

**MONTANA FISH, WILDLIFE AND PARKS
FISHERIES BUREAU**

**Draft Environmental Assessment of the Removal of Non-Native Brook Trout with
Piscicides, and Stocking of Westslope Cutthroat Trout into Chicago Gulch Creek**

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Montana Fish, Wildlife & Parks (FWP) proposes the use of piscicides to eliminate non-native brook trout, (*Salvelinus fontinalis*) from Chicago Gulch (approximately 4.5 miles of stream). After brook trout are successfully removed, westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) (WCT) would be stocked into the system. The WCT would be obtained from the nearby wild populations of Collar Gulch Creek and/or Half Moon Creek. Other suitable donor populations may be used if necessary. All actions would be in Fergus County, Region 4, Montana.

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.

The proposed action is in conformance with the BLM's Approved Judith Resource Area Resource Management Plan (1994) to maintain and enhance suitable habitat for all wildlife species. The emphasis for habitat maintenance and development will be on present and potential habitat for sensitive, threatened and/or endangered species, nesting waterfowl, crucial wildlife winter ranges, non-game habitat and fisheries. From the Approved Plan, page 15 (BLM 1994).

C. Estimated Commencement Date: July 2012

D. Name and Location of the Project: Removal of non-native brook trout with rotenone, and stocking of WCT into Chicago Gulch Creek, 20 miles NE of Lewistown Montana.

Chicago Gulch is a small first order stream that combines with Collar Gulch to form Fords Creek about one mile downstream from the project area. Fords Creek flows into Box Elder Creek, 56

miles downstream from the confluence with Collar Gulch. The portion of stream (approximately 4.5 miles) to be treated is located in T17N R20E on Bureau of Land Management, private land (one owner), and State of Montana school trust lands between 47.18477°N, -109.13273°W (downstream end) and 47.21335°N, -109.18124°W (upstream end)(Figure 1). Locations may change slightly based on updated fisheries information and stream flow.

Montana Fish, Wildlife & Parks propose transferring non-hybridized eyed eggs and juvenile and adult WCT to Chicago Gulch Creek, once non-native brook trout are removed, as described in this EA. Pure WCT from Collar Gulch Creek (47.19687°N, -109.20439°W) and/or Half Moon Creek (46.81203°N, -109.27948°W) would be used as donors. Other suitable donors would be used if needed.

Eggs would be collected from spawning WCT by backpack electrofishing or trapping during spawning season for 2 to 5 years after removal of non-native brook trout. Ideally, eggs would be collected from five to ten females and spawned with ten to fifteen male WCT. Fertilized eggs would be hatched in Chicago Gulch Creek using Remote Site Incubators (RSI's). Juveniles and adults may also be transferred over 2 to 5 years. No more than 10% of adult fish would be collected from any population in one year. No more than 20% of juvenile fish would be collected from any population in one year. WCT would be collected from one or two WCT populations. Mixing of individuals from two populations would prevent potential founder effects caused by low genetic diversity in donor populations. Other suitable donor populations would be used if necessary.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian –

The treated length of Chicago Gulch Creek would be approximately 4.5 miles long. There are three tributaries to Chicago Gulch Creek along the proposed treatment length. The tributaries that may need treatment include about 0.5 miles of East Fork Fords (Chicago) Creek and about 0.2 miles of the unnamed tributaries (Figure 1). Treatment of these tributaries may increase the total length of stream requiring treatment to approximately 5.2 miles.

