DRAFT
ENVIRONMENTAL ASSESSMENT

CHERRY CREEK WESTSLOPE CUTTHROAT TROUT RESTORATION

March 2011

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Montana Fish, Wildlife & Parks proposes to restore native westslope cutthroat trout (WCT) in Cherry Creek, a tributary of the Big Hole River. This restoration would be accomplished by the construction of a fish migration barrier near the mouth of the stream, and also by removing non-native brook trout and hybridized rainbow-cutthroat trout upstream of the barrier using rotenone in the formulation of CFT Legumine. Genetically pure WCT would be reintroduced to Cherry Creek after removal of non-native brook trout and hybridized cutthroat trout.

B. Agency Authority for the Proposed Action:

87-1-702. Powers of department relating to fish restoration and management. The department is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects as defined and authorized by the act of congress, provided every project initiated under the provisions of the act shall be under the supervision of the department, and no laws or rules or regulations shall be passed, made, or established relating to said fish restoration and management projects except they be in conformity with the laws of the state of Montana or rules promulgated by the department, and the title to all lands acquired or projects created from lands purchased or acquired by deed or gift shall vest in, be, there remain in the state of Montana and shall be operated and maintained by it in accordance with the laws of the state of Montana. The department shall have no power to accept benefits unless the fish restoration and management projects created or established shall wholly and permanently belong to the state of Montana, except as hereinafter provided.

C. Estimated Commencement Date:

Barrier Construction: Summer 2011 (pending funding)
Fish removal: Late August to early September 2011.
Potential second removal if necessary in 2012
Reintroduction of WCT: Pending confirmation of successful removal of non-native trout: July 2012 stock catchable-sized sterilized WCT in Cherry and Granite lakes; 2012 through 2015, introduce WCT from up to 5 Upper Missouri River Basin WCT donor populations (introduced as live fish, or embryos).

D. Name and Location of the Project: Westslope cutthroat trout restoration in Cherry Creek, a tributary to the Big Hole River near Melrose, Montana.

Cherry Creek is located in Beaverhead County approximately 2 miles southwest of the town of Melrose, Montana; T3S, R9, Sec 7, 8, 9, R 10, Sec 8, 9, 10, 11, 12, 17, 18, 19, 20, R11W Sec 13 (Figure 1). The Cherry Creek drainage originates on the Beaverhead-Deerlodge National Forest, and also flows through Bureau of Land Management-administered lands and private land owned by four parties.

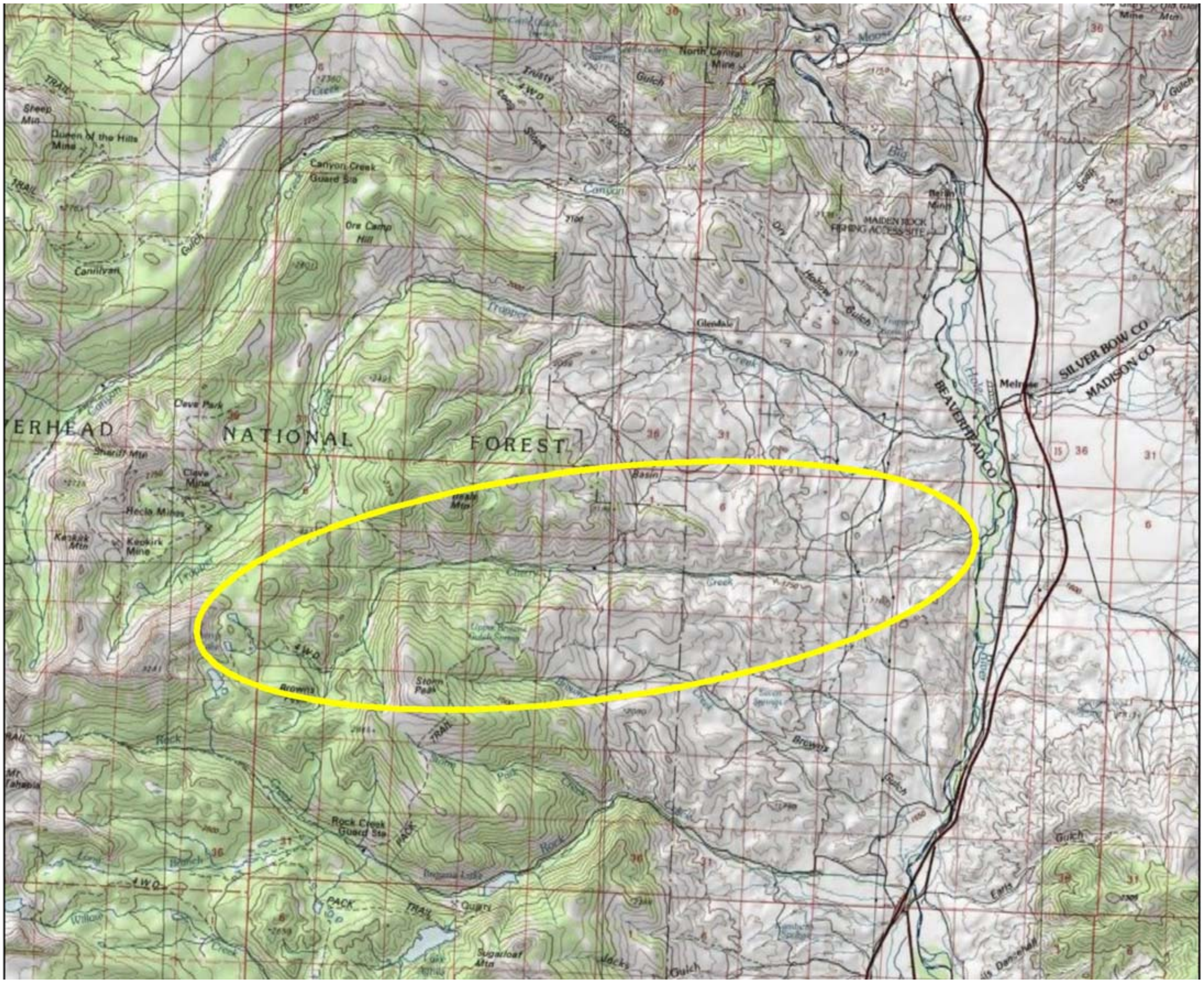

Figure 1. Cherry Creek project location.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres

3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – Cherry Lake is 7.7 acres and has a maximum depth of 25.7 ft. Granite Lake is 7.0 acres and has a maximum depth of 15.9 ft. A total 10.3 miles of mainstem stream are to be included in this restoration project. In addition, approximately 2.0 miles of small tributary streams that contain fish will be included. This would total approximately 12.3 miles of stream to be treated to remove non-native and hybridized fish.

5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

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

The cutthroat trout is Montana's state fish. Westslope cutthroat trout *Oncorhynchus clarkii lewisi* were first described by the Lewis and Clark Expedition in 1805 near Great Falls, Montana, and are recognized as one of 14 interior subspecies of cutthroat trout. The historical range of WCT includes Idaho, Montana, Washington, Wyoming, and Alberta, Canada. In Montana, WCT occupy the Upper Missouri and Saskatchewan River drainages east of the Continental Divide, and the Upper Columbia Basin west of the Divide. Although still widespread, WCT distribution and abundance in Montana has declined significantly in the past century due to a variety of causes, including introductions of nonnative fish, habitat degradation, and over-exploitation (Hanzel 1959, Liknes 1984, McIntyre and Rieman 1995, Shepard et al. 1997, Shepard et al. 2003). Reduced distribution of WCT is particularly evident in the Missouri River drainage where genetically unaltered WCT are estimated to persist in less than 5% of their historic habitat, and most remaining populations are restricted to isolated headwater habitats (Shepard et al. 2003, Shepard et al. 2005). Many of these remaining populations are also at risk of extirpation due to small population size and the threats of competition, predation, and hybridization with non-native trout species.

The declining status of WCT has lead to its designation as a *Species of Special Concern* by the State of Montana, a *Sensitive Species* by the U.S. Forest Service (USFS), and a *Special Status Species* by the Bureau of Land Management (BLM). Additionally in 1997 a petition was submitted to the U.S. Fish and Wildlife Service (USFWS) to list WCT as "threatened" under the *Endangered Species Act* (ESA). USFWS status reviews have found that WCT are "not warranted" for ESA listing (DOI 2003); however, this finding was in litigation until 2008 and additional efforts to list WCT under ESA are possible.

In an effort to advance range-wide WCT conservation efforts in Montana, a Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana was developed in 1999 by several federal and state resource agencies (including the BLM, Montana Fish, Wildlife & Parks [FWP], the USFS, and Yellowstone National Park [YNP]), non-governmental conservation and industry organizations, tribes, resource users, and private landowners (FWP 1999: MOU). The MOU outlined goals and objectives for WCT conservation in the Montana, which if met, would significantly reduce the need for special status designations and listing of WCT under the ESA. The MOU was revised and endorsed by signatories in 2007 (FWP 2007). As outlined in these MOU's, *the primary management goal for WCT in Montana is to ensure the long-term self-sustaining persistence of the subspecies in its historical range*. This goal can be achieved by maintaining, protecting, and enhancing all designated WCT "conservation" populations, and by reintroducing WCT to habitats where they have been extirpated.

Cherry Creek is a tributary to the Big Hole River with its origins in the East Pioneer Mountains (Figure 4). At its headwaters are two lakes (Cherry and Granite), both of which support self-sustaining populations of hybridized westslope cutthroat trout (Cherry Lake = 81% westslope, Granite Lake = 92% westslope). Historically, Cherry Creek has harbored a non-hybridized

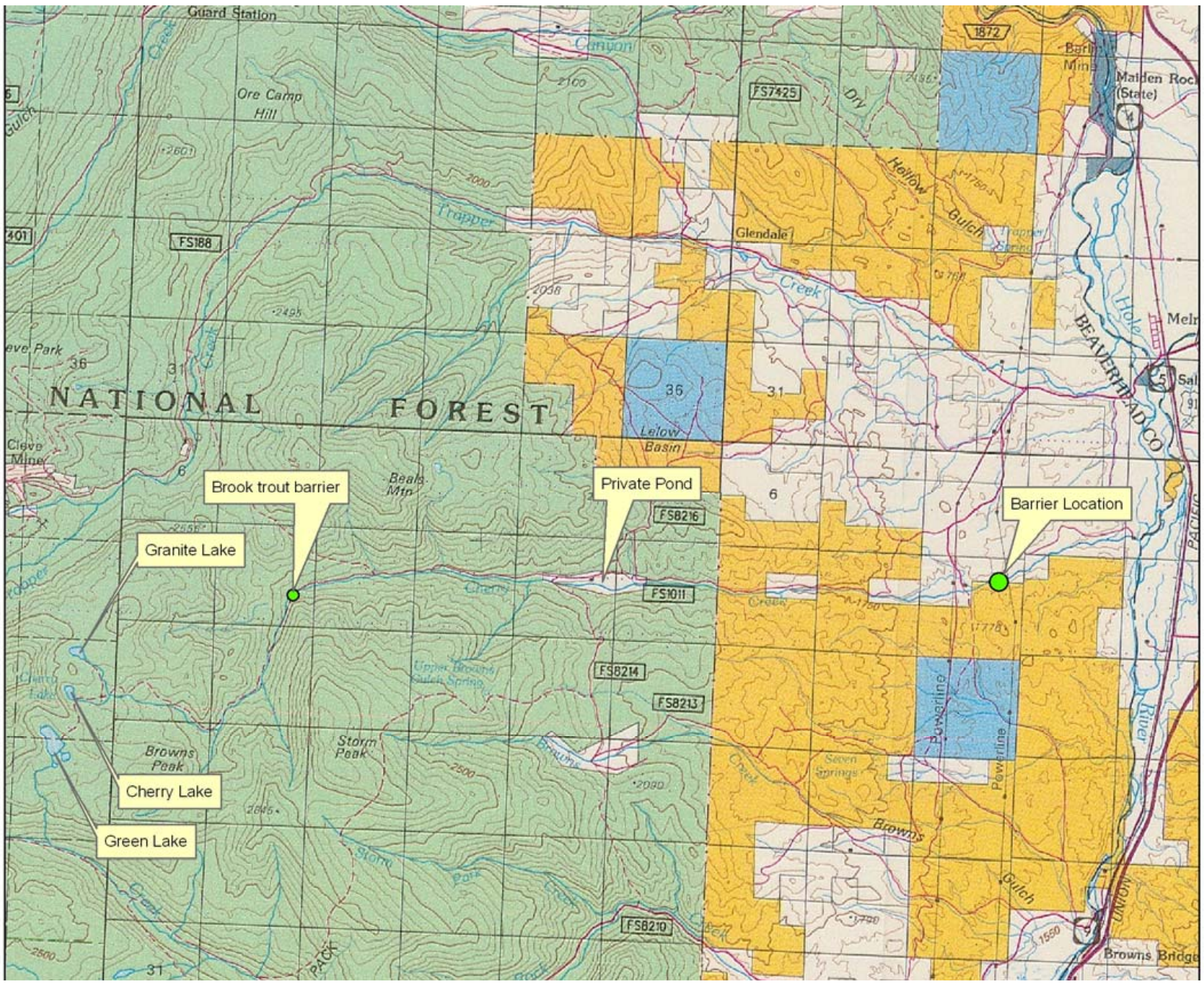

Figure 4. Map of project Cherry Creek drainage showing important geographical features.

