or lake trout, particularly in Mission, Tabor, or McDonald reservoirs. Illegal introductions are a particular risk if these fish were placed in an important bull trout drainage where they do not presently exist, or if they were stocked in an area where introduced fish had been removed. In addition to the risks posed by spreading introduced species, there is the risk of introducing fish pathogens.

Fisheries Management (high risk)

Immediately prior to closure of Noxon Rapids Dam in August, 1958, Thompson Falls Reservoir and the Clark Fork River downstream to Cabinet Gorge Reservoir were chemically treated with rotenone to remove the existing fish populations (Huston 1985). This was a common management strategy at that time in situations where a new reservoir was being constructed. The plan was that poisoning, followed by stocking of rainbow trout, would result in a sport fishery for rainbow. Presumably, bull trout present in these waters were also poisoned.

At this time, there is no solid information whether or not northern pike, brown trout, and other introduced sport fishes are a detriment to bull trout in these waters. In the future the management goal of maintaining a viable sport fishery for these species may conflict with the goal of restoring bull trout. If bull trout are to persist, it may be necessary for the focus of fisheries management to adapt to a goal of protecting imperiled native species.

Barriers

Culverts

Historically, impassible culverts may have been a major problem for migratory bull trout in the Middle Clark Fork River drainage. However, in recent years, many of the most problematic culverts have been replaced. A culvert barrier remains in Tamarack Creek and efforts should be made to adapt it for fish passage and reestablish a migratory component to this watershed.

Diversions (high risk in lower Flathead River portion of drainage)

Diversions are not extensive but are locally important risks to the restoration of bull trout populations in the Clark Fork portion of the drainage. However, the extensive irrigation system in the Flathead River portion of the drainage was probably one of the primary causes of the decline of bull trout. Many of the passage barriers created by the irrigation system are slowly being corrected by the installation of fish ladders and the problem is becoming less severe.

Thermal (high risk in Flathead River portion of drainage)

Rieman and McIntyre (1993) concluded that temperature represents a critical habitat characteristic for bull trout. Temperatures in excess of 59° F are thought to limit bull trout distribution in many systems (Bjornn 1961; Fraley and Shepard 1989; Brown 1992).

Temperature appears to limit bull trout habitat in several tributaries and in the mainstem Flathead River below Flathead Lake. In the lower Flathead River, summer water temperatures are near 68°F (DosSantos et al. 1988). However, temperature may not be a migration barrier. Preliminary data indicate that in the Blackfoot drainage, fish migration occurs primarily in the cool months (D.J. Peters, Montana Fish, Wildlife, and Parks, Missoula, Montana, personal communication).

Further research is needed to determine the specific causes of thermal problems and the resultant impact on bull trout. In the lower Flathead River, warm water temperatures may be a natural occurrence - the result of warming of waters in the shallow South Bay of Flathead Lake. In addition, man's land use practices in the Mission Valley, have likely elevated temperatures in the lower Flathead River and its tributaries over historic temperature regimes.

Dams (very high risk)

There are five hydroelectric dams on the Clark Fork and Flathead rivers which block upstream fish passage, three of which are within, or border on, this bull trout recovery area. Noxon and Cabinet Gorge dams are in the main stem Clark Fork River downstream of Thompson Falls dam and are further discussed in the lower Clark Fork River drainage status report

Thompson Falls Dam was constructed between 1913 and 1916 (Gaffney 1955). Little is known about the fishery of the Clark Fork River prior to the construction of this dam, located just upstream of the town of Thompson Falls, 37 miles downstream of the confluence of the Flathead and Clark Fork rivers. Bull trout populations in the lower Clark Fork River (below Thompson Falls Dam) are discussed in more detail in the lower Clark Fork River drainage status report.

Milltown Dam was constructed on the Clark Fork River in 1906 and 1907, just downstream of the confluence of the Blackfoot River with the Clark Fork River (Periman 1985). This dam is a run-of-the-river hydroelectric facility that blocks upstream fish passage. Experimental efforts are currently underway to trap fish at the dam. These efforts will be continued to determine timing of fish migration and trap effectiveness.

Kerr Dam was completed in 1938 on the Flathead River, four miles downstream of Flathead Lake. This dam blocked upstream fish passage from the lower Flathead River into Flathead Lake. The impacts of this barrier on fish populations have not been determined.

