YELLOWSTONE CUTTHROAT TROUT
RESTORATION IN THE UPPER BOULDER RIVER WATERSHED

Montana Fish, Wildlife & Parks

Draft Environmental Assessment

May 20, 2011

PART 1. PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Montana Fish, Wildlife & Parks is proposing to replace existing rainbow trout fisheries in the upper Boulder River drainage (south of Big Timber) with Yellowstone cutthroat trout (YCT). Rainbow trout would be removed from Fourmile Creek and part of Meatrack Creek, the six Rainbow Lakes, Mirror Lake, and Rainbow Creek. Rainbow trout removal would take place by gill netting in the lakes and piscicide application in flowing water. Yellowstone cutthroat trout would be stocked in the treated waters for several years to establish self-sustaining populations. This project is part of an overall plan to establish a genetically pure, self-sustaining population of Yellowstone cutthroat trout in the large, interconnected upper Boulder river system. A previous project, completed in 2009, successfully replaced the rainbow trout population in Silver and Prospect lakes (Fourmile Creek drainage) with YCT. The waters proposed for this treatment are the primary remaining sources of rainbow trout genetics in the entire area. By replacing them with genetically pure YCT, the entire system will eventually trend toward being composed of a large metapopulation of YCT. Such opportunities for large-scale YCT recovery are increasingly rare.

B. B. Agency Authority for the Proposed Action:

FWP "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under statute 87-1-702.

Implementation of this project would require authorization from the U.S. Forest Service to use piscicides within the Absaroka-Beartooth Wilderness. The Forest Service would authorize the use of piscicides through the analysis provided within this EA.

The Forest Service decision is subject to appeal pursuant to 36 CFR 215.11. Only individuals or organizations that submitted comments or otherwise showed interest in this project may appeal. A written appeal must be submitted within 45 days following the publication date of the legal notice of this decision in the Bozeman Chronicle, Bozeman, Montana. It is the responsibility of the appellant to ensure their appeal is received in a timely manner. The publication date of the legal notice of the decision in the newspaper of record is the *exclusive* means for calculating the time to file an appeal. Appellants should not rely on date or timeframe information provided by any other source. See Appendix A for Forest Service Administrative Review or Appeal Opportunities process.

C. Estimated Commencement Date: July 15, 2011.

Estimated Completion Dates: September 15, 2013
Phase 1: Removal of rainbow trout and rainbow/cutthroat hybrids in Rainbow Lakes and Mirror Lake via gill netting, summer 2011- summer 2012
Phase 2: Removal of rainbow trout and rainbow/cutthroat hybrids in Fourmile Creek, Meatrack Creek and Rainbow Creek, summer 2012- summer 2013

D. Name and Location of the Project: Yellowstone cutthroat trout restoration in the upper Boulder River watershed.

The upper Boulder River watershed is located approximately 50 river miles south of Big Timber, Montana. The project area is primarily public land administered by the Yellowstone Ranger District (Figure 1) in compliance with the Gallatin National Forest Plan. The majority of the project area lies within the Absaroka-Beartooth Wilderness Area. All of the waters proposed for treatment currently support self-sustaining populations of rainbow trout and rainbow × cutthroat hybrids.

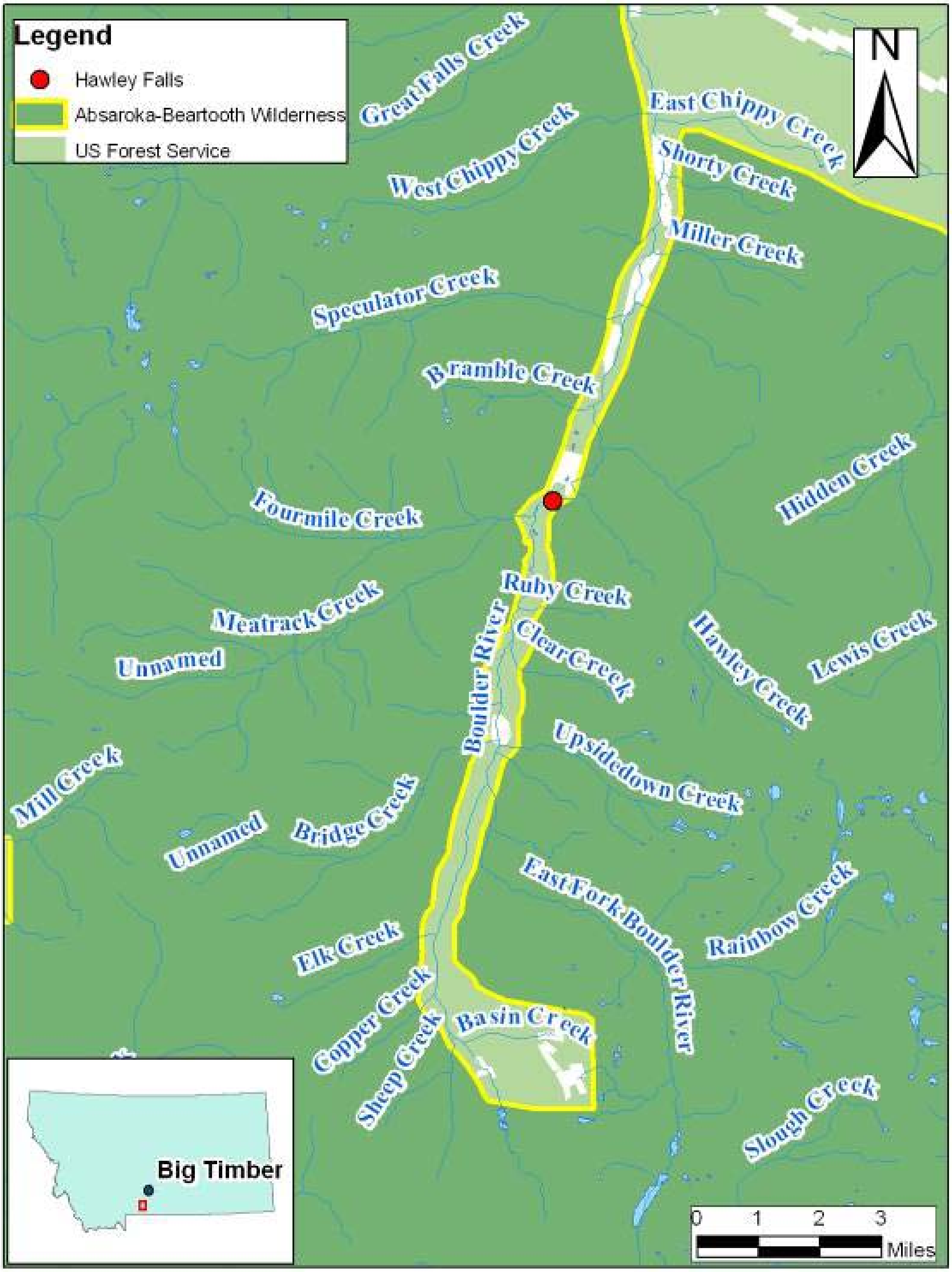

Figure 1: Map of the project area.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open Space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – 0 acres;
5. Floodplain – 0 acres
6. Irrigated Cropland - 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres
10. Other – Lake acres affected – 65.6, Stream miles affected – 18.5

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action.

1. Summary of the Proposed Action:

Introduction

The Boulder River originates in the Absaroka and Beartooth mountain ranges in south central Montana and flows north-northeast approximately 60 miles prior to joining the Yellowstone River in the town of Big Timber. The Boulder contains two major tributaries, the West Boulder River and the East Boulder River, as well as a large number of small tributaries. The majority of the land on the main Boulder downstream of Natural Bridge Falls is privately owned. Upstream of the falls, most of the land is publicly owned (Gallatin National Forest) with a number of small in-holdings containing private camps and church-owned facilities.

Above Natural Bridge Falls, the Boulder River fishery is a reflection of fish species that were historically stocked in the river, its tributaries, and headwater lakes. In the headwaters of the upper Boulder, Hawley Falls, just downstream from the mouth of Fourmile Creek, functions as a barrier to upstream fish passage. The area above these falls presents the best opportunity to restore Yellowstone cutthroat trout in the drainage, and one of the best opportunities in the entire Yellowstone River ecosystem.

The Boulder River and its tributaries above Hawley falls support mixed populations of genetically pure Yellowstone cutthroat trout, rainbow trout, and various degrees of hybrids of the two species. The lack of brook trout and brown trout in this watershed is a remarkable feature, as most Yellowstone cutthroat trout populations suffer threats from these invasive species. Nonnative rainbow trout have the ability to interbreed with YCT. This mechanism of hybridization creates serious threats to the long-term persistence of genetically pure YCT, but in some areas it can create opportunities for YCT restoration. Unlike brown trout and brook trout, which must be completely removed from an entire drainage to ensure long-term YCT persistence, rainbow trout can be removed over time via population reduction combined with genetic swamping. This method has been shown to be very successful in high mountain lakes, but is yet to be proven effective in streams.

Because brook trout and brown trout do not exist in the Boulder River or its tributaries and lakes upstream from Hawley Falls, and the falls prevent them from invading the drainage, the only obstacle to securing a healthy metapopulation of YCT in the upper Boulder is the presence of rainbow trout. The proposed action would work to eliminate rainbow trout from the river system via a combination of direct fish removal (gill netting, piscicide application) and genetic swamping (interbreeding of rainbow trout with YCT to the benefit of YCT).

Current genetic data from the upper Boulder river system have demonstrated that the fish population in any given location within the drainage is typically a direct result of the fish population of upstream areas and contributing tributaries. This is because in steep drainages, fish are more likely to move downstream than upstream, and these fish contribute to the genetic composition of the downstream population they colonize via future reproduction. For instance, tributaries downstream of lakes that contain YCT have populations of YCT. Tributaries downstream of lakes that contain rainbow trout have rainbow trout. Fourmile Creek contains a population of rainbow trout due to historic rainbow trout stocking in Silver and Prospect lakes at the head of the drainage. Through downstream movement of rainbow trout from Fourmile Creek, the Boulder River near its mouth contains a mix of rainbow, cutthroat and hybrid fish. Similarly, Rainbow Creek has a population of rainbow trout that resulted from early stocking in Rainbow Lakes and Mirror Lake. The East Boulder River downstream of Rainbow Creek contains a similar species composition to that of the Boulder River near the mouth of Fourmile Creek. The remaining fish-bearing lakes in the Boulder drainage upstream from Hawley Falls contain YCT, as do the tributaries that drain them. All of these tributaries contribute to downstream movement of YCT genetics into the main Boulder River. If the source of rainbow trout genetics in the Fourmile Creek and Rainbow Creek areas is eliminated, the result will be a YCT population in the Boulder River drainage with an ever-increasing genetic purity over subsequent generations.

Rainbow Lakes, Mirror Lake

The seven Rainbow Lakes are located in the Rainbow Creek drainage in the upper Boulder River, entirely within the Gallatin National Forest and the Absaroka-Beartooth Wilderness Area (Figure 2). The lakes are several miles east of the Boulder River, adjacent to the Custer-Gallatin Forest divide. Of the seven lakes, six contain self-sustaining fish populations and range in size from 2.4-17.5 acres. Maximum depths in these lakes range from 10-35 feet. Nearby Mirror Lake lies about one mile west of the Rainbow Lakes. Mirror is 16.4 acres in size with a maximum depth of 80 feet and also contains a self-sustaining population of rainbow trout.

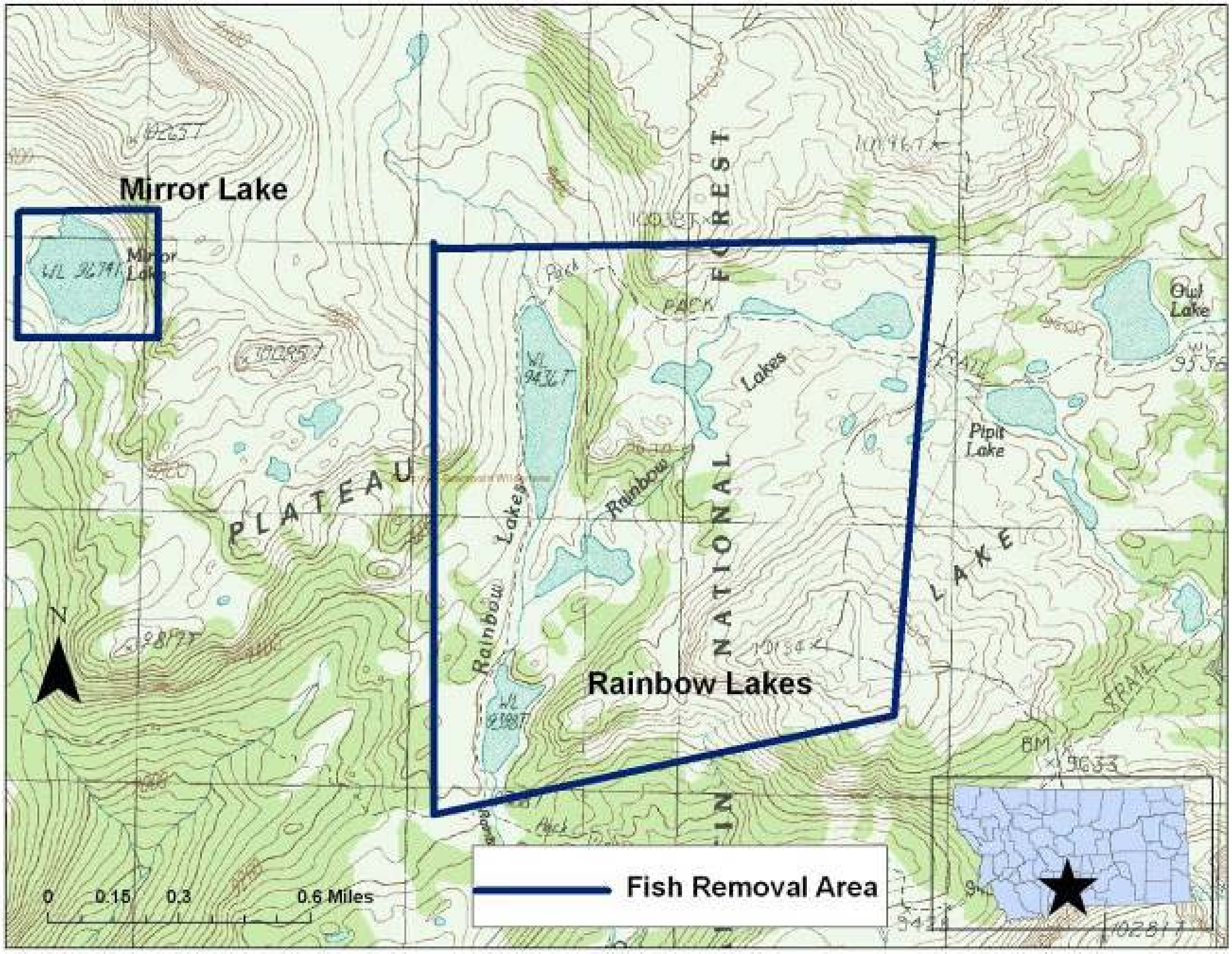

Figure 2: Lakes in the Rainbow Creek drainage proposed for fish removal through gill netting.

