VIII. FISHERIES

Introduction

The following analysis documents the existing condition and potential effects of the Proposed Action, and its alternatives, on the aquatic environment and principal fish species that are part of that environment. This includes consideration of potential effects to Threatened, Endangered, and Sensitive fish species.

Analysis Area/Information Sources

Information for this analysis has been gathered from a variety of sources. The Flathead National Forest and Montana Department of Fish, Wildlife and Parks (FWP) have conducted site-specific fish habitat condition and population status inventories within the watershed for more than twenty years. Forest Service biologists prepared a baseline Biological Assessment (BA) addressing the status of bull trout in 1998 and updated it for the South Fork Flathead River in 2000 (USDA Forest Service 2000).

The project would occur in the South Fork Flathead River drainage, along the Hungry Horse Reservoir. The South Fork Flathead River drainage supports an intact native fish assemblage that is unique for the western United States. Non-native fish, Yellowstone cutthroat (*Oncorhynchus clarki bouvieri*) and rainbow trout (*O. mykiss*) only occur in a handful of high mountain lakes in the Swan Mountain crest that trickle down to the river or reservoir. Another non-native, Arctic grayling (*Thymallus arcticus*), occurs only in Handkerchief Lake, although individuals are occasionally caught in Hungry Horse Reservoir. The South Fork is considered a stronghold for bull trout and westslope cutthroat trout, and has been classified as a high-integrity sub-basin in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) (1997). Management emphasis for fisheries in the analysis area is based on protecting and improving critical spawning and rearing habitat for these important fish. Other native species known to be present in this drainage are mountain whitefish (*Prosopium williamsoni*), peamouth (*Mylocheilus caurinus*), northern squawfish, (*Ptychocheilus oregonensis*), largescale sucker (*Catastomus macrocheilus*), and slimy sculpin (*C. cognatus*). Lake trout (*S. namaycush*) and brook trout (*S. fontinalis*) are not present in the South Fork drainage.

The South Fork Flathead River originates at the confluence of Danaher and Young’s Creeks in the Bob Marshall Wilderness and flows north for 57 miles into the Hungry Horse Reservoir. The Hungry Horse Dam was completed in 1953, and it created the 23,813-acre Reservoir. The dam disconnected the South Fork Flathead River drainage from Flathead Lake; migratory fish from Flathead Lake can no longer access streams in the South Fork drainage. Construction of the dam blocked about 40% of the spawning habitat available for cutthroat trout and bull trout from Flathead Lake. It is estimated that 363-miles of tributary habitat was blocked to Flathead Lake fish because of the dam (FWP 1991). This represents an annual loss of at least 65,500 migratory westslope cutthroat trout and 4,000 to 6,000 adult bull trout to Flathead Lake (FWP 1991). Populations of bull trout and westslope cutthroat trout are declining in Flathead Lake due to changes in the lake's food web, and spawning and rearing habitat changes in tributaries; however, the South Fork Flathead River supports a healthy and stable fish population.

After the Reservoir filled, fish adapted to their new environment and now use the reservoir rather than Flathead Lake for that part of their life history. Thirty-six miles of the 363 stream miles lost to Flathead Lake fish are also lost to South Fork Flathead fish since those reaches were inundated by the Reservoir. Hungry Horse Reservoir supports an estimated 40,000 westslope cutthroat trout greater than 7" in length, and 47,000 bull trout 10" or greater in length based upon gill net samples in 1989 by the FWP (1991).

At a finer resolution, the assessment area focuses primarily upon Hungry Horse, Fire, Spring, Dudley, Tent, Ryle, and Riverside Creeks (Map 3-5, Hydrology section of this Chapter).

The temporal assessment of natural and man-caused disturbances in the analysis area begins with the first road building and the construction of the Hungry Horse Dam and Reservoir; effects will continue as long as the roads and the Hungry Horse Dam are present in the analysis area.

Affected Environment/Existing Condition

This section describes the current condition of the aquatic environment and the principal species that are part of that environment. This assessment is largely based upon data from the FWP, the Biological Assessment for bull trout (USDA Forest Service 2000), and the Soils and Hydrology sections of this document. For each stream, the discussion includes a brief description of fish species and habitat, and any parameters that have changed from the baseline bull trout matrix written in 2000.

Environmental Baseline – Species and Habitat Indicators

Agencies that authorized activity within lands occupied by bull trout are mandated by the Endangered Species Act of 1973, as amended, to consider effects to bull trout and other Threatened and Endangered species that would likely occur because of management actions. Agency biologists use the Matrix of Pathway Indicators (matrix) for bull trout to evaluate and document baseline conditions and to determine the likelihood of “take” of bull trout. Matrix analysis incorporates 4 biological indicators and 19 physical-habitat indicators. Analysis of the matrix habitat indicators provides a thorough investigation of the existing baseline condition and potential impacts to bull trout habitat. Determinations of indicator status are “Functioning Appropriately” (FA), “Functioning At Risk” (FAR), and “Functioning At Unacceptable Risk” (FUR). Baseline status determination project streams can be found in the Section 7 Baseline BA for the South Fork Flathead River, as updated (USDA 2000). These streams will not be included in this analysis since bull trout populations are not present in project streams with the exception of a few individuals that stray into a stream mouth for temperature refugia or feeding forays.