It has been documented that fish pass downstream through Milltown (D.J. Peters, Montana Fish, Wildlife, and Parks, Missoula, Montana, personal communication) and Kerr dams (J. DosSantos, Confederated Salish and Kootenai Tribes, Pablo, Montana, personal communication). It is assumed that fish can pass downstream through the other facilities as well. However, upstream fish passage is impossible at all of them. The construction of these dams was probably one of the primary causes of the decline of bull trout in this portion of the Clark Fork River system.

Many tributary streams also contain dams, including Rattlesnake, Crow, Mission, Post, and Dry creeks. All of these streams, except Crow Creek, are known to have been historic bull trout spawning and rearing streams. The impacts of these tributary dams vary depending on the situation. Some have blocked migratory fish from spawning tributaries and some have created isolated bull trout populations. Each case is unique and the effects should be evaluated on a case by case basis.

Habitat

Rural Residential Development

In recent years the human population in this portion of Montana has been increasing at a rapid rate. Rural residential development may be a risk to the restoration of bull trout in certain drainages such as the Ninemile, Rattlesnake, and Jocko. Development exacerbates temperature problems, increases nutrient loads, decreases bank stability, and increases pressures to alter stream and riparian habitats.

Mining (high risk)

Many areas of the Clark Fork portion of the drainage have experienced mining activity. Most of the damage was done by placer mining, particularly in the St Regis River and Ninemile, Cedar, Trout, and Quartz creeks. In addition, mining impacts from the Butte and Anaconda area in the headwaters of the Clark Fork impacted bull trout at least as far downstream as Missoula. The Montana Department of Health and Environmental Sciences reports that over 153 miles of streams have impaired water quality as a result of mining. Included on this list are Cache, Cedar, Crow, Josephine, Kennedy, Little McCormick, and Trout creeks, the Clark Fork River and Oregon Gulch (MT DHES 1994).

In the Flathead River portion of the drainage, mining has had relatively little impact on known bull trout streams.

Grazing

There are some isolated areas that have been impacted by grazing (particularly in the Flathead portion of the drainage, the Ninemile drainage, and in the Thompson River drainage) but overall grazing is not one of the high risk factors. Nevertheless, where grazing impacts occur, an effort should be made to correct the problems, particularly in core area and nodal habitats.

Agriculture (water quantity and quality)(high risk in Flathead)

In certain portions of the Flathead drainage, agricultural impacts may have been the primary cause of the loss of bull trout from many streams. Stream dewatering for irrigated agriculture was considered a major fisheries problem in the Flathead River portion of the drainage from the 1910's until the mid-1980's. In 1985, the Confederated Salish and Kootenai Tribes were able to established instream flows on streams that are impacted by the FAID. Bull trout streams on the Flathead Indian Reservation are no longer completely dewatered. Although stream dewatering is no longer a major problem in this portion of the drainage, agricultural impacts to water quality remain.

Agricultural impacts to water quality occur in 363 miles of 23 streams in the Flathead and Clark Fork portions of the MCFR drainage (MT DHES 1994). Some of these streams no longer contain bull trout, but others are core areas (for example, Cedar, Rattlesnake and Trout creeks and the Jocko and Thompson rivers). In the Clark Fork portion of MCFR drainage, agricultural impacts to bull trout are a cause for concern but not considered a high risk. However, in the more agriculture intense Flathead portion, impacts to water quality are considered a high risk.

Restoring bull trout migration into Grant Creek may be difficult, if not impossible, due to over-appropriation of water for irrigation and domestic water supplies.

Irrigators on Dry Creek near Superior should be contacted to evaluate whether fish passage during spring runoff can be achieved at the irrigation diversion dam. Passage at this site is essential for migratory spawners because the entire reach of stream below the diversion goes dry during the irrigation season. This effectively eliminates the utility of the reach for spawning and rearing. In nearby drainages, such as Fish and Cedar creeks, some stream reaches dry up seasonally. However, during the spring runoff, migratory bull trout move upstream into the perennial reaches to spawn. If the Dry Creek irrigation dam were improved for fish passage at high flow, it is likely fish passage would occur into upper Dry Creek.