The Rainbow Lakes were stocked with Yellowstone cutthroat trout in 1932 and stocked with rainbow trout in 1949. Genetics analysis shows that the rainbow trout populations in three of these lakes contain up to 15% YCT genes from the 1932 stocking. The remaining genes are those of rainbow trout. No stocking record exists for Mirror Lake, but this self-sustaining rainbow trout population is likely a result of early stocking.

The strategy for replacing the rainbow trout and hybrid populations of Rainbow and Mirror lakes rests heavily on the concept of genetic swamping. Genetic swamping is accomplished by stocking high densities of YCT in lakes that contain rainbow trout. The conversion from rainbow trout or hybrids to YCT populations can happen in two ways: 1) stocked YCT interbreed with rainbow trout and through several generations, genetic composition trends further toward YCT; or 2) stocked YCT outcompete wild rainbow trout of the same year class to such an extent that YCT replace an entire year class of rainbows. While option #1 may take several decades to be successful, option #2 can convert a rainbow trout population to predominantly YCT in as little as 4 years (Matt Boyer, FWP, personal communication). In Rainbow and Mirror lakes, the goal is option #2, where YCT replace year classes of rainbow trout over several years. This strategy is made much more successful by removing large numbers of adult rainbow trout, which contribute to future generations through spawning. If more of these adults are removed, fewer juvenile rainbow trout are available to compete with the stocked YCT. In addition, more habitat is available for YCT as their populations become established. Complete removal of rainbow trout in these lakes is not likely due to logistical constraints and the popularity of the Rainbow Lakes for angling opportunity. The goal in this project is to remove 50-75% of the adult rainbow trout population through intensive gill netting over 1-2 years while stocking YCT at high rates (500 fish/acre) for several years.

Rainbow trout removal through gillnetting would take place over a 1-2 week period in 2011, and again in 2012. A barrier to upstream movement of fish prevents the movement of fish from Rainbow Lakes #2, 3 and 4 to Lakes #5, 6 and 7. Therefore, netting would take place in Mirror Lake and Rainbow Lakes #5, 6 and 7 during the first year, without the risk of fish moving in from Rainbow Lakes #2, 3 and 4. Netting would take place in lakes #2, 3 and 4 during the second year of the project.

No motorized equipment would be used for the project. A local backcountry horsemen group would assist in packing gill nets and associated gear to the lakes. The crews performing the netting and packing would practice minimum-impact camping techniques and would comply with all food storage orders to reduce wilderness impacts. Gill nets would not be left unattended for more than 24 hours at a time. Dead fish carcasses would be disposed of by sinking in deep parts of the lakes to avoid potential conflicts with wildlife and humans. Signs would be posted at the trailheads to inform wilderness users of the objectives of the project, its importance, and techniques used to accomplish the objectives. Crews performing gill netting would make an extra effort to inform visitors about the project and its purpose.

Fourmile Creek, Meatrack Creek

Fourmile Creek is a 7-mile long tributary that joins the Boulder River upstream of Hawley Creek and Hawley Falls (Figure 3). Meatrack Creek is a tributary similar in size to Fourmile Creek, and joins Fourmile less than one mile upstream of the confluence with the Boulder River. The Fourmile Creek drainage, including Meatrack Creek, contains the best habitat and highest fish densities in the entire upper Boulder River drainage. The abundance of fish leads to significant downstream movement of fish from this drainage into the Boulder River. Because of historic fish planting activity, Fourmile Creek contains an abundant, self-sustaining population of rainbow trout, while Meatrack Creek contains a similar population of YCT. Mixtures of rainbow trout, YCT, and hybrids are present in both lower Meatrack and lower Fourmile creeks, evidence that populations from each creek are mixing in their lower reaches. The Boulder River near the mouth of Fourmile Creek contains a mix of rainbows, YCT, and hybrids.

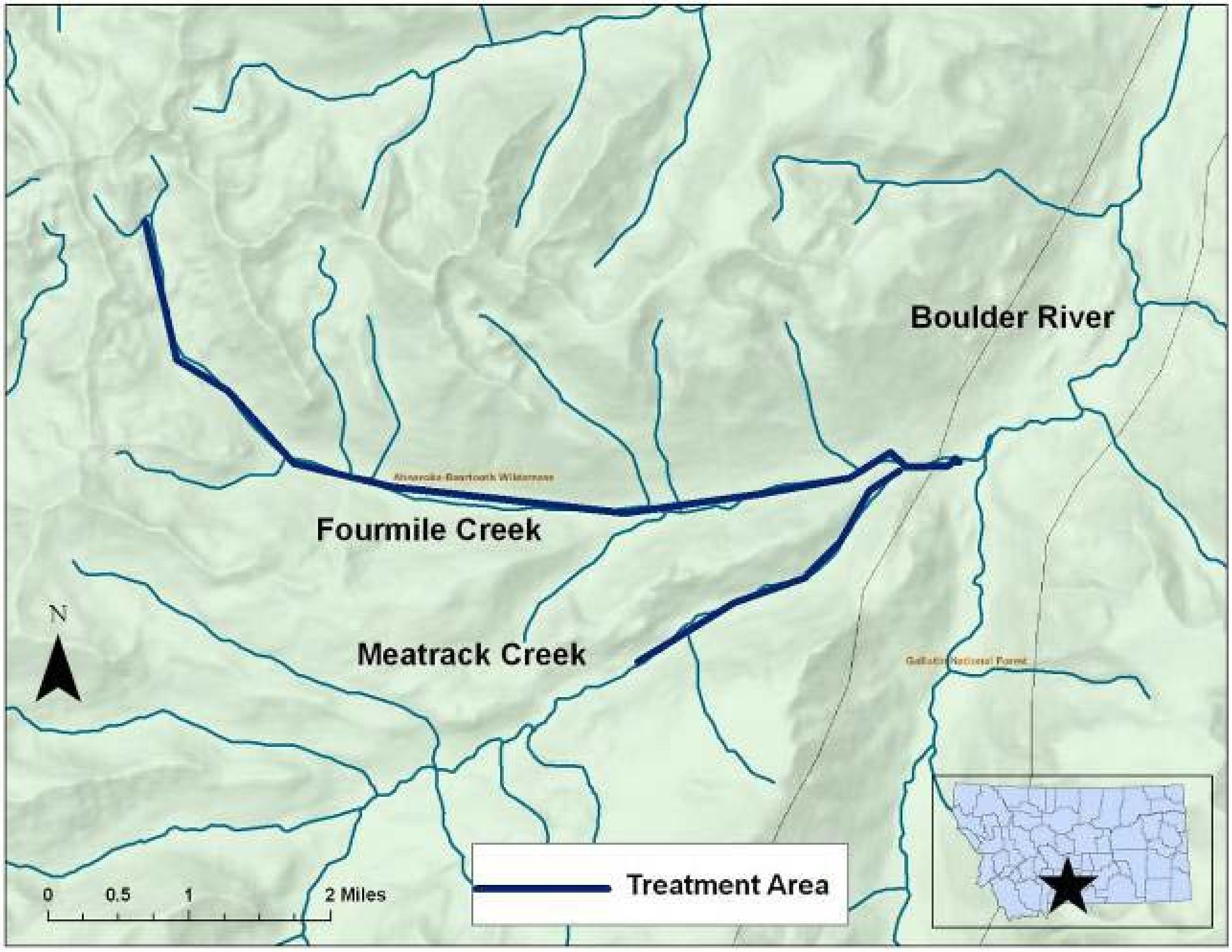

Figure 3: Fourmile Creek drainage, showing stream reaches proposed for piscicide treatment.

On Fourmile Creek near its mouth, a significantly steep, bouldery reach of stream minimizes upstream fish passage from lower Fourmile and the Boulder River. Subsequently, the majority of the fish movement here, like most other Boulder River tributaries, is in a downstream direction. The Fourmile Creek rainbow trout population is a driving force shaping the trout population in the upper Boulder. If this rainbow trout population were to be replaced with YCT, the subsequent downstream flow of YCT into the Boulder would help shift this population closer to being unhybridized YCT.

Two lakes, Silver Lake and Prospect Lake, are within in the headwaters of Fourmile Creek. Prior to 2007, these lakes supported self-sustaining populations of rainbow trout resulting from historic stocking. An environmental assessment was prepared in 2007 to replace these populations with unhybridized YCT through intensive gill netting and YCT stocking. At the time, the plan was to proceed with a YCT restoration project in Fourmile and Meatrack creeks upon completion of the lakes project. The Silver and Prospect lakes project was successfully completed, and as of 2009, YCT were the only fish found in the lakes. The project proposed in this EA would extend the presence of YCT in the drainage downstream to the Boulder River.

The overall goal of this portion of the project would be to replace the rainbow trout populations in Fourmile and lower Meatrack creeks with genetically pure YCT using the piscicide rotenone. Rotenone would be applied to the creek for 1-3 days during a single summer between 2011-2013. All Montana Department of Agriculture regulations for piscicide application and product label instructions would be strictly adhered to. The chemical would be applied through continuous drip stations spaced at 0.5-2 hour travel time intervals throughout the project area. The treatment area would extend from Fourmile Creek at the outlet of Silver Lake, downstream to its mouth, including the lower 3 miles of Meatrack Creek. Upper Meatrack Creek has a genetically pure population of YCT which would not be removed. A detoxification station would be set up near the mouth of Fourmile Creek to detoxify chemical before it reached the Boulder River.

Rainbow Creek, East Fork Boulder River

Rainbow Creek is a 5.5-mile long tributary to the East Fork of the Boulder River (Figure 4). It enters the East Fork Boulder River approximately 5.5 miles upstream of its confluence with the main Boulder River. The creek drains the seven Rainbow lakes, Mirror Lake, Fish Lake, Burnt Gulch Lake, and several other fishless lakes. Resulting from their initial introduction into Rainbow lakes, and subsequent downstream movement, an extensive, self-sustaining population of rainbow trout is present in Rainbow Creek. Significant downstream movement of rainbows over the years has resulted in high levels of rainbow/YCT hybridization in the East Fork Boulder River. The East Fork contains a 99% genetically pure population of YCT in its headwaters, but Rainbow Creek contributes significant rainbow trout genetics to the East Fork and, consequently, the main Boulder River.

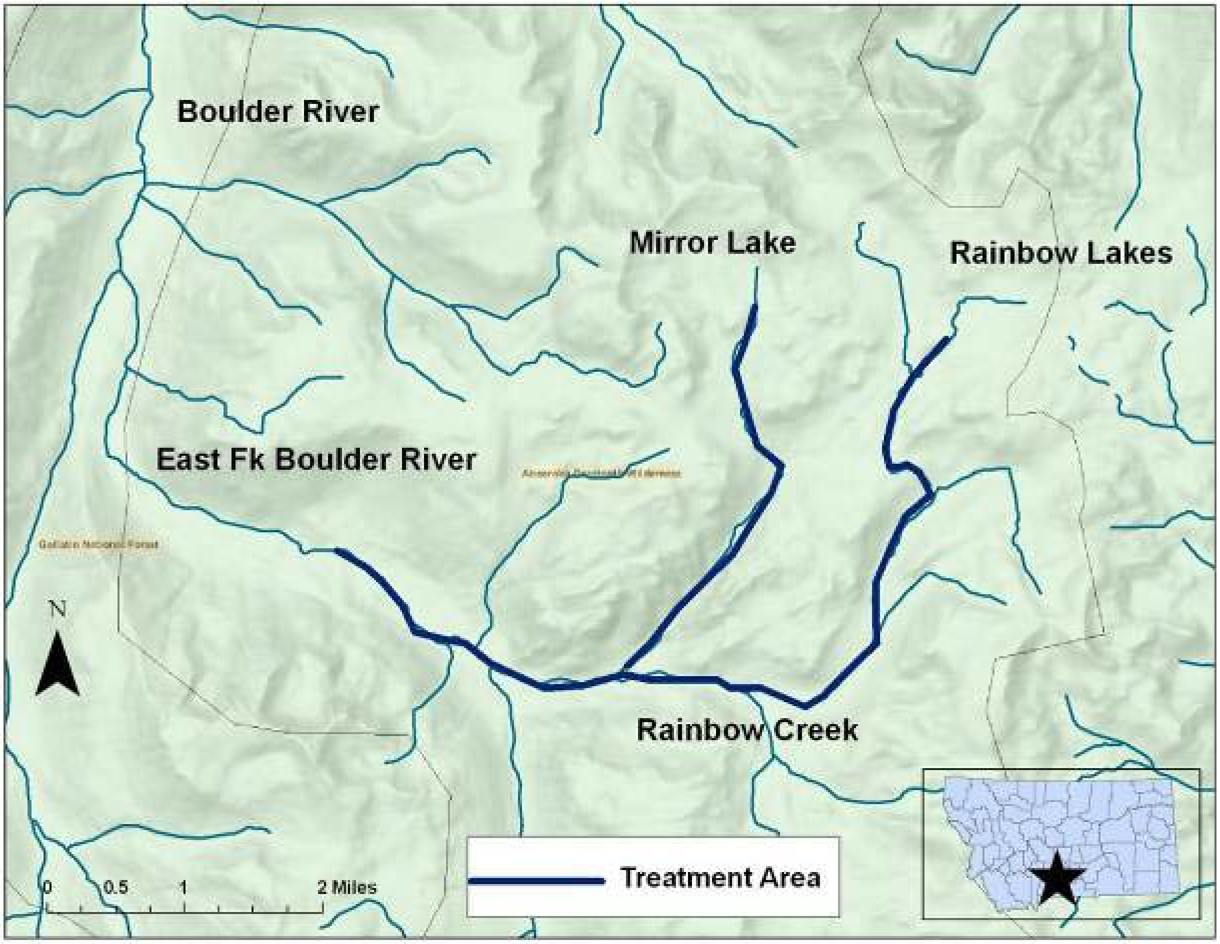

Figure 4: Stream areas proposed for piscicide treatment in the Rainbow Creek drainage.

The goal of this portion of the project would be to replace the rainbow trout population in Rainbow Creek and part of the East Fork Boulder River using the piscicide rotenone. Rotenone would be applied to the creek for 1-3 days during a single summer between 2011-2013. Application would strictly adhere to all Montana Department of Agriculture regulations for piscicide application and product label instructions. The chemical would be applied using continuous drip stations spaced at 0.5-2 hour stream travel time intervals throughout the project area. The treatment area would extend from the outlet of the lowermost of the Rainbow Lakes, downstream to the mouth of Rainbow Creek, and downstream approximately 3 miles. Treatment would extend downstream in the East Fork of the Boulder River to eliminate the source of rainbow trout and hybrids near the mouth of Rainbow Creek so they do not re-enter Rainbow Creek and breed with YCT. Rather, the fish population in this area would be replaced with YCT newly stocked in Rainbow Creek and the East Fork, and YCT currently residing in the East Fork upstream from the mouth of Rainbow Creek. YCT would be reintroduced to all treated waters.

