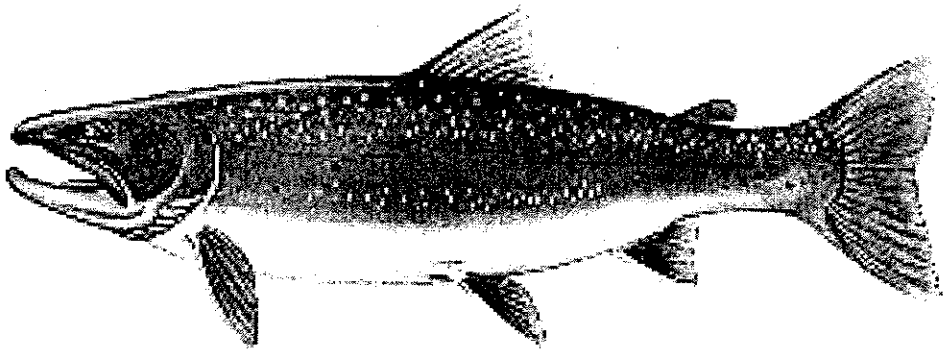
SOUTH FORK FLATHEAD RIVER DRAINAGE
BULL TROUT STATUS REPORT
(Upstream of Hungry Horse Dam)



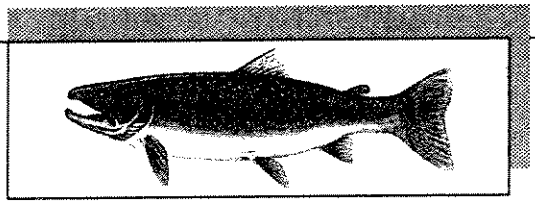
October 1995

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

Bull trout are one of four native salmonid species distributed throughout the Flathead River drainage. They were widespread throughout the interconnected system, but the construction of Hungry Horse Dam in 1953 cut off the South Fork and isolated the fish community above the dam from that of the main river and Flathead Lake. Formed by the dam, the reservoir extends 32 miles upstream and ranges from less than one to five miles wide. The South Fork of the Flathead River extends over 50 miles upstream from Hungry Horse Reservoir to its headwaters in the Bob Marshall Wilderness Area. Migratory fish now reach maturity in Hungry Horse Reservoir or the South Fork Flathead River and spawn and rear in tributaries to these waters.

Risks

The South Fork Flathead River drainage, upstream from Hungry Horse Dam, is the most intact native fish ecosystem remaining in western Montana. The threat of illegal fish introductions, results of which may be highly variable depending on species, is the greatest single threat to the long-term well-being of bull trout in this watershed. Existing threats are primarily tied to impacts from forestry practices in the nonwilderness portion of the watershed. In addition, there is some concern over the uncertainty associated with the impacts of extreme water level manipulations in the artificial lake environment of Hungry Horse Reservoir. Illegal harvest is also a problem in this drainage, due to the high level of remote backcountry use during the fall spawning season (hunting in the Bob Marshall).

Core Areas and Nodal Habitats

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

South Fork include the entire drainages of tributaries to the Reservoir (Wounded Buck, Wheeler, and Sullivan creek drainages), as well as to the river upstream (Spotted Bear River, Bunker Creek, Little Salmon Creek, White River, Gordon Creek, Youngs Creek, and Danaher Creek), and the South Fork of the Flathead River upstream from Gordon Creek.

Nodal habitats are waters which provide migratory corridors, overwintering areas, or are otherwise critical to the population at some point during its life history. Nodal habitats for this population are provided by the South Fork of the Flathead River downstream from Gordon Creek, including Hungry Horse Reservoir.

"Disjunct" bull trout populations exist in Big Salmon Lake and Doctor Lake. Core areas for these populations are Big Salmon Creek upstream of Big Salmon Lake and Doctor Creek upstream of Doctor Lake. Nodal habitats are provided by the lakes themselves.

The Conservation Goal

Because the South Fork Flathead River drainage has been an isolated system for only a short period of time (42 years) biologically speaking, there remains uncertainty as to what factors will be necessary to maintain a healthy bull trout population into the next century. Based on current knowledge, this ecosystem is in a relatively healthy condition as it pertains to bull trout life history requirements, and the Scientific Group believes an appropriate goal is to "conserve" the status quo, rather than striving for "restoration" as in most other watersheds.

The conservation goal for the bull trout population in the South Fork of the Flathead River upstream from Hungry Horse Reservoir is to: Protect and maintain the existing native species complex through natural reproduction; maintain the bull trout population's genetic structure and not allow loss of the existing diversity; determine the age structure of the migratory adult population and ensure it remains healthy; and assure that operation of Hungry Horse Dam does not exceed the

recommended 85 foot drawdown. In addition, it is recommended that a baseline population index be established and population goals developed to maintain or improve those baseline levels.

SOUTH FORK FLATHEAD RIVER DRAINAGE
BULL TROUT STATUS REPORT

INTRODUCTION

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

The Scientific Group reviewed the status of bull trout and the risks to the survival of the species in Montana. In addition, the Scientific Group prepared reports on three significant issues in bull trout restoration: 1) land use impacts, 2) removal and suppression of introduced species, and 3) the use of hatcheries and transplants in restoration. Because the threats facing bull trout vary widely in western Montana, separate reports were prepared for each of twelve major restoration/conservation areas, except for Rock Creek which is included in the Upper Clark Fork report. Delineation of these restoration/conservation areas was largely based on the fragmentation of historically connected systems (Figure 1). Loss of interconnectivity resulted from migration barriers or other habitat changes such as dams, altered thermal regimes or stream dewatering. Each of the twelve restoration/conservation areas presently contains core areas and nodal habitats for bull trout.

This document addresses historic and current status and distribution, and identifies major threats, core areas and associated nodal habitats for bull trout in the South Fork of the Flathead River drainage upstream from Hungry Horse Dam (Figure 2). This population's present range includes Hungry Horse Reservoir and its immediate tributary system as well as the South Fork of the Flathead River drainage upstream from the reservoir.