Species Status and Ecology

Bull Trout (Threatened Species)

The Alliance for the Wild Rockies and two other Montana conservation organizations formally petitioned the U.S. Fish and Wildlife Service (USFWS) to list bull trout (*Salvelinus confluentus*) as an endangered species in October 1992. In May 1993, USFWS ruled that the petition had

merit, and on June 10, 1994 they ruled that the listing of bull trout was "Warranted but precluded" due to higher-priority listing actions; it was upgraded to a Category species. Category species are species for which the USFWS has substantial information on hand to support a proposal to list the species as endangered or threatened. Following a lawsuit from the petitioners and the court ruling, the USFWS prepared a proposed rule to list bull trout as threatened in the Columbia River Basin and endangered in the Klamath River Basin (June 13, 1997). The comment period on the proposed rule for bull trout ended October 17, 1997. The final rule to list bull trout as threatened in the Columbia River basin was published on June 10, 1998. A bull trout conservation assessment was completed in 1997 by the U.S. Forest Service, USFWS, FWP, Bureau of Reclamation, Bonneville Power Administration, and the Confederated Salish and Kootenai Tribes to conserve bull trout in the South Fork Flathead River drainage.

Two basic life history forms of bull trout are known to occur: resident and migratory. Resident bull trout spend their entire lives in their natal streams, while migratory bull trout travel downstream as juveniles to rear in larger rivers (fluvial types) or lakes (adfluvial types). The North Fork Flathead River populations are an adfluvial migratory group, with juveniles moving downstream to Flathead Lake at age 2-3, and then returning around age 6 to spawn. Bull trout spawning occurs in the fall, and the eggs incubate in the stream gravel until hatching in January (Fraley and Shepard 1989). The alevins remain in the gravel for several more months and emerge as fry in early spring. Unlike many anadromous salmonids, which spawn once and die, bull trout are capable of multi-year spawning (Fraley and Shepard 1989). The historic range of bull trout stretched from California, where the species is now extinct, to the Yukon Territory of Canada (Hass and McPhail 1991). The decline of bull trout across most of their historic range in the United States resulted in their listing as a threatened species under the Endangered Species Act in 1998.

Several factors have contributed to the decline of bull trout. Habitat degradation, interaction with exotic species, over harvesting, and fragmentation of habitat by dams and diversions, are all factors contributing to the decline (Rieman and McIntyre 1995). A change in the species composition of Flathead Lake is perhaps the most important factor in the decline of the upper Flathead bull trout subpopulation (McIntyre 1998). Between 1968 and 1975, opossum shrimp (*Mysis relicta*) were stocked in three lakes with tributaries feeding into Flathead Lake; the shrimp were then able to migrate downstream and they became established in Flathead Lake. The shrimp were documented in Flathead Lake in 1981, and populations peaked in 1986. Two non-native species, lake trout (*S. namaycush*) and lake whitefish (*Coregonus clupeaformis*), expanded as juvenile fish benefited from the addition of shrimp to the prey base.

It is believed that the expansion of the lake trout and lake whitefish contributed to the decline of bull trout (McIntyre 1998). The mechanisms of the decline are not well understood, however, it is assumed that competition between these fish species was a major contributor to the decline in bull trout. Bull trout populations remain healthy in Swan Lake and Hungry Horse Reservoir. Lake trout are absent from Hungry Horse but have recently been documented in Swan Lake which has raised concern among land and fishery managers.

Bull trout numbers in Flathead Lake have been estimated based upon redd counts. In 1982, the highest bull trout redd count year, about 13,000 adult bull trout were estimated in Flathead Lake

(Weaver 1998). The lowest redd count year was 1996 and adult bull trout were estimated at 916 fish (Weaver 1998). It is important to note that these are gross estimates based on complex assumptions, but these numbers provide an indication of the precipitous rate of decline the population suffered in less than two decades.

Bull trout populations remain strong in Hungry Horse Reservoir; anglers can harvest two bull trout annually using a punch card issued by FWP. There is no bull trout-spawning habitat within the analysis area streams. The gravels are too small and these drainages do not contain the large, alluvial floodplains that produce the groundwater influence typical of bull trout streams. An occasional bull trout may be captured during electrofishing, usually a sub-adult that has entered the stream temporarily to forage. Bull trout do not spawn in the project area.

Westslope Cutthroat Trout (Sensitive Species, Management Indicator Species)

Westslope cutthroat trout is a sensitive species on the Flathead National Forest. A sensitive species is defined as one that is susceptible to activity impacts or habitat alterations. Westslope cutthroat trout has also been identified as a “management indicator species” in the Flathead National Forest Land and Resource Management Plan (Forest Plan). Management indicator species are species used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

The USFWS was petitioned by environmental groups to include the westslope cutthroat trout under the protection of the Endangered Species Act. In 2003, the USFWS determined that the listing was not warranted due to wide species distribution, available habitat on public lands, and conservation efforts underway by state and federal agencies. The Flathead River drainage is considered a stronghold for westslope cutthroat trout throughout its range (Shepard et al. 2003).