Summary

This YCT project is unique in relation to other restoration efforts within the native YCT range in several ways. First, the project would restore a YCT population throughout a very large drainage area. Large-scale watershed projects like this one do not present themselves elsewhere for numerous reasons, most notably that:

1) Competing brown and brook trout do not exist in the upper Boulder River above Hawley Falls. Most YCT projects elsewhere require the complete removal of brown and brook trout. If even only a few individuals of these species are not removed, they recover completely in number after several generations and the project is unsuccessful. Aside from complete removal, there is no way to eliminate the negative effects of these species. Unlike other systems, this watershed only contains YCT and rainbow trout.
2) Because rainbow trout and YCT interbreed, and upstream sources of each exist, it is possible to convert the sources of rainbow trout to YCT and allow the population to gradually shift to a YCT-dominated system through generations of interbreeding that favors YCT. By using the same mechanism that produced rainbow/YCT hybrids, we can restore genetically pure YCT.
3) The goal of this project is not to create a 100% genetically pure YCT population. Creating such a population requires the expensive construction of fish passage barriers and complete removal of nonnatives, and is more suitable to populations in other areas. According to most conservation experts, a cutthroat trout population that is at least 90% genetically pure exhibits the primary ecological characteristics of the species and contains significant conservation value. A target of at least a 90% genetically pure YCT population throughout the entire upper Boulder River watershed is achievable if the project goals described above are met.

Piscicide Treatment

FWP has a long history of using rotenone to manage fish populations in Montana, spanning as far back as 1948. The department has administered rotenone projects for a variety of reasons, but rotenone is principally applied to improve angling quality or for native fish conservation. This project is a native fish conservation project intended to eliminate nonnative rainbow trout and rainbow/cutthroat hybrids.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the pea family (Fabaceae), such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.), which are found in Australia and its surrounding Pacific islands, southern Asia, and South America. Native people have used locally available rotenone for centuries to capture fish for food. Fisheries managers in North America have used rotenone since the 1930s. Rotenone is also a natural insecticide, and is used in organic gardening and to control parasites such as lice on domestic livestock (Ling 2002).

Rotenone acts by inhibiting oxygen transfer at the cellular level. Fish are especially vulnerable to low levels of rotenone, as they readily absorb rotenone into the bloodstream through the thin cell layers of the gills. Mammals, birds, and other non-gill breathing organisms lack this rapid absorption route into the bloodstream, and can tolerate exposure to concentrations that are much higher than levels that are lethal to fish.

The rotenone-treated area in the upper Boulder drainage encompasses the reaches of stream described above, and short sections of their typically small, steep tributaries. While most of these tributaries are either ephemeral, or lack sufficient flow or habitat to support fish, installation of drip stations near the confluence of these streams with the main creeks would eliminate the potential for fish to seek refugia here during treatment. A detoxification station would be established at the downstream end of each treatment area to limit the spatial extent of the treatment. The detoxification zone would extend downstream from the detoxification station to a distance of approximately 15 to 30 minutes of flow travel time downstream, which is typically about ¼ to ½ mile or less for streams in this area.

The proposed piscicide for this action is CFT Legumine, a relatively new formulation using rotenone as the active ingredient. CFT Legumine has several advantages over other formulations of rotenone, including a new emulsifier and solvent that reduce the presence of petroleum hydrocarbon solvents. The hydrocarbons in other rotenone formulations are highly volatile, resulting in a distinct chemical odor during treatment. Fish may be able to detect the hydrocarbons in other formulations, and avoid treated waters, resulting in incomplete fish kills. Because of the lack of hydrocarbons, the new formulation has fewer of these drawbacks. CFT Legumine has been used successfully in several recent rotenone treatments in Montana.

Application of piscicide would follow established methodologies, consistent with the product's labeling, as required by federal law. CFT Legumine would be applied to achieve a concentration of up to 1 ppm (part per million) of rotenone. The amount of chemical needed to reach the correct concentration would be calculated by determining the amount of stream flow present in multiple locations of the creek and each of the tributaries. At each application location, a gravity-fed, constant head drip station (Figures x-x) would deliver diluted chemical at the appropriate rate. Drip stations would run for 4-8 hours to ensure adequate mixing throughout the stream (Figure 5). Drip stations would be spaced at varying intervals in the stream to recharge the initial rotenone drip as it naturally breaks down in the stream. The spacing of these drip stations would be calculated based on bioassay experiments performed in the stream prior to the treatment. Sentinel fish (YCT from the Big Timber hatchery held in cages) would be placed above each drip station to confirm that a concentration of rotenone lethal to fish was present throughout the area.

Figure 5: Examples of drip stations used to deliver piscicide to streams.

Rotenone detoxifies through three potential mechanisms: natural oxidation, dilution by freshwater, and introduction of a neutralizing agent, such as potassium permanganate ($KMnO_4$). In this treatment, application of $KMnO_4$ is the proposed method to expedite detoxification. $KMnO_4$ application would follow CFT Legumine label instructions for detoxifying streams, with concentrations between 2 and 4 ppm. Sentinel fish in cages above the $KMnO_4$ application site would signal the need for beginning detoxification. Detoxification would be terminated when replenished fish survive and show no signs of stress for at least four hours. As $KMnO_4$ requires between 15 to 30 minutes contact time to detoxify rotenone, sentinel cages would be placed at sites located 15 and 30 minutes of travel time downstream of the detoxification station. Survival of the caged fish would be indicative of successful detoxification. In addition, a supplemental detoxification station would be placed downstream of the initial station in the event that rotenone was not completely detoxified where planned. Dead fish would be allowed to decompose naturally in the stream and become food for scavengers. Rotenone does not have negative effects on animals that consume treated waters or fish killed by rotenone (Finlayson et al 2000). To avoid human conflicts with bears, treatment areas with evidence of significant bear activity would be avoided if deemed unsafe.

Monitoring

To ensure the rotenone treatment was successful and amphibian and invertebrate populations were not adversely affected, fish, amphibian, and invertebrate monitoring would take place in the stream treatment areas before and after project implementation. Pre-project fish data are already available. Post-project fish monitoring would consist of electrofishing and visual surveys at multiple locations to ensure that no fish survived the treatment. Invertebrate monitoring would include pre- and post-project kick net samples that would be preserved in alcohol and sent to a laboratory for identification. Complete invertebrate recovery is expected to be achieved 2 years after project completion. Amphibians would be monitored through visual surveys at multiple locations in the treatment area before and after treatment.

To monitor success of the gill netting and YCT stocking in Rainbow lakes and Mirror Lake, follow-up sampling via gill netting and visual observation would be done to ensure that the majority of rainbow trout were removed and that stocked YCT survival was adequate to establish a new population. YCT spawning in the lakes and their inlet/outlet streams would be monitored. Several years after project completion, after several generations of fish had the opportunity to reproduce in the lake, fish would be collected for genetics analysis to determine their level of YCT purity.

Relationship of Proposed Project to Existing Plans and Agreements

The respective actions and responsibilities of the cooperators on this proposed project (FWP and GNF) are consistent with a number of existing cooperative plans, agreements, and authorities, noted below.

Conservation Agreement for Yellowstone cutthroat trout in the States of Idaho, Montana, Nevada, Utah and Wyoming (Range-wide YCT Conservation Team 2009).

The primary instrument guiding mutual cooperation in cutthroat conservation projects is the Conservation Agreement for Yellowstone cutthroat trout in the States of Idaho, Montana, Nevada, Utah and Wyoming. This agreement was the result of numerous earlier agreements and documents, beginning with a 1998 Yellowstone cutthroat trout agreement within Montana. Agencies affiliated with this effort included FWP; Montana Department of Environmental Quality; USDA Forest Service, Northern Region, Gallatin-Custer National Forests; Bureau of Land Management; U.S. Fish and Wildlife Service; Bureau of Reclamation; Bureau of Indian Affairs; and the Crow Tribe. This agreement established a framework of cooperation among the participating parties to work together for the conservation of YCT. The primary goal of the Agreement and accompanying Yellowstone Cutthroat Trout Conservation Program is to ensure the persistence of the YCT subspecies within its historic range in Montana, at levels and under conditions that provide protection and maintenance of both the intrinsic and recreational values associated with the subspecies.

There are 7 objectives stated in the Memorandum of Understanding and Conservation Agreement for Westslope and Yellowstone Cutthroat Trout (FWP et al. 2007), of which FWP and the Gallatin and Custer National Forests, among others, are signatories. This project will fulfill at least 2 objectives of the agreement:

Objective 1: Identify and Characterize all YCT Conservation Populations

Objective 2: Secure and Enhance Conservation Populations

Objective 3: Restore Populations

Objective 4: **Secure and Enhance Watershed Conditions**

Objective 5: Public Outreach

Objective 6: Data Sharing

Objective 7: Coordination

The objective of this proposal is to remove rainbow trout and rainbow x cutthroat hybrids from portions of the upper Boulder River drainage. This activity is supported by both objective 2 and objective 3. It would secure and enhance the conservation population of YCT currently in the upper Boulder drainage, and would help to restore a YCT population, which was once prevalent further downstream in the Boulder River system.

Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau of Land Management Wilderness

These are guidelines for fish and wildlife management in U.S. Forest Service administered wilderness areas (AWFA 2006). The guidelines indicate that:

Chemical treatment may be necessary to prepare waters for the reestablishment of indigenous fish species**,** consistent with approved wilderness management plans**,** to conserve or recover Federally listed threatened or endangered species, or to correct undesirable conditions resulting from human activity. Proposals for chemical treatments will be considered and may be authorized by the Federal administering agency through application of the MRDP as outlined in Section E., General Policy. Any use of chemical treatments in wilderness requires prior approval by the Federal administering agency.

Guidelines for Chemical Treatment

a. Use only registered pesticides according to label directions.

b. In selecting pesticides, give preference to those that will have the least impact on nontarget species and on the wilderness environment.

c. Schedule chemical treatments during periods of low human use, insofar as possible.

d. Immediately dispose of fish removed in a manner agreed to by the Federal administering agency and the State agency.

Gallatin National Forest Land and Resource Management Plan (Forest Plan)

The Gallatin Forest Plan guides all natural resource management activities and established management standards for the Forest. Goals, objectives, standards, schedule of management practices, and monitoring and evaluation requirements comprise of the Forest Plans management direction (USDA 1988):

Goals related to wilderness and fisheries

a. Manage the existing and recommended wilderness resource to maintain its wilderness character and to provide for its use and protection.

b. Meet or exceed State of Montana water quality standards.

c. Maintain and enhance fish habitat to provide for an increased fish population.

d. Provide habitat for viable populations of all indigenous wildlife species for increasing population of big game animals.

e. Coordinate with the land and resource management and planning efforts of other Federal, State, local agencies, and private landowners. Strengthen this coordination within the entire greater Yellowstone Area.

Objectives related to wilderness and fisheries

a. Designated wilderness will be managed according to the Wilderness Act of 1964.

b. Fish habitat will be managed by application of “best management practices.” Management standards have been set to mitigate impacts occurring to the fishery resource from land use activities.

c. Special consideration will be given to high quality water leaving the Forest to provide for the downstream “Blue Ribbon” trout streams.

d. The management need of high mountain lakes will be identified. Management of lakes located within Wilderness will be keeping with the Wilderness Act of 1964.

e. Projects to improve lake and stream habitat will be implemented.

Standards related to wilderness and fisheries

a. The limits-of-acceptable change process will be used to guide management of dispersed recreation and wilderness areas.

b. The GNF will coordinate management of the wildlife and fish resources with the MFWP, U.S. Fish and Wildlife Service, Yellowstone National Park, private landowners and other agencies.

c. Habitat that is essential for species identified in the Sensitive Species list developed for the North Region will be managed to maintain these species. Aquatics species native to the project area include Yellowstone cutthroat trout, western toad, and possibility northern leopard frog.

d. "Indicator Species," which have been identified as species groups whose habitat is most likely to be affected by Forest management activities, will be monitored to determine population change. The species group of "Wild Trout" are considered indicator of coldwater fisheries.

e. The Upper Boulder River Yellowstone cutthroat trout restoration projects falls within Management Areas 4 (Absarokee-Beartooth Wilderness) and 5 (Boulder River Travel Corridor). Goals for these MA's include: managing existing wilderness in accordance with the Wilderness Act of 1964, and maintain and improve the wildlife habitat values and the natural attractiveness of these areas to provide opportunities for public enjoyment and safety.

2. Purpose and Need for the Proposed Action:

The YCT is native to Montana and several neighboring states: Wyoming, Idaho, and parts of Utah and Nevada. In Montana, YCT historically occupied streams and lakes in the Yellowstone River watershed having suitable habitat, water quality, and thermal regime. Like many native cutthroat trout, YCT have experienced dramatic declines in abundance and range. YCT currently occupy an estimated 43% of their historic multi-state range (Figure 6; May et al. 2007). In Montana, this subspecies occurs in only 34% of their historic range, with unhybridized YCT confirmed in only 35% of this occupied habitat (FWP fisheries database). Another 13% of currently occupied habitat potentially supports unhybridized fish; however, testing is necessary to verify the genetic status of these populations.

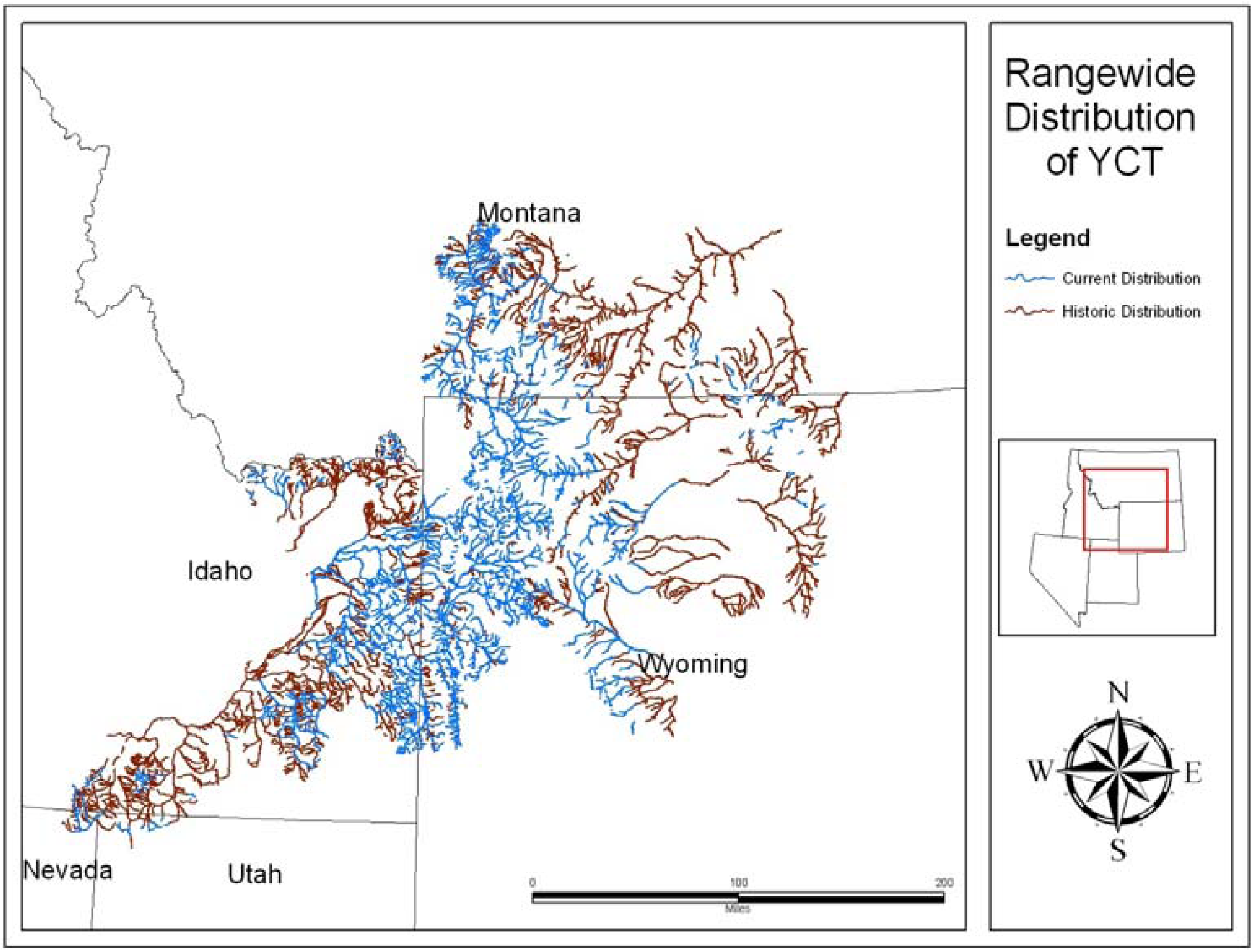

Figure 6: Historic and current distribution of Yellowstone cutthroat trout across its native range (FWP fisheries database).