Figure 1. Bull Trout Restoration/Conservation Areas in Montana

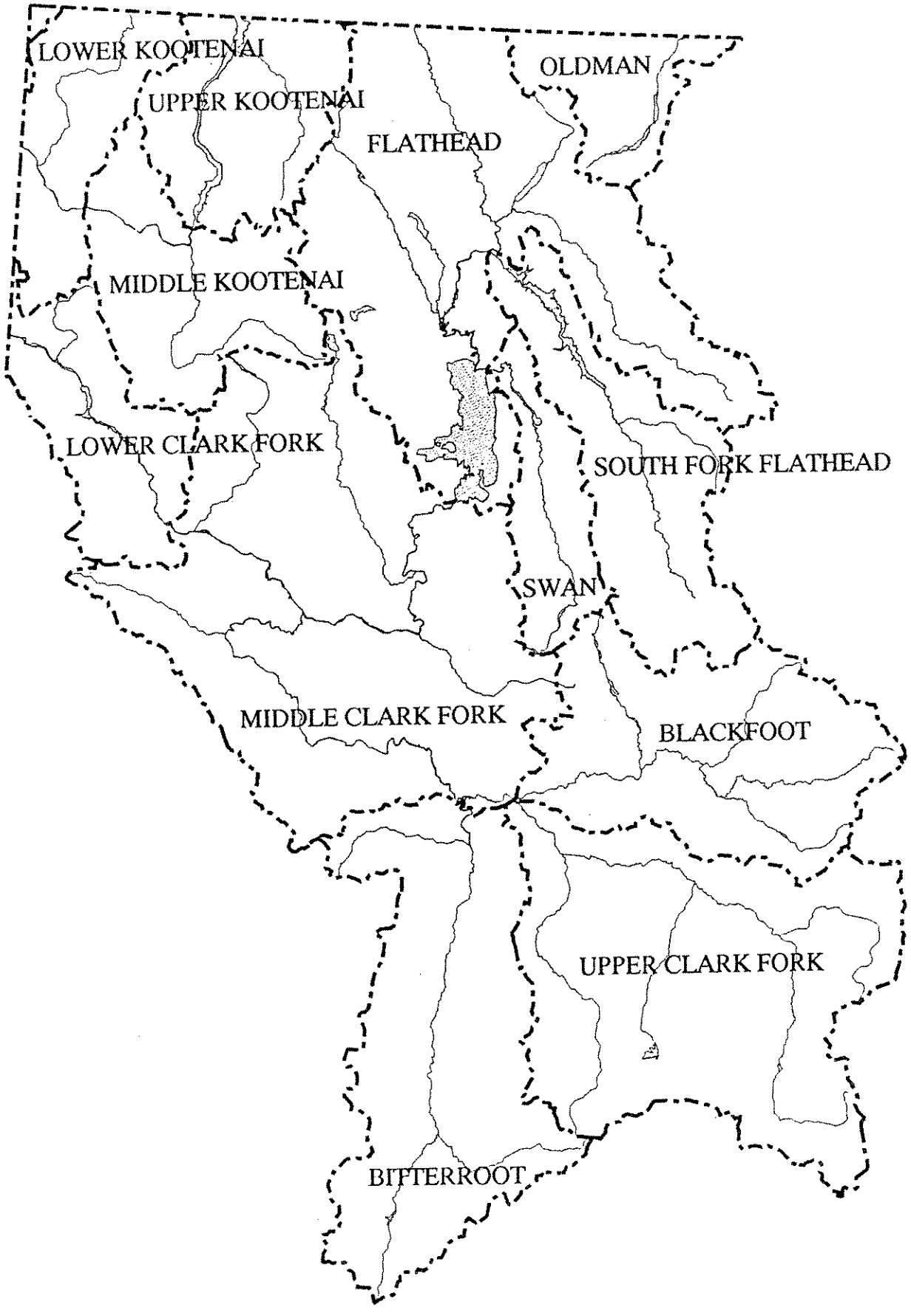
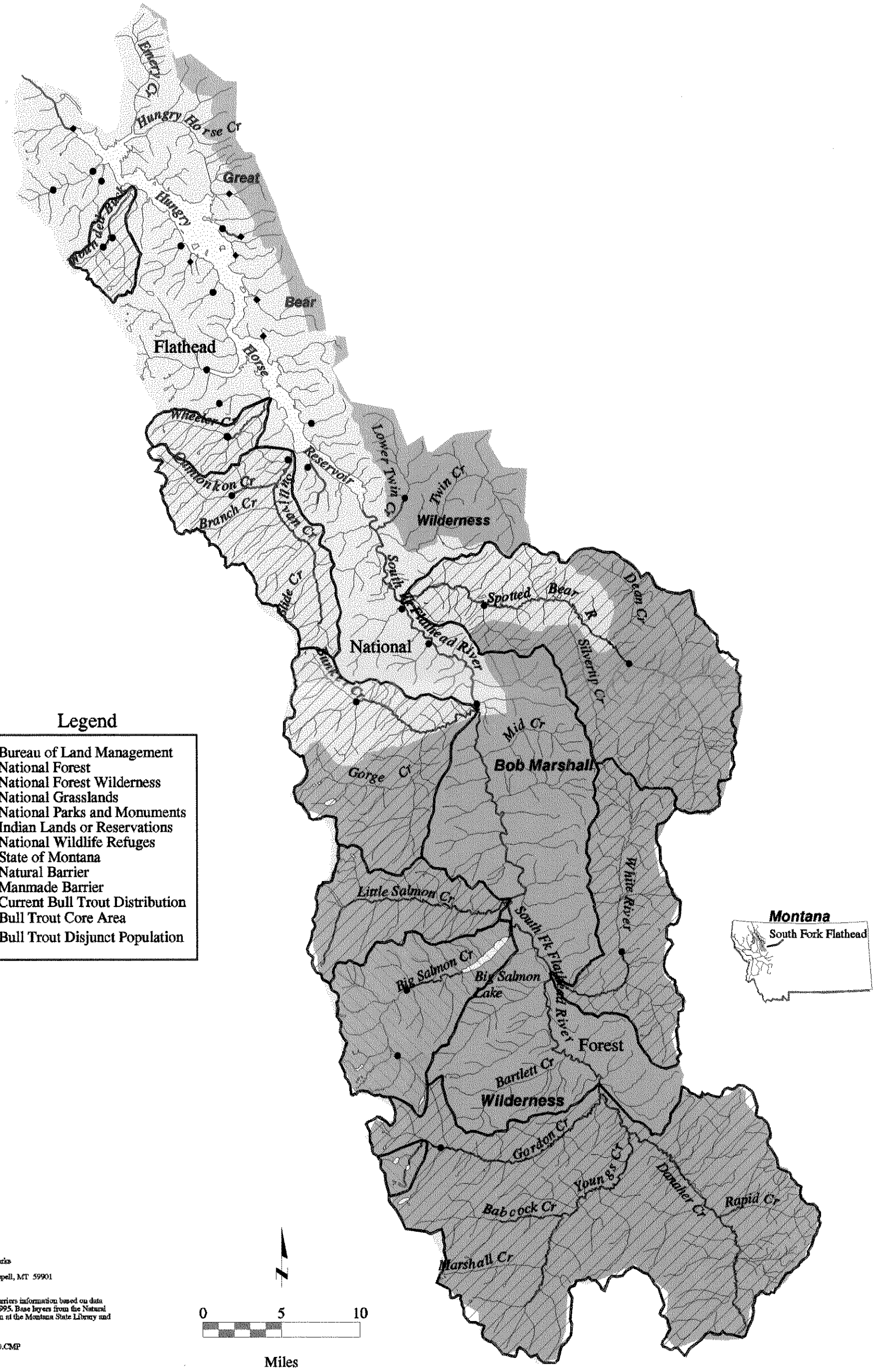