Westslope cutthroat trout have two possible life forms, resident and migratory. Migratory forms are further divided into adfluvial (migrates to lakes) or fluvial (migrates to rivers). All life forms spawn in tributary streams in the springtime when water temperature is about 10 Celsius and flows are high (Liknes and Graham 1988). Cutthroat trout spawn when they are about 4 or 5 years old, and only a few survive to spawn again (McIntyre and Rieman 1995). Fry emerge in late June to mid-July and spend one to four years in their natal streams. Resident fish spend their entire lives in tributary streams, while migratory forms may travel several hundred kilometers as they move between Flathead Lake and spawning habitat.

The primary reasons for this species’ decline are similar to those discussed above for the bull trout. Habitat loss is considered a widespread problem. Cutthroat trout have declined due to poor grazing practices, historic logging practices, mining, agriculture, residential development, and the lingering impact of forest roads. Fish have been unable to use countless miles of spawning habitat due to barriers created by dams and road culverts. Genetic introgression with rainbow trout in the Flathead River Drainage threatens long-term persistence of westslope cutthroat trout (Hitt 2003).

Habitat Conditions and Fish Population

While assessing potential effects to bull trout, agencies have concurrently provided an analysis of effects to the primary constituent elements for bull trout designated critical habitat and related habitat indicators. No critical bull trout habitat was designated on National Forest System (NFS) lands. Since there is no private land within the analysis area or the South Fork Flathead River drainage, and no critical habitat on NFS lands, there is no critical habitat within the analysis area.

There is no historical data documenting what fish densities existed in these streams prior to the construction of the dam. These streams currently have some of the highest density of fish compared to other streams in the Flathead Basin (based on population estimates). The higher densities of fish are due to increased productivity in the South Fork Flathead River, which is most likely due to greater amounts of limestone (hence nutrients) in the South Fork.

Historically, habitat conditions would have been in optimal condition. Natural erosional processes have occurred in the drainages, creating pulse disturbances with which the fish have evolved. It is important to recognize some of the streams (Murray, McInernie, Tent, and Ryle Creeks) within the assessment area have a portion of their headwaters within the Great Bear Wilderness. Wilderness and roadless areas are important components in maintaining fisheries populations due to minimizing influences from forest management (ICBEMP 1997).

Current Conditions

Data is presented from the analysis area when available; data is also presented from neighboring streams for comparative purposes since these streams function in a similar manner.

Population Viability

Redd counts for westslope cutthroat trout in the assessment area (as well as redd counts from some other nearby streams that flow into the eastside of the Hungry Horse Reservoir) have been conducted since 1986 (Table 3-39) and juvenile population estimates since 1988 (Table 3-40). This information reveals that the most robust cutthroat streams in the area are Emery Creek, Hungry Horse Creek, Margaret Creek, and Tiger Creek. These streams have been identified as critical spawning habitat for westslope cutthroat trout by the Flathead Basin Commission (1991) and are the only 4 streams in the South Fork Flathead River that have this designation. Genetic sampling results are shown in Table 3-41 (also includes other nearby streams outside the assessment area to provide further references of genetic quality). All of these streams contain pure westslope cutthroat trout.

Table 3-39. Summary of Migratory Westslope Cutthroat Trout Spawning Site Inventories[1]

Year	Emery Creek	Hungry Horse Creek	Margaret Creek	Tiger Creek	Riverside Creek	Murray Creek	McInernie Creek	Harris Creek	Felix Creek	N. Logan Creek
1986	88	93	18	10	--	--	--	--	--	--
1987	74	29	10	7	--	--	--	--	--	--
1988	108	123	37	46	--	--	--	--	--	--
1989	129	118	43	61	--	--	--	--	--	--
1990	29	53	7	20	--	--	--	--	--	--
1991	68	67	17	16	--	--	--	--	--	--
1992	74	69	9	14	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--
1994	--	133	17	23	--	--	--	--	--	--
1995	149	66	23	24	--	--	--	--	--	--
1996	270	121	30	29	0	7	20	1	0	13
1997	--	--	--	--	4	3	22	--	--	8
1998	151	113	46	31	0	3	30	3	6	3
1999	116	70	24	10	--	6	27	5	8	0
2000	149	100	31	19	--	11	--	--	--	--
2001	200	221	32	36	--	18	39	6	18	7
2002	176	129	44	26	--	--	--	--	--	--
2003	188	120	39	26	0	8	27	6	18	8
2004	210	151	23	31	0	10	26	6	14	6
2004	109	63	31	26	--	--	--	--	--	--

[1]Site inventories taken in tributaries to Hungry Horse Reservoir from 1986-2005, and in the passage project streams from 1996-2005.
A double dash (--) indicates that no survey was performed that year.

Table 3-40 displays westslope cutthroat trout population estimates (electrofishing) and 95% confidence intervals in tributaries of the Hungry Horse Reservoir from 1988 to 2005. Sampling was conducted in 150m stream monitoring sections.