population of westslope cutthroat trout. Cutthroat trout are now rare in most of the drainage as they have been replaced by non-native brook trout. Genetic samples collected from cutthroat trout as recent as 2005 indicated that non-hybridized cutthroat trout were still present in the stream. However, sampling completed in 2008 and 2009 indicated recent hybridization has occurred, and that non-hybridized fish are no longer present in the stream (Leary 2009, 2010). It appears that hybridized cutthroat trout migrating from Granite and Cherry lakes and non-native rainbow trout from another source downstream have spawned with the cutthroat in the stream. Although non-hybridized fish are no longer present, the WCT in Cherry Creek are still considered a conservation population because many fish are greater than 90% westslope, but the slightly hybridized fish are mixed with highly hybridized fish, and it is difficult to distinguish the two without testing each individual fish. Therefore, FWP and partners propose to proceed with Cherry Creek westslope restoration by removing all fish from the drainage and restoring non-hybridized cutthroat trout from existing wild sources within or adjacent to the Big Hole drainage. Such an effort would provide an opportunity to conserve the genetic diversity of several remaining but threatened populations, and also create one of the largest genetically pure and conserved cutthroat populations in the upper Missouri drainage.

The Cherry Creek drainage is a relatively pristine watershed, and the fisheries habitat conditions in Cherry Creek are very good. At the headwaters the stream is a moderate to high gradient with a spruce and other conifer forest canopy. The lower 2/3 of the drainage on National Forest, BLM, and private property is characterized by lower stream gradient, and contains dense willow riparian vegetation resulting in a very stable stream channel and high quality fish habitat. Cherry Creek flows through a narrow bedrock canyon approximately 1.5 miles upstream of the mouth. Fish densities in this reach (combined brook trout and cutthroat trout), range from 250 trout per mile to nearly 400 per mile. Because of its small size and dense riparian vegetation, Cherry Creek does not provide much angling opportunity.

Motorized access is present through most the Cherry Creek drainage, though the lower 2.5 miles of the drainage are only accessible through private property. The upper part of the drainage is accessible by a public road and trail which extends to the headwater lakes. The public road accessing the drainage is passable to most vehicles to approximately 6 miles upstream of the confluence with the Big Hole River, after which the road is passable only by ATV, horse or foot. Unlike the stream, Cherry and Granite lakes provide important recreational fisheries. There is a pond located on private land within the National Forest that contains stocked cutthroat trout and wild brook trout. This pond was historically stocked with rainbow trout. The brook trout have colonized the pond from water diverted from Cherry Creek through an irrigation ditch to the pond.

The goal of this project is to restore non-hybridized westslope cutthroat trout to Cherry Creek and secure the population from the threats of hybridization and competition from non-native fish. This action is proposed to be completed in three stages: 1) construction of a fish migration barrier to prevent colonization of non-native fish upstream; 2) removal of brook trout, rainbow trout, and hybridized cutthroat trout from the stream, lakes and pond using the piscicide rotenone in the formulation of CFT Legumine; 3) collecting fertilized cutthroat eggs or live fish from a minimum of five native cutthroat populations, primarily from within the Big Hole drainage, and repopulating the lakes and streams with these sources.

Stage 1: Fish Migration Barrier

The small bedrock canyon located 1.5 miles upstream from the mouth of the Cherry Creek is ideally suited for constructing a fish migration barrier (Figures 4 and 5). The intent of the fish barrier is to prevent non-native brook trout and rainbow trout from migrating upstream. The narrow bedrock opening to the canyon allows for a structure to be anchored into rock walls and reduce the chances of structural failure and increase the chances that the structure will last for 50+ years. A private consulting firm was contracted to develop the fish barrier design. The design criteria for the structure were to prevent fish passage up to a 50 year flood event, and be structurally sound during a 100 year event. The fish barrier would consist of a concrete structure approximately six ft high with a two drop steps and a concrete splash apron downstream of the structure to prevent fish from being able to leap over the structure (see Appendix A). The structure would be constructed on private property and would isolate all fisheries habitat upstream from colonization by brook trout and other fish species found downstream.

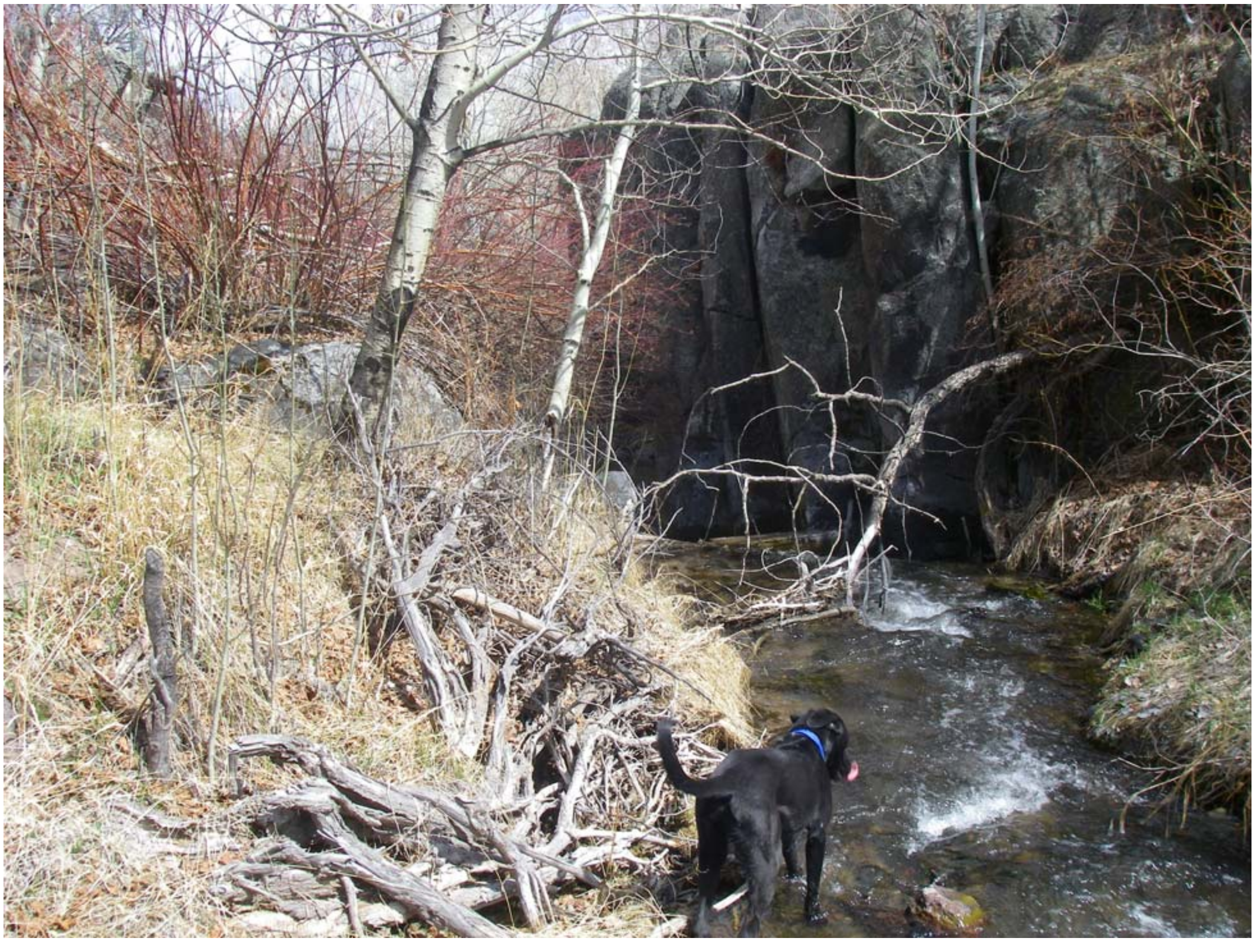

Figure 5. **Photo of the proposed barrier location on Cherry Creek approximately 1.5 miles upstream from the confluence with the Big Hole River.**

Construction of the fish migration barrier is anticipated to be the major expense in completing the proposed project, and, pending funding, it is anticipated that construction would occur in early spring 2011, before high water occurs. To facilitate water management during construction of the fish barrier, the stream would be dewatered to the extent possible by irrigation diversions located upstream on private property. Water will be diverted from the stream and spread on irrigated ground to reduce the total volume present at the barrier site. Remaining water will likely have to be pumped around the barrier site during the two to three week construction time period. Necessary permits for the construction of the barrier including USACE 404, FWP 124, DEQ 318, and County Floodplain Permit, all of which will be obtained prior to construction. A private contracting company would be hired to construct the barrier, and will be responsible for following stipulations in all obtained permits. Construction oversight would also be provided by the company responsible for developing the barrier structure design.

Stage 2. Fish Removal

Once the fish migration barrier is constructed, non-native and hybridized trout would be removed from the stream and lakes upstream of the barrier using the piscicide rotenone in the formulation CFT Legumine. Fish removal is anticipated to occur between late summer and mid fall 2011. This timing is to ensure that all trout eggs, embryos, and juveniles have emerged from redds, thereby increasing their vulnerability to rotenone.

Rotenone is a commonly used piscicide that highly targets fish and has little or no impact on other aquatic and terrestrial plants and animals, with the exception of aquatic invertebrates. FWP has a long history of using rotenone to manage fish populations in Montana that span as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control parasites such as lice on domestic livestock (Ling 2002).

Rotenone acts by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals, birds and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream, and thus can tolerate exposure to concentrations much higher than those used to kill fish.

The boundaries for this treatment would span from the headwater lakes (Cherry and Granite lakes) and extend downstream to approximately ½ mile downstream of the fish migration barrier (no rotenone will be applied downstream of the migration barrier, but this reach would be a detoxification zone, so it is possible that fish will be killed in this area as well). All fish bearing waters upstream of the barrier, including tributary streams and the pond located on private property, would be treated with CFT Legumine, which is a five percent by volume formulation of rotenone. FWP and partners will follow the label-recommended concentration for "normal pond use” when treating the lake and the label required concentration for treating the stream, which are both one part rotenone formulation to one million parts water or one part per million (ppm). Spring areas may also be treated with the powder formulation of rotenone (Prentox, 7% rotenone) or a sand/powder mix to prevent fish from seeking them as freshwater refuges during the application.

The spring prior to scheduled fish removal, approval would be sought from the FWP Commission to lift the fishing limits at Cherry and Granite lakes. This would allow unlimited angler harvest and aid in the reducing the total number of fish in the lakes. Once the project is completed and cutthroat trout are restored to Cherry and Granite lakes, the standard trout limit for lakes (see current fishing regulations) would be reinstated. No permanent fishing regulation changes would be proposed for the drainage.