Figure 2. Bull trout distribution and core areas in the South Fork Flathead drainage.



Map produced by:
Jeffrey Hutten
Montana Fish, Wildlife & Parks
Information Services Unit
490 N. Meridian Road, Kalispell, MT 59901
406-751-4571

Bull trout distribution and barriers information based on data collected up to November, 1995. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

May 20, 1996
/GIS/JHFF/BULLTRT/BC10.CMP

Montana Fish, Wildlife & Parks

Other "disjunct" populations of bull trout in the basin are also described. "Disjunct" populations are defined as those in Big Salmon and Doctor lakes that appear to be self-reproducing and functionally isolated from the Hungry Horse portion of the system. In both cases, fish probably pass downstream from these "disjunct" populations into the South Fork Flathead River and/or Hungry Horse Reservoir. Migration from the South Fork upstream into these lakes is physically possible but appears to occur infrequently.

Big Salmon Lake supports a migratory bull trout population which utilizes Big Salmon Creek for about 5.5 miles upstream from the lake to a barrier falls for spawning and rearing. Differences in water temperatures below the outlet of Big Salmon Lake likely discourage upstream movement of spawners from Hungry Horse Reservoir or the South Fork.

Doctor Lake also supports a bull trout population. Little is known about this population. The spawning/rearing area has not been identified but is suspected to be in a short reach of Doctor Creek upstream from the lake.

Most of the bull trout information available in this drainage is on the migratory life form occupying Hungry Horse Reservoir or the South Fork of the Flathead River as adult fish. These fish migrate into tributary drainages to spawn. The juvenile fish rear from one to four years before moving back downstream to the river or reservoir where sub-adults reside several additional years prior to maturity. The resident life form, which spends its entire life cycle in a tributary stream, has not been documented in the South Fork. However, extensive surveys have not been conducted.

Land ownership is entirely within the Flathead National Forest. Reservoir tributaries and the lower third of the South Fork drainage are managed timberlands while the upper two-thirds of the South Fork drainage lies within the Bob Marshall Wilderness Area.

The South Fork has a drainage area of 1,663 mi^2 and an average annual discharge of

3,522 cfs, measured at Hungry Horse Dam (USGS 1995). Water stored in Hungry Horse Reservoir is used for power production, irrigation, recreation, and most recently to provide downstream flows for salmon passage in the lower Columbia River. The usable capacity of the reservoir is 3,451,000 acre-ft., which allows for substantial flood control storage in the headwaters of the Columbia River system.

HISTORIC AND CURRENT STATUS OF BULL TROUT IN THE SOUTH FORK FLATHEAD RIVER DRAINAGE

Historic Distribution

Bull trout are one of four native salmonid species in the South Fork Flathead River drainage and are distributed throughout the Flathead system. The other native salmonids are westslope cutthroat trout (*Oncorhynchus clarki lewisi*), pygmy whitefish (*Prosopium coulteri*), and mountain whitefish (*P. williamsoni*) (Brown 1971). Prior to human intervention, migratory fish occupied Flathead Lake and the main Flathead River as adults, with spawning and rearing occurring in specific tributaries to the North, Middle, and South forks of the Flathead River. The Swan, Stillwater and Whitefish drainages were also part of this interconnected system. Construction of Hungry Horse Dam in 1952-53 blocked access to the entire South Fork of the Flathead River drainage and about 38% of the spawning and rearing area once available to the Flathead bull trout population was cut off (Zubik and Fraley 1987). Bull trout upstream from the dam now reach maturity in Hungry Horse Reservoir or the South Fork instead of in Flathead Lake or the main Flathead River.

Little quantitative information exists regarding historic bull trout distribution and abundance in the South Fork of the Flathead River drainage. Prior to construction of Hungry Horse Dam, this drainage was considered a major spawning and rearing area for the migratory bull trout population from Flathead Lake (Zubik and Fraley 1987). Anecdotal information suggests that large adult fish were seasonally common in the South Fork and several of its major tributaries.