The diminished and fragmented distribution of YCT is the result of a variety of disturbances across the landscape. Introduction of nonnative salmonids (rainbow trout, brown trout, and brook trout) has been especially harmful (Gresswell 1995; Kruse et al. 2000). Hybridization with rainbow trout is a leading cause of the decline (Muhlfeld et al. 2009). Brook trout and brown trout compete with YCT, and can eventually displace the species. Brown trout consume fish as a substantial component of their diet, making predation another threat to native cutthroat trout.

Habitat degradation and other alterations have also contributed to the decline in native cutthroat trout. Land use activities that degrade riparian health and function, and contribute to stream bank erosion and channel instability, can limit the suitability of the habitat, and impair water quality. Features such as road crossings and irrigation diversions have potential to restrict movement of fish, which can eliminate access to spawning, rearing, or overwintering habitat. Irrigation withdrawals have had profound effect on some YCT populations, as water demand coincides with sensitive incubation periods for YCT eggs, and can result in significantly reduced habitat availability and warm water temperatures.

Marked reductions in the distribution and abundance of YCT in their historic range have resulted in their designation as a species of special concern (MNHP and FWP 2006). In response to these declines and designated status, a diverse group of state and federal agencies, agricultural and silvicultural interests, and environmental advocacy groups developed a memorandum of understanding (MOU) to guide conservation, protection, and restoration of cutthroat trout in Montana (Montana Cutthroat Trout Steering Committee [MCTSC] 2007). This document was updated to create the "Conservation Agreement for Yellowstone cutthroat trout in the states of Idaho, Montana, Nevada, Utah and Wyoming" (Rangewide YCT Conservation Team 2009).

Concerns over the status of Yellowstone cutthroat trout have prompted environmental advocacy groups to petition the US Fish and Wildlife Service (USFWS) to list this subspecies as a threatened or endangered species. In two decisions, the USFWS found listing YCT to be unwarranted, citing the presence of stable, viable, and self-sustaining populations throughout its historic range as justification for this determination (USFWS 2001, 2006). Nonetheless, plaintiffs submitted a notice of intent to sue in 2006, indicating legal challenges are likely. In the interim, FWP and its conservation partners are implementing projects, such as this proposed action, to increase the likelihood of long term YCT persistence such that they are not warranted for inclusion on the Endangered Species List.

The proposed project in the upper Boulder River watershed is consistent with the goals outlined in the current YCT Conservation Strategy (Range Wide YCT Conservation Team 2009). This strategy was the result of the above-mentioned YCT Conservation Agreement, and was developed by a working group with representation from the respective states, the U.S. Forest Service, BLM, and other state and federal agencies. The heads of each major state and federal agency involved in YCT conservation signed the agreement and strategy. These documents set guidelines for YCT conservation activities and placed high priorities on such projects. The proposed project was supported and ranked as a top funding priority by a YCT working group including personnel from Montana Fish, Wildlife & Parks, the U.S. Forest Service, and Yellowstone National Park. A grant from the Western Native Trout Initiative provides partial funding for the project.

Contrary to the many changes in habitat that have caused YCT decline throughout the range, conditions in the upper Boulder River remain very similar to their natural state, and continual protection is expected due to land ownership patterns. Aside from some road crossings, humans have had minimal effect on habitat in the upper Boulder River drainage. Water withdrawal for irrigation is almost nonexistent here. High elevation and cool, snowmelt-influenced water temperature makes this system particularly resistant to problems associated with potential climate change. Perhaps most importantly, brown trout and brook trout (a major causes for YCT decline) do not exist in the project area. Given these conditions, the primary obstacle to YCT restoration in this system is the presence of competing and hybridizing rainbow trout. Upon removal of rainbow trout, YCT should thrive in the system.

YCT are a part of Montana's heritage, and are a symbol for one of the nation's most famous parks. Catching a native trout is still one of the most important attractions that Montana has to offer its residents and visitors. The upper Boulder River is an extremely popular destination for recreationists and anglers from Montana and areas throughout the U.S. Securing a healthy, genetically pure YCT population would enhance the recreation and value-oriented experience for upper Boulder River users and promote their recognition and support for this popular native fish species.

3. Benefits of the Project:

This project would convert rainbow and rainbow/cutthroat hybrid trout populations in 7 mountain lakes and 18.5 miles of stream to genetically pure YCT. While remaining YCT populations are rare, populations in large, interconnected reaches of stream like the upper Boulder River are essentially nonexistent. The upper Yellowstone River system supports a large, interconnected YCT population, but nonnative fishes such as brown, rainbow and brook trout are continual threats. YCT are expected to perform as well as, or better than, rainbow trout that currently exist in the project area, maintaining a popular sport fishery while promoting a native species. Overall, this project would help achieve the goals and objectives listed in the “Conservation Agreement for Yellowstone Cutthroat Trout within Montana” (Range Wide YCT Conservation Team 2009) both statewide and locally. The social benefit of this effort would be the preservation of this beautiful and rare fish species and population, and the ability of future generations of people to use and enjoy this native species in its natural habitat.

G. Other Local, State or Federal agencies with overlapping jurisdiction.

USDA Forest Service – The Gallatin National Forest manages all of the land on which the proposed project would take place. The U.S. Forest Service is a signatory on the *Conservation Agreement for Yellowstone Cutthroat Trout within Montana*, which highlights the Forest’s intentions to restore YCT populations.

As described in the “Cooperative Agreement for Fish, Wildlife and Habitat Management on National Forest Wilderness Lands in Montana (FWP, USFS 2008), the Gallatin National Forest has the authority to regulate the use of pesticides within areas designated as “Wilderness”, and issue a Pesticide Use Permit for activities such as the one being proposed. This agreement specifies further detail on pesticide use within “Wilderness” areas.

H. Agencies Consulted During the Preparation of the EA

USDA Forest Service, Gallatin National Forest. Big Timber/Livingston/Bozeman, MT. - Scot Shuler, Ron Archuleta, Lauren Oswald, Scott Barndt

PART II. REVIEW OF ALTERNATIVES

Alternative 1 – No Action

The predicted consequence of the "no action" alternative is a high probability that the shift to a system dominated by rainbow trout genetics will continue to develop. Rainbow trout continually moving downstream from Rainbow lakes and Mirror Lake, Rainbow Creek, and Fourmile Creek will mix with the populations of rainbow/YCT hybrids and genetically pure YCT. The balance of genetic contribution to this metapopulation would likely continue to shift toward rainbow trout. The upper Boulder River currently contains genetically pure YCT populations in several reaches of stream, all of which are critical to the long-term persistence of the species in the Yellowstone River drainage as a whole. No action would continue to expose the threat of these populations losing their identity as YCT through hybridization. The lakes and streams would continue to provide quality fisheries for rainbow trout and rainbow/YCT hybrids, but some areas may experience a decline in opportunity to fish for native YCT.

Alternative 2 – Removal of Rainbow Trout Using Only Piscicides

A second alternative to the proposed plan (removing rainbow trout using netting in the lakes and piscicide in the streams) would be to remove rainbow trout from both lakes and stream using piscicides. This alternative would have several advantages. Most importantly, it would ensure that all fish were removed from the lakes and would not require genetic swamping/replacement by YCT. Piscicide can be 100% effective, while netting is usually not. Once fish were completely removed from the lakes and the chemical detoxified, genetically pure YCT could be stocked. They would have no rainbow trout to compete and/or breed with and would thrive.

Despite these advantages, the disadvantages of this alternative are numerous. First, the amount of rotenone required to complete this project would be extremely high. This would either require hundreds of animal days using pack stock in the wilderness, or the transportation of chemical to the lakes via helicopter. It would also require the use of mechanized equipment such as generators and motorized pumps to apply the chemical in the lakes, which would all have to be transported to the site. Very high stock use could cause damage to the trails and vegetation in the area, which is not consistent with wilderness values and habitat conservation. The use of a helicopter for such activities in designated wilderness is prohibited without special permission from the U.S. Forest Service. Because of the scope of work that would be required, and the intrinsic value of this high use area by wilderness visitors, such activity, while very efficient, would probably not be justified.

Another disadvantage of this alternative is that recreational fishing would be eliminated from the lakes for 1-2 years, since all fish would be removed and those re-introduced into the lakes would take time to grow to a catchable size. Piscicide would also affect nontarget invertebrates in the lakes. Where feasible alternatives exist, FWP and its partners are committed to avoiding impacts to nontarget species. Finally, the cost of this alternative would be much higher than that of the proposed alternative.

The predicted consequences of Alternative 2 include:

- Complete and rapid removal of rainbow trout from target area
- Potentially higher negative effects on trails and habitat relating to increased stock use
- Use of helicopter and motorized equipment in the wilderness
- Unavoidable negative effects of piscicides on nontarget invertebrate populations in the lakes
- Higher cost combined with reduced feasibility
- Temporary loss of fishing opportunity

Alternative 3 – Removal of Rainbow Trout Using No Piscicides

A third alternative would be to complete the project using no piscicides and only mechanical removal using gill nets in the lakes and electrofishing in the streams. While less efficient than piscicide, these are the only other methods of fish removal that could possibly achieve the objective. Trout removal in streams by means other than piscicide have proven extremely difficult and largely unsuccessful (Meronek et al. 1996; Thompson and Rahel 1996).

Fish removal in the lakes with gill netting would not ensure complete removal, but could be done effectively. In a similar project, rainbow trout were successfully removed from Silver and Prospect lakes in the Fourmile Creek drainage using gill nets. The magnitude and duration of the netting was much more flexible in these lakes because of low visitor use and other circumstances. In this project, intensive netting could remove 75% or more of the fish population in the lakes in a relatively short time (1-2 weeks). This would allow the newly stocked YCT an opportunity to establish a population with less competition, while still providing some angling opportunity for catchable rainbow trout during this period.

Fish removal in the creeks using electrofishing would be much less effective and less feasible. FWP has tried to remove fish through intensive electrofishing effort in other areas, but unlike using piscicide, complete fish removal is almost never possible with electrofishing. While fish removal efficiencies are much lower with electrofishing than with piscicide for all sizes of fish, this is especially pronounced in smaller size classes of trout, which are extremely difficult to capture using electricity. Because of capture inefficiency, many of these fish are missed during removal efforts and quickly fill in habitat vacated by the larger fish being removed. Oftentimes this results in a population returning to pre-removal levels in just 1-2 years after project completion (Meyer et al. 2006).

The remoteness, rough terrain, and extent of habitat, over 18 miles of stream, makes electrofishing even less feasible than electrofishing removal efforts elsewhere. A minimum of 2 to 3 electrofishing passes using a backpack unit with 2 to 3 individuals per crew would be required. The entire length and width of the stream would have to be intensively electrofished. This would equate to several people walking through approximately 40 to 60 miles of stream removing fish. Large crews and numerous electrofishing units would be required. Off-trail activity and fish and wildlife habitat disturbance would be much greater using this alternative. While piscicide application only requires entry into the stream and riparian area every ½ to 2 miles, electrofishing removal would require the entire length of all stream be walked through multiple times by multiple people. Potential disturbance to sensitive wildlife species would be greater with the electrofishing alternative. Moreover, electrofishing removal efforts are seldom successful, which means that re-entry into the system for subsequent electrofishing efforts would probably be necessary. With piscicide treatment, the proposal would be to enter the area for treatment only once, complete the treatment and re-introduce YCT. Repeated and long-term human presence, and potential habitat disturbance, would be avoided.

The predicted consequences of Alternative 3 include:

- Incomplete removal of rainbow trout
- Allows some fishing opportunity
- Slower YCT establishment in lakes
- Low probability of successful removal in streams
- Minimize impacts to non-target invertebrate species
- More disturbance to Wilderness area due to electrofishing effort required

Alternative 4 -- Removal Using Netting in Lakes and Piscicide in Streams (Preferred Alternative)

The fourth, and preferred alternative involves removing rainbow trout using netting in the lakes and piscicide in the streams. This alternative has been discussed in the Summary of Proposed Action. The drawbacks to this alternative include some negative effects to nontarget invertebrates in the streams and slower establishment of a genetically pure YCT population in the lakes. However, the advantages of this alternative are numerous, and include:

- Minimal negative effects to the wilderness values
  - No motorized use
  - Less human/stock use impacts
- High probability of success and lower likelihood that project will need to be repeated
- Maintain angling opportunity for some rainbow trout in the lakes
- Highly efficient stream treatment
- Lower impact to non-target species than Alternative 2
- Lower cost than Alternatives 2-3

PART III. ENVIRONMENTAL REVIEW

Below is an environmental review checklist followed by an explanation of potential impacts and the mitigating measures that would be taken to ensure the impacts of this project were minimized as much as possible.

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. **WATER** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X			2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?		X				See 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X			2m

Comment 2a: Alterations in Water Quality

Potential impacts to water quality relate to piscicide treatment and the presence of dead fish following treatment. Implementation of a number of best management practices (BMPs) and associated mitigative activities would limit the duration and severity of alterations in surface water quality associated with the proposed actions.

This project would involve discharge of rotenone into selected tributaries in the upper Boulder River watershed. Rotenone is an insecticide commonly used in organic agriculture and home gardening, as well as being an effective piscicide. Rotenone comes from the roots and stems from a variety of tropical and subtropical plants in the pea family (Fabaceae). The empirical formula of this isoflavonoid compound is $C_{23}H_{22}O_6$. Carbon comprises 70% of its molecular weight, and hydrogen and oxygen constitute 6% and 24% respectively. Compared to other piscicides, rotenone is relatively inexpensive and accessible, and has been routinely used to remove unwanted fish from lakes and streams. Rotenone acts by blocking the ability of tissues to use oxygen, which causes fish to asphyxiate quickly.

