BEARTOOTH FRONT STORM DAMAGE
HFRA PROJECT

Fisheries Report
And
Biological Evaluation

USDA
Forest Service
Custer National Forest
Beartooth Ranger District
Red Lodge, Montana

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INTRODUCTION

This report addresses potential effects on fish, amphibians, and their habitats. The analysis area includes all surface waters and wetlands within the proposed project area.

The Report is organized as follows:

APPLICABLE LAWS, REGULATIONS AND POLICY
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- **Presidential Executive Order 12962**
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MITIGATION
MONITORING
REFERENCES

Clean Water Act

The Clean Water Act requires States to identify existing water bodies that do not meet water quality standards, and develop plans to meet them. Montana Water Quality Law, as directed by the Clean Water Act, developed a water quality classification system, developed water quality standards to be applied to various water classes, and identified water bodies that do not meet standards.

Presidential Executive Order 12962

The 1995 Presidential Executive Order 12962 directs Federal agencies to "improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunity by evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order."

Montana Water Quality Law

The Montana Water Quality Act establishes general guidelines for water quality protection in Montana. It requires the protection of Montana's water, as well as the full protection of existing and future beneficial uses.

The Montana Department of Environmental Quality has classified most of the streams within the analysis area as B-1 streams under the Montana Water Classification system, with the exception of the West Fork Rock Creek drainage, which is classified as an A-1 stream. The Administrative Rules of Montana (ARM 17.30.623) require that waters classified as A-1 or B-1 are suitable for the *"growth and propagation of salmonid fishes and associated aquatic life."* Other beneficial uses associated with these classifications include; drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Administrative Rules of Montana (ARM) 16.20.607/618).

Streamside Management Zone (SMZ) Law and Rules

The Montana Legislature passed the Streamside Management Zone (SMZ) Law in 1991 and it became effective in 1993. An SMZ is a buffer strip that provides necessary water quality protection, critical fish and wildlife habitat, and actively regulates high flood flows. This law prohibits certain forestry practices, e.g., equipment operation and broadcast burning, within 50 to 100 feet of streams and/or the immediate boundaries of wetlands. It specifies other criteria, e.g., retention tree requirements and road construction limitations, for this management zone (ARM 2007b).

Stream Protection Act – SPA 124

The Montana legislature enacted The Stream Protection Act in 1965. It requires all government agencies (Federal, State and local) to notify the State of all planned activities that will alter the bed or banks of any intermittent or perennial stream. (MCA 85-5-502 2007). The Montana Department of Fish, Wildlife and Parks administers this Act on Federal land through the SPA 124 permit process.

Custer National Forest Land and Resources Management Plan

Management goals for wildlife and fisheries management are identified in the Custer National Forest Plan under Chapter II - Forest Wide Management Direction and Chapter III – Management Area Direction.

The Forest Plan goal for wildlife and fisheries management is to:

"[M]anage and/or improve key wildlife and fisheries habitats, to enhance habitat quality and diversity, and to provide wildlife and fish-oriented recreation opportunities. Most of the critical habitat areas have been incorporated into management areas that maintain or improve these key habitats. Wildlife and fisheries management is considered in all management areas and the level of wildlife habitat management will increase over time (page 3)."

Forest Plan management standards for wildlife and fisheries management state:

"[M]anage the land to maintain at least viable populations of existing native and desirable non-native vertebrate species promote the conservation of federally listed threatened and endangered species and coordinate and cooperate with appropriate state, federal and private agencies in the management of habitats for major interest species (page 16)."

Goals for Management Area M (Riparian) are:

"Manage to protect from conflicting uses in order to provide healthy, self-perpetuating plant and water communities that will have optimum diversity and density of understory and overstory vegetation (page 80)."

"Adequate tree and shrub vegetation to contribute to stable bank and stream cover will be maintained unless project analysis indicates a need to reduce cover to meet fish or wildlife habitat objectives. Water quality will be protected or improved (page 80)."

Forest Plan standards for Management Indicator Species (page 18) are:

"Management Indicator Species include both biological indicators (those species which represent a whole group of other species that use the habitat similarly), as well as species of high interest, such as the major hunted species and those listed as threatened or endangered. The Custer

National Forest has established a list of management indicator species and habitat indicators based upon National Forest Management Act (NFMA) and planning regulations criteria which include the following categories (page 18)".

Forest Plan standards for Habitat Indicator Species (page 18) are:

Native-strain Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* are designated in the Forest Plan as an aquatic Habitat Indicator Species for cold water habitats.

For the purpose of this report, all wild trout within the project area were considered Management Indicator Species (MIS). In addition to native Yellowstone cutthroat trout, nonnative wild trout occurring in the project area include brook trout *Salvelinus fontinalis*, brown trout *Salmo trutta*, and rainbow trout *Oncorhynchus mykiss*.

Forest Plan standards for Management of fisheries resources (page19) include:

1) "Fish species and habitats will be managed in cooperation with state and other Federal agencies."