The U.S. Forest Service reported that, in 1937-1938, bull trout were present in Hungry Horse, Wounded Buck, Flossy, Riverside, Clayton, Deep, Logan, Wheeler, Forest, Sullivan, and

Quintonkon creeks, all tributaries to what is now Hungry Horse Reservoir (Flathead National Forest 1948). The lower portions of these streams, including some bull trout habitat, were inundated by the Reservoir. In addition, the report noted bull trout presence in Lower and Upper Twin Creeks, Spotted Bear River, and Bunker, Mid, Black Bear, Bartlett, Gordon, and Youngs creeks, all upstream from the present full pool of the reservoir. It did not appear that this was intended as an all-encompassing list, as one of the tables in the report noted "These species may be found in places other than those listed." In addition, bull trout were noted to be present in Big Salmon Lake and Doctor Lake (Flathead National Forest 1948).

Finally, the report (Flathead National Forest 1948) notes that several previously fishless streams were planted in 1938 with cutthroat trout. These included Lost Johnny, Wheeler, and Emery creeks above unspecified falls; and Big Salmon, Feline, and Pendant creeks above the Barrier Falls in the Big Salmon drainage. It was noted that, in 1938, Graves Creek "above the falls" was "still barren of fish." A 1995 stream survey conducted by Montana Fish, Wildlife and Parks included a walking reconnaissance of Emery Creek from the Reservoir to the headwaters. No falls were encountered. It is uncertain whether a falls occurs below the Reservoir pool level (T. Weaver, Montana Fish, Wildlife and Parks, Kalispell, pers. comm.).

Current Distribution

Originally the South Fork was an integral part of the Flathead Lake and River system utilized by bull trout. The construction of Hungry Horse Dam isolated the South Fork fish populations upstream of the dam from those in the lower river. The reservoir formed by the dam extends for 32 miles upstream and ranges from less than one to five miles wide. The South Fork of the Flathead River extends over 50 miles upstream to its headwaters in the Bob Marshall Wilderness Area (Figure 1). Migratory fish reach maturity in Hungry Horse Reservoir or the South Fork Flathead River.

Gillnet catch rates of bull trout in recent years are similar to those observed historically. Records date back to 1958. Mean catch in sinking gill nets ranged from 4.7 to 6.3 bull trout per net in May and from 2.0 to 6.7 bull trout per net in fall collections. The mean catch rate in the upper reservoir area has been consistently higher than in the areas closer to the dam. The lengths of bull trout captured in gill nets have ranged from 7-to-36 inches (May et al. 1988).

Most of the spawning and rearing habitats for the South Fork bull trout population are located in backcountry areas, so there has not been a great deal of survey work completed. Field crews conducted systematic spawning site inventories for the first time in 1993 (Table 1). All tributaries suspected of providing spawning habitat were surveyed. A total of 366 bull trout redds were observed in the South Fork Flathead drainage. Crews counted 64 redds in non-wilderness tributaries. Wounded Buck, Wheeler, and Sullivan creeks and the Spotted Bear River contained the majority of these redds. Crews observed 302 redds in wilderness tributaries. Little Salmon, Big Salmon, White River, Gordon and Youngs creeks contained the majority of the redds. However, Bunker, Babcock, Danaher, and Rapid creeks provided additional bull trout spawning. No spawning was observed in 21 of the 36 streams surveyed in 1993 (Weaver 1993b).

Based on these findings, eight streams were recommended for a long-term monitoring program. These include Little Salmon, White River, Gordon, Youngs, Wounded Buck, Wheeler, and Sullivan creeks and the Spotted Bear River. Counts in these tributaries were repeated during 1994 (Table 2) (Weaver 1994). Genetic analysis of fish collected from spawning tributaries indicates that many genetically different groups of fish exist in the drainage. However, they mix as juveniles through adults in the South Fork and Hungry Horse Reservoir (Kanda et al. 1994). The sample from Youngs Creek was substantially different from all others analyzed. This suggests that a distinct population of bull trout may exist in the headwaters of the South Fork. Further research is needed before this can be conclusively demonstrated.

Spawning site inventories conducted during 1993 and 1994 provide an index of adult bull trout abundance. Redd numbers can be translated into estimates of adult bull trout in the

watershed above Hungry Horse Dam. Biologists estimated a total population in Hungry Horse Reservoir of 2,932 and 3,194 adult fish in 1993 and 1994, respectively (Weaver 1993b, 1994). Using the 1993 adult population estimate as a basis for comparison with FWP angler survey data, the estimated legal harvest of adult bull trout in 1985, 1991, and 1993 was less than 10 percent of the population annually (FWP unpublished file data, Kalispell).

Current Distribution - Disjunct Populations

Bull trout populations considered "disjunct" currently exist in Big Salmon and Doctor lakes. The Big Salmon Lake population is known to be in a relatively healthy condition (Table 2) but little is known about the population in Doctor Lake which is located in the headwaters of Gordon Creek.

Table 1. **Number of bull trout redds observed in South Fork tributaries during spawning site inventories conducted in fall, 1993. Streams listed in upstream order. Total redds counted were 366 (79 in non-wilderness tributaries, 287 in wilderness tributaries).**

Stream	Number of Redds	Stream	Number of Redds
Doris	0	SF White River	0
Wounded Buck	22	Gordon	35
Wheeler	12	Youngs	40
Clark	0	Hahn	0
Sullivan	25	Otter	0
Quintonkon	5	Cabin	0
Lower Twin	--[1]	Marshall	0
Spotted Bear	13	Babcock	4
Bunker	2	Jenny	0
Harrison	0	Danaher	9
Mid	0	Camp	0
Black Bear	0	Basin	0
Little Salmon	56	Foolhen	0
Big Salmon	92	Rapid	12
Holbrook	0	Spring	0
Burnt	0	Calf	0
Bartlett	0	Bar	0
White River	39	Limestone	0

[1] incomplete count

Table 2. **Number of bull trout redds observed in South Fork tributary monitoring index areas during 1993 and 1994.**

Non-wilderness Tributaries			Wilderness Tributaries		
	1993	**1994**		**1993**	**1994**
Wounded Buck	22	29	Youngs	40	24
Wheeler	12	10	Gordon	35	44
Sullivan	30	11	White River	39	60
Spotted Bear River	13	8	Little Salmon	56	47
			Big Salmon (disjunct)	92	91
TOTALS	77	58	TOTALS	262	266
Total 1993 = 339 Total 1994 = 324					

CORE AREAS AND NODAL HABITATS FOR BULL TROUT IN THE SOUTH FORK FLATHEAD 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 provide the highest quality spawning and rearing habitat.