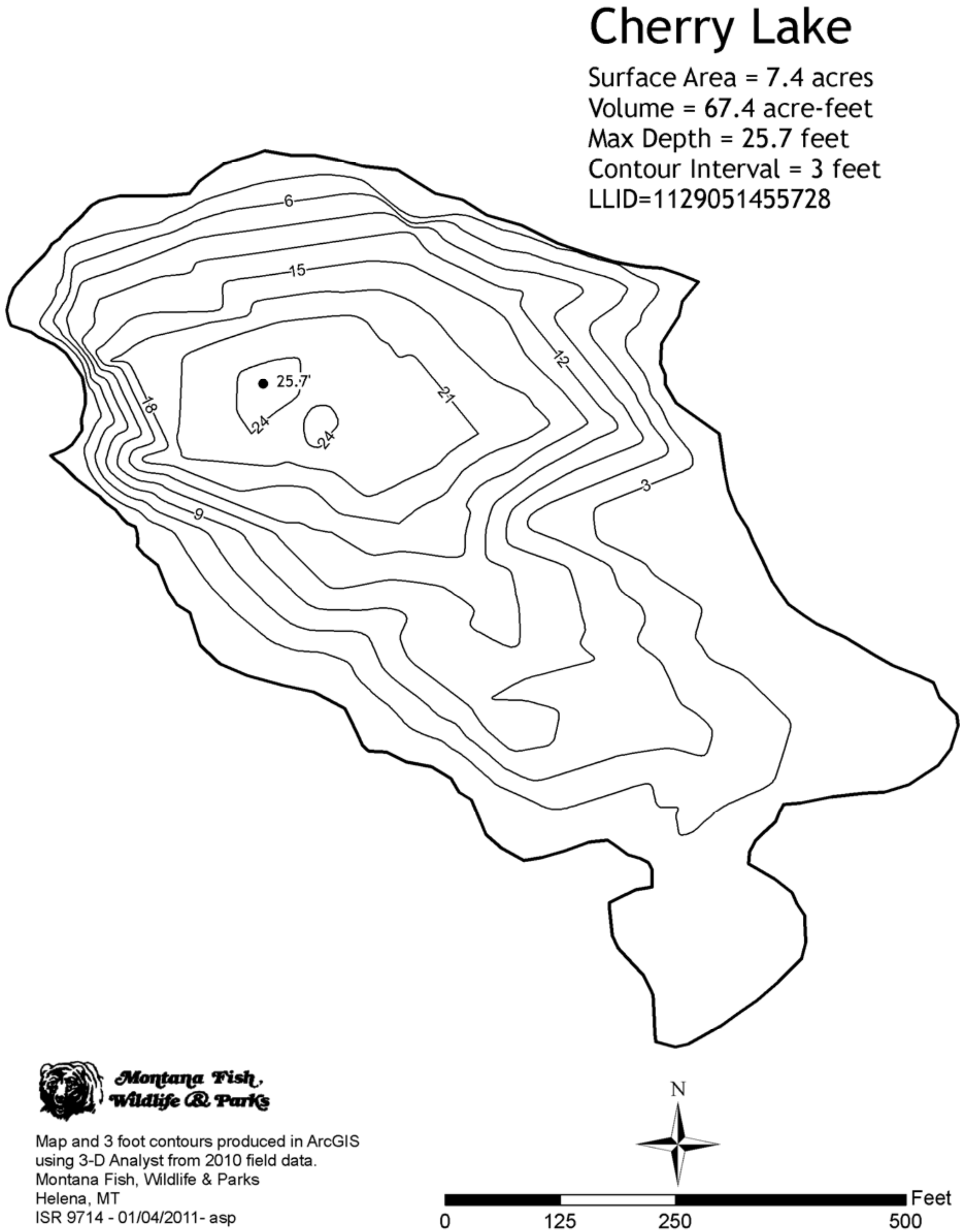

Figure 6. Bathymetric map of Cherry Lake.

Cherry Lake has a volume of 51.1 acre-feet (ft.), and Granite Lake has a volume of 41.0 acre-ft. (Figures 5 and 6). To achieve a 1 ppm concentration of CFT Legumine (recommended application rate) to treat these lakes, 34 gallons and 27 gallons of CFT Legumine would need to be applied to Cherry and Granite lakes, respectively. The persistence of Legumine in the lakes would be three to five weeks, depending on the amount of fresh water entering the lake from the stream at that time, water temperature, sunlight intensity, and alkalinity. The rotenone would be dispensed in the lakes by boat. Drip stations would be used to dispense the rotenone in the inlet stream. A drip station is a small container that dispenses a measured amount of liquid rotenone to a stream at a constant rate for a specific period of time. We would apply rotenone to the marshy areas around the lake and to the backwaters of the stream with backpack sprayers. It is likely that each lake would take one day to treat. The materials and equipment needed to do the lake treatments would be transported primarily by helicopter. Although ATV access is present to the lakes, it would be difficult to transport the equipment and chemical to the lakes given the rough nature of the road. A suitable landing location is present at Granite Lake, but there is no suitable landing site at Cherry Lake. Equipment and chemical for Cherry Lake will have to be flown to the nearest suitable landing location, which is at the junction of the Cherry Lake and Granite Lake trails. It may be possible to transport equipment by sling directly into Cherry Lake, but this determination has not yet been made. If transporting equipment to Cherry Lake via helicopter is not feasible, ATV's will be used to transport the equipment the 1/3 mile from the landing location to the lake.

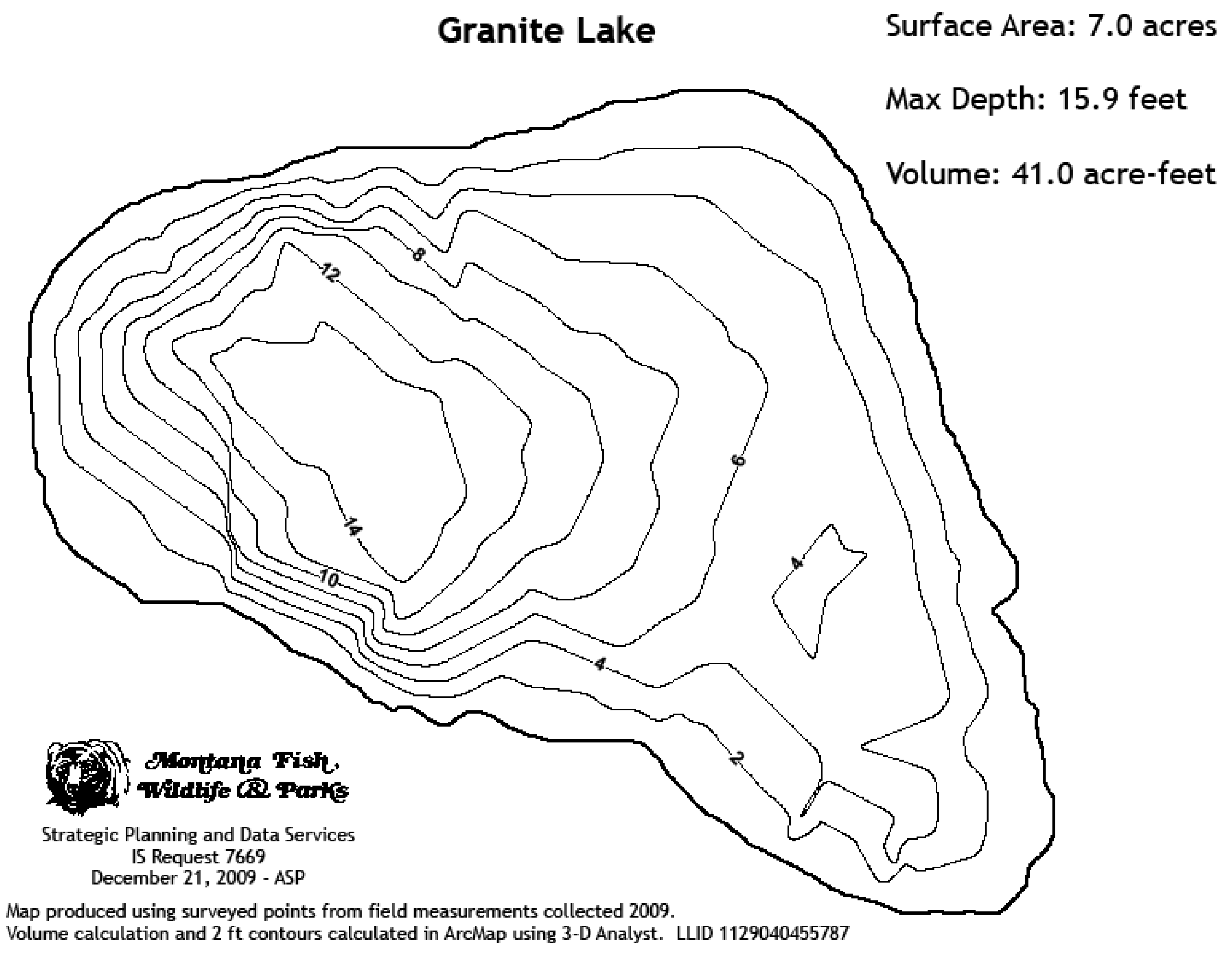

Figure 6. Bathymetric map of Granite Lake.

In addition to Cherry and Granite lakes, a small 0.52 acre pond located on private property will be included in the treatment. The pond will be treated using the same methods as Cherry and Granite lakes, but no helicopter will be needed. The pond is fed by both spring water and irrigation flows by a ditch originating from Cherry Creek. Flows into the pond will be temporarily halted during treatment until the stream has been treated through the area. Westslope cutthroat would be restocked into the pond the following year after treatment.

The treatment downstream of the lakes to the constructed barrier would be done using drip stations (described above). These drip stations would administer CFT Legumine to the stream at a rate of one ppm for four hours. Backwaters, spring areas and small tributaries will be treated with backpack sprayers according to the CFT Legumine label specifications. The total amount of Legumine to be applied to Cherry Creek is unknown because the amount is dependent on the flow rate of the stream and the distance downstream the chemical will remain active after its application (determined by on-site bioassay). Assuming Cherry Creek is flowing five cfs and the chemical remains active for one mile (i.e., one mile spacing between drip stations), approximately ten gallons of CFT Legumine would be required to treat the stream from the outlet of the lakes to the fish barrier. It is expected that fish killing concentrations of CFT Legumine would be present in the stream for only 24 to 48 hours after application, after which time the Legumine will have naturally detoxified and diluted to below fish killing concentrations.

There are three ways in which rotenone can be detoxified: natural oxidation, dilution by freshwater, and introduction of a neutralizing agent such as potassium permanganate. We would rely on natural oxidation and dilution to detoxify the rotenone in the lakes and the stream to the fish barrier. However, at the fish barrier a detoxification station, which would apply potassium permanganate to the stream, would be established to detoxify any Legumine treated waters going over the fish barrier (see section 2a). The detoxification zone would be defined as the distance the stream travels in 15 to 30 minutes downstream of the fish barrier. The Legumine label states that a minimum of 20-30 minutes of contact time between rotenone treated waters and the applied neutralizing agent is necessary to fully detoxify the rotenone. Potassium permanganate is readily oxidized by natural processes in the stream, and therefore it is imperative that adequate permanganate be applied to the stream to be present and active at 20-30 minutes of travel downstream. The determination of the appropriate amount of permanganate to apply to achieve 20-30 minutes of travel time is achieved by an on-site bioassay. Water temperatures less than 50 degrees F require a longer contact time, thus increasing travel distance. It is anticipated that the detoxification zone on Cherry Creek would extend approximately ½ mile downstream of the fish barrier. It is likely that it would take between four and six days to treat the ten miles of stream in Cherry Creek from the lakes to the proposed barrier. The discharge of the stream would be measured prior to treatment, and the potassium permanganate would be applied at the rate specified on the Legumine label (three to five ppm) and according to the on-site bioassay results. In addition, a backup detoxification would be established ½ mile downstream of the fish barrier if full detoxification is not achieved by the primary detoxification station.