Dam Operations (high risk)

Thompson Falls Dam is owned by the Montana Power Company (MPC) and is operated as a run-of-the river facility. Closed in 1916, this facility was the first to isolate Lake Pend Oreille from its tributaries above Thompson Falls. There is little information on bull trout occurrence in the Clark Fork River prior to dam construction. Currently, the dam is an upstream fish passage barrier and its operation has unknown impacts on bull trout.

Kerr Dam is operated by MPC as a "load-following" facility, meaning that flows from the dam fluctuate from moment to moment. Fluctuating flows are known to have reduced the food base (aquatic macroinvertebrates) in the lower Flathead River, which, in turn, has reduced the carrying capacity of the river for fish (Cross and DosSantos 1988). MPC is currently applying to the Federal Energy Regulatory Commission for relicensing of Kerr Dam. This relicensing application includes protection, mitigation and enhancement for the lower Flathead River. It is possible that, with relicensing, flow regimes from Kerr Dam may be modified to benefit the downstream fisheries.

Tabor Reservoir is an irrigation storage facility. Spawning and rearing habitat is compromised because the only tributary stream (Dry Lake Creek) is completely flooded at full pool and mostly inaccessible at minimum pool. Spawning can only occur when there are suitable lake water levels to inundate passage barriers while still exposing an adequate length of stream. Rearing habitat becomes lentic (without current) during late spring and summer because the entire stream is inundated at full pool. The lack of spawning and rearing habitat raise concerns about the long term viability of this population (Hansen and DosSantos 1993b). Appropriate dam operations are vital for continued successful reproduction in this population.

In the Mission Reservoir and stream complex, the lake environment is the most limiting component of bull trout habitat due to extreme drawdowns for irrigation (Hansen and DosSantos 1993a). The greatest risks to bull trout in this system are hybridization with brook trout, washout of adult fish through the dam, overwinter stress from deficiencies in reservoir habitat, and illegal harvesting (Hansen and DosSantos 1993a). A higher minimum pool was recently negotiated, but further research is necessary to determine the extent to which drawdown affects the bull trout population.

McDonald Reservoir is used for irrigation storage. It supports an isolated, migratory population of bull trout. This population is believed to be more secure than those at Tabor and Mission reservoirs because of adequate pool volume, a high quality spawning stream and the absence of brook trout. Dam operations have a minor negative impact on this population.

Forestry (high risk)

Past forestry practices (road construction, log skidding, riparian harvest, clear cutting, log drives) were often damaging to watershed conditions and are a major contributing cause of the decline of bull trout. The effects of these practices include increased sediment in streams, increased peak flows, thermal modifications, loss of in-stream woody debris, and channel instability.

Evermann (1892) wrote the following about Rattlesnake Creek: "The banks are lined with a heavy growth of trees, bushes, and vines, but this promises not to remain very much longer. The larger timber is being cut off rapidly for wood, which is floated down the stream. At the time of our visit, at least 3 miles of the stream was literally filled with an immense jam of cordwood which had been started down, and above this we saw a constant line of sticks floating by to augment the large amount already in the jam. From the best information we could gain, all of this timber is being cut from Government land, and, whether by Government permission or not, it is certainly to be very greatly deplored."

The Clark Fork River and Fish Creek were also used for log drives (R. Kramer, USFS, Missoula, Montana, personal communication). Log drives were very damaging to fish and fish habitat at the time they occurred. Some of the impacts to the stream channel (eroded stream bed, gouged banks, straightened channel, blocked side channels, lost instream cover and woody debris) no doubt persist into the present (Sedell et al. 1991).

Current forestry practices are less damaging but the risk is still high because of the existing road system, mixed land ownership, and the lingering results of past activities. Over 238 miles of streams have impaired water quality as a result of silvicultural activities in this drainage. Some of these streams include Big Blue, Big, Cedar, Crow, Fishtrap, Little Joe, Little Thompson, Nemote, Rattlesnake, South Fork Fish, Trout, Twelvemile and West Fork Fishtrap creeks and the St. Regis and Thompson rivers (MT DHES 1994).

Kramer et al. (1991) in a study of fisheries habitat on the Lolo and Deerlodge National forests found that percent of surface fines (a measure of fine sediment) in streams is correlated to, among other variables, road densities. Measures of fine sediment in relatively undeveloped watersheds on the Lolo and Deerlodge forests appear to be roughly half of those measured in managed watersheds on the same forests (Kramer et al. 1994).