Core areas in the South Fork include the entire drainages of tributaries flowing directly into Hungry Horse Reservoir (Wounded Buck, Wheeler, and Sullivan creeks), as well as tributaries to the South Fork upstream from the reservoir (Spotted Bear River, Bunker Creek, Little Salmon Creek, White River, Gordon Creek, Youngs Creek, and Danaher Creek), and the South Fork itself upstream from Gordon Creek.

Nodal habitats are waters which provide migratory corridors, overwintering areas or are otherwise critical to the population at some other point during its life history. Nodal habitat for this population is provided by the South Fork downstream from Gordon Creek, including Hungry Horse Reservoir.

"Disjunct" bull trout populations exist in Big Salmon Lake and Doctor Lake. Core areas for these populations are Big Salmon Creek upstream of Big Salmon Lake and Doctor Creek upstream of Doctor Lake. For the latter, further confirmation of the spawning and rearing area needs to be obtained. Nodal habitats are provided by the lakes themselves.

RISKS TO BULL TROUT IN THE SOUTH FORK FLATHEAD RIVER DRAINAGE

The risks to bull trout in the South Fork Flathead River drainage are listed in Table 3. The risks were evaluated by the Scientific Group based on the degree to which a risk contributed to the past and current decline of the species (designated as CURRENT/HISTORIC in the table) and the threat the risk factor poses to future conservation of the fish (CONSERVATION in the table). Those risks which are of greatest concern are noted with an asterisk.

The South Fork Flathead River drainage upstream from Hungry Horse Dam is the most intact native fish ecosystem remaining in western Montana. The threat of illegal fish introductions, results of which may be highly variable depending on species, is the greatest single threat to the long-term well-being of bull trout in this watershed. Existing threats are primarily tied to impacts from forestry practices in the nonwilderness portion of the watershed. In addition, there is some concern over the uncertainty associated with the impacts of extreme water level manipulations in the artificial lake environment of Hungry Horse Reservoir. Illegal harvest is also a problem in this drainage, due to the high level of remote backcountry use during the fall spawning season (hunting in the Bob Marshall).

Environmental Instability (Risk Factors)

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 population if such an event should occur.

The South Fork of the Flathead River drainage is at a relatively low risk of environmental

instability. The upper two-thirds of the drainage is in the Bob Marshall Wilderness Area. The interconnected tributary system buffers potential impacts from catastrophic environmental events. If a localized extinction did occur, it is probable that once conditions again became suitable in the affected area, the bull trout population would be refounded by fish from other parts of the system. Refounding success will likely be high as long as the migratory life form is maintained at adequate population levels. The threat from an extended drought would be of concern due to the fact that Hungry Horse Reservoir could be drawn down as much as 220 feet. If so, critical nodal habitat would be lost or at least significantly reduced.

This drainage has been subject to drought, flooding, and wildfire in recent years. However, the magnitude of these events has been relatively low, from a long-term perspective, and the bull trout population has apparently remained relatively stable.

Introduced Species (Risk Factors)

An early Forest Service report (Flathead National Forest 1948) described fishery conditions in the Flathead Basin in 1937 and 1938 and noted: "At the present time it seems advisable to confine the stocking to native species except in isolated places where introduced species are firmly established." That advice was largely heeded in the remote South Fork Flathead watershed.

Introduced species in the South Fork Flathead River drainage include rainbow trout (*Oncorhynchus mykiss*), Yellowstone cutthroat trout (*O. clarki bouvieri*), rainbow x cutthroat hybrids (*O. mykiss X O. clarki*) and Arctic grayling (*Thymallus arcticus*).

Arctic grayling were stocked into Hungry Horse Reservoir following completion of the dam, with 5.7 million fry planted in 1953-1956 (Gaffney 1959). Apparently, these fish were not able to successfully reproduce. Grayling are also stocked into Handkerchief Lake in the Graves Creek drainage. This population reproduces but is also stocked to supplement angling

Table 3. Risks to bull trout in the South Fork Flathead River drainage. * = High risk; ** = Very high risk.

RISK	CURRENT/HISTORIC	CONSERVATION
Environmental Instability		
Drought		
Landslide/Geology		
Flood/Rain on Snow		
Fire		
Introduced Species		
Private Ponds		
Legal Introductions		
Illegal Introductions		**
Fish Management		
Barriers		
Culverts		
Diversions		
Thermal		
Dams		
Habitat Risk Factors		
Rural Residential Development		
Mining		
Grazing		
Agriculture		
Dam Operations	*	**
Forestry	*	**
Recreational Developments		
Transportation		
Population		
Population Trend		
Distribution/Fragmentation		
Abundance		
Biological Sampling		
Angling		
Illegal Harvest	*	*

opportunity. Occasionally, grayling are observed in Hungry Horse Reservoir, probably drifting down from Handkerchief Lake, but their presence is not perceived to be a threat to bull trout. Many of the high mountain lakes have been planted with rainbow and/or Yellowstone cutthroat trout. Hybridized populations are known to occur in many of these lakes and their outlet streams (Sage 1993). Rainbow trout have been observed in the reservoir, but their presence does not appear to threaten the bull trout population. Native westslope cutthroat trout populations are at risk due to the potential for hybridization with rainbow trout.