Caged fish (westslope cutthroat trout from the Anaconda Hatchery) placed in the stream would be the primary means of determining the presence or absence of rotenone in Cherry Creek and the effectiveness of the detoxification station during the treatment. Caged fish will be placed downstream of the detoxification station a distance of 30 minutes travel time (the amount of time it takes water to travel for 30 minutes). Distress or the lack thereof in these fish indicates whether or not the detoxification station is effectively neutralizing the rotenone. A backup detoxification station will also be present on site to administer additional permanganate to the stream if necessary. Caged fish placed in the creek upstream of the barrier will indicate when rotenone is no longer present in the stream and when detoxification with potassium permanganate is no longer required. The label states that if sentinel fish in treated stream water show no signs of distress within four hours, the stream water is considered no longer toxic, and detoxification can be discontinued. It is anticipated that detoxification would be necessary in Cherry Creek for a period of less than 48 hours after rotenone application, after which the chemical will be below toxic levels in the stream.

Dead fish in the stream and lakes would be left on-site in the water. Studies in Washington State indicate that approximately 70% of rotenone-killed fish sink to the bottom (Bradbury 1986) and those in the stream decompose within a week or two. Dead fish stimulate plankton and other invertebrate growth and aid in invertebrate recovery following treatment.

If all non-native and hybridized fish are not removed during the first treatment, it may be necessary to implement a second treatment the following year to achieve the desired objectives of complete removal of non-native fish. To determine if complete fish removal is achieved, gill nets will be used in Cherry and Granite lakes and the private pond and checked for the presence of fish. If no fish are captured, then it will be assumed the fish removal was a success. Similarly, Cherry Creek will be electrofished the spring and summer following treatment (2012). If the objectives of the project were not met and fish are found in the stream and/or lakes, a second treatment may be conducted between late summer and mid fall of 2012. In the event that an additional treatment is necessary the following year, landowners, stakeholders and other interested parties would be notified as soon as possible and a supplemental analysis to this EA would be prepared.

To keep the public from being exposed to the rotenone, signs explaining the project will be placed at access points. These signs will inform the public of the project and state that the waters are closed and to not enter or drink treated water. Signs will also be placed at the lakes informing the public of the presence of treated waters.

Stage 3: Restocking

Because the lakes are important recreational fisheries, they would be restocked with sterilized (triploid) westslope cutthroat trout from the Washoe Park Hatchery in Anaconda as soon as FWP verifies that complete removal of hybridized fish was achieved (likely in early July the year following treatment). These fish would be of catchable size and would provide recreational fishing opportunities the following fishing season after lake treatment. Approximately 200 fish would be stocked in each lake.

To repopulate the stream and to establish self-sustaining populations in the lakes, fertilized westslope cutthroat trout eggs or live fish from at least five different sources will be introduced into the drainage. Fish would be introduced to the Cherry Creek drainage for at least three years through on-site incubation of fertilized eggs, transfer of live fish from the donor populations, or introduction of live fish produced from locally collected eggs that are reared in a hatchery. Each introduction method is considered to have its own unique benefits, and a combination of each could be used based on variables such as changing health and abundance status of the donor population. To be considered a potential donor source for this project, a minimum of fifty fish from two separate samplings will have been genetically tested and verified that no hybridization has occurred in the population. A minimum of 50 fish sample gives us better than a 99% chance of detecting as little as 1% hybridization in the fish population. The fish population must be further tested and verified disease-free. The potential donor list of streams to repopulate Cherry Creek is found in Table 1. Because most of these populations are limited in number and distribution, it may not be feasible to collect eggs each year without having a substantial impact on the existing populations. Egg collecting may therefore occur only once in each population or may occur in non-consecutive years. Prior to egg collection, necessary additional genetic and fish health samples will be collected and analyzed. Fish from the identified donor streams will be tested and verified disease-free. This will consist of testing a minimum of 60 surrogate fish (likely brook trout) from each stream for the presence of pathogens. If the fish population is found to be pathogen free, approval from the FWP Fish Health Committee will be sought to collect fertilized eggs and/or live fish to be used to repopulate the stream and lakes. Fish and/or eggs will be introduced into the drainage each year for a minimum of three years following fish removal. The fourth year after introduction, westslope cutthroat trout females should become sexually mature and spawn on their own, and further egg introduction should not be necessary.

Table 1. List of potential donor streams that harbor non-hybridized populations of westslope cutthroat trout that could contribute to the repopulation of Cherry Creek.

Stream	Big Hole Drainage	Miles of occupied habitat	Sympatric with brook trout	Genetic samples collected
S Fk N Fk Divide Creek	Yes	3	Yes	55
Jerry Creek	Yes	2	No	25
Delano Creek	Yes	2	No	37
Plimpton Creek	Yes	4	No	41
Bryant Creek	Yes	3	No	60
Sappington Creek	Yes	2	No	65
McVey Creek	Yes	3	Yes	35
Thayer Creek	Yes	3	Yes	55
Browns Creek	No	3	No	105
Brays Canyon Creek	No	3.5	Yes	130
Spruce Creek	Yes	2	No	15
Doolittle Creek	Yes	4	Yes	16

Several of the WCT populations listed in Table 1 have little potential for protection and expansion or are at risk of extinction because of non-native species and limited occupied habitat, therefore their long-term persistence is in jeopardy. By collecting and transferring fertilized eggs or live fish from these populations and establishing them in Cherry Creek, these populations will be replicated and preserved. The stock of fish in Cherry Creek should also be genetically diverse and could serve as a donor source for future WCT restoration projects, because of the wide contribution of donor fish populations. The use of other suitable donor sources (i.e., genetically pure, native WCT populations in nearby river basins) could be necessary if unanticipated issues (e.g., presence of disease, genetics issues, or reduced population abundance) prevent the use of the identified donors.

Funding

Funding for this project is expected to come from multiple sources including government grants, watershed groups, and private donations. Expected expenses and income sources are reviewed in Table 2. This table does not include personnel expenses. No additional funding will be required for personnel services by FWP, USFS and BLM, but these cost will come out of annual work budgets. A list of secured funding for this project is listed in Table 3. It is possible that a lack of funds could delay the commencement of this project until 2012.

Table 2. Projected project expenses for Cherry Creek Westslope cutthroat trout restoration.

WORK ITEMS (ITEMIZE BY CATEGORY)	NUMBER OF UNITS	UNIT DESCRIPTION	COST/UNIT	TOTAL COST
Design	-	-	-	-
Survey/Design				$ 15,000.00
Permitting				$ 350.00
Oversight				$ 10,000.00
Labor				$ -
				$ -
Construction				
Barrier (See attached budget)				$ 70,000.00
				$ -
Other Expenses	-	-	-	-
CFT Legumine (Rotenone)	90 gal		$76/gal	$ 6,840.00
KMnO4	12 buckets	bucket=55 lbs	$129.00	$ 1,548.00
Application equipment				$ 4,000.00
Safety Equipment				$ 2,000.00
Mobilization	-	-	-	-
Helicopter Time	13	hours	$576.00	$ 7,488.00
Total Project Cost	-	-	-	**$117,226.00**

Table 3. Funding secured for Cherry Creek Project

Secured Funding	
Montana Trout Unlimited	$2,000.00
US Forest Service RAC	$30,000.00
EMC^2	$5,000.00
BLM	$10,000.00
Big Hole Watershed Committee	$10,000.00
FWP	$10,000.00
Future Fisheries (FWP)	$30,000.00
Total	$97,000.00
Non Secured Funding	
US Forest Service	$20,000.00
Total	$20,000.00

PART II. ALTERNATIVES

Alternative 1 – No action

The no action alternative would allow status quo management to continue which would maintain the present angling quality and species diversity in Cherry Creek and Cherry and Granite lakes. This alternative would not aid in westslope cutthroat trout conservation. Hybridization levels in Cherry Creek would likely increase as hybridized trout from Cherry and Granite lakes move downstream, and potentially, rainbow trout move upstream from the Big Hole River. With increasing hybridization rates, the cutthroat population in Cherry Creek would lose its conservation value. Westslope cutthroat trout are currently found in less than five percent of their historic range within the Missouri River drainage. Of the remaining populations, few are considered secure. A secure population is one whose long term persistence is likely because of the lack of non-native species present and large population size (i.e., > 500 individuals occupying > 5 miles of stream). Completing the Cherry Creek restoration project would nearly double the amount of secure miles of westslope cutthroat trout habitat in the Big Hole drainage. The project would further include two self-sustaining lakes that could serve as egg donor sources for future westslope cutthroat trout.

Alternative 2 – Proposed Action: Restoration of westslope cutthroat trout in Cherry Creek through the construction of a fish migration barrier, removal of brook trout and hybridized trout using rotenone, and restocking the system with non-hybridized westslope cutthroat trout.

This alternative would involve the construction of a fish migration barrier 1.5 miles upstream of the mouth of the stream and chemically removing brook trout and hybridized trout from the drainage upstream of the fish barrier, including Cherry and Granite lakes. The piscicide proposed for use is rotenone in the formulation of CFT Legumine (five percent rotenone). The rotenone would be detoxified within ½ mile downstream of the fish migration barrier using potassium permanganate. Once fish removal is achieved, the stream and lakes will be stocked with non-hybridized westslope cutthroat trout from a minimum of five sources within the Big Hole drainage and potentially other sources in nearby drainages. Because Cherry and Granite lakes are important recreational fisheries, sterile westslope cutthroat trout from the Washoe Park Hatchery will be stocked in early July the year following fish removal. These fish will be catchable size fish and will provide angling opportunity while the juvenile fish introduced into the lake recruit to catchable size. This alternative offers the highest probability of achieving the goal of conserving westslope cutthroat trout in the Big Hole drainage, and will greatly increase the miles of secured habitat occupied by the species within the Big Hole.

Alternative 3 –Construct a fish migration barrier and mechanically remove hybridized trout and brook trout from the Cherry Creek drainage and restock with non-hybridized westslope cutthroat trout.

This alternative would involve construction of a fish migration barrier, identical to Alternative 2, (preferred alternative) and use gill nets and electrofishing to remove brook trout and hybridized trout then stock non-hybridized cutthroat into the stream and lakes. Gill nets have been shown to be effective in some situations at removing fish from lakes; however, there are several drawbacks with this methodology. First, larger (> 5 acre), deeper lakes are much more difficult to remove fish from using gillnets. Second, intensively gillnetting lakes is very time consuming and labor intensive. Third, gillnetting is not effective at capturing juvenile fish, therefore, the netting generally has to occur over a multiple year basis to allow juvenile fish to grow to the size that they can be effectively captured in the nets. A related project was performed in Silver (10.0 acres) and Prospect Lakes (6.8 acres) in the Absaroka Beartooth Wilderness south of Big Timber Montana. These two lakes were intensively gillnetted (15-20 nets per lake) for 4 years before fish removal was considered complete. Similarly Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an unwanted population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a 4-year period in Bighorn Lake to remove the population, totaling 261 fish. The researchers concluded that the removal of nonnative trout using gill nets was impractical for larger lakes (> 5 acres). In clear lakes, trout have the ability to become acclimated to the presence of gillnets and thus to avoid them. These researchers reported observing brook trout avoiding gillnets within approximately two hours of being set.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gillnetted from 1992 to 1994 to remove a population of brook trout. The population, which totaled 97 fish, was successfully removed with an effort of 108 net days. The researchers reported that following the removal of brook trout from Maul Lake it was mistakenly restocked with rainbow trout. Efforts to remove those fish using gillnets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. These researchers reported that gillnets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake were conditions that allowed a successful fish eradication using gillnets. Their criteria for successful fish removal using gillnets include lakes less than 3.9 surface acres, less than 19 feet deep, with little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction.

Although not tested, Knapp and Matthews surmised the maximum size of a lake that could be depopulated using gillnets was 7.4 surface acres and 32 feet deep.