2) "An inventory will be made of warm and cold water fisheries potential. In suitable areas, activities will be designed to maintain, develop or create cold and warm water fisheries. Streams and lakes supporting pure strains of fish species will be managed to maintain or expand these populations."

3) "Resource management activities will be conducted in such a manner to assure maintaining water quality and quantity in order to maintain fish habitat. An implementation program will be designed to identify specific activity constraints and will be guided by the following guidelines:"

Forest Plan guidelines for fisheries (page 19) include:

"Riparian vegetation, including shrub and overstory tree cover, will be managed along all perennial streams with defined channels to provide shade, to maintain streambank stability and in-stream cover, and to promote filtering of overland flows."

Sensitive Species

Sensitive species are those animal species identified by a Regional Forester for which population viability is a concern as evidenced by a significant current or predicted downward trend in population numbers, density, or in habitat capability that will reduce a species' existing distribution (FSM 2670.5.19).

Protection of sensitive species and their habitats is a response to the mandate of the National Forest Management Act (NFMA) to maintain viable populations of all native and desired non-

native vertebrate species (36 CFR 219.19). The sensitive species program is intended to be pro-active by identifying potentially vulnerable species and taking positive action to prevent declines that will result in listing under the Endangered Species Act.

As part of the National Environmental Policy Act (NEPA) decision-making process, proposed Forest Service programs or activities are to be reviewed to determine how an action will affect any sensitive species (FSM 2670.32). The goal of the analysis should be to avoid or minimize impacts to sensitive species. If impacts cannot be avoided, the degree of potential adverse effects on the population or its habitat within the project area and on the species as a whole needs to be assessed.

One sensitive aquatic species, the Yellowstone cutthroat trout, is present in the project area. Genetically unaltered populations of YCT persist in Little Rocky Creek in the Benbow Area, and Wyoming Creek in the Main Fork Rock Creek Area.

Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana

The Custer National Forest is a cooperator in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout within Montana (MOUCA) (MFWP 2007). The management goals of the MOUCA are to: 1) ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges, 2) maintain the genetic integrity and diversity of non-introgressed populations, as well as the diversity of life histories, represented by remaining cutthroat trout populations, and 3) protect the ecological, recreational, and economic values associated with each subspecies (MFWP 2007). The MOUCA specifies that maintaining, securing, or enhancing populations entail: 1) protecting, conserving, or restoring habitat (including watersheds that currently support or have a high potential to support cutthroat trout), 2) reestablishing connectivity among isolated populations, and 3) applying regulations that protect cutthroat trout (MFWP 2007).

Montana Forestry Best Management Practices

The 1987 Montana Legislature passed House Joint Resolution 49 which directed the Montana Environmental Quality Council to study the effects of forest management practices on watersheds in Montana. This led to the development of the Montana Forestry Best Management Practices in 1989. These practices are a voluntary approach to addressing non-point source pollution related to timber management activities. As part of the MOU between Region 1 Forest Service and the State of Montana, the Forest Service agrees to implement Montana's Forestry BMP's for all timber management activities on NFS land.

ASSUMPTIONS, METHODOLOGY AND SCIENTIFIC ACCURACY OF INFORMATION USED

Stream and riparian systems within proposed treatment areas of storm damaged portions of the Beartooth Ranger District were assessed during the 2007 field season. For this report,

descriptions of affected environment and the environmental analysis are based on general reviews of the project area, site-specific field reviews**,** fish and amphibian population and distribution data, reach specific aquatic habitat data, and interpretation of effects to water resources (see Water Quality section) and the subsequent effects to aquatic habitat and biota therein.

AFFECTED ENVIRONMENT

Fish and Amphibian Distribution

Fish bearing streams and lakes occurring within the project area include: 1) East Fork Fishtail, West Fork Fishtail and Little Rocky creeks in the Benbow area, and 2) Hellroaring, Wyoming, and Rock creeks, and Greenough Lake in the Main Fork Rock Creek area. The remaining, much smaller perennial systems in the project area, including Dale Creek in the Benbow area, and 7 unnamed headwater tributaries, are not known to support fish.

Amphibian habitats present within the treatment area include isolated wetlands in portions of Unit 58 (Little Rocky Creek drainage) and Unit 60 (West Fishtail Creek drainage), and Greenough Lake (Unit 45) in the Main Fork Rock Creek drainage.

Yellowstone cutthroat trout are the only sensitive fish species present in the project area. Nonnative wild trout occurring in the project area include brook, brown, and rainbow trout. Potential sensitive amphibian species include the Northern leopard frog *Rana pipiens* and Western toad (Boreal toad) *Bufo boreas*. Non-sensitive native amphibians present in the project area include the Columbia Spotted frog *Rana luteiventris*, Boreal Chorus frog *Pseudacris maculata*, and Tiger salamander *Ambystoma tigrinum*.

Yellowstone Cutthroat Trout (Oncorhynchus clarki bouvieri)
Yellowstone cutthroat trout (YCT) historically occupied approximately 17,397 miles of habitat in the western U.S., including, from east to west, the upper portions of the Yellowstone River drainage within Montana and Wyoming and the upper Snake River drainage in Idaho, Wyoming, Nevada and Utah (Behnke 1992; as reported in May et al. 2003). In Montana, YCT were historically widely distributed throughout the upper Yellowstone River basin and its tributary streams, ranging as far downstream as the Tongue River (MFWP 2005).