Table 3-40. Westslope Cutthroat Trout Population Estimates, 1988-2005

Year	Hungry Horse Reservoir Tributary Creeks												
	Felix	**Emery**	**Lower Hungry Horse**	**Upper Hungry Horse**	**Murray**	**McInernie**	**Harris**	**North Logan**	**Lost Mare**	**Riverside**	**Margaret**	**Tiger**	**Clark**
1988	149	267	82	78	--	198	130	131	93	--	214	157	--
1989	--	188	116	65	--	--	--	--	108	--	119	203	--
1990	94	249	130	115	--	109	53	--	152	--	151	171	--
1991	111	--	--	--	--	152	140	--	--	--	--	--	45
1992	68	--	--	168	25	102	110	61	220	121	152	--	--
1993	101	--	--	154	13	96	215	--	--	--	--	--	69
1994	170	--	--	105	24	--	--	--	--	--	--	--	38
1995	44	--	--	70	40	--	--	--	--	--	100	--	--
1996	61	--	--	81	92	146	101	84	--	93	137	--	--
1997	--	146	--	--	73	94	130	131	93	65	173	153	--
1998	65	63	--	94	122	145	--	--	108	112	197	353	--
1999	128	38	--	147	161	97	53	--	152	92	119	185	--
2000	68	--	--	60	126	114	140	--	--	146	98	83	45
2001	--	--	--	102	--	--	110	61	220	--	57	152	--
2002	--	54	--	82	--	--	215	--	--	--	124	148	69
2003	--	145	--	118	--	--	--	--	--	--	159	197	38
2004	--	--	--	97	--	--	--	--	--	--	116	256	--
2005	--	--	--	100	--	--	101	84	--	--	114	181	--

A double dash (--) indicates no survey was performed that year.

Table 3-41. Summary of Genetic Sampling of Westslope Cutthroat Trout in the Eastside Tributaries to the Hungry Horse Reservoir

Assessment Area Stream	Year	# Fish Tested	Purity (%)
Emery Creek	1982	27	100
Hungry Horse Creek	1982	48	100
Felix Creek	1982	25	100
Ryle Creek	1984	25	100
Tent Creek	1984	27	99
Riverside Creek	1984	24	99
Murray Creek	1984	28	100
McInernie Creek	1984	28	100
Canyon Creek	1984	26	100
Harris Creek	1984	25	100
Paint Creek	1984	17	100

Cutthroat trout in this assessment area are part of the larger meta-population of the South Fork Flathead River. These trout are adfluvial; adults migrate from the reservoir into streams to spawn in the spring. The juveniles rear for 2-3 years in the tributaries prior to returning to the reservoir. Both the populations in the streams and the larger meta-population are at a low risk of extinction since the population size is robust and the migratory form is present (Rieman et al. 1993). Given the importance of these streams in the assessment area to the reservoir fish population, it would be important to maintain spawning and rearing habitat.

Threats to this meta-population would include environmental risks such as drought, floods, fire, and anthropogenic risks. Anthropogenic risks include introduction of exotic species, operation of the Hungry Horse Dam, habitat changes or loss, and exploitation.

Although no exotic species have been stocked within the assessment area, exotic rainbow trout and Yellowstone cutthroat trout were stocked in high mountain lakes west of the assessment area in the 1930s. These fish can travel down tributaries and into the Reservoir where they have access to most tributary streams within the assessment area to spawn. This risk is small given the current population size and current ‘genetic swamping’ efforts, (genetic swamping is the process of overstocking genetically pure fish to dilute hybrid genes in introgressed fish) but in the long-term, attempts should be made to remove this risk and prevent any future exotic introductions (including lake trout (*S. namaycush*)) into the South Fork Flathead River.

Excessive drawdown of Hungry Horse Reservoir below the 85' limit can impact fish populations. Research by Montana Department of Fish, Wildlife and Parks has shown that phytoplankton, zooplankton, and macro-invertebrates are all reduced as reservoir volume shrinks. In addition, zooplankton is lost through the dam as water is released from the surface. These losses reduce the food supply for cutthroat trout, and subsequently for bull trout because they are at the top of the food web.

Habitat degradation has occurred in area streams. For example, stretches of road (Forest Road 38) along Hungry Horse Creek have infringed upon the stream’s natural meander pattern, which

has reduced habitat complexity and increased the amount of fine sediments (note that stretches of Forest Road 546 also infringed on Emery Creek until the road was relocated per the Paint Emery Decision). Other areas have had riparian harvests that reduced the amount of large woody debris in streams. Future risks to fish populations from future habitat degradation should be minimized as habitat restoration, road reclamation, and increased riparian protection measures are implemented. Lastly, most fish passage barriers have been replaced, which has reconnected populations and reduced the risks of isolation.

Risks from angling appear to be small at this time, but if the population size decreases, risks would increase. Many anglers concentrate their fishing in these assessment area streams as adult cutthroat stack up and migrate up the tributaries to spawn. The fish become particularly vulnerable just downstream of road culverts.

Habitat Conditions

In 1955, an interagency survey was completed that looked at fish barriers along both sides of the reservoir. In the project area, Felix, Harris, McInernie, Riverside, Margaret, and Murray Creeks were all identified as having barriers because of Forest Road 38. Over the years, various attempts were made to provide for fish passage: in 1995, baffles were installed on McInernie Creek and the culvert on Margaret Creek was replaced with a bottomless arch; in 1996, culverts on Riverside and Murray Creeks were replaced with bottomless arches; and in 1997, the culverts at Felix and Harris Creeks were replaced. These measures should result in an estimated annual recruitment of 5,200 juvenile cutthroat trout to Hungry Horse Reservoir.