The Thompson River has a main logging haul road along one side of the stream and a county road along the other side of the stream for nearly its entire length. Many other streams have logging roads in the riparian zone.

Recreational Development

This is a low risk to bull trout in the Middle Clark Fork River drainage.

Transportation (high risk in St. Regis River drainage)

Within this drainage, many rivers were channelized during road and railroad construction, resulting in shortening of stream channels, increased erosion, higher water velocities, and loss of fish habitat. In addition, there is a future risk of toxic spills occurring and materials entering the river. Nearly 184 miles of 14 streams are reported to suffer water quality impairment because of highway, road, and bridge development in this drainage (MT DHES 1994).

The St. Regis River has experienced the most severe impacts from highway and railroad construction. The mainstem Clark Fork is a major transportation corridor. The railroad along the lower reaches of the Jocko River restricts the floodplain and, in some locations, forms a dike.

Population

Life History

The migratory form of bull trout persists in low numbers in the Middle Clark Fork River. Three fragmented migratory populations persist in irrigation storage reservoirs on the Flathead Indian Reservation (Mission, St. Mary's, McDonald lakes). Resident bull trout are found in some tributary streams.

Trend (declining) (high risk)

There is relatively little trend data available. However, limited evidence indicates that migratory bull trout are declining at the present time. Generally, insufficient information is available to determine long and short term population trends.

Distribution/Fragmentation (high risk)

Disruption of migratory corridors leads to the loss of the migratory life history form. Resident stocks living upstream from barriers are at an increased risk of extinction (Rieman and McIntyre 1993). In some cases, barriers protect the species from extinction.

Maintenance of the migratory life history form is needed for the long term survival of the species in this drainage. Although the migratory life form persists and has access to a limited number of tributaries, mainstem Clark Fork River hydroelectric dams and numerous tributary barriers have fragmented populations into separate units. These barriers increase the risk of extinction of the species by limiting genetic exchange and constricting the range of the fish.

Abundance (high risk)

If a population is small enough, random variation among individuals can lead to declines in the population long enough for the population to go extinct. As a population is restricted in abundance, or as the variation in its birth rate or survival increases, the predicted mean time to extinction decreases (Rieman and McIntyre 1993). The abundance risk was judged to be high for bull trout in this basin because of low numbers of migratory bull trout.

Biological Sampling Loss

As a result of research on the impacts of electrofishing on fish, electrofishing techniques and equipment have been modified to minimize injury. There is also a FWP policy minimizing the use of electrofishing in waters containing Species of Special Concern. Overall, the risk of loss of bull trout due to sampling was judged to be minimal.

Angling

The current risk from angling is low as fishing for bull trout is no longer legal in this drainage and Mission and Dry Lake creeks are entirely closed to fishing. However, there is still some slight risk to bull trout from incidental hooking and handling mortality. If, in the future, data indicate that hooking mortality is a significant problem, core areas could be entirely closed to fishing, particularly during the spawning season.

The portions of the drainage that receive the most significant angling pressure are the Clark Fork River (75,791 angler days for Sanders, Mineral, & Missoula counties in 1993), the lower Flathead River (11,256 angler days for Lake and Sanders counties in 1993), the St. Regis River (1,597 angler days in 1993) (FWP 1993), and Fish Creek. Fishing pressure is growing on these rivers at a rapid rate (up 25% on the Clark Fork River, 47% on the lower Flathead River, and 60% on the St Regis River since 1991), and could become a problem for bull trout recovery in the future (FWP 1991 and 1993).

Illegal Harvest (high risk)

Accurate information on illegal harvest is difficult to obtain. However, FWP game wardens have cited several anglers for illegally taking bull trout in this drainage in recent years. Given the low numbers of fish still present, any illegal harvest is a potential problem.

RESTORATION GOAL

The first component of the restoration goal is maintenance of self-sustaining bull trout populations in all the core areas where they presently exist, including the migratory life history form, with maintenance of the population genetic structure throughout the watershed. Under this goal, all existing populations should at least remain stable or increase from current numbers in the future. In addition, the reestablishment of connectivity within the Clark Fork River and between the Clark Fork and Flathead rivers and their tributaries is considered imperative for the long term survival of this species in this drainage.