Yellowstone cutthroat trout inhabit relatively clear, cold stream, river, and lake environments (Young 2001). Spawning typically occurs in spring and early summer, after flows have declined from their seasonal peak, in sites with suitable substrate (gravel less than 85 mm in diameter), water depth (9-30 cm), and water velocity (16-60 cm/s) (Varley and Gresswell 1988; Byorth 1990; Thurow and King 1994; as reported in Young 2001). Upon emergence, fry immediately begin feeding, typically in nearby stream margin habitats, but they may also undertake migrations to other waters (Gresswell 1995; as reported in Young 2001). Sexual maturity is generally achieved by age 3 or older. Yellowstone cutthroat trout and rainbow trout readily hybridize, producing fertile offspring; sympatric populations often form hybrid swarms

(Allendorf and Leary 1988; Henderson et al. 2000; as reported in Young 2001).

Throughout their historic range, YCT trout have undergone substantial declines in distribution and abundance (Young 2001). Genetically unaltered YCT occupy 7 to 25% of historical habitats (May et al. 2003). The distribution of stream resident YCT on the Custer National Forest (CNF) is restricted from its historic range; eleven genetically pure YCT populations currently occupying less than 30 miles of stream habitat on CNF. Few lake dwelling populations of YCT are thought to have existed in Montana historically (MFWP 2006). At present, a purported 179 lakes support pure populations in Montana (MFWP 2006). Most stream populations of YCT are at risk of extinction from either hybridization or demographic or stochastic influences (MFWP 2005). Genetically unaltered YCT inhabit about 73 lakes and 27 miles of stream on the Custer National Forest. Watershed distribution and stream miles occupied by genetically unaltered YCT in the project area are provided in below (Table 1).

Table 1. Stream populations of genetically unaltered YCT on Custer National Forest within or transected by project units.

WATERSHED (HUC 6)	WATERSHED NAME[1]	STREAM MILES WITH YCT
100700050501	Little Rocky Creek	3.0 (0.8)*
100700060901	Rock Creek/Wyoming Creek (Wyoming Creek)	2.0 (0)*

[1] Parenthesized stream name below watershed name identifies the tributary occupied by YCT if different from watershed name.

* Stream miles with YCT within the unit boundaries of the proposed project.

Northern Leopard Frog (Rana pipiens)

The Northern leopard frog historically ranged from Newfoundland and northern Alberta in the north to the Great Lakes region, the desert Southwest and the Great Basin in the south (Maxell 2000). A number of isolated populations historically existed in the Pacific Northwest and California (Stebbins 1985; as reported in Maxell 2000). In Montana they have been documented across the eastern plains and in many of the mountain valleys on both sides of the Continental Divide at elevations up to 6,700 feet (Werner et al. 2004).

The Northern leopard frog is found in, and adjacent to, permanent slow moving or standing water bodies with considerable vegetation, but may range widely into moist meadows, grassy woodlands and even agricultural areas (Nussbaum et al. 1983; as reported in Maxell 2000). Adults feed on invertebrates, but may cannibalize smaller individuals. Adults overwinter on the bottom surface of permanent water bodies, under rubble in streams or in underground crevices that don't freeze. Northern leopard frogs breed from mid-March to early June (Maxell 2000). Mating occurs when males congregate in shallow water and begin calling during the day (Maxell 2000). Eggs are laid at the water surface in large, globular masses of 150 to 500 (Maxell 2000).

Juveniles may move as much as 8 kilometers from their natal ponds to their adult seasonal territories (Dole 1971; as reported in Maxell 2000). Young and adult frogs often disperse into marsh and forest habitats, but are not usually found far from open water (Maxell 2000).

Over the last few decades the Northern leopard frog has undergone declines across much of the western portion of their range (Stebbins and Cohen 1995; as reported in Maxell 2000). Most Northern leopard frogs in western Montana became extinct in the 1970's or early 1980's. The only 2 population centers known to exist in western Montana are near Kalispell and Eureka (Maxell 2000). However, the northern leopard frog is still abundant and widespread in southeastern Montana and northwestern South Dakota (Reichel 1995; as reported in Hendricks and Reichel 1996). Although this species is relatively common on the Ashland District of the Custer National Forest, there have only been three recorded observations of this species on the Beartooth District. All of the sightings were recorded pre 1970 and were in the East Rosebud Creek drainage (near East Rosebud Lake). There have been no Northern leopard frog observations in the proposed project area.

Western Toad (Boreal Toad) (Bufo boreas)

The Western toad (*Bufo boreas)* is currently recognized as two subspecies ranging from the Rocky Mountains to the Pacific Coast and From Baja Mexico to southeast Alaska and the Yukon Territory (Stebbins 1985; as reported in Maxell 2000). They are found in a variety of habitats, including wetlands, forests, sagebrush meadows and floodplains. Western toads inhabit all types of aquatic habitats ranging from sea level to 12,000 ft in elevation (Maxell 2000). The subspecies of Western toad found in Montana is the boreal toad (*Bufo boreas boreas*).