Table 3-42 displays results of McNeil core samples for the percent of fine sediments less than 6.35 mm in spawning gravels. In general, a stream is considered "threatened" if percent fines are greater than 35% and "impaired" if percent fines are greater than 40% (Flathead Basin Commission, 1991). Gravel spawning conditions have been improving since the late 1980s when drought conditions may have led to increases in percent fines; flows were not adequate to flush fines from the gravels. Streams throughout the South Fork drainage are shown for comparison and similar trends. Overall, sediment levels are low, and it would not appreciably impact spawning gravels.

The following table lists the median percentage of streambed material smaller than 6.35mm in McNeil core samples collected from westslope cutthroat and bull trout spawning areas in the South Fork drainage from 1986-2004.

Table 3-42. Percentage of Streambed Material Smaller than 6.35mm in Westslope Cutthroat and Bull Trout Spawning Areas, 1986-2004

Year	South Fork Flathead River Drainage Creeks						
	Hungry Horse	Tiger	Margaret	Emery	Wounded Buck	Little Salmon	Young's
1986	28.4%	23.4%	31.6%	--	--	--	--
1987	34.2%	25.2%	28.0%	--	--	--	--
1988	35.0%	35.5%	34.9%	34.9%	--	--	--

Year	South Fork Flathead River Drainage Creeks						
	Hungry Horse	Tiger	Margaret	Emery	Wounded Buck	Little Salmon	Young's
1989	29.2%	30.2%	33.5%	35.2%	--	--	--
1990	36.0%	31.6%	34.1%	36.4%	--	--	--
1991	36.1%	32.2%	32.9%	35.5%	--	--	--
1992	34.9%	33.6%	34.6%	34.1%	--	--	--
1993	31.1%	32.4%	33.3%	37.4%	--	--	--
1994	29.7%	30.8%	31.6%	31.2%	31.6%	--	--
1995	23.0%	31.9%	32.3%	30.7%	29.9%	27.1%	30.2%
1996	25.8%	32.0%	33.8%	32.7%	31.2%	17.4%	25.3%
1997	27.9%	34.1%	35.3%	34.1%	33.0%	19.0%	27.2%
1998	30.2%	31.6%	34.2%	35.0%	30.6%	--	--
1999	30.4%	32.0%	35.4%	34.6%	31.9%	--	--
2000	31.1%	33.6%	35.1%	34.9%	31.1%	--	--
2001	30.7%	32.1%	34.0%	33.2%	30.4%	--	--
2002	31.8%	34.0%	34.9%	34.1%	32.3%	--	--
2003	30.9%	32.3%	33.9%	34.9%	34.0%	--	--
2004	32.1%	33.8%	34.5%	35.7%	33.9%	--	--

A double dash (--) indicates no survey was performed that year.

Environmental Consequences

Effects indicators used include:

- Change in sedimentation level
- Change in water yield
- Impacts to riparian zones and instream woody debris recruitment

The primary consideration for fish habitat is increased sedimentation that can degrade spawning gravels, reduce winter rearing habitat (filling pools and spaces between gravels) and decreased aquatic insect production (Bjornn et al. 1977, Irving and Bjornn 1984, Weaver and Fraley 1991). These effects directly and indirectly impact fish populations by reducing spawning success, over-winter survival, and food availability.

The effects of increased water yield on fish habitat would be a secondary concern. Increased water yields could cause more erosion on hillsides, more stream-channel erosion, and more bank failures, all of which would increase stream sediment loads (Everest et al. 1985). Furthermore, higher water yields could break open debris jams, suddenly releasing stored sediment loads. High water yields may produce streamflows capable of moving massive amounts of bedload, which could fill pools and displace eggs and insects in the gravel. These effects indirectly affect fish populations by reducing habitat complexity.

Impacts to riparian zones and instream woody debris recruitment are concerns when activity occurs along the stream channel. When a forest is left intact near streams, trees are available for

shade and to fall into the stream channel to become sediment traps, control channel erosion, scour pools, provide a food base for insects, and provide cover for fish (Bryant 1983).

Alternative 1 (No-Action Alternative)

Direct, Indirect, and Cumulative Effects

Direct effects as described in this report refer to fish mortality or disturbance. Indirect effects refer to modification of habitat, which could result in individual or population effects. Vegetation in harvested areas would mature over time, resulting in gradually decreasing water yield for all watersheds and in an improved condition. Existing roads would remain in their present state, and BMP implementation may be delayed until a funding source becomes available. Sediment levels would most likely stay around present levels; however, undersized culverts could plug and fail, resulting in large increases of sediment into streams.

Cumulative effects in the project area include past, ongoing, and proposed activities from timber harvest, road building and maintenance, fires, and other natural events. These activities have and would continue to incrementally affect fisheries habitat and fish populations by increasing peak flows, decreasing channel stability, and increasing sediment inputs. No additional impacts would occur under Alternative 1, fish populations and habitat would remain strong and well distributed.