Deploying gillnets and traps require frequent presence at the site to check and reset nets. There would be an infeasible time commitment required to attempt this method of fish removal. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives of completely removing hybridized trout in a timely manner. Further, angling opportunity at the lakes would be significantly reduced for a much longer time period (i.e., four years) than chemical fish removal (eight winter months).

Multiple-pass electrofishing has been used to eradicate unwanted trout (primarily nonnative brook trout) from several small streams in north central Montana (Big Coulee, Middle Fork Little Belt, and Cottonwood creeks) and in southwest Montana (Muskrat, Whites and Staubach creeks). The project reaches in these efforts were less than three miles in length and required up to twenty-five electrofishing removal passes over several years to eradicate the unwanted species. Eradication of undesired trout from Cherry Creek with electrofishing would be unlikely and also cost prohibitive, due to the length of project reach (10+ miles of stream), and size and complexity of the stream. Electrofishing removals would require a four to five-year commitment, for several weeks each year, to attempt to eradicate nonnative trout from Cherry Creek.

These reports demonstrate that gillnetting and electrofishing can be successful in some instances, but require a substantial amount of effort and time, plus specific conditions for success. This option was not considered the preferred alternative in Cherry Creek because of the large size of the drainage (10+ miles of stream), the commitment of multiple years of significant effort, and the lack of probability of success using these methods. It would further be much more costly to mechanically remove fish from the Cherry Creek drainage, because removal efforts would require a minimum period of four years to complete, versus one year (possibly two) for the preferred alternative. The mechanical removal option also would result in the lack of fishable populations of cutthroat trout in Cherry and Granite lakes for a substantially longer time than chemical treatment of the lakes. For these reasons and that because rotenone has a much higher probability success, this alternative was eliminated from further consideration.

Alternative 4: Construct a fish migration barrier and use angling to eliminate brook trout and hybridized fish from Cherry Creek then restock with non-hybridized westslope cutthroat trout.

FWP has the authority under commission rule to modify angling regulations for the purpose of removing unwanted fish from a lake or stream. Unfortunately, this method does not guarantee complete fish removal. Further, FWP is not aware of any circumstances where recreational angling was responsible for complete removal of a fish population. There are a number of reasons why this method may not work, especially in remote areas like Cherry Creek. First, liberalizing bag limits does not guarantee every angler would keep all of the fish they catch primarily because of differences in value systems among anglers. Recreational angling has been shown to reduce the average size of fish and reduce population abundance. As the size and abundance of fish decreases, angler satisfaction tends to decrease also. For these reasons it may be difficult to attract anglers to a site for voluntary angling, if angling quality is poor. Second, cleaning, preserving and transporting large bounties of fish in remote locations further dissuades anglers from keeping every fish they catch. Next, very small fish are not vulnerable to angling and can require as much as two years to recruit into the fishery. During this time, adult fish have the opportunity to continue reproducing. Finally, anglers in remote rugged country do not typically target streams, especially those with little or no trail access. Lifting bag limits on streams would not succeed in complete removal of a fish population. Angling in Cherry Creek would be very difficult owing to the dense riparian vegetation and small size of the stream. Using angling techniques alone in the stream would not result in removal of brook trout and hybridized trout and would not achieve the objective of conserving non-hybridized cutthroat trout in the stream and lakes. The amount of time required for anglers to depress or remove all fish from a lake or stream would likely require many years to accomplish and the likelihood of success is very minimal. For these reasons this method of fish removal was considered unreliable at achieving the objective of complete fish removal from lakes and streams, and was eliminated from further analysis.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment 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				

Comment 1b. The small impoundment created by the construction of the fish migration barrier will likely lead to deposition of stream sediments upstream. This will cover existing soils in the stream banks and the streambed itself with sediments. However, due to the small size of the impoundment (< 0.25 acres), the impact to existing soils should be minimal. Further, it is expected as sediments accumulate upstream of the fish barrier that they will become vegetated similar to the conditions of the existing stream banks.

Comment 1c. The small canyon where the barrier is being proposed is a relatively unique feature to Cherry Creek. The proposed barrier would be at the upstream end of this canyon and except for the structure itself, which will have a footprint into the canyon approximately 21 ft. There should be little impact on the geology or physical features of the location. Some minor amounts of drilling may occur at the site to anchor the structure to the canyon walls.

Comment 1d. See response to comment 1b.

2. WATER **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	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		No	2c
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		YES	see 2af
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		Yes	See 2j
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		YES	2m

Comment 2a: The proposed project is designed to intentionally introduce a piscicide to surface water to remove unwanted fish. The impacts would be short term and minor. CFT Legumine 5%

liquid rotenone is an EPA registered piscicide and is safe to use for removal of unwanted fish, when handled and applied according to the product label. The concentration of rotenone to be used is 1 part formulation to one million parts of water (ppm).

There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002, ODFW 2002, Loeb and Engsrtom-Heg 1970, Engstrom-Heg 1972, Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o}F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o}F pond water 14 days after a treatment. By day 18 the concentrations were sub lethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about fifteen to thirty minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). The lakes would likely naturally detoxify within three to five weeks following treatment. The stream will also be allowed to naturally detoxify down to the fish migration barrier. We expect this to occur within 24 to 48 hours after application of Legumine because of natural breakdown processes and dilution from freshwater sources. At the fish barrier, potassium permanganate will be used to detoxify the rotenone present in the stream and prevent fish killing concentrations of rotenone from traveling more than ½ mile downstream.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surfaced. Although no trout were involved with his study, Parker (1970) reported that at water temperatures of 40^{o}F and less, dead fish required 20 to 41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (<50^{o}F) and deep water (>15 feet). In similar projects in the Beartooth Mountains in Montana, very few fish floated to the surface. It was more common for the occasional fish to lose its equilibrium and beach itself along the shoreline than to bloat and float to the surface. Bradbury (1986) reported that nine of eleven water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the lake through bacterial decay. This action would be beneficial in Cherry and Granite lakes because it would stimulate phytoplankton production, then zooplankton production, and would help provide food for fish. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

During barrier construction, it is likely that minimal amounts of turbidity will be generated. Barrier installation will require excavation of the streambed and banks to prepare the site and accommodate the concrete forms. The amount of turbidity generated should be minimal because work will be done in low water conditions and water will be pumped or diverted around the construction site. Barrier construction will be completed in one to two weeks, but actual excavation time will likely be less than one day. A 318 permit from MT DEQ will be obtained prior to construction activities.

Comment 2c. The presence of the fish migration barrier will impound water upstream of the barrier approximately 100 ft. This impoundment will increase flood elevation upstream of the structure approximately six ft. This impact should be minor given the incised and stable nature of the stream and floodplain in the area upstream of the barrier. There are no structures located near the stream upstream of the barrier for more than ¼ mile. There should be no affect on flood elevations downstream of the structure. Over time, FWP anticipates that the pool upstream of the proposed barrier will fill with stream bedload and sediments.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001, Engstrom-Heg 1971, 1976, Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no evidence of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a twenty-one day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well. In Soda Butte Creek near Cooke City, Montana, a well at a Forest service campground located 50 ft from a treated stream was tested immediately following treatment with Prenfish, and 10 months later no traces of rotenone were found (Olsen 2006). Because rotenone is known to bind readily with stream and lake substrates, we do not anticipate any contamination of ground water as a result of this project.

Comment 2j: The Legumine label states "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir…" There are 4 irrigation water diversion sites located within the proposed treatment area. Two irrigate the landlocked private land within the National Forest, the third and fourth irrigate adjacent ground on the north and south side of the stream in section eight (Figure 4) the fifth is located downstream of the barrier site in the detoxification reach. The project has been and will continue to be coordinated with the private landowners such that all irrigation diversions are closed for 24 to 48 hours while treated waters are present in Cherry Creek. The timing of the treatment in late summer (late August or early September) will mitigate the need for irrigation water because most of the diversions on Cherry Creek are closed by that time in the year. Therefore, the impacts to irrigation should be short-term and minor.

Comment 2m: FWP would apply for an exemption of surface water quality standards for the purpose of applying a piscicide from Montana DEQ under section 308 of the Montana Water Quality Act and Section 318 for the temporary generation of turbidity.

3. <u>AIR</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X			3a
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 which will conflict with federal or state air quality regs?		X				

Comment 3a: Emissions from outboard motors would be created during the lake treatment phase of this project, but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b: CFT Legumine does not contain the same level of aeromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations and as a consequence does not have the same odor concerns and has less inhalation risks as other formulations of rotenone.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X			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				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: There would be some disturbance of vegetation along the stream and lake shore during the treatment. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor.

5. FISH/WILDLIFE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment 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		yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or movement of animals?			X		No	5e
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			5g
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	See 5f
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)			X			5i

Comment 5b: This project is designed to eradicate non-native brook trout and hybridized cutthroat-rainbow trout in Cherry Creek upstream of the proposed fish migration barrier. No other game fish species are present within the project area. However, these impacts are minor and temporary because the stream and lakes would be restocked with non-hybridized westslope cutthroat trout. Once they are verified to be fish-free in early July, the lakes would be restocked with sterilized, catchable westslope cutthroat trout. The stream and lakes would be stocked for 3 consecutive years with westslope cutthroat trout eggs or live fish from within or near the Big Hole drainage. There would be no proposed changes in the fishing regulations in the lakes or the stream. A request would be made of the FWP Commission to temporarily remove the harvest limits on Cherry and Granite lakes the summer prior to treatment to promote angler harvest. Rotenone when applied at fish killing concentration has no impact on terrestrial wildlife including birds and mammals that consume dead fish.

Comment 5c: Non-game (non-target) species that would be impacted include zooplankton and some aquatic insects. Columbia spotted frogs are present at Cherry and Granite lakes and in Cherry Creek and could be impacted but because of the timing of the project, impacts are anticipated to be minimal. Metamorphosed amphibians that breathe air are not affected by rotenone at fish killing concentrations; however, non-metamorphosed tadpoles that respire through their skin or gills are affected. The timing of this project in late summer/early fall should mitigate any impacts to spotted frogs because most will have metamorphosed into the air-breathing adult form.

<u>Aquatic Invertebrates</u>:

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic invertebrates. One study reported that no significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for this project (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g. fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall. 2005; Minshall 2003), though the physical impacts and resulting modifications of invertebrate assemblages after these types disturbances can last for a much longer period than a piscicide treatment.

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992, Matthaei et al. 1996). Headwater reaches of tributaries to Cherry Creek that do not hold fish would not be treated with rotenone and would provide a source of aquatic invertebrate colonists that will drift downstream. In addition, recolonization would include aerially dispersing invertebrates from downstream areas (e.g. mayflies, caddisflies, dipterans, stoneflies).

The possibility of eliminating a rare or endangered species of aquatic invertebrate in Cherry Creek by treating with rotenone is very unlikely. In SW Montana, as part of a MEPA process, aquatic invertebrates are routinely collected prior to WCT restoration projects in mountains streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse, Soda Butte creeks). These collections in all cases have shown aquatic invertebrate assemblages typical of headwater streams in southwestern Montana, and in no cases have threatened or endangered species been discovered. There are no known threatened or endangered invertebrates in area surrounding Cherry Creek. FWP expects that Cherry Creek contains the same type of aquatic invertebrate assemblage as found in other nearby streams and the possibility of eliminating a rare or endangered species is minimal.

Both Anderson (1970) and Kiser et al. (1963) reported that most zooplankton species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankton occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. Among the aforementioned studies variation in climate, physical environment, and water chemistry would likely cause subtle differences in results in other areas.

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1996). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment, then became stable. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. Many studies report that aquatic insects are much less sensitive to rotenone treatment than fish (Schnick 1974). Houf and Campbell (1977) reported no short-term or long-term effects on species abundance or insect emergence in three ponds treated with 0.5 to 2.0 mg/L of Noxfish 5% rotenone. In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Aquatic invertebrates in general are capable of rapid recovery from disturbance (Matthaei et al. 1996).