Adult and juvenile toads are freeze intolerant and overwinter and shelter in underground caverns, or rodent burrows (Maxell 2000). Adults feed on a variety of ground dwelling invertebrates and are known to eat smaller individuals of their own species. Adults must utilize thermally buffered microhabitats during the day, and can be found under logs or in rodent burrows (Maxell 2000). Because of their narrow environmental tolerance (10-25 ^{o}C throughout the year), adults are active at night and can be found foraging for insects in warm, low-lying areas (Maxell 2000). Breeding typically occurs from May to July in shallow areas of large and small lakes, ponds, slow moving streams and backwater channels of rivers (Black 1970; Metter 1961; as reported in Maxell 2000). Tadpoles metamorphose in 40 to 70 days and can be found in dense aggregations adjacent to breeding grounds (Werner et al. 2004).

In the northern Rocky Mountains Western toads have undergone declines. Surveys in the late 1990's revealed they were absent from a number of areas they historically occupied. While they remain widespread across the landscape, they appear to be occupying only 5 –10%, or less, of the suitable habitat (Maxell 2000). Based on these findings the USFS listed the Western toad as sensitive in all of Region 1's National Forests, and initiated a regional inventory in Montana. As a result, a systematic inventory of standing water bodies in 40 randomly chosen 6th level hydrologic unit code (HUC) watersheds was completed across western Montana during the summer of 2000. Results indicated they were widespread, but extremely rare. The Western toad has been documented on the Beartooth Plateau, at altitudes as high as 9,200 ft (Werner et al.

2004). Two Western (Boreal) toad records exist for the Beartooth District, but none have been documented in the project area. These records include a 1970 sighting on the Red Lodge Creek Plateau and one in the upper Stillwater River drainage in 2003.

Watershed Condition and Stream Habitat Characteristics

Natural disturbance and human induced activities can and to some extent have, impacted aquatic resources within the project area (Tables 2 and 3). Of the activities listed in Table 2, past timber harvest has had a relatively low degree of impact in the analysis area, and past fire suppression activities have likely increased the risk of catastrophic wildfires throughout the project area.

Table 2. Degree of impact from past, present and reasonably foreseeable activities on aquatic resources in the project area.

ACTIVITY	RESULTING CONDITION	DEGREE OF IMPACT IN ANALAYSIS AREA
Fire Suppression	Fire fighting that interrupts the natural ecological processes affected by wildland fire. There are moderate to excessive fuel accumulations across the project area.	Moderate to High
Wild Fire	Several small fires between 1994 and 2004 (total of about 2,000 acres)	Low
Grazing	Bank alteration, channel over widening, sediment introduction, fish habitat modification	Low to Moderate
Beaver Reduction	Lower water tables, smaller willow communities and less wetland/riparian/aquatic habitat	Low to Moderate
Fishing	Injury due to catch & released fishing, and harvesting of catchable fish (Little Rocky and Rock creeks and Greenough Lakes)	Low to Moderate
Recreation (non-fishing)	Introduction of sediment and non-biodegradable products into the water (Little Rocky and Rock creeks, and Greenough Lakes)	Low to Moderate
Water Diversion	Diversion of water from streams, lakes, ponds, and springs to irrigate crops and/or livestock (Fishtail, Little Rocky, and Rock creeks)	Moderate to High
Timber Harvesting	Past timber harvests in the East Fork Fishtail Creek, Little Rocky Creek, Rock Creek drainages were limited in extent and generally not located in riparian areas, and have likely recovered, having negligible effects on aquatic systems.	Low

Roads and Road Maintenance	Introduction of fine sediments where roads cross or parallel streams. Water quality concerns were identified for portions of roads in the Little Rocky Creek drainage in the 2007 Beartooth Travel Management DEIS.	Low to Moderate
Herbicide and Pesticide Application	Spraying for noxious weeds, treatment for non-native fishes.	None to Low
Foot & Horse Trails	Sediment introduction	None to Low

Project area streams are classified B-1 for water quality beneficial uses using the state Department of Environmental Quality water quality classification system. The Water Quality Report fully details the respective designations of these classifications; significant among them for this analysis is the growth and propagation of salmonid fish.

Stream channel types in the Rosgen classification system are alphanumeric classifications of streams based on geomorphologic and stream substrate characteristics (Rosgen 1996). The most common Custer National Forest stream channel types are Rosgen A and B, but all types are present. Streams bearing unaltered Yellowstone cutthroat trout populations on CNF are primarily Rosgen B channels, often with inclusions of A channel types in the upper most headwaters and short C channel inclusions within lower gradient reaches of the predominant B channel.

Rock Creeks generally has moderate entrenchment, sinuosity and gradient with cobble and boulder sized substrates (Rosgen B3 streamtype). Less entrenched segments result in decreased gradient and substrate size (C4 streamtype) and higher sensitivity. Little Rocky, Fishtail, and Wyoming creeks are relatively high gradient with moderate entrenchment and sinuosity, and boulder sized substrate (Rosgen B2a streamtype). B channel types with large substrate are relatively resistant to changes in streamflow or sediment loads.