Brook trout (*Salvelinus fontinalis*) were recently documented in Devine Lake in the headwaters of Youngs Creek. Brook trout present a major threat to bull trout due to hybridization. Hybridized offspring are generally sterile, but available data suggests this sometimes creates an unstable situation resulting in an overall decline or eventual replacement of bull trout. These brook trout were illegally introduced and the species was not previously known to be present in the South Fork drainage upstream from Hungry Horse Dam. The Scientific Group listed chemical rehabilitation of Devine Lake as a priority on their list of immediate actions and FWP treated this lake in the fall of 1994. Follow-up surveys during the 1995 field season indicate this removal effort was a success, with no brook trout captured in gill nets or observed. Monitoring will be repeated.

Hungry Horse Dam, serving as an isolating mechanism for the watershed upstream from it, could be considered a positive contribution to the fishery resource by precluding the natural spread of introduced species upstream. In the future, this could become even more important as introduced species of fish continue to disperse throughout the mainstem Flathead drainage and may even prove important in isolating the South Fork watershed from natural migrations of other introduced organisms such as the parasite that causes whirling disease.

Private Ponds

There are limited private lands and no private ponds in the South Fork of the Flathead River drainage above Hungry Horse Dam. The Scientific Group recommends that no private pond permits be allowed in this drainage.

Legal Introductions

Montana Fish, Wildlife and Parks historically stocked rainbow and Yellowstone cutthroat trout in many of the high mountain lakes in the South Fork Flathead drainage. Although this practice has been discontinued, hybridized populations are known to exist in many of these lakes and their outlet streams. Present stocking is limited to native westslope cutthroat trout in high mountain lakes. Westslope cutthroat have also recently been experimentally stocked in tributaries to Hungry Horse Reservoir as part of a program designed to mitigate for losses resulting from dam construction and operation.

Illegal Introductions (very high risk)

With the exception of the illegal brook trout plant in Devine Lake, there have been few illegal introductions. However, the future threat is judged to be high. The problems created by illegal fish introductions are the same as those discussed above under agency stocking. The difference is that these illegal efforts are not subjected to environmental analysis, are almost always detrimental, and generally involve warmwater species (bass, perch, pike, walleye) and\or nongame species (minnows, suckers, carp, bullheads). In part, the agency stocking efforts of the past have contributed to this problem by providing closer sources of many of these species for transplant stock. This problem occurs mainly in lakes, and is currently out of control in the Flathead basin. Despite stepped up educational and enforcement efforts the problem has not abated.

Lake trout, walleye, northern pike, brook trout, yellow perch or other species could easily be illegally planted in Hungry Horse Reservoir and could have negative impacts on the bull trout population. The recent proliferation of illegal introductions (over 100 illegal introductions in FWP Region 1 in the last 20 years) is a major concern of fisheries managers, especially in situations such as the South Fork drainage where populations of native species are still viable (J. Vashro, Montana Fish, Wildlife, and Parks, Kalispell, Montana, personal communication). There is also the potential for introduction of disease through illegal stocking.

The closure of Hungry Horse Reservoir to angling for bull trout may result in an increased likelihood of an illegal introduction in the future. If anglers no longer have the potential to catch a trophy bull trout, individuals may introduce some other species to provide this opportunity.

Fisheries Management

Fisheries management in the South Fork Flathead drainage is directed by a management plan compiled in cooperation with a group of citizens who expressed willingness to participate in the planning process. The plan is targeted toward native species management, emphasizing quality, not quantity (FWP 1991b).

Barriers

Culverts

Four tributaries to Hungry Horse Reservoir (Felix, Harris, Murray, and Riverside creeks) are currently blocked by impassable culverts. In most instances, the blockages occur on streams that are potential spawning habitat for westslope cutthroat trout or mountain whitefish. Since these species are a portion of the prey base for bull trout, anything which reduces their number may have an influence on food availability for the bull trout population. In addition, baffles have been placed in two other culverts (Logan and McInernie Creeks) that were perceived to be potential barriers to migration at certain flows. Cutthroat trout redd surveys on McInernie Creek in 1995 indicate passage for spawning westslope cutthroat trout was provided that year (T. Weaver, pers. comm.).

Felix Creek and Riverside Creek may have once provided bull trout spawning and rearing habitat and are now blocked by impassable culverts. There are plans to improve fish passage in several east-side tributaries to the reservoir, including Felix, Murray, and Margaret creeks, as part of Hungry Horse Mitigation efforts.

Diversions

There is only one diversion in the South Fork Flathead drainage. The Forest Service has a microhydro site on Addition Creek which provides power for the Spotted Bear Ranger Station. Addition Creek is not utilized by spawning bull trout due to small size and steep gradient. Incidental use by rearing juveniles, migrating from another spawning tributary, may occur but has not been documented.

Thermal

With the exception of Big Salmon Creek below Big Salmon Lake, there are no thermal barriers in the South Fork Flathead drainage. The naturally warm outflow from Big Salmon Lake probably inhibits migratory spawners from utilizing the creek below the lake. The lake contains a "disjunct" bull trout population which utilizes the drainage upstream for spawning and rearing.

Dams

Hungry Horse Dam disconnected the South Fork Flathead drainage from the main Flathead system. The full ramifications of this loss to Flathead Lake as well as the South Fork are not presently known. Preliminary genetic information suggests that, to a great extent, bull trout populations utilizing the three forks of the Flathead segregated themselves naturally (Kanda et al. 1994). Thus, the genetic diversity of Flathead Lake bull trout may have been reduced as a result of the dam construction. The population remaining upstream from the dam is probably representative of South Fork stocks that existed there historically.

Habitat Risk Factors

Rural Residential Development

There are only a few small tracts of private land and scattered mining claims in the South Fork. Therefore, very limited rural residential development is possible upstream from Hungry Horse Dam.

Mining

The only mining which has occurred in the South Fork Flathead drainage is recreational gold panning. There are, however, a few scattered mining claims (e.g. Baptiste), none of which are currently active.

Grazing

There is no grazing in the South Fork Flathead drainage above Hungry Horse Dam with the exception of stock used by outfitters and recreationists. In some instances, stock grazing is impacting water quality and streambank stability. The trail system in the wilderness is extensive and grazing problems are created in high use areas.