In regard to zooplankton, Schnee (2007b) chronicled two years of post rotenone treatment monitoring for upper and lower Martin lakes near Olney, Montana that were treated in 2005. He concluded that zooplankton density two years after the treatment were similar to pre-treatment densities, and in some cases higher. Zooplankton community composition showed no change between 2006 and 2007. Based on this evidence, FWP expects the plankton species composition in Cherry and Granite lakes to return to pre-treatment diversity and abundance within two years. Schnee (2007) concluded that rotenone's effects on non-target organisms such as plankton, amphibians, reptiles and aquatic insects were temporary and natural reproduction and/or recolonization by these species was sufficient to restore populations to pre-treatment densities within two years.

<u>Birds and Mammals:</u>

Mammals are generally not affected by rotenone at fish killing concentrations because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume rotenone under field conditions is by drinking lake or stream water or consuming dead fish, a half pound animal would need to drink 33 gallons of water treated at 2 ppm.

The EPA (2007) made the following conclusion for small mammals and large mammals:

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

Rats in one study were injected with rotenone for a period of weeks, and the study reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000) on the rats. However, the results have been challenged based upon the following errors in experimental methodology: (1) that the continuous intravenous injection method used to treat the rats leads to "continuously high levels of the compound in the blood,"and (2), that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound under field applications as proposed in Cherry Creek. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981, BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and wildfowl find it slightly toxic; but in order to kill Japanese quail, 4,500 to 7,000 times more was required than the amount used to kill fish.

The EPA (2007) made the following conclusion for birds:

> *Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible*

that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio; Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} *of 4110 mg/kg, a 1000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

<u>Amphibians and Reptiles</u>:

Potential amphibians and reptiles found within the Cherry Creek treatment area include: long-toed salamanders (*Ambystoma macrodactylum*), spotted frogs (*Rana pretiosa*), boreal toads *(Bufo boreas)* (amphibians), and western terrestrial garter (*Thamnophis elegans*), common garter (*T. sirtalis*), and rubber boa (*Charina bottae*) snakes (reptiles). Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between three and ten times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs, concluding that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 mg/L) but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians. The Cherry Creek treatment would be scheduled for late August or September (prior to brook trout spawning), which would reduce but not eliminate potential impacts to larval amphibians. Any reduction in amphibian abundance would likely be short term because of the low sensitivity of adults to rotenone, and the likelihood that many larval amphibians would have metamorphosed to air-breathing ability by late August. A reduced abundance of aquatic invertebrates may temporarily impact larval amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment, though snakes are known to consume trout which would be temporarily reduced by a piscicide treatment.

It is important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management.

Based on this information FWP would expect the impacts to non-target organisms in Cherry Creek to range from non-existent to short term and minor.

Comment 5d: The objective of the proposed action is to restore non-hybridized westslope cutthroat trout to Cherry Creek. Undesignated cutthroat trout and rainbow trout were stocked into Cherry Lake in 1946. Although no stocking records are available, it is possible that Granite

Lake was also stocked at the same time. It is unknown whether or not westslope cutthroat trout were native to Cherry and Granite lakes, but substantial cascade barriers located downstream of the lakes would suggest that the lakes were historically fishless. Recent genetic evidence suggests that the hybridized westslope in the lakes are genetically very similar to those in the stream downstream, meaning either they originated from the stream or more likely that the fish from the lakes through time have out-migrated and have populated upper reaches of the stream. Genetic evidence also suggest that the fish in both lakes are hybridized with both Yellowstone cutthroat trout and rainbow trout, so it is likely that Yellowstone cutthroat trout were stocked into the lakes at one time as well. Westslope cutthroat trout were likely historically native to Cherry Creek. Undesignated cutthroat trout were stocked into the creek in 1934 and 1953, but there is no record of brook trout being stocked. FWPs intent is to stock only non-hybridized westslope cutthroat trout into Cherry Creek once fish removal is completed (See comment 5i).

Comment 5e. One of the proposed actions would create a barrier preventing upstream migration of fish into the middle and upper reaches of Cherry Creek. Preventing non-native trout species from colonizing this part of Cherry Creek is the intended purpose of the barrier, and is necessary to ensure the long-term persistence of westslope cutthroat trout. Further, the location of the structure should mitigate some of the impacts to trout that may migrate upstream from the Big Hole River to Cherry Creek to spawn. It is unknown whether trout from the Big Hole River use Cherry Creek as a spawning and rearing area. Rainbow trout have been documented in Cherry Creek but brown trout have not; both species are common in the Big Hole River. If trout from the Big Hole River use Cherry Creek for spawning and rearing, 1.5 miles of stream habitat downstream of the fish migration barrier would still be available for migrating fish. The habitat in this reach is in very good condition with abundant willows and very stable banks. There are also abundant beaver ponds in this reach of stream which may limit fish access to upstream reaches. Some native fish species may be precluded from upstream passage due to the barrier, including: burbot, sculpin, and mountain whitefish. These native fish species are common through the Big Hole River Basin, and no population level impacts are anticipated.

Comment 5f: Dead fish would result from this project. It is possible that osprey or eagles would eat rotenone-killed fish. Bald eagles have been observed at the lakes. Conducting this project in the fall would not impact bald eagle nesting, and there would be no impacts to bald eagles that consume rotenone-killed fish. The lake would be restocked with fish the following year, so there would be only minor impacts to bald eagle foraging opportunities. Further, Green Lake and Trapper Lake are located within only a few miles of Cherry and Granite lakes and would continue to provide foraging opportunities for pisciverous birds. See comment 5c for impacts to birds.

The project area is within potential grizzly bear habitat, but there are no known grizzly bears currently inhabiting this area. This project should have little or no impact on grizzly bears because the bears are not dependent on fish in the lake or stream for food. There would be no impact on grizzly bears that consume fish killed by rotenone or consume treated waters (See comment 5c for impacts to mammals). The project would not have an impact on grizzly bears.

The project site is within the range of the gray wolf and lynx. Wolves and lynx are known to be present near the project area and they may use this area at times, but they are not dependant on the lake or stream for fish. The impacts to these species may include temporary displacement during the treatment when personnel and equipment are present in the drainage. However, there should be no impacts from consuming treated waters or fish killed by rotenone for the same reasons as the grizzly bear. Therefore, impacts to lynx and wolves should be minor and temporary. See comment 5c for impacts to mammals.

Westslope cutthroat trout, including some populations of slightly hybridized WCT, are considered a sensitive species. The intent of the proposed project is to remove hybridized WCT from the Cherry Creek drainage in order to expand the range of genetically pure WCT in the Big Hole basin. The removal of hybridized WCT is expected to be a short term and minor impact because genetically pure WCT will be transferred to the Cherry Creek drainage once hybrids are removed. The project will benefit WCT outside of the Cherry Creek drainage by providing an opportunity to “replicate” existing but threatened native WCT populations.

Comment 5g. There is the potential for displacement of some animals during the implementation of this project (see Comment 5f). Mule deer, elk and other big game species may be temporarily displaced as crews are present in the drainage performing the proposed work, particularly as the helicopter is being used. However, these impacts should only be minor and temporary. The helicopter would be used for a maximum of 3 days and the total treatment should be completed within 2 weeks. Barrier construction should also be completed within a three week time window. Motorized access is currently present throughout most of the drainage and our presence will likely represent only a small and temporary increase in human activity in the drainage.

Comment 5i. Granite and Cherry lakes were likely historically fishless. Stocking records indicate that Cherry Lake was stocked as early as 1946 (no stocking record is available for Granite Lake); therefore, fish have been present in the lakes for a considerable time period. Under the preferred alternative, Cherry and Granite lakes would be restocked with non-hybridized westslope cutthroat trout to re-establish the fisheries.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X		Yes	6a
b. Exposure of people to serve 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				

Comment 6a: Noise levels will increase temporarily as ATV’s, a gas powered boat, and a helicopter is used during the treatment phase of this project, and as heavy equipment is used to

construct the fish barrier. These impacts should be minor and temporary as the construction of the barrier is scheduled to last only three weeks and the treatment phase of the project is scheduled to last only two weeks. There are no occupied structures within ½ mile of the fish barrier. The helicopter flight path does cross over one residence on Cherry Creek, but the landowners are a cooperator with FWP to restore cutthroat trout to Cherry Creek.

7. LAND USE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
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				

8. RISK/HEALTH HAZARDS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment 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	see 8ac
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators. All applicators would wear safety equipment required by the product label and MSDS sheets. Such safety equipment may include respirator, goggles, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one Montana Department of Agriculture certified pesticide applicator would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill.

Comment 8b: 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, a 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.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for the dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values: an additional 10x database uncertainty factor - in addition to the inter-species (10x) uncertainty factor and intra-species (10x) uncertainty factor – has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1000. The following table summarizes the EPA toxicological endpoints of rotenone (from 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 = 15 mg/kg/day = 0.015 mg/kg/day 1000	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 = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	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

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded:

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.*
>
> *Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.*
>
> *Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."*

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk: first, the rapid natural degradation of rotenone, second, using active detoxification measures by applicators such as potassium permanganate, third, properly following piscicide labels which prohibit the use near water intakes, and finally, proper signing, public notification, or area closures which limit public exposure to rotenone-treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application by dermal and incidental ingestion, but requires a waiting period of three days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water, and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because signs would be in place to warn recreationists that the stream and lakes are being treated with rotenone and closed to entry. Proper warning through news releases, signing the project area, temporary road closure, and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE), and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene, and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. The human health risk is low, however, because of low concentrations of these solvents in this formulation. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present, but either analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine:

> "…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physicalchemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene, and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira, et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions as those involved with fisheries management programs.

9. <u>COMMUNITY IMPACT</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment 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	Comment 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				
f. Define projected maintenance costs		X				

11. AESTHETICS/RECREATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment 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	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: There will be a temporary loss of angling opportunity at Cherry and Granite lakes and Cherry Creek between the time of fish removal and the restocking. However, this

should only minimally impact angling because the removal of fish will occur in late summer, when the number of anglers in high elevation lakes declines dramatically. The lakes will then be restocked shortly after ice out the following spring. Winter ice fishing use at the lakes is currently unknown, but assumed to be low because of the remoteness of the lake and difficulty of access in the winter. Angling quality may be temporarily reduced for two years after project implementation as the stocked juvenile fish grow and recruit into catchable-sized fish. However, once the project is complete (four years after treatment), angling opportunities should be identical to pre-project conditions. Further, angling opportunity will remained unchanged in nearby Green Lake (< 1 mile to the south), which drains into Rock Creek. FWP will place signs at access points and at the lakes informing the public of the project.

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				12c
d. Will the project affect historic or cultural resources?		X				12c

Comment 12c. In November, 2010, a cultural inventory of the proposed barrier site was conducted by a BLM archeologist and no artifacts or evidence of culturally or historically significant use was identified. A report of the cultural inventory is attached as Appendix B.

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment 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		yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X			13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of piscicide can generate controversy from some people. Public outreach and information programs can educate the public on the use of pisticides. It is not known if this project would have organized opposition. However, initial scoping of private landowners in the drainage, grazing lessees, local sporting groups (George Grant Chapter Trout Unlimited, Anaconda Sportsmen, Skyline Sportsmen) and other agencies indicated overall support and/or lack of opposition to the proposed project.

Comment 13g: The following permit would be required:

DEQ 308 - Department of Environmental Quality (authorization for short term exemption of surface water quality standards for the purpose of applying a fish toxicant),
Section 404 Permit from the Army Corps of Engineers,

318 Permit from Montana DEQ for temporary exemption of water quality standards for the purpose of constructing the fish barrier,

Floodplain Permit from Beaverhead County for construction of the barrier,

124 Permit from Montana Fish, Wildlife and Parks will be required for the construction of the fish barrier.

PART IV. ENVIRONMENTAL IMPACT STATEMENT REQUIRED?