Among the most important long-term effects of forest management on fish habitat in the western North America has been changes in the distribution and abundance of large woody debris in streams (Hicks et al. 1991). Large woody debris can influence salmonid fishes by scouring pools, redistributing gravel, fine sediments, and organic matter; creating spawning areas, providing refuge from predators and ice scour, and providing cover during high winter flows (MacInnis et al 2008). Large woody debris plays an important role, hydrologically and in forming aquatic habitats, in all of the streams in the analysis area to varying degrees.

Timber harvest can also result in accelerated delivery of sediment to the stream course. Excessive sediment entering stream channels can affect channel shape and form, stream substrates, the structure of fish habitats and the structure and abundance of fish populations (Everest et al. 1987, Hicks et al. 1991, Waters 1995, McIntosh et al. 2000). Streams are not similar in terms of their inherent sensitivity to changes in streamflow or sediment discharge, their inherent stability, or their ability to recover from sediment related change (Rosgen 1996, Hogan and Ward 1997). Stream habitats described in terms of pools, riffles and spawning gravel are geomorphic entities that are selectively influenced or controlled by channel type, streamflows

and sediment inputs (Rosgen 1996, Hogan and Ward 1997). Potential sediment effects to trout vary according to life-stage specific habitat requirements, habitat conditions (quality) and habitat availability (quantity) (Everest et al. 1987, Bjornn and Reiser 1991, Hicks et al. 1991, Hogan and Ward 1997). Sediment effects on adult and juvenile trout can occur when sediment concentrations exceed the capacity of the channel and pools fill or riffles become more embedded. Adverse effects to young trout (egg through fry life stages) can occur when fine sediment concentrations increase in spawning gravels (Bjornn and Reiser 1991, Hicks et al. 1991, Waters 1995).

Spawning gravel is the sorted product of bed scour and redeposition from which sand and finer material has been removed and transported downstream. The maintenance of good spawning gravel requires that the stream's normal sediment supply contain relatively low amounts of fine material, and that stream-flows and gradients be sufficiently high to flush out fines (Bjornn and Reiser 1991, Waters 1995, Kondolf 2000). If inputs exceed the stream's sediment transport capacity, then concentrations can increase in spawning gravels and affect survival of incubating eggs and emerging fry. Increased sediment delivery rates may also in-fill breeding, rearing, and over-wintering habitat for amphibian species (Maxell 2000).

Pools are the result of local scour or impoundment induced by structural controls (e.g., boulders, large woody debris) in the channel or streambank (Rosgen 1996, Hogan and Ward 1997). Pools are areas of higher velocity during peak flows, but at low flows their depth creates a depositional environment for fine sediment. Increased sediment can influence the amount and quality of juvenile and adult pool habitat if sediment increases are sufficient to alter channel morphology by filling in pools and increase width/depth ratios.

ISSUES

Sensitive and MIS Aquatic Species (Fish and Amphibians): Effects of the proposed activities on water resources and the subsequent effects to aquatic habitat and biota.

Concern: Increased fine sediment in streams has been shown to reduce habitat quality and cause adverse effects to aquatic biota (Chapman 1988). Storm damage cleanup and fuel reduction activities along stream corridors could reduce riparian integrity and bank stability (Chamberlin et al. 1991), and could reduce the amount of large woody debris (LWD) recruited to stream channels. LWD in mountain streams creates structurally diverse and complex habitats that are important for all life stages of fish (Hicks et al 1991). There are two primary concerns:

1) Storm damage cleanup and fuel reduction could increase sediment delivery to stream channels and degrade water quality and aquatic habitat.

2) Storm damage cleanup and fuel reduction could influence riparian and wetland integrity and streambank stability and reduce the amount of LWD available for recruitment to stream channels.

Table 3 – Past and present human activities, natural events, stream channel types and sensitivity, and fish and amphibian habitats within the project area.

WATERSHED NAME	PAST HARVEST ACRES[1]	PAST FIRE ACRES[1]	FS ROADS MILES[1]	TOTAL ROADS MILES[1]	WINDFALL ACRES[1]	DOMINANT CHANNEL TYPE AND SENSITIVITY	STREAM MILES SUPPORTING FISH IN THE PROPOSED TREATMENT AREA	AMPHIBAN HABITAT ACRES IN THE PROPOSED TREATMENT AREA
WF Fishtail Creek	0	1	0	0	2,250	B - Moderate	0.6	4
EF Fishtail Creek	13	0	0	0	897	B - Moderate	0.6	0
Lower Little Rocky Creek	57	10	9	20	119	B - Moderate	0	0
Upper Little Rocky Creek[2]	71	24	24	25	2536	A & B – Low to Moderate	0.8 (0.8)*	3
Rock Creek-Wyoming Creek[2]	54	424	41	42	285	A & B – Low to Moderate	3.4 (0)*	2

[1]Totals derived from Water Quality Report
[2]Sensitive Species Occupied Watersheds: Yellowstone Cutthroat Trout
*Miles of Yellowstone Cutthroat Trout Occupied Habitat in the Analysis Area

Indicator: Units of measure: equivalent clearcut area acres (ECA), number of stream crossings, miles of new system or temporary roads, and large woody debris frequencies in selected areas. Determine potential for riparian, streambank stability and LWD related effects to aquatic species and habitat, accounting for aquatic mitigation measures.