Rotenone is a highly reactive molecule, a factor favoring its quick decomposition in the environment. This degradability is in marked contrast to some pesticides used in nonorganic agriculture. Organochlorines are synthetic pesticides comprised of chlorinated hydrocarbons, and include chemicals such as DDT, heptachlor, and chlordane. These compounds persist in the environment long after their release, making the behavior and fate of organochlorine pesticides substantially different from rotenone, which breaks down within days in a stream environment. Organophosphates are another class of pesticide that differs markedly from rotenone in terms of threats to human health and the environment. Commonly used organophosphate pesticides include malathion, parathion, and diazinon. Although these chemicals are considerably less persistent than the organochlorines, they are more acutely toxic, and act as potent neurotoxins. Organophosphate poisonings are one of the most common causes of poisoning worldwide. In contrast, rotenone does not share this acute toxicity to humans with the organophosphate pesticides.

CFT Legumine is the rotenone formulation proposed for this project. The EPA has registered this formula (Reg. No. 75338-2), and approved its use as a piscicide. Information on its chemical composition, persistence in the environment, risks to human health, and ecological risks come from a number of sources including material data safety sheets (MSDS) and manufacturer's instructions. (A MSDS is a form detailing chemical and physical properties of a compound, along with information on safety, exposure limits, protective gear required for safe handling, and procedures to handle spills safely.) In addition, a recent study presented an analysis of major and trace constituents in CFT Legumine, evaluated the toxicity of each, and examined persistence in the environment (Fisher 2007).

The MSDS for CFT Legumine lists three categories of ingredients for this formula (Table 1). Rotenone comprises 5% of CFT Legumine by weight. Associated resins account for 5%, and the remaining 90% are inert ingredients, of which the solvent n-methylpyrrolidone is a component. Additional information in the MSDS confirms its extreme toxicity to fish. The TVL addresses risks to human health from exposure, which is addressed in 8a.

Table 1: Composition of CFT Legumine from material safety data sheets (MSDS).

Chemical Ingredients	*Percentage by Weight*	*CAS. No.*[1]	*TLV*[2] *(units)*
Rotenone	5.00	83-79-4	5 mg/m^3
Other associated resins	5.00		
Inert ingredients including n-methylpyrrolidone	90	872-50-4	Not listed

[1]Chemical abstracts number
[2]A TLV reflects the level of exposure that the typical worker can experience without an unreasonable risk of disease or injury.

Fisher (2007) analyzed chemical composition of CFT Legumine, including the inert fraction (Table 2). On average, rotenone comprised 5% of the formula, consistent with MSDS reporting. Other constituents were solvents or emulsifiers added to assist in the dispersion of the relatively insoluble rotenone. DEGEE, or diethyl glycol monoethyl ether, a water-soluble solvent, was the largest fraction of the CFT Legumine analyzed. Likewise, n-methylpyrrolidone comprised about 10% of the CFT Legumine. The emulsifier

Fennedefo 99™ is an inert additive consisting of fatty acids and resin acids (by-products of wood pulp and common constituents of soap formulations), and polyethylene glycols (PEGs), which are common additives in consumer products such as soft drinks, toothpaste, eye drops, and suntan lotions. Trace constituents included low concentrations of several forms of benzene, xylene, and naphthalene. These organic compounds were considerably lower than measured in Prenfish, another commercially available formulation of rotenone, which uses hydrocarbons to disperse the piscicide. Their presence in trace amounts in CFT Legumine relates to their use as solvents in extracting rotenone from the original plant material.

Table 2: Average percent concentrations and ranges of major constituents in CFT Legumine lost to be used in a piscicide project in California (Fisher 2007).

Major CFT Legumine Formula Constituent	*Rotenone*	*Rotenolone*	*n-methylpyrrolidone*	*DEGEE[1]*	*Fennedefo 99*
Average %	5.12	0.718	9.8	61.1	17.1
Range	4.64-5.89	0.43-0.98	8.14-10.8	58.2-63.8	15.8-18.1

[1]diethyl glycol monoethyl ether

Toxicity to nontarget organisms and persistence in the environment are major considerations in determining the potential risks to human health and the environment, and several factors influence rotenone's persistence and toxicity. Rotenone has a half-life of 14 hours at 24 °C, and 84 hours at 0 °C (Gilderhus et al. 1986, 1988), meaning that half of the rotenone is degraded and is no longer toxic in that time. As temperature and sunlight increase, so does degradation of rotenone. Higher alkalinity (>170 mg/L) and pH (>9.0) also increase the rate of degradation. Rotenone tends to bind to, and react with, organic molecules rendering it ineffective, so higher concentrations are required in streams with increased amounts of organic debris. Without detoxification, rotenone would degrade to nontoxic levels in one to several days due to its break down and dilution in the aquatic environment.

Mitigative activities proposed would further reduce the spatial and temporal extent of rotenone toxicity. A detoxification station established immediately below the target reach would release up to 4 mg/L of $KMnO_4$. This strong oxidizer rapidly breaks down rotenone into nontoxic constituents of carbon, oxygen, and hydrogen, with total breakdown occurring within 15 to 30 minutes of exposure. $KMnO_4$ in turn breaks down into potassium, manganese, and water, which are common constituents in surface waters, and have no deleterious effects at the concentrations used (Finlayson et al. 2000). The result of release of $KMnO_4$ on water quality would be elimination of toxic concentrations of rotenone.

Concentration of rotenone in treated waters is another factor relating to potential effects from incidental ingestion by other organisms, including humans. The effective concentration of rotenone is 1 ppm or 1 mg/L, which is well below concentrations harmful to humans from ingestion. The National Academy of Sciences suggested concentrations at 14 ppm would pose no adverse effects to human health from chronic ingestion of water (NAS 1983). Moreover, concentrations associated with acute toxicity to humans are 300-500 mg per kilogram of body weight (Gleason et al. 1969), which means a 160-pound person would have to drink over 23,000 gallons in one sitting to receive a lethal dose (Finlayson et al. 2000). Similarly, risks to wildlife from ingesting treated water are low. For example, ¼-pound bird would have to consume 100 quarts of treated water, or more than 40 pounds of fish and invertebrates within 24 hours for a lethal dose (Finlayson et al. 2000). The EPA, in their recent reregistration evaluation of rotenone (EPA 2007), concluded that exposure to rotenone, when applied according to label instructions, presented no unacceptable risks to humans and wildlife. In summary, this project would have no adverse effect on humans or wildlife associated with ingesting water, dead fish, or dead invertebrates.

Bioaccumulation of rotenone would not result in threats to human health and the environment under this alternative. Rotenone can bioaccumulate in the fat tissues of fish that are not exposed to toxic levels (Gingerich and Rach 1985). As a complete fish-kill is the goal, bioaccumulation would not be a problem. Potential toxicity and persistence of the other constituents of the CFT Legumine formulation are additional considerations. Proposed concentrations of n-methylpyrrolidone (about 2 ppm) would have no adverse effects to humans ingesting treated waters. According to the MSDS, ingestion of 1000 ppm per day for three months does not result in deleterious effects to humans. In addition, n-methylpyrrolidone will not persist in surface waters given its high biodegradability. In fact, this feature, combined with its low toxicity, makes methylpyrrolidone a commonly used solvent in wastewater treatment plants.

Fisher (2007) examined the toxicity and potential persistence of other major constituents in CFT Legumine, including DEGEE, fatty acids, PEGs, and trace organic compounds, (benzene, xylene, naphthalene). With proposed application of CFT Legumine, none of these compounds would violate water quality standards, nor would they reach concentrations shown to be harmful to wildlife or humans. Furthermore, persistence of these chemicals was not a concern. The trace organics would degrade rapidly through photolytic (sunlight) and biological mechanisms. Likewise, the PEGs would biodegrade in a number of days. The fatty acids would also biodegrade, although they would persist longer than the PEGs or benzenes. Nonetheless, these are not toxic compounds, so the relatively longer persistence would not adversely affect water quality. Overall, the low toxicity, low persistence, and lack of bioaccumulation indicate the inert constituents in CFT Legumine would have a minor and temporary effect on water quality.

To reduce the potential risks associated with the use of CFT Legumine, the following management practices, mitigation measures, and monitoring efforts would be employed:

1. A pretreatment bioassay would be conducted to determine the lowest effective concentration and travel time of the chemical in the stream.
2. Signs would be posted at trailheads and along the stream to warn people not to drink the water or consume dead fish.
3. Piscicides would be diluted in water and dripped into the stream at a constant rate using a device that maintains a constant head pressure.
4. A detoxification station would be set up downstream of the target reach. Potassium permanganate ($KMnO_4$) would be used to neutralize the piscicide at this point.
5. An additional detoxification station would be established downstream from the initial detoxification station as a safeguard.
6. Project personnel would be trained in the use of these chemicals, including the actions necessary to deal with spills as prescribed in the MSDS for CFT Legumine™.
7. Persons handling the piscicide would wear personal protective gear as prescribed in the CFT Legumine™ label.
8. Only the amount of piscicide and potassium permanganate needed for immediate use would be held near the stream.
9. Sentinel or caged fish would be located below the detoxification station and within the target reach to determine and monitor the effectiveness of both the rotenone and potassium permanganate.

The presence and fate of dead fish would be another potential alteration of water quality associated with piscicide treatment. Decomposing fish would add nutrients to the water. This would result in short-term and minor changes in water quality as decomposition would be rapid, and scavengers would consume carcasses.

Comment 2f: Changes in the Quality of Groundwater

Investigations on the fate and transport of rotenone in soil and groundwater indicate this project would not alter groundwater quality. Rotenone binds readily to soils and is broken down by soil and in water (Dawson et al. 1991; Engstrom-Heg 1971, 1976; Skaar 2001; Ware 2002). Because of its strong tendency to bind with soils, its mobility in most soil types is only one inch; although, in sandy soils rotenone can travel up to three inches (Hisata 2002). Combined, the low mobility and rapid break down prevents rotenone from contaminating groundwater.

Groundwater investigations associated with several piscicide projects also indicate application of rotenone, and the inert ingredients, would not threaten groundwater quality. California investigators monitored groundwater in wells adjacent to and downstream of rotenone projects, and did not detect rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Likewise, case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, FWP monitored a domestic well two weeks and four weeks after applying 90 ppb of rotenone to Lake Tetrault (FWP, unpublished data). This well was down gradient from the lake, and drew water from the same aquifer that drained and fed the lake; however, no rotenone or associated constituents were detectable. FWP monitored groundwater associated with several other rotenone projects, with wells ranging from 65 to 200 feet from the treated waters. Repeated sampling occurred within periods of up to 21 days, with no detectable concentrations of rotenone or the inert ingredients found. According to the Montana Groundwater Information System, two known wells are near the treatment area and potentially have hydrologic connectivity to treated waters. One is located at the USFS Fourmile Creek cabin, and the other is located at the USFS cabin at Box Canyon. While no groundwater contamination is expected, we would notify the USFS Big Timber Ranger District of treatment time and offer to monitor the water quality of these wells if they were being used at the time. An outside source of drinking water would be made available if requested by the Ranger District.

Comment 2m: Discharge Affecting Water Quality Regulations

This project would involve discharge of CFT Legumine, an EPA registered piscicide, to targeted tributaries in the upper Boulder River. Montana state law (MCA 75-5-308) allows application of registered pesticides to control nuisance aquatic organisms, or to eliminate undesirable and nonnative aquatic species. FWP would apply for a short-term exemption from surface water standards, or 308 authorization, from DEQ, and abide by the requirements of the authorization. These requirements call for minimizing the concentration and duration of chemical to the extent practicable. We would accomplish this by performing a bioassay to determine the lowest, effective concentration of rotenone. Other requirements of 308 authorization include preventing significant risk to public health, and ensuring that existing and designated uses of state water are protected and maintained upon completion of the activity. Comment 2a and 8c, address risks to the environment and public health, which would be short-term and minor, or negligible.

3. **AIR** Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))		X				
b. Creation of objectionable odors?			X		YES	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge that will conflict with federal or state air quality regs?		X				

Comment 3b: Creation of Objectionable Odors

Piscicide treatment has potential to create objectionable odors. Compared to other rotenone formulations that use aromatic hydrocarbons to disperse rotenone, CFT Legumine does not present substantial concerns regarding odor, and has considerably lower inhalation risks. Following label instructions, respiratory protection would be required when working with undiluted product in a confined space. Otherwise, any odors from CFT Legumine application in the field would be short-term and minor because of rapid dissipation.

Decaying fish present another cause of objectionable odor in the treatment area, although applicators on past projects report most fish sink to the bottom of the stream, where odors from decomposition are not noticeable. Applying piscicide during the fall would reduce the occurrence of objectionable odors, compared to warm summer months.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		YES	4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Changes in Plant Species

Because personnel and livestock would be in the treatment area for an approximate period of 2 weeks each year, there would be some effects on the vegetation at campsites. However, these effects would be minor in relation to the normal use of the area by recreationists. Selecting campsites in treed areas or using existing campsites can mitigate these disturbances. Wilderness camping policies would be followed during this project. Exceptions to wilderness guidelines would only be used if cleared first by the GNF, Big Timber Ranger District.

Comment 4e: Establisment or Spread of Noxious Weeds

Pack animals and their feed, and vehicles, are possible vectors of noxious weeds into the project area. The GNF requires the use of weed free feed, and would be used during this project to feed livestock that carry equipment and personnel. Likewise, vehicles transporting personnel and gear will receive an undercarriage wash to remove seeds.

5. **<u>FISH/WILDLIFE</u>** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		YES	5b
c. Changes in the diversity or abundance of nongame species?			X			
d. Introduction of new species into an area?			X		YES	5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X		YES	5f.
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: Changes in the Diversity or Abundance of Game Animals or Birds

The proposed action is expected to result in an increase in native YCT and a decrease in nonnative rainbow trout (both are considered game fish in Montana). The loss of rainbow trout from the treatment area is considered only a minor alteration because the rainbow trout fisheries would be replaced with YCT fisheries. Furthermore, many rainbow trout would remain in lakes on the Lake Plateau that drain into the Stillwater River. The project would increase the distribution of YCT, which is the trout species native to the area, and has potential to become protected under the Endangered Species Act. The increase in YCT associated with this project would help ensure their long-term persistence in the upper Boulder River watershed, and protect a large metapopulation of YCT, which is becoming increasingly rare within the species' historic range. At the same time this project would increase recreational angling opportunities for this important native species.