After considering the potential impacts of the proposed action and possible mitigation measures, FWP has determined that an Environmental Impact Statement is not warranted. The impacts of WCT restoration as described in this document are minor and/or temporary and mitigation for many of the impacts is possible. The primary impacts as a result of this project are temporary reductions in aquatic invertebrate abundance as a result of toxic effects of rotenone. Impacts to aquatic invertebrates have been shown to be short term (one to two years) and minor, and invertebrate communities are very resilient to the impacts of rotenone. There has been no evidence of fluvial fish (brown trout, rainbow trout or other species) using Cherry Creek as a spawning and rearing stream upstream of the barrier location. Any loss of access to spawning and rearing as a result of the fish barrier would be mitigated by improvement to the native WCT, a species in need of conservation. Once the barrier is constructed, approximately 1.5 miles of Cherry Creek downstream will still be accessible to fish migrating from the Big Hole River to spawn.

Prepared by : Jim Olsen, Fisheries Biologist______ Date: ____________________

Submit written comments to: Montana Fish, Wildlife & Parks
c/o McVey Creek EA comments
1820 Meadowlark Ln.
Butte, MT 59701

Comment period is _30__ days. Comments must be received by ___24 April 2011____

Public meetings will be held in Dillon on April 13 at the Beaverhead-Deerlodge National Forest Office (420 Barrett Street) and Butte on April 14 at FWP Butte Area Office (1820 Meadowlark Lane). Both meetings begin at 7 p.m.

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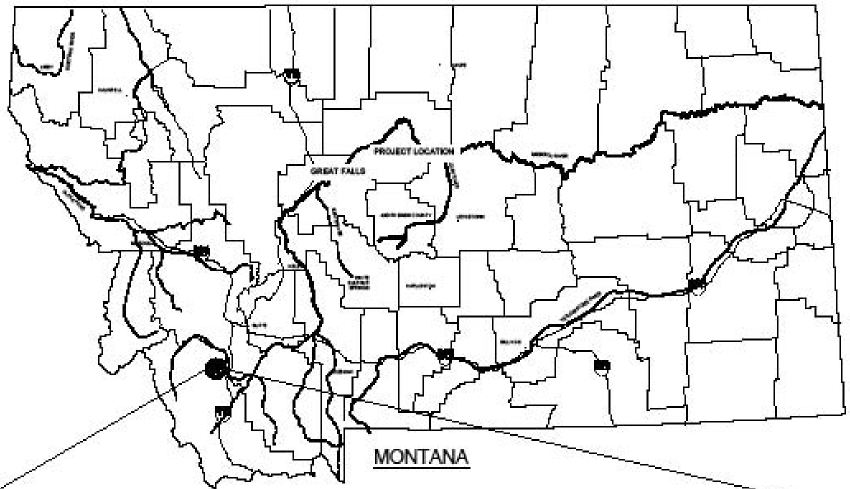
Appendix A: Design drawings for proposed Fish Barrier on Cherry Creek near Melrose Montana.



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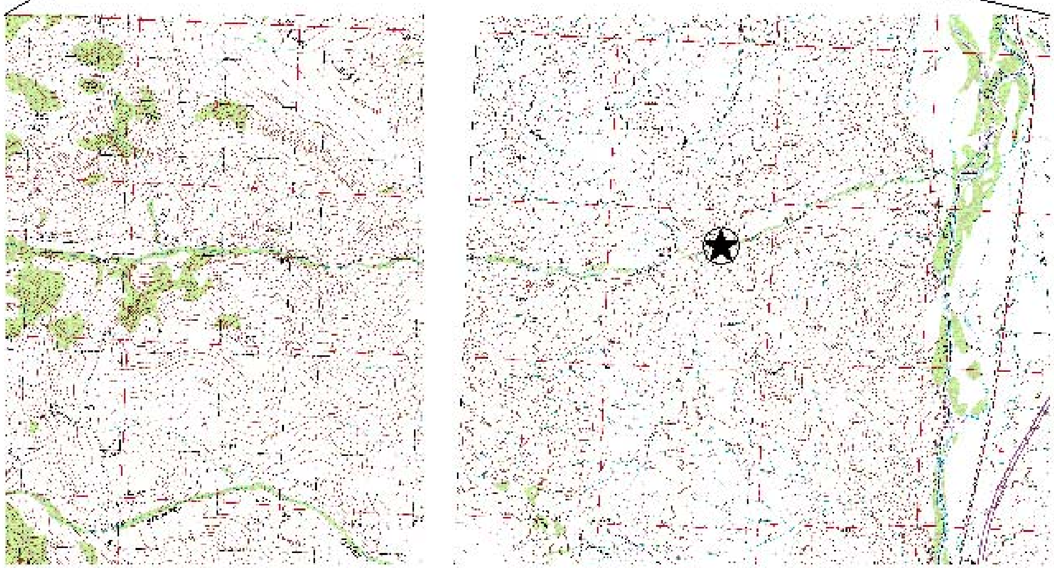

PROJECT VICINITY MAP

CONSTRUCTION PLANS FOR CHERRY CREEK FISH BARRIER BEAVERHEAD COUNTY, MONTANA

PREPARED FOR:

Montana Fish, Wildlife & Parks

FWP PROJECT# 3828

PREPARED BY:

ENVIRONMENTAL MANAGEMENT CONSULTANTS CORPORATION

IN CONJUNCTION WITH

HYALITE ENGINEERS PLLC.

SHEET INDEX:

emc

Offices in Bozeman MT, Denver CO, and Phoenix AZ

HYALITE ENGINEERS, PLLC

SHEET

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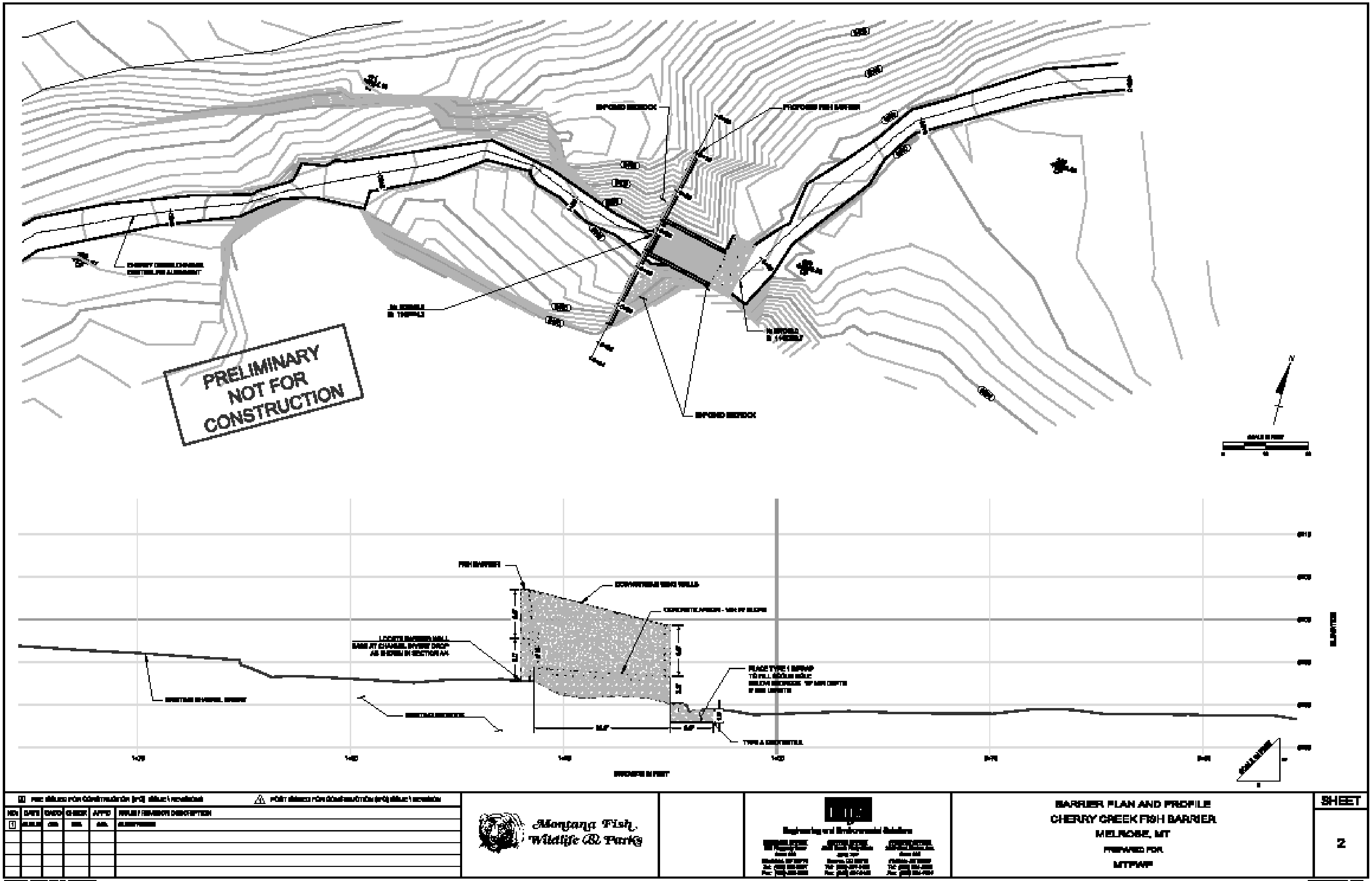
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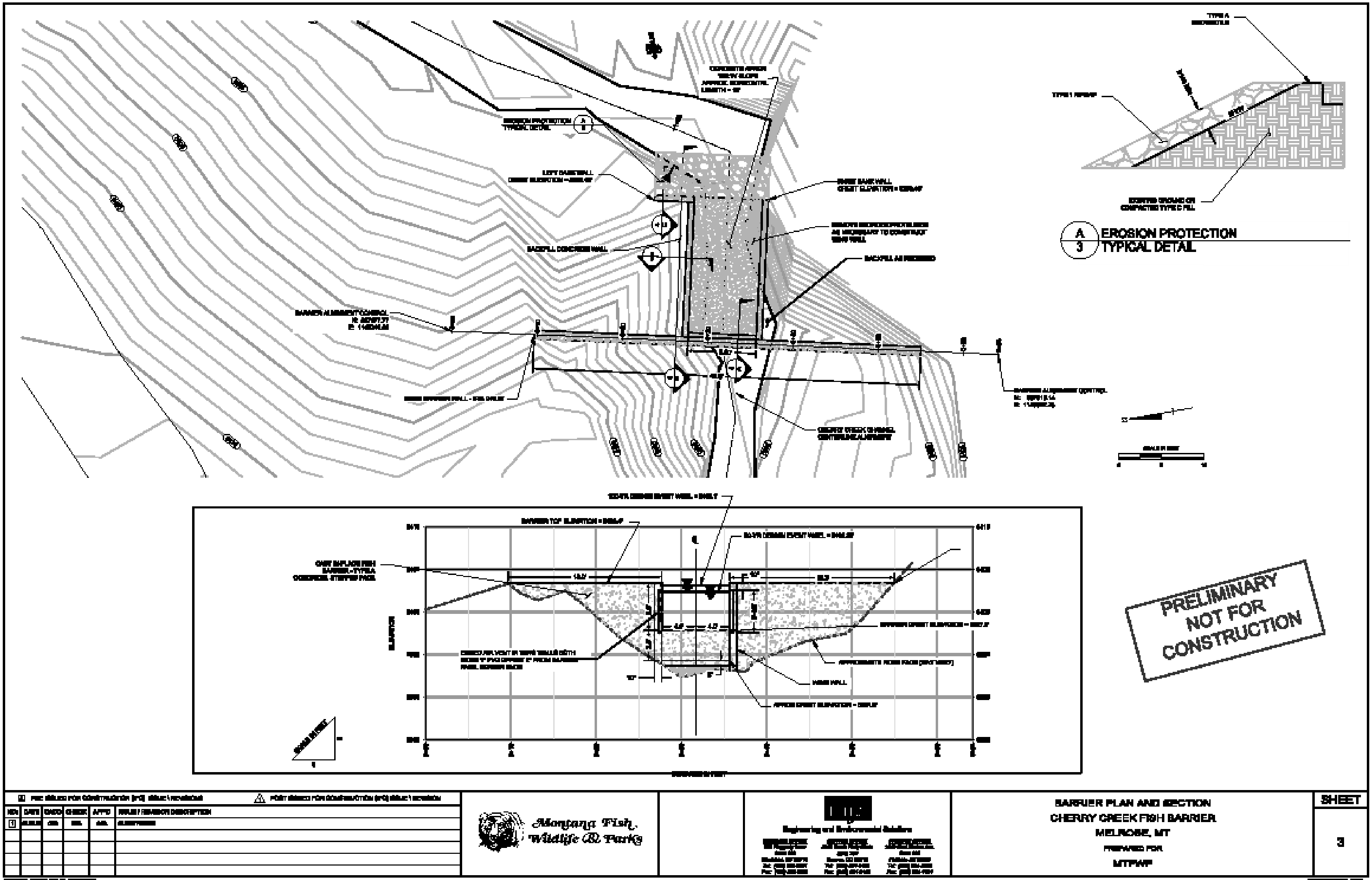
CHERRY CREEK FISH BARRIER
MELROSE, MT
PREPARED FOR
MTFWP
Montana Fish Wildlife & Parks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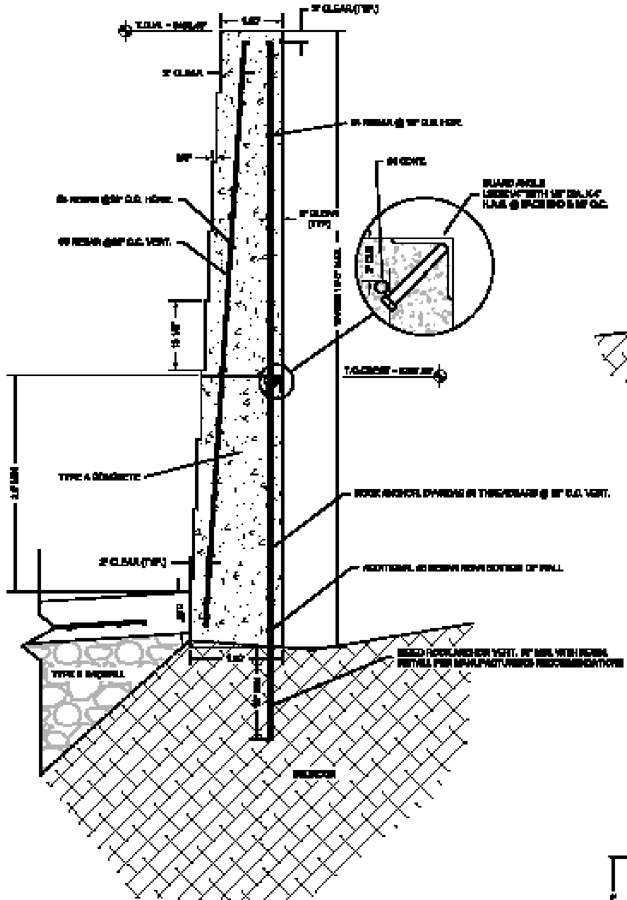
PREPARED FOR
MTFWP