Alternatives 2 & 3 (Action Alternatives)

Direct and Indirect Effects

Riparian Habitat Conservation Areas

Inland Native Fish Strategy (INFISH) Riparian Habitat Conservation Areas (RHCA) would be established along all wetlands and stream courses. INFISH highlights four roles of a RHCA: 1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams; 2) providing root strength for channel stability; 3) shading the stream; and 4) protecting water quality (Naiman et al. 1992). Processes in riparian areas and streams vary within watersheds. In steep, high-gradient, non-fish bearing streams, RHCAs would be important in protecting water quality, shading streams, influencing and storing sediment, and providing a source of wood recruitment to streams. Farther down in the watershed, the trees would provide shade, roots would provide bank stability, and as trees fall into the stream they would help scour pools and provide cover for rearing; lastly, they would provide a colonization site for aquatic insects.

It is important to understand that processes change along a gradient from the top of the headwater tributaries downstream to main rivers. Understanding these processes in context with the location of the project is important because objectives may vary. For example, if the project were along a headwater fish-bearing stream, retention of large-woody debris along the stream would be critical because that wood would be important for shading, bank stability, filtering sediment, cover, pool formation and insect production. If the project were along a river, the trees would be important for filtering sediment and bank stability. The wood would have a reduced

role in pool formation, cover, shading, and insect production. Other processes (e.g. bank erosion, etc) have an increased role in providing fish habitat in larger rivers.

RHCAs widths would be 300' for all fish-bearing streams in the project area with activities proposed along them (e.g. Hungry Horse, Fire, Ryle, Tent, Riverside, Murray and McInernie Creeks); 150' for perennial non-fish bearing streams (e.g. Ada and Spring Meadow Creeks) and wetlands greater than 1 acre; and 50' for intermittent streams.

No large-woody debris (LWD) would be removed from an RHCA in the project area; consequently, this project would not interfere with the distribution and function of LWD in the stream network. Riparian management objectives would be maintained in all units and stream reaches. The retention of LWD within the RHCA would allow natural recruitment processes to function over time and contribute to the development of the complex habitats essential to bull trout survival (Rieman and McIntyre 1993, Hauer et al. 1999). The INFISH riparian buffer is displayed in Table 2-10 in Chapter 2 of this document.

Timber Harvest

Timber harvest would occur on about 749 acres in 31 harvest units under Alternative 2, and on approximately 355 acres in 20 harvest units under Alternative 3.

The vegetative treatments have been designed to have a minimal effect upon fisheries and water quality; RHCAs would be applied to all units bordering streams. The unit locations are primarily lower in the drainages, which substantially reduces sediment transport and peak-flow effects. Sediment modeling predicted that very little sediment would be generated from the harvest or haul routes.

Riparian values for all watersheds, including water temperature, filtration of sediment and contaminants, large woody debris recruitment, and stream bank condition, would be maintained because of the implementation of RHCAs. The implementation of RHCAs on all stream channels would insure that this project would not retard the attainment of Riparian Management Objectives such as temperature, amount of large woody debris, and frequency of pools.

Road Work

Both Action Alternatives include road related work such as decommissioning (including culvert removals), BMPs, culvert upgrades, and log hauling. Refer to Chapter 2 for a summary of this information.

Temporary Roads

Under Alternative 2, there would be approximately 30 miles of haul route roads in the project area. Nine temporary roads (4.3 miles total) are proposed with two stream crossings in an un-named, fishless tributary to the Reservoir. There would be 3.0 miles of new temporary road construction, and 1.3 miles of historic or naturally revegetated roads, that would be restored and used as temporary road segments. Under Alternative 3, there would be approximately 26 miles

of haul route roads in the project area. Two temporary roads (about 0.5 miles total) are proposed to access Units 26 and 56; no stream crossings would occur under Alternative 3. Culverts would be installed prior to project activity, and would be removed after project implementation is over. Installation of the culverts and construction of the roads would produce an insignificant amount of sediment and should not affect fish due to their location.

Temporary roads used for project implementation would not usually require a stream crossing (except for two in an unnamed tributary), they would be utilized for a short time, and they would be reclaimed upon completion of the harvest within the affected units. Temporary roads would be located on stable soils downstream of spawning reaches. Stream buffers, as described in the INFISH plan, would be implemented around any stream channel near a temporary road. Temporary roads would be rehabilitated following project activities.

Best Management Practices (BMP)

BMP road improvement activities (drive-thru-dips, water flappers, etc.) would be the same for both Action Alternatives and would be implemented on all haul routes. In addition, some non-haul route roads in the project area would receive BMPs; 4.5 miles of road under Alternative 2, and 6.1 miles of road under Alternative 3 (refer to the Hydrology report in the Project File for more information). These activities can affect water quantity or water quality. The BMPs would be implemented prior to log hauling and would minimize effects associated with log hauling. The roads do not parallel streams closely (within 300') and adequate vegetative buffers exist along the streams; therefore, the only entry for sediment into streams is at stream crossings. Installing BMPs would improve existing conditions; however, short-term sediment inputs at stream crossings would likely occur when BMPs are implemented. No roadwork would occur above bull trout spawning streams. Sediment produced from BMPs would not be of the magnitude to affect rearing, i.e. filling of large interstitial areas between large gravels and cobbles. Implementation of BMPs provide long-term benefits by removing water from the road surface and routing water from ditches at intervals that would reduce the likelihood of new streams forming if ditch relief culverts were spaced too far apart.