Comment 5c: Changes in the Diversity or Abundance of Nongame Species

This project would have potential to result in changes in diversity and abundance of a variety of nongame wildlife species. Range maps, observation data, and field guide information housed by the Montana Natural Heritage Program (MNHP) allowed determination of species likely to occur within the project area. In addition, the MNHP is a source of information on the habitats, food preferences, and life history strategies, which informed evaluation of potential effects. This section examines the risks to wildlife associated with direct exposure to rotenone, a diminished prey base relating to reduced biomass of fish or aquatic invertebrates, or exposure to rotenone through ingestion of dead animals or treated water. Rotenone is highly toxic to fish, and treatment would have immediate effects on fish within the treatment area. Comment 6b addresses effects on game fish, which would be minor and temporary, as restocking would restore a population of native Yellowstone cutthroat trout. Aside from rainbow and Yellowstone cutthroat trout, no other fish species are known to exist in the project area.

Gilled aquatic invertebrates are nontarget organisms with considerable potential to suffer negative effects from piscicide treatment. In streams, benthic populations of true flies, stoneflies, mayflies, and caddis flies would be the primary affected taxa. Owing to a number of factors, these effects would be short-term and temporary. Investigations into the effects of rotenone on benthic organisms indicate that rotenone has temporary or minimal effects on stream-dwelling invertebrates. For example, following piscicide treatment of a California stream, macroinvertebrates experienced an "explosive resurgence" in numbers, with black fly larvae recovering first, followed by mayflies and caddis flies within six weeks after treatment (Cook and Moore 1969). Stoneflies returned to pretreatment abundances by the following spring.

Although gill-respiring invertebrates are a sensitive group, many are far less sensitive to rotenone than fish (Schnick 1974, Finlayson et al. 2010), and would be likely to survive concentrations applied for fish removal. The well-established ability of macroinvertebrates to recover following disturbance, combined with the lower susceptibility of some taxa to rotenone, would contribute to rapid recovery of invertebrate populations. Drift and recolonization by aerial adults are the primary mechanisms of aquatic invertebrate recovery. Many miles of stream upstream of the treatment area would provide a source of drifting invertebrates to treated waters. Recolonization by adults would also occur by upstream aerial migration from downstream areas.

Timing piscicide treatment for fall would reduce potential for effects on macroinvertebrates, as most of the year's crop of invertebrates would have emerged by that time. Moreover, a considerable proportion of the new crop would be in the egg phase, and not vulnerable to piscicide.

Amphibians are closely associated with water, and have potential to be exposed to rotenone during treatment. Species with potential to occur within the treatment area are the Columbian spotted frog (*Rana luteiventris*), the western toad (*Bufo boreas*), and the boreal chorus frog (*Pseudacris maculata*). Of these, the Columbian spotted frog has the greatest probability for exposure to rotenone, given its preference for streamside habitat. Western toads and boreal chorus frogs are largely terrestrial, except for during the breeding season, so these species have a lower probability of encountering rotenone treated waters.

Applying rotenone to the target streams would likely have negligible effects on amphibians given the physical setting and proposed timing of piscicide application. Similar to other gill-bearing organisms, amphibian larvae are sensitive to rotenone, and exposure to rotenone at levels used to kill fish is acutely toxic to Columbian spotted frog larvae (Grisak et al. 2007). Nonetheless, the potential for exposure would be minimal in the upper Boulder river system, as these very high gradient mountain streams simply do not provide suitable slow water or lentic breeding habitat for frogs and toads. Likewise, conducting the treatment in the fall, after metamorphosis, would prevent exposure in the event unidentified beaver ponds or other backwater features were present. Billman (2010) found that rotenone applications in amphibian habitats proved lethal to tadpoles, but nonlethal to metamorphs, juveniles and adults. Fall treatment, which would avoid treatment during the tadpole stage of development, is the recommended approach to avoiding effects on amphibians (Grisak et al. 2007; Billman 2010).

Effects on adult amphibians would be insignificant given their low vulnerability to rotenone, mobility, and project timing. Adult Columbian spotted frogs do not suffer an acute response to trout killing concentrations of Prenfish, another commonly used formulation of rotenone (Grisak et al. 2007; Billman 2010). Adult western toads would likely be less sensitive than frogs given their impermeable skin (Maxell and Hokit 1999). Adult toads and frogs have the ability to leave the aquatic environment, which substantially reduces the potential for exposure (Maxell and Hokit 1999). Moreover, by fall, these organisms would be moving towards or occupying overwintering habitat. Western toads and boreal chorus frogs hibernate away from streams. Columbian spotted frogs hibernate in spring-fed ponds, which are not present in the project area.

Implementation of a basic monitoring plan would allow evaluation of the short and long-term effects of piscicide treatment on potentially sensitive taxa. The macroinvertebrate sampling component would involve sampling macroinvertebrates using standard operating procedures developed by DEQ. Sample collection would occur before piscicide treatment at two locations in each treated stream, and would be repeated shortly after treatment, then for two years afterward. Fish recovery would be evaluated using electrofishing over the course of 5 years.

A temporary reduction in prey of aquatic origin has potential to influence mammals, amphibians, reptiles, birds, and bats. Mammalian predators that are likely to exploit prey of aquatic origin in the treatment area as a regular source of their diet include American mink (*Mustela vison*) and grizzly bear (*Ursus arctos*). Mink are opportunistic predators and scavengers, with fish and invertebrates comprising a portion of their diet. Therefore, the reduction in density of fish and invertebrates following treatment may displace mink to adjacent, untreated reaches until populations recovered. Grizzly bears are opportunistic foragers, and would be resilient to a temporary reduction in fish. Conversely, these predators, along with opportunistic black bears (*Ursus americanus*), raccoons (*Procyon lotor*), red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), gray wolves (*Canis lupus*), and striped skunks (*Mephitis mephitis*) would likely consume dead fish immediately after piscicide treatment. The temporary reductions of aquatic prey, and the brief availability of dead fish, constitute short-term and minor effects on mammalian predators.

A number of bird species with potential to occur within the project area consume fish or invertebrates with an aquatic life history stage. The belted kingfisher (*Megaceryle alcyon*) consumes fish as its primary food source. The American dipper (*Cinclus mexicanus*) forages for aquatic invertebrates in mountain streams year round. Numerous species of songbird eat winged adults of invertebrates originating from streams. The effect of a reduction of forage base on these organisms would be minor and short-term. Belted kingfishers may be temporarily displaced, until Yellowstone cutthroat trout rebound in the treatment streams. As rotenone does not affect all aquatic invertebrates, some invertebrate prey would remain to support American dippers, although some level of displacement is possible. Most songbirds that consume winged invertebrates would not be present during the fall treatment period. Reductions in emergence of adult insects may occur the following summer, although drift from upstream and increased survival of invertebrates not killed by piscicide would counteract these potential deficits. Overall, the effects of reduced forage on birds would be minor and temporary.

Two species of gartersnake, the common gartersnake (*Thamnophis sirtalis*) and the terrestrial gartersnake (*T. elegans*), may occur in the treatment area, and a reduction in aquatic based food may affect these snakes. Similarly, the Columbian spotted frog regularly forages along stream margins. Effects on these reptile and amphibian predators would likely be short-term and minor, with temporary displacement or reductions in population size. Given the quick recovery expected of the fish and invertebrate prey base, gartersnakes and frogs would not experience long-term or significant effects.

Bats also consume winged insects, and therefore, rotenone projects have potential to have a negative effect on bats. Diet preferences and seasonal habitat use for bats in the project area indicate effects on bats would be negligible. Only one species is known to migrate out of Montana during the winter; however, the others would likely be hibernating during the treatment period. Review of diets indicates most of the bats species that may occur in the project area consume mostly invertebrates of terrestrial origin. Because of the rapid recovery of aquatic invertebrates, and a lack of reliance on invertebrates of aquatic origin, bats would experience no adverse effects from piscicide treatment in the upper Boulder.

Ingestion of rotenone, either from drinking water, or from consuming dead fish or invertebrates, is a potential route for rotenone exposure. A substantial body of research has investigated the effects of ingested rotenone in terms of acute and chronic toxicity, and other potential health effects. An important consideration in reviewing theses studies is that most examined laboratory exposure to exceptionally high concentrations of rotenone that would not be attainable under proposed field application. The low level of effects at these super-elevated concentrations indicates risks to wildlife from exposure to proposed levels would be nil.

In general, ingestion does not affect mammals because of digestive action in their stomach and intestines (AFS 2002). Investigations examining the potential for acute toxicity from ingesting rotenone find mammals would need to consume impossibly high amounts of rotenone-contaminated water or dead animals for a lethal dose. For example, a 22-pound dog would have to drink nearly 8,000 gallons of treated water within 24 hours, or eat 660,000 pounds of rotenone killed fish within a day to receive a lethal dose (CDFG 1994). A half-pound mammal would need to consume 12.5 mg of pure rotenone, or drink 66 gallons of water treated at 1 ppm for a lethal dose (Bradbury 1986). In comparison, the effective concentration of rotenone to kill fish is 1 ppm, which is several orders of magnitude lower than concentrations resulting in acute toxicity to mammals.

Evaluations of potential exposure of various sized mammals associated with their estimated daily food intake and total body residue of rotenone within killed fish indicate acute toxicity from ingesting rotenone-killed fish is highly unlikely (EPA 2007). Estimation of the daily consumption of dead fish by an "intermediate-sized mammal" of 350 mg, which is about half the size of a male American mink, found an estimated daily dose of 20.3 μg of rotenone. This is well below the median lethal dose of 13,800 μg of rotenone for a mammal of that size. A "large mammal" is one with 1,000 g body weight, which is within the weight range for female American mink. If this size mammal fed exclusively on fish killed by rotenone, it would receive an equivalent daily dose of 37 μg of rotenone. In comparison, the estimated median lethal concentration of rotenone for a 1,000 g mammal was 30,400 μg, which is over 800 times the daily dose. The EPA (2007) concluded that piscivorous mammals were highly unlikely to consume enough fish to result in observable acute toxicity.

Chronic toxicity associated with availability of dead fish over time would not pose a threat to mammals, nor would other health effects be likely. Rats and dogs fed high levels of rotenone for six months to two years experienced only diarrhea, decreased appetite, and weight loss (Marking 1988). The unusually high treatment concentrations did not cause tumors or reproductive problems. Toxicology studies investigating potential secondary effects to rotenone exposure have found no evidence that it results in birth defects (HRI 1982), gene mutations (BRL 1982; Van Geothem et al. 1981), or cancer (Marking 1988). Rats fed diets laced with 10 to 1000 ppm of rotenone over a 10-day period did not experience any reproductive dysfunction (Spencer and Sing 1982).

Concerns over putative links to Parkinson's disease often emerge in response to potential rotenone projects. This issue relates to a study in which rats injected with rotenone for up to 2 weeks showed lesions characteristic of Parkinson's disease (Betarbet et al. 2000). Review of the methodology employed in this study finds no similarities to fisheries related piscicide projects in terms of dose, duration of exposure, or mode of delivery. The rats received constant injection of rotenone and dimethyl sulfoxide directly into their bloodstream, resulting in continuously high concentrations of rotenone. The purpose of the dimethyl sulfoxide was to enhance tissue penetration of the rotenone, as normal routes of exposure actually slow introduction of chemicals into the bloodstream. In contrast, field exposure would involve far lower concentrations of rotenone, without the potentially synergistic effects of dimethyl sulfoxide to promote uptake into tissues. Moreover, the rapid breakdown of rotenone in the environment would not support more than a few days of potential exposure from ingesting water or dead animals. Finally, continuous intravenous injection in no way resembles any potential mode of field exposure to rotenone, which would be ingestion of dilute rotenone in water, or consumption of fish or invertebrates killed by rotenone. As the injection study does not provide a model for potential effects of field application of rotenone, and other researchers have not found Parkinson's-like effects in exposed animals (Marking 1988), we conclude that rotenone application would not result in neurological risks to field exposed animals.

Birds may also scavenge dead fish and invertebrates, or ingest treated water; however, research on toxicity of rotenone to birds indicates acute toxicity was not possible from field application of rotenone to achieve a fish kill. In general, birds require levels of rotenone at least 1,000 to 10,000 times greater than is required for lethality in fish (Skaar 2001). Chickens, pheasants, and related gallinaceous birds are resistant to rotenone, and four-day-old chicks are more resistant than adults (Cutkomp 1943). Rotenone is slightly toxic to waterfowl, although acute toxicity occurs at levels 2000 times higher than the proposed treatment concentration (Ware 2002). Evaluation of the risks to scavenging birds based on estimated daily dose and body size indicated no risk of acute toxicity from eating rotenone-killed fish (EPA 2007). The daily dose of rotenone from consumption of scavenged fish ranged from 15 μg to 95 μg. At this level of contamination, a raven-sized bird would need to consume from 43,000 to 274,000 dead fish in one day for a lethal dose (EPA 2007).

In summary, effects on nontarget species of wildlife would range from nonexistent to short-term and minor. Fish and benthic invertebrates would suffer significant mortality; however, restocking and natural recovery would result in these effects being temporary. Some species may experience temporary reductions in prey base, which may displace these animals until fish and macroinvertebrate populations rebound. Concentrations of rotenone in water and dead fish would be orders of magnitude less than levels causing acute and chronic toxicity to animals ingesting treated water or dead fish. Moreover, as rotenone degrades rapidly, the duration of potential exposure would be short, measurable in days, which would not pose long-term threats to wildlife.

Comment 5d: Introduction of New Species to an Area

Yellowstone cutthroat trout would be introduced into the treatment area after the removal of rainbow trout. These two species share similar feeding characteristics and habitat use, and achieve similar sizes and densities, meaning that impacts from introducing YCT would be no greater than those currently experienced with rainbow trout.

Comment 5f: Effects on Unique, Rare, Threatened , or Endangered Animals

The MNHP database lists several animal species of special concern as occurring in, or near the project area (Table 3). Field guide information provided by the MNHP website allows inference on potential effects of the project on these species. Evaluation of their habitat needs, forage base, and migration timing suggests effects on these species would be nonexistent or negligible.

Among the mammals of special concern, effects of the proposed actions would be minor and of short duration. Presence of field crews and their activity may temporarily displace large mammals, such as the gray wolves, wolverines, lynx, and grizzly bears, from occupied habitat. Conversely, availability of dead fish from piscicide treatment would attract scavenging animals to the stream corridor over the short-term. These effects would be minor and temporary. All food storage orders would be followed to prevent human-wildlife conflicts. In the lakes, all dead fish would be sunk in deep water to avoid luring animals to the project area. In the streams, large concentrations of dead fish would be avoided to prevent disturbance of scavenging animals and ensure human and animal safety.

The harlequin duck is the only bird species of special concern known to occur within the project area. The Montana Natural Heritage Program database reports from 42 to 75 observations of harlequin duck near or within the general project area, and cites direct evidence of breeding in or near these streams. Harlequin ducks inhabit relatively low gradient reaches of fast moving, clear mountain streams and portions of the main stem of the Boulder River and its larger tributaries provide suitable habitat. Disturbance associated with field crews applying piscicide would be the most probable negative effect on harlequin ducks, although this would likely be minor and short-term. Female harlequin ducks and their young leave Montana for the Pacific coast from late July through to early September. Males are only present for mating, and return to the coast in June. If harlequin ducks are present in the project area, most will likely migrate before onset of piscicide application. In addition, disturbance would be limited to presence of humans along streams for one or two days. The low toxicity of rotenone associated with consumption of treated water or exposed invertebrates would not result in negative effects on remaining birds. Their forage base of aquatic invertebrates would recover in terms of biomass before the next breeding season.