ENVIRONMENTAL EFFECTS

The following analysis describes anticipated direct, indirect, and cumulative effects to riparian integrity, fish and amphibian habitat and populations. Effects are discussed in terms of risk of causing measurable changes to aquatic habitat and biota in relation to impacts to water quality and quantity. These risk determinations are often identified as negligible or not detectable; meaning that the changes to the aquatic environment imposed by the proposed activities cannot be distinguished from natural variation, or from variations that are occurring from existing or past activities.

a. Effects of the No-Action Alternative

DIRECT EFFECTS

Direct effects are those that "are caused by the action and occur at the same time and place" (40 CFR 1508.8). Direct effects are those effects resulting in the direct mortality of fish or amphibians, or the immediate destruction of fish or amphibian habitat.

There are no directs effects associated with the no-action alternative.

INDIRECT EFFECTS

Indirect effects "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (ibid). Indirect effects would be effects resulting in changes to fish and amphibian populations and habitats as a result of increases in either water or sediment yield across the project area, and the overabundance of in channel LWD in the short-term and reduction of future standing LWD or long-term recruitment. Such indirect effects include: potential for altering the rate in which sediment or woody debris enters the stream channel, modifying temperature regimes by reducing riparian shading, changes in streambank stability due to near-bank activities, decreases in terrestrial invertebrate populations as a result of riparian vegetation loss, and fine sediment accumulation in the redd environment, leading to oxygen deficiency for maturing embryos and decreased survival.

Indirect effects to aquatic habitat and species under the No Action Alternative would result from excessive amounts of large woody debris (LWD) recruited to stream channels and riparian areas in localized reaches. For instance, wind fallen LWD in the lower reaches of upper Little Rocky Creek, a Yellowstone cutthroat trout occupied reach, overwhelms the streambank and bed for a distance of nearly one-half of a mile. In this area, there are few standing trees within a 100ft buffer of either side of the stream

channel and LWD frequencies within and spanning the wetted channel are estimated to be 40 to 60 pieces per 100 linear feet, conservatively. In contrast, LWD inventories in a similar reach immediately upstream of the windfall area had an average of 8 pieces of LWD within and spanning the wetted channel per 100 linear feet, with moderately dense conifer stands buffering the channel on both sides. Therefore, densities of LWD in impacted areas likely exceed the range of variability that these stream systems have developed under. These areas are now subject to high intensity riparian burns and are also prone to excessive scour of streambed and banks at higher flows when LWD is mobilized. Subsequently, aquatic habitats and species, including the Yellowstone cutthroat trout, within these windfall reaches could be impacted dramatically if riparian fuel loads and in-channel LWD densities are not decreased.

As summarized in the Water Quality Report, human activities or natural events that remove or destroy a significant amount of timber canopy have the potential to alter hydrologic processes. Loss of timber canopy can result in increase water yields, increase snowmelt rates, and accelerate instream erosion processes. The resultant increased sediment loads can have deleterious effects on salmonids and amphibians as discussed in the Watershed Condition and Stream Habitat Characteristics section.

Equivalent clearcut area (ECA) estimates were provided in the Water Quality Report to help determine levels of forest canopy reduction. ECA values for windfall in fish and amphibian occupied watersheds in the analysis area are summarized in Table 4. West Fork Fishtail and Upper Little Rocky watersheds are at or slightly above levels that could produce measurable changes in annual water yields and possibly streamflows, and could potentially impact aquatic habitats and species as discussed above. However, as concluded in the Water Quality Report, there is a low risk of existing levels of windfall causing substantial increases in streamflow downstream of the immediate blowdown areas. Therefore, localized areas similar to and including the impacted reach in upper Little Rocky Creek discussed previously may experience flasher runoff events, increased streamflows for short durations, and decreases in aquatic habitat stability and quality. Subsequent impacts to fish and amphibian populations in these stream systems would likely be localized and would not impact the entire population.

Table 4 – Summary of Water Quality Report ECA analysis by fish and amphibian occupied watersheds in the proposed treatment area.

WATERSHED NAME	HARVEST ECA ACRES[1]	FIRE ECA ACRES[1]	ROAD ECA ACRES[1]	Windfall ECA ACRES[1]	ECA – EXISTING ACRES[1]	% HUC ECA EXISTING[1]
WF Fishtail Creek	0	0	0	1,715	1,715	19
EF Fishtail Creek	2	0	0	673	676	10
Lower Little Rocky Creek	10	1	39	68	118	2
Upper Little Rocky Creek[2]	14	7	49	1,910	1,980	29
Rock Creek-Wyoming Creek[2]	8	159	81	214	461	1

TOTAL	**34**	**167**	**169**	**4,580**	**4,950**	**61**

[1]Totals derived from Water Quality Report
[2]Sensitive Species Occupied Watersheds: Yellowstone Cutthroat Trout

CUMULATIVE EFFECTS

Cumulative effects are defined as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CFR 40 1508.7).