Culvert Removal or Upsizing

The proposed changes in road management for both alternatives would include decommissioning 13.8 miles of roads and berming 14.9 miles of currently closed roads; gating yearlong 1.3 miles of road currently open yearlong; and leaving open 0.8 miles of road slated to be closed (gated) yearlong under the Paint Emery Decision. Road management work would include upsizing six culverts and removing seventeen culverts.

Culvert removals or upgrades could route sediment directly into the stream channel, thereby impacting fish habitat and fish; refer to the Hydrology section of this Chapter for generated sediment estimates. Mitigation measures would include dewatering and re-routing the stream at each site; performing channel work after July 15 to minimize impacts on spawning; and rehabilitating the site with wattles, filter cloth, shrubs, grass seed, etc. to minimize erosion. Despite these mitigation measures there would be short-term impacts; primarily reducing the quality of spawning gravels as the interstitial areas become filled. Impacts upon growth of juvenile fish could potentially be impacted as the same interstitial areas are important for

invertebrate production and extreme sediment levels reduce rearing space (Suttle et al. 2004). There are long-term benefits associated with the culvert removals and upgrades since the likelihood of culvert failures would be reduced, thereby reducing the amount of potential sediment that would be delivered if a culvert did fail.

Road decommissioning work would be conducted after July 15 to protect westslope cutthroat trout alevin emergence. There is no bull trout spawning within the project area, so no fall restriction would be required. This timeframe would allow some re-establishment of vegetation on these sites, which would help stabilize the soil before the next runoff cycle. Sediment resulting from culvert removal typically arrives in two pulses. The first pulse of sediment is short-term, usually lasting less than four hours, and results from the release of material trapped under and immediately adjacent to the pipe. The second pulse of sediment consists of material entrained during subsequent periods of higher flow, when the stream encroaches upon disturbed banks that have not revegetated (refer to Hydrology section in this Chapter). Foltz et al. (2007) found that sediment concentrations downstream of the culvert outlet (an average of 810m downstream) were similar to sediment concentrations above the culvert for the entire excavation period; therefore, downstream effects to fisheries should be minimized.

The culvert removal and upgrade portion of this project has the highest risk of impacting fish habitat in the short-term because of the risk that sediment from culvert removals would be deposited in spawning reaches. The timber harvest proposed would be much less likely to affect bull trout and westslope cutthroat trout habitat because of the flat ground, low-impact harvest systems, use of BMPs, and retention of INFISH riparian buffers, all of which have proven effective at preventing sediment from being delivered to streams. The amount of sediment expected to result from project activities would not be expected to lead to extensive pool filling and channel instability.

Cumulative Effects

The cumulative effects area would include the assessment area from Hungry Horse Creek to McInernie Creek and Hungry Horse Reservoir. The South Fork Flathead supports an intact native aquatic species assemblage, which is rare in the western U.S. (USDA 1997). Findings from the Interior Columbia Basin Ecosystem Management Project (ICBEMP) confirm that the South Fork has a high aquatic integrity rating and is an aquatic stronghold. All of the streams in the assessment area have strong populations of westslope cutthroat trout where they exist.

There are several past and ongoing actions that may cumulatively affected fish and fish habitat including:

- Paint Emery Resource Management Project
- Personal use firewood cutting on National Forest land
- Operation of the Hungry Horse Dam

Sediment delivered to streams by project implementation by itself, would not be likely to result in major impacts to trout in the watershed. Sediment levels within the watershed did not increase because of the Paint Emery road decommissioning. The sediment increase expected from this project, primarily from the culvert removals and upgrades, may have a short-term negative effect

on the westslope cutthroat trout, primarily on spawning success and young-of-the-year survival. In subsequent years, this project would result in less sediment delivery and a gradual improvement in the quality of habitat. This project, and Paint Emery prescribed burns not yet implemented, would not likely affect other habitat features, such as temperature, cover, or food supply. As mentioned previously, bull trout do not spawn within the project area.

Firewood cutting is regulated by the existing permit system on the Flathead National Forest, and firewood cutting within 300 feet of any stream or lake is prohibited. Firewood cutting would not be expected to affect fish or other aquatic resources; largely because there would be limited areas where open roads allow access within RHCAs.

The Hydrology section of this chapter thoroughly covers cumulative effects from past road construction, timber harvest, and wildfires within the project area concerning sediment yield and water yield. In brief, the McNeil core samples and substrate scores reveal that habitat conditions are as healthy today as they were 20 years ago. Stream environments are very dynamic from year to year, depending on snowpack and annual precipitation; however, they do maintain a long-term equilibrium that is evident here. Both Action Alternatives would have a slight cumulative effect due to the predicted increased sediment levels associated with the culvert removals and upgrades. It is anticipated, based upon past monitoring, that sediment levels would return to near existing conditions within a year.

The operation of Hungry Horse Dam by the Bureau of Reclamation may have impacted fisheries in the past due to extreme drawdowns as low as 180’ below full pool. There have been no extreme drawdowns in recent years, and water levels have been much more consistent year to year. An agreement signed in 2004 by FWP, the Bureau of Reclamation, and Northwest Power Planning Council has limited drawdowns to 20’ below full pool in September. The Hungry Horse Dam itself provides a barrier from upstream invasion of non-native fish such as lake trout and brook trout, two species that are capable of displacing native fish.