The one amphibian species of concern with potential to be found in the project area is the Western Toad. This is considered a sensitive species by the U.S. Forest Service. Potential impacts to amphibians and mitigation measures are discussed above, in Comment 5c. The Northern Leopard Frog is also an amphibian species of concern identified by the Forest Service, but is not found in the vicinity of the project area.

As this is a Yellowstone cutthroat trout conservation project, this species would ultimately benefit from this project. Upon completion of piscicide treatment and gill netting removal, YCT would be stocked into the treatment area and would be free of competition with nonnative rainbow trout. These genetically pure YCT would also contribute to an increase in the genetic contribution of YCT throughout the drainage.

Table 3:Animal species of special concern known to occur in the sections encompassed by the upper Boulder RiverYellowstone cutthroat trout conservation project.

Group	Scientific Name	Common Name	Global Rank	State Rank	USFWS	USFS
Mammals	*Canis lupus*	Gray wolf	G4[1]	S3[2]	LE[3]	Endangered
Mammals	*Gulo gulo*	Wolverine	G4	S3		Sensitive
Mammals	*Lynx canadensis*	Canada lynx	G5[4]	S3	LT[5]	Threatened
Mammals	*Ursus arctos*	Grizzly bear	G4	S2[6]S3	L, DM[7]	Threatened
Birds	*Histrionicus histrionicus*	Harlequin duck	G4	S2B		Sensitive
Amphibians	*Bufo boreas*	Western Toad	G4	S2		Sensitive
Fish	*Oncorhynchus clarkii bouvieri*	Yellowstone cutthroat trout	G4T[8]2	S2		Sensitive

[1] G4 or S4: uncommon but not rare (although it may be rare in parts of its range), and usually widespread

[2] G3 or S3: Potentially at risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.

[3] LE: listed endangered- Any species in danger of extinction throughout all or a significant portion of its range (16 U.S.C 1532[6])

[4] G5 or S5 Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.

[5] LT: Listed threatened: Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (16 U.S.C 1532[20]).

[6] G2 or S2: At risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.

[7] DM: Delisted taxon, recovered, being monitored for first five years

[8] T: Infraspecific taxon (trinomial) – the status of infraspecific taxa (subspecies or variety) are indicated by a "T-rank" followed by the Species' global rank.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Increases in existing noise levels?		X				
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. **<u>LAND USE</u>** Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?			X		YES	7a
b. Conflict with a designated natural area or area of unusual scientific or educational importance?			X		YES	7b
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

7a: Alteration or Interference with the Productivity or Profitability of the Existing Land Use of an Area

Several hunting and fishing outfitters operate under permit with the USFS near the treatment area. The project is expected to be completed before the hunting season each year, minimizing the displacement of game and impacts on hunters. The quality of fishing would be temporarily reduced in the Rainbow Lakes, Mirror Lake, Fourmile Creek, lower Meatrack Creek, Rainbow Creek, and a short reach of the East Fork of the Boulder River.

In the lakes, netting would reduce rainbow and hybrid trout densities by a targeted 75%, which could translate to lower catch rates and slower fishing. However, the current low size quality of the fish in these lakes would be improved because fewer adult fish would be competing for the same amount of food resources. The slower fishing would be mitigated by the opportunity to catch larger fish. After approximately 1 to 2 years, stocked YCT would reach a catchable size, and restore the opportunity to catch large numbers of fish, and enhance the opportunity to catch a fish native to Montana.

In the treatment reaches of Rainbow Creek, Fourmile Creek, lower Meatrack Creek, and part of the East Fork Boulder, fishing opportunity would be mostly eliminated for approximately two years. All fish would be removed from these reaches, and re-introduced YCT would require two years to grow to catchable size. Fortunately, most of these stream reaches receive very little fishing pressure.

Rainbow Creek is relatively small and difficult to fish. Some YCT stocked in the upstream lakes in 2011 may grow to catchable size and drift out of Rainbow lakes and into the creek in 2013, providing fishing opportunity before the 2012-stocked YCT in Rainbow Creek grow to catchable size.

Meatrack Creek contains a self-sustaining, genetically pure YCT population upstream of the treatment area. The upper meadows in Meatrack Creek provide fishing opportunities for hunting outfitters and other anglers. This area would not be treated. Additionally, some fish from the meadows may migrate down into the treatment area in 2012-2013, providing some fishing opportunity while the newly stocked YCT in the lower creek are becoming established.

Fourmile Creek receives very little fishing pressure. YCT newly established in Silver Lake from a previous project may drift downstream into upper Fourmile Creek and provide fishing opportunity while the newly stocked YCT become established.

The East Fork of the Boulder River likely receives more angling use than the other creeks. The treatment reach here would be limited in scope. Fish removal would not extend to the lower several miles of the creek, and would not extend any significant distance upstream from the mouth of Rainbow Creek. Such a strategy would retain fishing opportunity in the East Fork while removing rainbows and hybrid fish from targeted areas where they are known to occur.

Numerous alternative fishing opportunities exist throughout the project area, including fishing in the main Boulder River and numerous other lakes on the Lake Plateau, the Fourmile Creek drainage, and various other lakes and tributary streams that drain into the main Boulder River. After several years, fishing quality in all project waters would be restored to its prior condition. The opportunity to catch rainbow trout and hybrids would be replaced with the opportunity to catch genetically pure, native YCT. YCT are currently part of FWP's standard trout harvest limit in the project area and would remain so after successful completion of the project. Thus, the opportunity for anglers to harvest fish in the area would remain. All outfitters licensed by the Gallatin National Forest in this area will be sent a copy of this EA and given the opportunity to discuss the project and provide comment.

7b: Conflict with a Designated Natural Area or Area of Unusual Scientific or Educational Importance

The majority of the proposed project is within the Absaroka-Beartooth Wilderness Area. The Absaroka-Beartooth Wilderness Area is managed to maintain 'wilderness character', including opportunities for solitude or a primitive and unconfined type of recreation, making "the imprint of man's work less noticeable", protecting indigenous species, and allowing natural processes to regulate ecosystems. Briefly, wilderness character can be compromised when wilderness ecological systems and processes are impacted by effects of modern civilization, including human control and manipulation.

As previously described, the AFWA agreement details situations under which such applications of piscicide are appropriate within wilderness areas; these include treatments to re-establish an indigenous species, as proposed and described under each alternative. The guidelines further denote treatment guidelines to minimize impacts to wilderness character, and all of these have been considered in developing this alternative. Taken together, application of piscicide within the A-B Wilderness as proposed would result in a short-term diminishment of wilderness character, during project activities, but would result in a long-term improvement in wilderness character through protection and expansion of the YCT population above Hawley Falls. Furthermore, the short-term impacts to wilderness character have been mitigated to the degree possible by including the mitigations outlined in the AWFA agreement.

Under the "No Action" alternative, the presence of rainbow trout and Yellowstone cutthroat trout x rainbow trout hybrids can be considered a negative impact to wilderness character. YCT population restoration would improve wilderness characteristics in the long-term by contributing to the "preservation and use in an unimpaired condition," making "the imprint of man's work less noticeable and improving the ecological characteristics.

Conducting the piscicide treatments has the potential for minimal short-term impacts to 'wilderness character.' These impacts include the temporary reductions in stream-dwelling aquatic invertebrates and temporary increased human activity in the area. Minimizing the number of people and the duration of stay in the project area would mitigate this disturbance. An anticipated 4 to 10 people would be necessary to transport equipment into the area and to net the lakes. From 4 to 10 pack animals would be required to transport the necessary equipment and feed into and out of the lakes. Similar requirements would apply to the stream treatments. As discussed in the evaluation of alternatives, netting in the lakes and piscicide in the streams is the least intrusive alternative that would accomplish the project goals.

8. RISK/HEALTH HAZARDS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	8c
d. Will any chemical toxicants be used?			X		YES	See 8a

Comment 8a: Risk of Explosion or Release of Hazardous Substances

Fieldworkers applying piscicide would have the principal risk relating to exposure to hazardous materials. Following the exposure controls and other protective measures detailed in the MSDSs would result in protection of the safety and health of applicators. Protective gear and equipment include the use of respirators when using undiluted CFT Legumine. All applicators would wear personal protective equipment as required by label instructions. The $KMnO_4$ applicators would also require protective clothing and gear to control exposure. Personal protection required in the MSDS includes gloves, splash goggles, synthetic apron, and vapor and dust respirator.

Field application would occur under the supervision of at least one, and possibly several licensed pesticide applicators. All individuals handling or applying chemical would receive training prior to the treatment. Materials would be transported, handled, applied, and stored according to the label specifications to reduce the probability spill or other unintended exposure.

Comment 8b: Creation of a New Emergency Plan

FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP, the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

FWP would coordinate with the GNF fisheries biologist to work out the details of the safety plan and ensure that it meets any additional USFS safety requirements.

Comment 8c: Creation of any Human Health Hazard or Potential Hazard

Risks to human health relate to exposure to rotenone, the inert ingredients in the CFT Legumine formulation, or $KMnO_4$ used in detoxifying rotenone. Information examined here includes an analysis of human health risks relating to rotenone exposure (EPA 2007), MSDS sheets for chemicals used, and an evaluation of the chemical constitution of the CFT Legumine formula (Fisher 2007).

Acute toxicity refers to the adverse effects of a substance from either a single exposure or multiple exposures in a short space of time. Rotenone ranks as having high acute toxicity through oral and inhalation routes of exposure, and low acute toxicity through exposure to skin (EPA 2007). Examination of acute toxicity profiles compiled by the EPA (2007) indicates this high acute toxicity would be applicable to undiluted CFT Legumine, with median lethal doses for rats ranging from 39.5 mg/kg for female rats, and 102 mg/kg for male rats. In contrast, the proposed concentration for rotenone in surface water is 1 mg/L. Therefore, field applicators would take necessary precautions to prevent ingestion or inhalation of undiluted CFT Legumine to avoid exposure to toxic concentrations of rotenone. Exposure to concentrations in surface water would not lead to acute toxicity, although only approved field personnel would be near the stream during treatment as an added protection.

In evaluating the potential for adverse effects from exposure to rotenone, the EPA (2007) calculated a number of toxicological endpoints, which address specific types of adverse effects (Table 4). In the case of neurotoxicity, insufficient data were available to quantify the doses to which rotenone users could be exposed without adverse effects. Application of an uncertainty factor allowed an estimate that would be protective of human health. Other uncertainty factors addressed inter- and intra-specific variability, and involved dividing the non-adverse effects level by a factor of 10 each. These toxicological endpoints allowed determination of health risks associated with ingestion, inhalation, and dermal contact with a margin of exposure that is highly protective of human health, given the inherent uncertainty with insufficient data and use of animal models in predicting effects on humans.

Table 4:Toxicological endpoints for rotenone (EPA 2007).

Exposure Scenario	Dose Used in Risk Assessment, Uncertainty Factor (UF)	Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = $\frac{15\ \text{mg/kg/day}}{1000}$ = 0.015 mg/kg/day	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = $\frac{0.375\ \text{mg/kg/day}}{1000}$ = 0.0004 mg/kg/day	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Dietary risks considered acute dietary risks to the subgroup "females 13-49 years old", and examined exposure associated with consuming exposed fish and drinking treated surface water. In determining potential exposure from consuming fish, the EPA used maximum residues in fish tissue. The concentrations of residue considered were conservative, meaning they may have been an overestimate of the rotenone concentrations in muscle tissue, as they included non-edible tissues, where concentrations may be higher. The EPA concluded that acute dietary exposure estimates resulted in a dietary risk below the EPA's level of concern; therefore, consumption of fish killed by rotenone does not present an acute risk to the sensitive subgroup.

The EPA considered chronic dietary risks relating to exposure through drinking water. Chronic exposure from consuming exposed fish was not evaluated, given rotenone's rapid degradation and low propensity to bioaccumulate in fish. Based on the chronic toxicity endpoint, the drinking water level of concern was 40 ppb (µg/L), which addressed effects on infants and children, the most sensitive population subgroup. In evaluating the potential for chronic exposure to rotenone, the EPA acknowledged the rapid degradation of rotenone in the environment, and that expediting deactivation with oxidizing agents, such as $KMnO_4$ was a standard procedure in many projects. The EPA concluded that no chronic exposures to rotenone would occur where water is treated with $KMnO_4$ or subject to an oxidative water treatment regime. They further concluded that persistence of chronic or sub-chronic exposures to 40 ppb for several weeks was limited to specific circumstances, such as drinking water intakes in cold-water lakes where no oxidative water treatment occurred. In the upper Boulder River, treatment with $KMnO_4$ and natural breakdown would not present a risk to infants and children. Moreover, these surface flows are not used for domestic water sources, so potential for humans to consume treated water is exceptionally low.

The EPA estimated recreational risks associated with swimming, which would entail skin contact and incidental ingestion. For adults, the short-term risks for swimmers on the day of application did not exceed the EPA's level of concern. For toddlers, the short-term risks for swimming on the day of application exceeded the EPA's level of concern, but after 3 days, natural breakdown of rotenone resulted in concentrations below the level of concern. Even without the temporary restrictions, the likelihood that toddlers would be in contact with this mountain stream in September is extremely low, so piscicide treatment would not threaten the health of this demographic.

An aggregate risk is the combined risk from dietary exposure and non-occupational sources, such as residential and recreational exposure. In its evaluation of the aggregate risk, the EPA combined the risk of eating treated fish and drinking treated water, and concluded the risk does not exceed their level of concern. The EPA did not aggregate recreational risk with the dietary risk, as the dietary assessment is conservative, and recreational exposure would be intermittent and would not occur for the general population. Moreover, stream closings, detoxification, and project timing would minimize recreational exposure.

Occupational risks relate to fieldworkers mixing and applying rotenone. The EPA (2007) calculated margins of exposure for handlers mixing and applying rotenone through various methods, and with varying levels of protective gear, from none, to use of gloves, respirators, and protective clothing. The proposed approaches for this project call for use of a liquid formula applied with drip stations or backpack sprayer of seeps, springs, and backwaters (should they occur). The margins of exposures for these applications are below the level of concern with the use of gloves. Requiring protective eyewear, protective clothing, and respirators for applicators mixing rotenone would be highly protective of the health of applicators in the field.

Finally, a description of the traditional uses of rotenone by native people is informative in evaluating its potential for creating hazards to human health. Native Brazilians have considerable exposure to rotenone through their use of this piscicide as a means to obtain fish for consumption (Teixera et al. 1984). They extract rotenone from the roots of the *Timbo* plant, and distribute the pulp by swimming into fish-bearing waters. Despite this high level of dermal exposure to rotenone, no harmful effects were apparent from this centuries old practice. Moreover, in contrast to the use of rotenone in fisheries management programs, the traditional method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions.