Cumulative effects are therefore spatial and/or temporal environmental effects to fish and amphibian habitat resulting from the additive, repeated, and synergistic effects of other actions. Primary activities within the analysis area include fire, timber harvest, road maintenance, recreation, fishing, livestock grazing, and water diversion (Tables 2 and 3). These human induced and naturally occurring activities will continue to cumulatively affect aquatic habitat by modifying the way sediment, water, and wood enter and travel through stream channels, altering riparian vegetative community structure, and inducing other habitat perturbations.

Stream channels throughout the project area generally have stable stream banks with a very low to moderate sensitivity to disturbance (Table 3). ECA condition is at or slightly above levels that could produce measurable changes in annual water yields and possibly streamflows in West Fork Fishtail and Upper Little Rocky watersheds (Table 4). There is also potential for wildfire throughout the project area and in some cases excessive fuel loads in riparian areas could produce high intensity burns, and if followed by a high precipitation or flashing runoff event, could be detrimental to local fish and amphibians and their habitats, including Yellowstone cutthroat trout in the Little Rocky Creek drainage. In this event, streams would eventually stabilize as vegetative recovers. However in some areas, already isolated and fragmented populations of trout may be lost before recovery is achieved and the aquatic environment stabilizes (Little Rocky Creek). Native, common amphibian populations may be displaced until wetland areas and lake environments recover, but populations are not expected to be impacted under this scenario.

The cumulative effects of the No Action Alternative on aquatic resources, when combined with past activities and natural processes, may have a negative impact on wild trout populations (sensitive and MIS), nonsensitive native amphibian species, and their habitats as risk to riparian and aquatic environments is expected to remain at current levels or increase. Adverse cumulative effects from this Alternative are possible because indirect effects associated with excessive windfall (primarily in riparian areas) could impact fish and amphibian populations, thereby compounding the effects of past activities and natural processes on the aquatic ecosystem.

b. Effects of the Action Alternative

DIRECT EFFECTS

Direct effects are those effects resulting in the direct mortality of fish or amphibians, or the immediate destruction of fish or amphibian habitat. Under the Action Alternative, construction of stream crossings (log bridges, armored fords, or culverts) for equipment access to windfall areas and equipment use along riparian areas and wetlands, are the only actions that could impose direct effects on aquatic species. Protection measures included in the proposed action would ensure the physical integrity of riparian areas, wetlands, and stream courses and direct mortality of individual aquatic species as a result of this action is expected to be negligible to nonexistent. All stream crossings would meet the requirements of SMZ regulations, Montana Forestry BMP's, and MFWP 124 permit stipulations. Additionally, temporary crossing would be fully rehabilitated once the project was completed. Sediment generation should be minimal, short in duration, and localized.

INDIRECT EFFECTS

Indirect effects would be effects resulting in changes to fish and amphibian populations and habitats as a result of increases in either water or sediment yield across the project area, and the overabundance of in channel LWD in the short-term and reduction of future standing LWD or long-term recruitment. Such indirect effects include: potential for altering the rate in which sediment or woody debris enters the stream channel, modifying temperature regimes by reducing riparian shading, changes in streambank stability due to near-bank activities, decreases in terrestrial invertebrate populations as a result of riparian vegetation loss, and fine sediment accumulation in the redd environment, leading to oxygen deficiency for maturing embryos and decreased survival.

Indirect effects to aquatic habitat and species under the Action Alternative would primarily result from sediment production anticipated from the proposed activities that utilize machinery. However, as mention under the Direct Effects of the Action Alternative, protection measures included in the proposed action would ensure the physical integrity of riparian areas, wetlands, and stream courses and direct mortality of individual aquatic species as a result of this action is expected to be negligible to nonexistent. Also, LWD retention in the Stream Management Zone, and addition retention guidelines for in-stream and streambank LWD (that conservatively compliment pre windfall conditions and provide increased protection) would be implemented under the Action Alternative.

Adverse indirect effects are not expected from the proposed treatments, but long-term beneficial effects are. A reduction in timber canopy has already occurred as a result of the windfall events and thinning and some prescribed burning activities in these areas are expected to reduce the potential for high intensity wildfire, decrease the risk of streambed and bank scour, and allow for faster regeneration on stream banks and riparian buffer areas. Additionally, proposed activities will affect a minimal amount of actual timber

canopy across a minimal amount of watershed area, and therefore also have little additional influence on aquatic species and water (Table 5).