Agriculture

There is no agricultural development in the South Fork Flathead drainage upstream from Hungry Horse Dam.

Dam Operations (very high risk)

Operation of Hungry Horse Dam has resulted in excessive drawdown during recent years. Montana Fish, Wildlife and Parks has recommended a maximum drawdown of 85 feet based on

biological considerations. Since 1988, this recommendation has been exceeded during five of the seven years, as the U.S. Bureau of Reclamation was forced to release water as required to meet the Pacific Northwest Coordinated Agreements for critical water years. Research has shown that reduced reservoir volume directly impacts the size of the aquatic environment for all organisms in the food web. Production of phytoplankton, zooplankton, and aquatic insects are all reduced when drawdowns are extreme. Reduction in the food base reduces the prey available for predator species like bull trout. Reservoir volume can also be greatly reduced, forcing bull trout and other fish species into riverine habitats. Due to the steep slopes in the reservoir, a volume reduction of approximately 80 percent occurs at drawdowns of 180 feet. Montana Fish, Wildlife, and Parks biologists are concerned that the bull trout population in Hungry Horse Reservoir will be damaged by continuing deep drawdowns (FWP 1993b).

Forestry (very high risk)

Due to the proximity of managed lands to critical spawning and rearing habitat around the reservoir, the risk from forestry was judged to be high. Timber harvest began during the 1950's and will likely continue into the future. Differences are obvious when comparing managed lands to the Wilderness Area. Managed lands present much higher risk to bull trout but the percentage of these lands is a relatively small portion of the entire drainage. Based on the 1993 and 1994 redd counts, twenty-one percent of the bull trout spawning in the South Fork drainage occurred in managed drainages.

There are many problems resulting from road systems around the reservoir. Most of the major tributaries on the managed lands have roads in the riparian zone. Streams have been impacted by increased water yields from timber harvest and old road systems (Weaver 1993a). Currently, the Forest Service and FWP are evaluating roads and closures are being proposed. These problem areas must be identified and treated prior to semi-permanent closures going into effect. This year, Flathead National Forest is planning to decommission seven miles of existing road in the Sullivan Creek drainage.

Recreational Development

Stock use and trail systems create erosion problems in most of the critical watersheds. Concentrated human and stock use cause site specific problems, such as sediment delivery, and the spread of noxious weeds which can exacerbate sediment problems throughout the drainage.

Transportation

Point sources of sediment exist on roads around Hungry Horse Reservoir. All other road systems are related to timber management and discussed as part of the forestry risk. As mentioned above, backcountry pack trails are also a significant source of sediment delivery, due to the high usage they receive.

Population Risk Factors

Life History

The migratory life form is known to exist in the South Fork Flathead drainage upstream from Hungry Horse Dam. Adults reach maturity in the reservoir and/or the South Fork Flathead River. Spawning and rearing areas are located in suitable tributary drainages scattered throughout the system. This interconnectedness buffers against local extinction resulting from catastrophic events. The resident life form may be present but has not been documented. Preliminary genetic information suggests a resident population may be present in Youngs Creek upstream from the falls.

Trend

Available data suggests a stable trend. However, data are limited and a longer period of record is required before the risks due to population trend can be fully assessed.

Distribution/Fragmentation

This population's historic distribution has been fragmented by Hungry Horse Dam. Disruption of migratory corridors may lead to the loss of the migratory life form. Impacts to the Flathead Lake population would likely be greater than to the Hungry Horse Reservoir/South Fork population. The dam currently prevents introduced fish species in the main Flathead system from entering the South Fork drainage.

Abundance

The abundance risk is based on the concept that, everything else being equal, populations with few individuals are at higher risk of extinction than populations with many individuals. Without additional information, we cannot assess risk due to abundance. The total adult population of bull trout in Hungry Horse Reservoir was estimated to be approximately 3,000 fish (FWP unpublished file data). It is suspected that the total number of bull trout, including rearing juveniles and sub-adults, exceeds 10,000 individuals.

Biological Sampling Loss

As a result of research on the impacts of electrofishing on fish, electrofishing techniques and equipment have been modified to minimize electrofishing risk. There is also a FWP policy limiting the use of electrofishing in waters containing Species of Special Concern. Annual gillnetting of Hungry Horse Reservoir is estimated to result in mortality of approximately 20 bull trout per year. Overall, the risk of loss of bull trout due to sampling was judged to be minimal.

Angling

Angling regulations for bull trout in the Flathead drainage have been gradually tightened over the past 40 years. The earliest regulations allowed an aggregate limit of 15 trout, but imposed an 18-inch minimum size limit on bull trout. Spawning stream closures first occurred in 1953 in the North Fork and in 1962 in the Middle Fork, but not until recently in the South Fork.

In 1985, bull trout were assigned a separate limit of one fish and the minimum length was dropped. Since early 1995, it has been illegal to harvest bull trout in the portion of the South Fork drainage discussed in this report. The closure was instituted by the Fish, Wildlife and Parks Commission as an emergency precaution, due to the continuing excessive drawdowns of Hungry Horse Reservoir.

Creel surveys conducted by interviewing anglers about their completed fishing trips showed bull trout "catch rates" (include all fish caught) of 0.15, 0.36, and 0.31 fish per angler day during 1985, 1986, and 1989, respectively. "Harvest rates" (include only fish kept) of 0.08, 0.06, and 0.08 fish per angler day were reported (1985 data from May and Fraley 1986; 1986 data from May and Weaver 1987, 1989 data from FWP unpublished file data). Mail angler surveys were conducted by FWP in 1985, 1991 and 1993 (FWP 1989; FWP 1991a; FWP 1993a). Based on estimated number of angler days and creel data, total harvest estimates for Hungry Horse Reservoir were between 200 - 500 bull trout between 1985 and 1993. These estimates include both sub-adult and adult fish. Based on fish lengths obtained during creel census on the reservoir, approximately half of the harvested bull trout were sub-adults (May and Fraley 1986). Using this assumption, an estimated harvest of 100-to-250 adult bull trout occurred annually between 1985 and 1993.