9. COMMUNITY IMPACT Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _______________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources			X		YES	10e
f. Define projected maintenance costs		X				

10e: Projected Revenue Sources

This proposed project would be accomplished cooperatively using personnel time contributed by the FWP, GNF, and the Beartooth Back Country Horsemen. Equipment costs include the purchase of gill nets, chemical (rotenone and potassium permanganate), and other miscellaneous equipment. Funding for the equipment and to reimburse the Back Country Horsemen group for their travel costs would come from

FWP, through a grant by the Western Native Trout Initiative. Total projected cost of equipment and travel is projected to be approximately $40,000. The implementation of this project would be accomplished through a commitment of 96 person-days per year from agency biologists, field workers and volunteers from 2011 – 2013 (numbers shown in table are maximum number of individuals per year).

Table 5: Breakdown of person-days required to complete project.

Activity	# people	# days	Person/days
FWP biologist	1	8	8
FWP technicians	4	8	32
USFS biologist	1	8	8
Volunteers	6	8	48
		Total	96

11. AESTHETICS/RECREATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Explanation Index
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		YES	11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)			X		YES	11d

Comment 11c: Alteration of the Quality or Quantity of Recreational/Tourism Opportunities and Settings

Fishing in the project area would be affected during the removal of rainbow trout and hybrids. Despite the simultaneous stocking of YCT, fishing quality (i.e., the numbers and sizes of fish) would be temporarily reduced during the project. This effect, however, should be temporary, and the numbers and sizes of YCT should be near those of rainbow trout within 2-3 years of completion of the project. The creation of a fishery for native YCT may increase the quality of the fishing experience for visitors and enhance opportunity. See comment 7a for more details.

Comment 11d: Impact to Designated or Proposed Wild or Scenic Rivers, Trails or Wilderness Areas

The majority of this project would occur within the Absaroka-Beartooth Wilderness Area. Camping, the use of livestock, and fish removal all present potential effects on the wilderness area and wilderness values. The camping and livestock effects would be mitigated by following FS camping specifications and food-order restrictions, and by coordinating exemptions to these regulations with the Big Timber Ranger District. Disposing of fish carcasses in deep areas of the lakes would mitigate the effects of netting of the lakes on wilderness values. Analysis of alternatives has shown that the proposed action would accomplish project objectives with the least intrusion on wilderness values.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Explanation Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X					13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13e
g. List any federal or state permits required.						13g

Comment 13e: Substantial Debate or Controversy about the Nature of Impacts Created

The potential for controversy with this project is unknown. Piscicide projects and large-scale fish removals can generate controversy from some people. FWP has coordinated with the Gallatin National Forest to generate and send a scoping letter to parties that may be interested in the project. If substantial debate or controversy is anticipated through public comments during the scoping process, a public meeting will be scheduled where individuals and groups will have the opportunity to voice their concerns and receive further explanation of the project. There will be many opportunities to express concerns about the project during the public comment period as well.

Comment 13g: Federal or State Permits Required

A **308 Authorization** is required from the Montana Department of Environmental Quality for short-term exemption of surface water quality standards for applying piscicide.

A **Pesticide Use Permit** from the U.S. Forest Service, Regional Office in Missoula is required for the use of a piscicide in a designated Wilderness Area. Procedures for this activity are outlined in the Cooperative Agreement for Fish, Wildlife and Habitat Management on National Forest Wilderness Lands in Montana (FWP, USFS 2008).

A **Pesticide Applicator's License** from the Montana Department of Agriculture is required for the government application of piscicide within the state of Montana. The project leader is a MDA certified pesticide applicator.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit YCT in the upper Boulder River drainage with minimal, short term impact on the physical, biological, or the human environment.

B) Do the proposed actions violate any Federal, State, or local law or requirements imposed for the protection of the environment? No

The portion of the project of which the Forest Service has the authority to approve is consistent all Forest Service policies, regulations, and Forest Plan direction related to wilderness and fish habitat management.

The portion of the project which Montana Fish, Wildlife & Parks has the authority to implement is consistent with all FWP policies, state law, and agency mandates.

C) Public Involvement.

The Draft EA for the Yellowstone cutthroat trout restoration project in the upper Boulder River will be released for a 30-day public comment period beginning May 20, 2011. A public meeting to answer questions and address concerns will be held on Wednesday, June 15, 2011, at 7:00 pm at the Carnegie Public Library, 314 McLeod Street, Big Timber, Montana. Additional meetings may be held if warranted.

Public notification of the proposed action will be completed through publication on the FWP web page, issuing press releases to south-central Montana newspapers, and publishing a Legal Notice in the Billings Gazette and Bozeman Chronicle. EA's will be sent to individuals who have expressed an interest in the YCT recovery program in the upper Boulder, including individuals and groups that were notified during the scoping process.

D) Response to comments raised during public scoping.

On April 6, 2011, a scoping letter was prepared and sent out to landowners, resource users, and other potential interested parties to describe the proposed YCT restoration project on the Upper Boulder. The letter provided a short description of the project and gave members of the public the opportunity to comment prior to the release of the Draft Environmental Assessment.

The scoping letter was sent out to over 240 individuals and/or groups. It was also publicized in the Billings Gazette and sent to the local newspapers. During the 30 day scoping period, we received a total of 4 comments. A summary of these comments is provided below, with FWP responses (in italics) to those comments where appropriate.

Magic City Fly Fishers: "The Board of Directors of Magic City Fly Fishers (MCFF), Trout Unlimited Chapter 582, whole heartedly supports your cutthroat restoration project in the upper Boulder River watershed. Native Yellowstone Cutthroat trout are a species of concern in Montana as well as an unofficial mascot of Montana's fishing heritage , and MCFF strongly supports any efforts to stop the decline of cutthroat populations, and hopefully, reverse those declining trends. As always, we greatly appreciate your hard work and steadfast commitment to Montana's natural resources.

Joe Kraus: "I believe one of the greatest features of the Boulder watershed and the larger Yellowstone Region is the fact that the native species that existed there historically are all present today. Indeed, this area is one of very few in the Lower 48 where this it true. As such, I consider it a national treasure. The one area where the native species have been displaced are the rivers and lakes that have been stocked with non-native species, most particularly brown, brook and rainbow trout (and lake trout in Yellowstone Lake). I therefore fully support your efforts to restore the native cutthroats to at least some of their native waters- including the Boulder watershed. In addition, although I am quite fond of the few lakes you have stocked with golden trout, I would even support their removal if it contributed to the restoration of the native cutthroats. I believe these efforts are a significant part of the ongoing effort to keep the greater Yellowstone Ecosystem as healthy as it can be and deserve our support."

Kent Hanawalt: "The letter announcing the proposal for restoration of Yellowstone Cutthroat Trout states that an environmental assessment is being prepared. But I submit that a more important step in the process is an economic assessment. Exactly what will be the costs and benefits of such a project? There is no question that the costs will be significant, and that they will be borne by the tax-payers of Montana. And who will benefit? My suspicion is that most of the people who would gain from such a project are already on the payroll of Fish, Wildlife, and Parks.

I appreciate the aesthetics of trying to maintain a "pure" native genetic strain, but I question both the pertinence and the practicality of such an exclusive goal. In fact, this project purports only to "swamp" the genetics – simply diluting rather than *restoring* them. And this project will affect only a minute fraction of the state's waters, in a remote area that will serve only a minute fraction of the fisherman.

What is the long-range strategy for protecting even these diluted genetics? Does this project include some sort of barrier to prevent future encroachment of rainbow, or will the goals of this project demand continual re-stocking *in perpetuity*?

Montana is teeming with other non-natives – how many more of the invaders must we poison off in order to preserve the species status quo? Of course all of us rue the introduction of such noxious weeds as leafy spurge and Russian knapweed. But there are many feral species of both flora and fauna that have been *encouraged* in Montana: crested wheatgrass, Kentucky bluegrass, alfalfa, wheat, Chinese ringneck pheasants, Pryor Mountain horses, and - the most destructive non-native species of all – Europeans.
The West Boulder River runs for two and a half miles through our ranch, and the fishing here is world-renowned. I've not heard any complaints from our fishermen about the genetic purity of their catch.
Is the YCT restoration project an effective use of our tax dollars?"

The question regarding the use of state tax dollars toward projects such as these is a valid one. In this environmental assessment, section 10e describes the projected revenue sources of the project:

10e: Projected Revenue Sources

This proposed project would be accomplished cooperatively using personnel time contributed by the FWP, GNF, and the Beartooth Back Country Horsemen. Equipment costs include the purchase of gill nets, chemical (rotenone and potassium permanganate), and other miscellaneous equipment. Funding for the equipment and to reimburse the Back Country Horsemen group for their travel costs would come from FWP, through a grant by the Western Native Trout Initiative. Total projected cost of equipment and travel is projected to be approximately $40,000. The implementation of this project would be accomplished through a commitment of 96 person-days per year from agency biologists, field workers and volunteers from 2011 – 2013 (numbers shown in table are maximum number of individuals per year).

Table 5: Breakdown of person-days required to complete project.

Activity	*# people*	*# days*	*Person/days*
FWP biologist	*1*	*8*	*8*
FWP technicians	*4*	*8*	*32*
USFS biologist	*1*	*8*	*8*
Volunteers	*6*	*8*	*48*
		Total	*96*

In summary, the money to pay for equipment would come from a federal grant directed toward native trout restoration projects. Remaining expenses woud come from time already budgeted for under FWP and USFS programs. FWP's fisheries program is funded through fishing license revenue dollars. Granted, other non-native species survey, inventory and restoration projects may have been otherwise completed in the absence of this project; however, FWP is mandated to protect and restore native fish species throughout Montana, and this project fits perfectly within these goals.

Genetic swamping in this project would dilute the genes of rainbow trout and hybrids while increasing the genetic contribution of Yellowstone cutthroat trout. Therefore, YCT genetics would be strengthened, not diluted. Because of the downstream flow of genetics already documented in the upper Boulder tributaries, this is a process that is expected to maintain itself over time, after being jump started by this *restoration project. Thus we can expect the long term product of this project to be a mostly genetically pure YCT population in a large, protected, interconnected river system.*

The long term protection of this project's integrity is accomplished by the waterfall downstream of Fourmile Creek, which we refer to as Hawley Falls. This falls functions as a barrier to the upstream movement of brook trout and rainbow trout.

Native fish restoration projects are carefully planned and targeted to specific areas. The Yellowstone cutthroat trout GMU working group, which comprises of fisheries biologists from FWP and other agencies involved in YCT work, is near the completion of a document that will identify streams that have the potential for YCT restoration. In reality, very few streams, typically only in headwater areas, have the potential for YCT restoration due to logistics and other fisheries values in those areas. The upper Boulder River is the largest area currently identified in the YCT native range with the realistic potential for YCT restoration. There is a limit to which areas YCT can be recovered, and this proves to be a very small portion of the species' native range. There are no plans, within any of our lifetimes, to remove nonnative fish from lower portions of rivers such as the Stillwater, Boulder, East Boulder, West Boulder, etc. Such activity would not only be logistically unfeasible, it would probably not be publicly acceptable due to the high value placed on south central Montana's incredible rainbow and brown trout fisheries.

Patrick and Jan Hoy: "We disagree with the proposed project and hope the U.S. Forest Service refuses to issue a permit to use rotenone to kill the Rainbow Trout. Our main concern is the use of a poison to kill the Rainbow Trout. This is a totally unnatural approach to increasing the population of YCT in the upper streams and lakes of the Boulder River watershed and we believe it should not be done. We have no problem with introducing more YCT into the lakes and streams, but introducing poison into the watershed to kill perfectly healthy fish seems unnecessary and ill-advised, especially since the only reason is an attempt to change the main fish population from Rainbow Trout to Yellowstone Cutthroat Trout. Please do not do it!!"

Reservations to the use of targeted pesticides to kill fish are understandable. However, we have demonstrated through the environmental assessment that other means of YCT recovery in this drainage simply are not feasible (see discussion on proposed alternative 3). Pesticides have been shown to be the only effective means of efficient fish removal in complex stream habitats, particularly in difficult-to-access wilderness areas. Without the removal of rainbow trout in these streams, the ultimate success of the project would be greatly compromised.

E) Duration of the comment period?

Public comment will be accepted through June 20, 2011.

F) Name, title, address and telephone number of the Person Responsible for Preparing the EA Document.

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Appendix A

Forest Service Administrative Review or Appeal Opportunities

This decision is subject to appeal pursuant to 36 CFR 215.11. Only individuals or organizations that submitted comments or otherwise showed interest in this project may appeal. A written appeal must be submitted within 45 days following the publication date of the legal notice of this decision in the Bozeman Chronicle, Bozeman, Montana. It is the responsibility of the appellant to ensure their appeal is received in a timely manner. The publication date of the legal notice of the decision in the newspaper of record is the *exclusive* means for calculating the time to file an appeal. Appellants should not rely on date or timeframe information provided by any other source.

Paper appeals must be submitted to: USDA Forest Service, Northern Region, ATTN: Appeal Deciding Officer, P.O. Box 7669, Missoula, MT 59807; or USDA Forest Service, Northern Region, ATTN: Appeal Deciding Officer, 200 East Broadway, Missoula, MT 59802. Office hours: 7:30 a.m. to 4:00 p.m. Fax (406) 329- 3411.

Electronic appeals must be submitted to: <appeals-northern-regional-office@fs.fed.us>. In electronic appeals, the subject line should contain the name of the project being appealed. An automated response will confirm your electronic appeal has been received. Electronic appeals must be submitted in MS Word, Word Perfect, or Rich Text Format (RTF).

It is the appellant's responsibility to provide sufficient project- or activity-specific evidence and rationale, focusing on the decision, to show why the decision should be reversed. The appeal must be filed with the Appeal Deciding Officer in writing. At a minimum, the appeal must meet the content requirements of 36 CFR 215.14, and include the following information: The appellant's name and address, with a telephone number, if available; A signature, or other verification of authorship upon request (a scanned signature for electronic mail may be filed with the appeal); When multiple names are listed on an appeal, identification of the lead appellant and verification of the identity of the lead appellant upon request; The name of the project or activity for which the decision was made, the name and title of the Responsible Official, and the date of the decision; The regulation under which the appeal is being filed, when there is an option to appeal under either 36 CFR 215 or 36 CFR 251, subpart C; Any specific change(s) in the decision that the appellant seeks and rationale for those changes; Any portion(s) of the decision with which the appellant disagrees, and explanation for the disagreement; Why the appellant believes the Responsible Official's decision failed to consider the substantive comments; and, How the appellant believes the decision specifically violates law, regulation, or policy.

If no appeal is received, implementation of this decision may occur on, but not before, five business days from the close of the appeal filing period. If an appeal is received, implementation may not occur for 15 days following the date of appeal disposition.

Offer to Meet. When an appeal is received under this rule, the Responsible Official, or designee, must contact the appellant and offer to meet and discuss resolution of the issues raised in the appeal (36 CFR 215.17). If the appellant accepts the offer, the meeting must take place within 15 days after the closing date for filing an appeal (i.e. 45 to 60 days from the publication date of the legal notice of this decision in the Bozeman Chronicle). These meetings, if they take place, are open to the public. For information on if, when and where such a meeting is scheduled, please visit the following web site:

www.fs.usda.gov/goto/r1/appeal-meetings