Table 5 – Summary of Existing ECA and Proposed Treatment by Watershed

WATERSHED NAME	ECA – EXISTING[1]	% HUC ECA EXISTING[1]	PROPOSED TREATMENT[1]	%HUC TREATMENT[1]
WF Fishtail Creek	1,715	19	55	1
EF Fishtail Creek	676	10	34	0
Lower Little Rocky Creek	118	2	108	2
Upper Little Rocky Creek[2]	1,980	29	123	2
Rock Creek-Wyoming Creek[2]	461	1	237	1
TOTAL	4,950	61	557	**NA**

[1]Totals derived from Water Quality Report
[2]Sensitive Species Occupied Watersheds: Yellowstone Cutthroat Trout

CUMULATIVE EFFECTS

Cumulative effects are therefore spatial and/or temporal environmental effects to fish and amphibian habitat resulting from the additive, repeated, and synergistic effects of other actions. Primary activities within the analysis area include fire, timber harvest, road maintenance, recreation, fishing, livestock grazing, and water diversion (Tables 2 and 3). These human induced and naturally occurring activities will continue to cumulatively affect aquatic habitat by modifying the way sediment, water, and wood enter and travel through stream channels, altering riparian vegetative community structure, and inducing other habitat perturbations.

The proposed actions are anticipated to: 1) have minimal additional influence on water yield and streamflow, 2) reduce the risk of high intensity wildfire in riparian areas, 3) ensure the physical integrity of riparian areas, wetlands, and stream courses through incorporated protection measures, SMZ regulations, Montana Forestry BMP's, and MFWP 124 permit stipulations, and 4) direct mortality of individual aquatic species as a result of this action is expected to be negligible to nonexistent.

The cumulative effects of the Action Alternative on aquatic resources, when combined with past activities and natural processes, should be beneficial to aquatic resources, including wild trout populations (sensitive and MIS), nonsensitive native amphibian species, and their habitats. Risk to riparian and aquatic environments is expected to decrease and these areas should stabilize more rapidly under the Action Alternative.

Short-term vs. Long-term Productivity

There are no short-term versus long-term productivity issues for aquatic habitat or species under any alternative.

Irreversible/irretrievable Commitments

There are no irreversible/irretrievable commitments on aquatic habitat or species under any alternative.

Unavoidable Adverse Effects

There are no unavoidable adverse effects on aquatic habitat or species under any alternative**.**

Effects by Alternative Summary - Biological Evaluation

No Federally listed threatened or endangered fish or amphibian species, designated critical habitat, fish or amphibian species proposed for Federal listing, or proposed critical habitat occur in the project area. Yellowstone cutthroat trout, a Forest Service sensitive fish species, are present within the Little Rocky Creek and Wyoming Creek drainages in the project area, and no sensitive amphibian species are suspected present within the project area. The project area is within the historic distribution of the Western (Boreal) toad and Northern Leopard frog. Table 6 summarizes the potential effects to aquatic sensitive species and Management Indicator Species in the project area.

Table 6. Potential effects of the alternatives on sensitive and management indicator (MIS) aquatic species in the project area.

SENSITIVE AND MIS SPECIES	NO ACTION ALTERNATIVE	ACTION ALTERNATIVE
Yellowstone cutthroat trout	MIIH	MIIH
Northern leopard frog	NI	NI
Western (Boreal) toad	NI	NI
Wild Trout*	MIIH	MIIH

NI = No impact
***MIIH** = 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.
WIFV = Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability of the population or species.
BI = Beneficial impact
MIS = Management Indicator Species (Wild Trout)

MITIGATION

The underlying goal of protection measures for riparian and aquatic habitats is to follow a functional definition of riparian zone consistent with CNF Plan and FSM direction, and consider riparian vegetation in relation to stability, integrity, and meeting needs of

riparian zone dependent species including fish and fish habitat. Measures included in the vegetation treatment prescription are intended to meet several objectives:

1. To protect riparian vegetation and soil in a manner that maintains an effective sediment filter.
2. To protect riparian vegetation in a manner that allows for effective thermal regulation.
3. To protect the integrity of stream channels, and banks, and wetlands
4. To maintain an effective source of LWD of larger sizes classes for fish habitat
5. to maintain floodplain stability
6. To maintain diverse, complex aquatic habitats (e.g., maximizing LWD) which are critical for long-term persistence of fish and amphibian populations.

The effects on aquatic species and habitats assume all of the following is incorporated and implemented as standard operating procedures:

1) Best Management Practices
2) Streamside Management Zone Law and Rules
3) Alternative practices to SMZ, to include retention of streambank and bed LWD
4) Stream Permits, including 124 permits from the Montana Department of Fish, Wildlife and Parks, and 404 permits from the US Army Corps of Engineers.
5) CNF Fisheries and Hydrology personnel should be involved in marking SMZ and wetland boundaries, and should mark all streambed and bank retention LWD.

MONITORING

Effectiveness monitoring will be essential to determining if proposed prescriptions are effective at protecting or improving aquatics resource. A long-term trend monitoring plan is recommended to determine if the proposed management is improving riparian conditions at a satisfactory rate.

A Forest level BMP Audit should be scheduled and completed on select treatments and roads within 2 years of full project implementation.

Large woody debris frequency should be inventoried in treatment areas to insure stream retention guidelines were adequately followed and to evaluate the efficacy of the prescription for future recommendations on similar proposed actions.

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