Regulatory Framework and Consistency

Regulatory Framework

Management standards for and related to fisheries habitat are contained in the Forest Plan (U.S. Department of Agriculture 1985), pages II-21, II-22, and II-26 – II-35. In addition, a separate management area (MA12) was established for riparian areas where specific standards and guides apply (III-52 to III-60). Lastly, Forest Plan Amendment 3 provides specific direction for important westslope cutthroat and bull trout streams.

The Inland Native Fish Strategy (INFISH) (USDA Forest Service 1995a) amended the Forest Plan on August 30, 1995. INFISH is an aquatic conservation strategy developed by the Forest Service to protect habitat and populations of all native fish (USDA Forest Service 1995a). This interim strategy was designed to provide additional protection for existing populations of native fish, outside the range of anadromous fish, on 22 National Forests in the Pacific Northwest, Northern, and Intermountain Regions. Implementing this strategy was deemed necessary as these species were at risk due to habitat degradation, introduction of exotic species, loss of

migratory forms, and over-fishing. As part of this strategy, the Regional Forester's designated a network of priority watersheds. Priority watersheds are drainages that still contain excellent habitat or assemblages of native fish, provide for meta-population objectives, or have excellent potential for restoration.

INFISH designated RHCAs that pertain to all bodies of water on forest-administered lands. The RHCAs are areas where specific management activities are subject to standards and guidelines in INFISH in addition to existing standards and guidelines in the Flathead Forest Plan. The RHCAs are defined for four categories of stream or water body dependent on flow conditions and presence of fish.

INFISH also established Riparian Management Objectives (RMO), which are stream habitat parameters describing good fish habitat. For this project, five default RMOs would apply, these are: 1) pool frequency; 2) LWD; 3) mean-maximum water temperature; 4) mean wetted-width-to-depth ratio; and 5) bank stability. These default RMOs were intended to be interim standards designed to protect fish habitat until the individual National Forests defined standards suitable to a particular area. In the absence of site-specific standards, the interim standards would apply. No site-specific standards have been defined on the Flathead National Forest.

Status of INFISH Riparian Management Objectives

Surveys aimed at INFISH RMO inventories have not been conducted in streams within the project areas. However, comparisons with inventoried streams on the Flathead National Forest allow some conclusions to be made with a reasonable degree of confidence. All streams should satisfy the INFISH temperature standard; i.e., stream temperatures do not exceed recommended maximums in spawning and holding habitat because the riparian areas are fully intact. There has been very little riparian harvest in the past.

The number of pools per mile likely does not meet the INFISH standard; particularly in the Rosgen B and C stream channel reaches (refer to Hydrology section for more information on Rosgen classifications). This pattern is commonly observed in streams on the Flathead National Forest including wilderness reference reaches, most likely a reflection of differing geology between this region and the Cascade Mountains where the standards were developed. LWD would most likely exceed the INFISH standard by a substantial amount, and should increase because of the fires. Pool frequency should increase over time as the streams recruit LWD.

Width-to-depth ratios on the Flathead National Forest typically exceed the INFISH standard of 10, particularly in the lower gradient reaches where bull trout spawning occurs. Bank stability likely meets or exceeds the INFISH standard of >80% stable. This project would not affect the attainment status of any INFISH RMO because no riparian harvest would occur and water yield would not be increased appreciably; therefore, stream processes would remain unaffected.

The Endangered Species Act (ESA) is responsible for the protection and recovery of listed species such as the bull trout. The bull trout was listed as threatened under ESA in 1998. A stand-alone BA for bull trout to facilitate consultation with USFWS would be prepared for the selected alternative in this project as required by section 7 of the ESA. Another native resident

of the watershed is the westslope cutthroat trout. The westslope is on the Regional Forester's "sensitive species" list.

Regulatory Consistency

Actions proposed under Alternatives 2 and 3 comply with all relevant Forest Plan requirements, including INFISH. If one of these Action Alternatives were implemented, a fisheries biologist would monitor the activity to insure proper implementation of planned actions.

The Endangered Species Act requires consultation between other federal agencies and the USFWS when a proposed activity is determined likely to affect a listed species. If one of the Action Alternatives were selected for this proposal, a BA would be prepared to analyze the effects of the selected alternative on the threatened bull trout. The initial determination for bull trout for all alternatives is "may affect, not likely to adversely affect" due to the culvert removals and upgrades. The Action Alternatives warrant the adverse affect determination largely because of concerns with sedimentation resulting from roadwork. The Action Alternatives would provide a long-term benefit to bull trout because of the road decommissioning, the "may affect" call is due to short-term sediment increases. However, the likelihood of encountering a bull trout is very low due to the incidental use of the streams by bull trout in this area. Bull trout do not spawn in these streams due to the lack of groundwater influence and the size of the streams. Bull trout probably enter these streams to forage and then return to the reservoir. If sediment levels were high during road decommissioning, bull trout would be able to return to the reservoir, thereby minimizing effects on this species.

The Flathead National Forest considers the westslope cutthroat trout a sensitive species and requires a similar effects determination when proposed management activity is likely to affect the species. The basis of the determination comes from the Biological Evaluation of the species status, a separate document located in the Fisheries section of the Project File. The determination for westslope cutthroat trout for all alternatives is "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."

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