Due to the large size of the Middle Clark Fork River drainage (as described for this report), the restoration goals are defined individually for three separate areas: the Clark Fork River above the St.Regis River, the Clark Fork River from Thompson Falls dam up to, and including the St.Regis River, and the Flathead River portion of the drainage. Within each of these areas, the goal is to have at least 100 redds or 2,000 total individuals in the migratory populations over a period of 15 years (or at least three generations), with spawning distributed among all the core areas.

Once a restoration plan is finalized and implemented, a monitoring program will need to be developed to determine the success of the program.

SOURCES OF UNCERTAINTY, DATA NEEDS

Migratory Fish

There is a need to determine the areas of the main river and tributaries that are used by migratory fish, their movements, and seasons of use.

Species Interactions

In addition to questions about bull trout interactions with other salmonids, particularly brown trout, there is a need to know more about bull trout - northern pike interactions in the lower Flathead River.

Distribution

Not all tributary streams have been sampled for bull trout. There is also a need to establish a baseline of redd counts and juvenile abundance.

Habitat

Better information is needed on how water temperatures effect bull trout behavior and distribution.

If Kerr Dam mitigation money becomes available, bull trout habitat selection, migration, and species interactions may be possible to identify in the lower Flathead River drainage. Habitat modifications may occur from operational changes at the dam or from on-site and off-site habitat improvement projects. The potential to increase bull trout populations through these projects is unknown.

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APPENDIX A

ACRONYMS

FWP	Montana Fish, Wildlife, and Parks
MCFR	Middle Clark Fork River
MDHES	Montana Department of Health and Environmental Services
TMDL	Total Mean Daily Load
US EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

GLOSSARY

aggrade:	raise the grade or level of a river valley or streambed by depositing streambed material or material or debris
core area:	a drainage that currently contains the strongest remaining populations of bull trout in a restoration area; usually relatively undisturbed habitat
cover:	anything that provides visual isolation or physical protection for a fish, including vegetation that overhangs the water, undercut banks, rocks, logs and other woody debris, turbulent water surfaces, and deep water
disjunct population:	a population found in a headwater lake, that appears to be self-reproducing, but is functionally isolated from the rest of the system
drainage:	an area (basin) mostly bounded upstream by ridges or other topographic features, encompassing part or all of a watershed
entrainment:	displacement of fish from a reservoir through an outlet from a dam or from a river into an irrigation ditch
escapement:	adult fish which return to spawn
fragmentation:	the breaking up of a larger population of fish into smaller disconnected subpopulations
fry:	first-year fish

migratory:	describes the life history pattern in which fish spawn and spend their early rearing years in specific tributaries, but migrate to larger rivers, lakes or reservoirs as adults during their non-spawning time
nodal habitat:	waters which provide migratory corridors, overwintering areas, or other critical life history requirements
redd:	a disturbed area in the gravel, or a nest, constructed by spawning fish in order to bury the fertilized eggs
resident:	fish, which are often found in tributary or small headwater streams, where the fish spend their entire lives
risk:	a factor which has contributed to the past or current decline of the species
restoration:	the process by which the decline of a species is stopped or reversed, and threats to its survival are removed or decreased so that its long-term survival in nature can be ensured
Restoration Team:	a policy-level group with representatives from state and federal agencies, conservation organizations and private industry; created by Governor Racicot to establish a Bull Trout Restoration Plan for Montana
population:	an interbreeding group of fish that spawn in a particular river system (or part of it) and are reproductively isolated
riparian area:	lands adjacent to water such as creeks, streams and rivers and, where vegetation is strongly influenced by the presence of water
Scientific Group:	composed of agency, private and university scientists appointed by the Restoration Team to conduct technical analysis
threat:	a factor which jeopardizes the future conservation of the species
watershed:	a drainage basin which contributes water, organic matter, dissolved nutrients, and sediments to a river, stream or lake (USDA 1995)
Watershed Group:	a group of agency representatives, landowners and recreational and commercial users of a watershed, plus a liaison from the Scientific Group; created by the Restoration Team and charged with developing recovery actions to help restore bull trout

APPENDIX B

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