A FISH BARRIER
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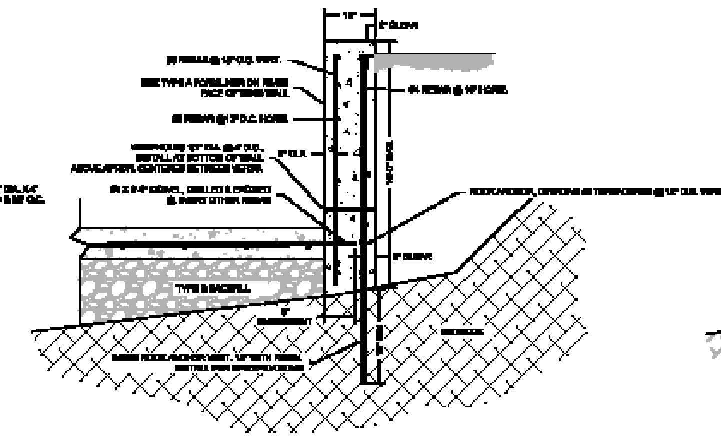

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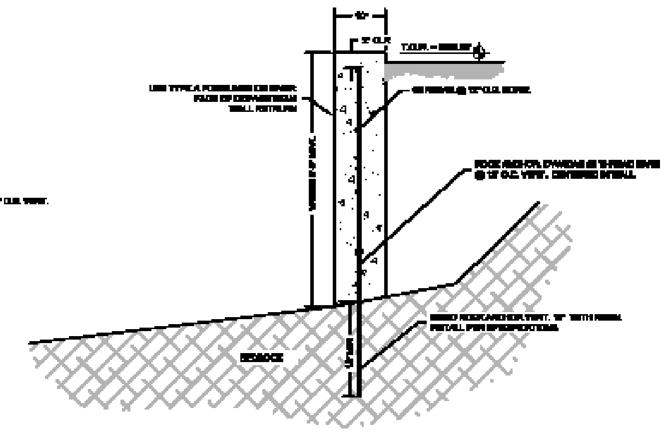

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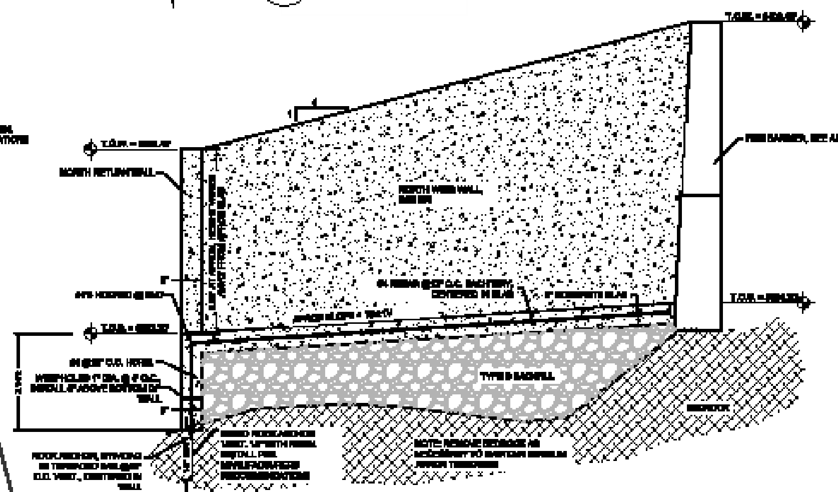

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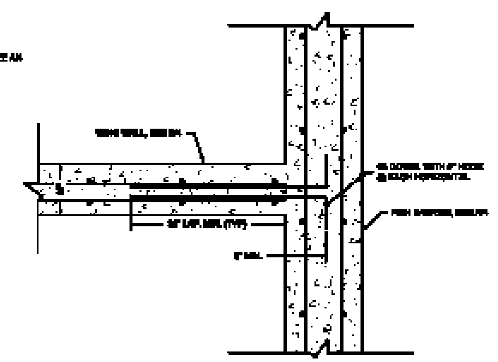

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Montana Fish, Wildlife & Parks

Engineering and Environmental Solutions

CONCRETE DETAILS
CHERRY CREEK FISH BARRIER
MELROSE, MT
PREPARED FOR
MTFWP

SHEET
4

Appendix B. Cultural Inventory Report

THE "GREEN SHEET"
CULTURAL RESOURCE COMPLIANCE DOCUMENTATION
DILLON FIELD OFFICE BLM

Project Name _Cherry Creek Fish Barrier _

Cultural Resource Inventory/Project Number _11-MT-050-08_

EA/CX/BLM Case File Number ___________________________

NHPA's Section 106 Status:

[X] Section 106 process completed.

[ ] Mitigation/Stipulations are required.

[X] Mitigation/Stipulations are NOT required.

Comments:

Montana Fish Wildlife and Parks in cooperation with the Bureau of Land Management are proposing to construct a fish barrier on Cherry Creek to better manage Westslope Cutthroat populations within the Big Hole River drainage. The majority of the project will be contained to within the main creek channel, including construction of a paved runway and culvert.

On November 5, 2010 a Class III cultural resources inventory was conducted for the Cherry Creek Fish Barrier project. In the course of the inventory, no historic or prehistoric cultural resources were observed. Therefore the project will have NO EFFECT to any historic properties and it is recommended that the project proceed pursuant to the BLM National Programmatic Agreement and implementing protocol.

Signature ___________________________________ (Jason D. Strahl) Date _January 11, 2011_
Title _Archaeologist, Dillon Field Office_

Department of Interior
Bureau of Land Management
Montana State Office
Cultural Resources Class III
Inventory Report

Inventory Report Number: 11-MT-050-08

Project Name: Cherry Creek Fish Barrier

State: Montana **County:** Madison **BLM Field Office:** Dillon Field Office

Topographic Map: Earls Gulch, MT – 7.5' USGS Topo **Base Meridian:** MPM

Location: Township: 3S Range: 9W Section: 8 E ½, SE ¼, NW ¼

Access: From Monida, Montana proceed past the Salmon Fly access for approximately one mile to an unnamed gravel road (private home owner access). Proceed south along gravel road for approximately three miles to BLM land and project location on Cherry Creek.

Land Ownership: Public surface and minerals are managed by the Dillon Field Office, Bureau of Land Management.

Area Surveyed (acres): One acres
Area of Potential Effect (acres): Less than one acre
Principal Field Investigator: Jason D. Strahl, Archaeologist
Organizational Affiliation: Bureau of Land Management,
Dillon Field Office
1005 Selway Drive
Dillon, Montana 59725

Date of File Search: November 4, 2010
Date(s) of Field Work: November 5, 2010
Site(s) Recorded in Project Area: None
Previously Recorded Sites: None

Project Description

Montana Fish Wildlife and Parks in cooperation with the Bureau of Land Management are proposing to construct a fish barrier on Cherry Creek to prevent migration of Brook Trout populations into Westslope Cutthroat populations upstream. The majority of the project will be contained within the main creek channel, including construction of a paved runway and culvert.

Environmental Context

The project is located on Cherry Creek on the eastern edge of the Pioneer Mountains within the Big Hole drainage at approximately 5,600 feet. The general topography surrounding the project area consists of long ridges dissected by permanent and seasonal drainages. Riparian vegetation, mainly consisting of willows, sedges, and grass characterize the vegetation around Cherry Creek; however, stands of Douglas fir trees occur on the slopes on the southern hill slopes. Open sagebrush/grassland is the vegetation community between the riparian areas and the forest. Soils consist of dark brown clayey silts with cobbles and stones.

Existing Data and Literature Review

Materials consulted in the initial literature review included the prehistoric and historic cultural overviews for the Butte District (Deaver and Deaver 1990, Brown 1975; see also Ingram 1976), and the Montana State Historic Preservation Plans (Montana Fish and Game Commission 1975; Van West 1985). In addition, project and site files curated at the Bureau of Land Management, Dillon Resource Area were examined to determine the presence/absence of previous cultural resource inventories and previously recorded site locations.

Survey Methods

A Class III cultural resource inventory was conducted for the proposed Cherry Creek Fish Barrier Project. An area measuring approximately 80 meters east to west along the creek by 100 meters north to south was inventoried for the proposed development using zigzag transects spaced at 10 meter intervals. A total of two acres was inventoried at the Class III level for the area of potential effect (APE) for the proposed spring development. Surface visibility was generally good with sparse vegetation above the stream and denser vegetation along the creek. The ground was mostly visible in eroded and deflated areas, in the two two-track roads, and along the stream bank. During the course of the inventory, special attention was given to these areas of ground disturbance for any indications of potentially buried cultural materials. The weather was partly cloudy and cool (highs in the 40s). The survey was conducted mid-day.

Summary Description of Resources Encountered

No cultural resources were observed during the course of the inventory.

Conclusions and Recommendations

A Class III cultural resources inventory was conducted for the Cherry Creek Fish Barrier project. In the course of the inventory, no historic or prehistoric cultural resources were observed. Consequently, it is recommended that the project proceed pursuant to the BLM National Programmatic Agreement and implementing protocol, since the project will have NO EFFECT on cultural resources.

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Date of Report: January 11, 2011 **Signature:**_______________________________________

Jason D. Strahl (Archaeologist)