Recent deep drawdowns of the reservoir have apparently reduced angler access and use leading to reduced harvest of bull trout. Only one boat ramp is accessible at drawdowns of greater than 60 feet and it is not functional when drawdown exceeds 130 feet.

The current/historic risk from angling was judged to be moderate. Bull trout harvest is no longer legal in the South Fork or its tributaries. Bull trout harvest was still allowed in Hungry Horse Reservoir until March, 1995. In 1993, anglers expended 2,423 days fishing the reservoir, compared to 8,043 angler days in 1991, an approximate 300% decrease. Anglers expended 9,472 days fishing the South Fork of the Flathead River in 1993, compared to 2,974 days in 1991, an approximate 300% increase (FWP 1991a; FWP 1993a). The most recent estimate of harvest was that less than 10 percent of adult bull trout were taken from the Reservoir in 1993 (FWP unpublished file data, Kalispell). Concerns remain about incidental hooking and handling

mortality from catch and release fishing in both the reservoir and the river.

Illegal Harvest (high risk)

Accurate information on illegal harvest is difficult to obtain. However, there is anecdotal information that concentrations of large bull trout are targeted by poachers. Filleted carcasses of dead bull trout were observed in the South Fork drainage by employees of Montana Fish, Wildlife, and Parks during redd counts in 1993 and 1994. Within the last 25 years, there have been rumors of bull trout smoking operations working in the backcountry area. In areas where the bull trout population is small, the loss of even a few fish is significant. Consequently, this risk to bull trout conservation was judged to be high.

CONSERVATION GOAL

Because the South Fork Flathead River drainage has been an isolated system for a relatively short period of time (42 years) biologically speaking, there remains uncertainty as to what factors will be necessary to maintain a healthy bull trout population into the next century. Based on current knowledge, this ecosystem is in a relatively healthy condition as it pertains to meeting bull trout life history requirements.

The Scientific Group believes an appropriate goal is to "conserve" the status quo, rather than striving for "restoration" as is being considered in most other watersheds. The conservation goal for the bull trout population in the South Fork upstream from Hungry Horse Reservoir is to: Protect and maintain the existing native species complex through natural reproduction; maintain the population's genetic structure and not allow loss of the existing diversity; determine the age structure of the spawning population and ensure it remains healthy; and assure that operation of Hungry Horse Dam does not exceed the recommended 85-foot drawdown. In addition, it is recommended that a baseline population index be established, and population goals be developed that will maintain or improve those baseline levels.

SOURCES OF UNCERTAINTY, DATA NEEDS

Contingency Planning

There is a need to address various scenarios if bull trout numbers decline. We need contingency planning that may include angling regulations, water level management, suppression of introduced species, transplanting or taking some fish into the hatchery for a genetic reserve (see the Scientific Group Issue Paper - "The Role of Hatcheries and Fish Transplants in Bull Trout Recovery"), etc.

Resident Fish

There are numerous uncertainties about the habitat needs of resident fish and whether or not South Fork tributary streams now contain, or are suitable for, the establishment of resident bull trout populations. In addition, we do not understand the mechanisms by which migratory fish become resident and how long this transition may take. A radio telemetry study in Youngs Creek or elsewhere in the drainage might shed some light on these issues.

Distribution and Abundance

We need to expand the information available on the status and trend of bull trout in the main population. In the two "disjunct" populations in Big Salmon and Doctor lakes we need to develop status and trend information and learn more about whether they are truly isolated. We also need a better understanding of the importance of these "disjunct" populations and the downstream corridors to the migratory South Fork population. Finally, we need to evaluate the primary threats to each of the populations and establish appropriate conservation and/or restoration goals for them.

There is a need to establish a baseline population index (redd counts) for long-term

monitoring of the population. Our knowledge would be enhanced by establishing juvenile monitoring programs in selected tributary streams and evaluating these populations to see how they respond to habitat conditions under managed and unmanaged situations.

Food Webs

We need to better understand food web interactions in Hungry Horse Reservoir and how water level fluctuations in the reservoir affect the ecology of bull trout.

Hydropower

The impact of hydropower operations, and resulting reservoir fluctuations on fish populations are not well understood.

Introduced Species

What factors must be considered if we are to succeed in limiting further species introductions in this relatively intact ecosystem? There is a need for long-term monitoring (at least 5 years) of the Devine Lake population to be sure brook trout are not reestablished or reintroduced.

Land Management

The effectiveness of current Best Management Practices (BMP's) and the Streamside Management Zone (SMZ) law in protecting bull trout habitat need to be evaluated. We need to document comparative habitat conditions in the wilderness and the managed portions of the drainage and follow up with a scientific evaluation of what those results may mean to future management prescriptions, including fire suppression, logging, etc. Management programs such as road obliteration need to be monitored to determine their effectiveness at reducing sediment sources.

The culvert replacement proposals should be carefully reviewed, not just in relation to bull trout, but from an ecosystem perspective that includes other native species.

Hydrologic Conditions

We need to evaluate the relationship between "dry" and "wet" years and bull trout spawning success and/or juvenile survival.

Fisheries Management

The apparent conflict between fisheries management objectives for native species and those for recreational fisheries need to be evaluated. Where those conflicts are real, regulations and management programs may need to be reevaluated and/or adjusted. There is a need for more education efforts directed at outfitters who are the "eyes and ears" of the multitude of people using the Bob Marshall backcountry. There is also a need for more enforcement of the bull trout closure during the migration and spawning period (summer/early fall) when bull trout are most vulnerable to poachers.

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APPENDIX A

ACRONYMS

DHES	Montana Department of Health and Environmental Sciences
FWP	Montana Fish, Wildlife and Parks
TMDL	Total Mean Daily Load
UCFRBSC	Upper Clark Fork River Basin Steering Committee
US EPA	United States Environmental Protection Agency
USGS	United States Geological Society

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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