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

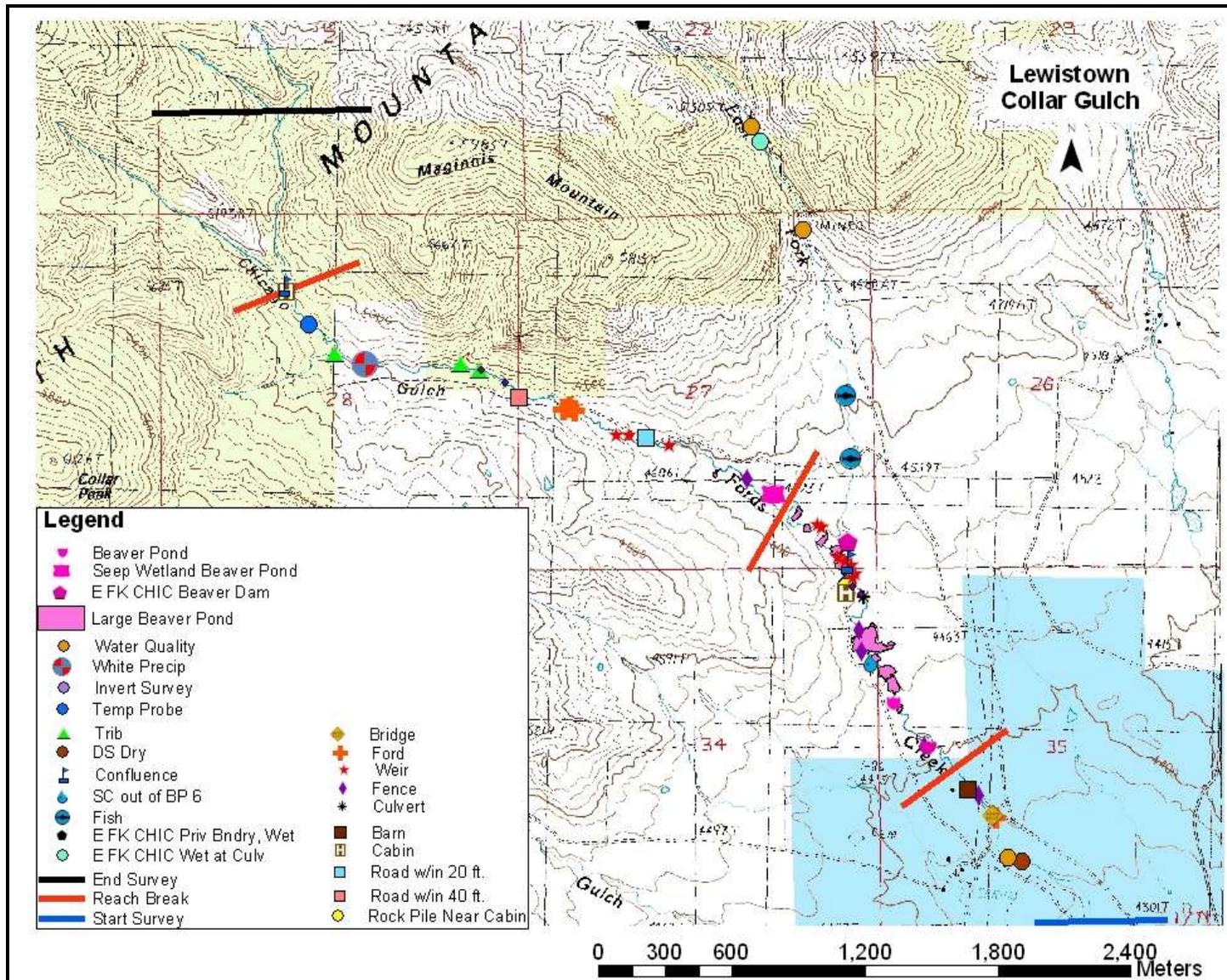


Figure 1. Map of the project area in T17N R20E. Features identified during 2007 surveys, conducted by the BLM.

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

Chicago Gulch contains a robust non-native brook trout population in about 4.5 miles of stream. The population extends downstream to approximately 47.18477°N, 109.13273°W where the stream typically goes dry. During wet cycles, trout likely go further downstream. There are no records in the FWP database that Chicago Gulch was stocked with trout. Fords Creek was stocked with brook trout about 7 miles downstream from the project area in 1968 and was also stocked with brown trout and cutthroat trout in the early to mid 20th century. Downstream of Chicago Gulch anecdotal evidence indicates that Fords Creek, Box Elder Creek and their tributaries typically are seasonal streams with prairie fish assemblages. Poor fish habitat exists at the upper end of the project area due to low flows and acid drainage (pH as low as 4.5). A white precipitate forms in the high acid areas with a lower limit at (47.20756°N; -109.17830°W). Fish are rare upstream of the confluence of west fork Chicago Gulch (47.21029°N; -109.18106°W). The west fork of Chicago Gulch has acid drainage and fish have not been sampled in that reach. A population estimate conducted in 2004 found 477 brook trout 4 inches & larger per 1000 feet near the middle of the proposed treatment section. Mean length was 5.1 inches (Moser et al. 2005). Brook trout have been observed throughout the project area.

After a successful treatment with piscicides, we would propose to stock Chicago Gulch with pure WCT from nearby populations. We propose transferring WCT from Half Moon Creek and Collar Gulch Creek. These locations were chosen because they are pure WCT and are the only populations in the Musselshell River Drainage. They have not been replicated or transferred to other locations. WCT would be transferred in 2013 - 2016 after the complete removal of non-native brook trout. Other suitable donor populations would be used if necessary. Prior to transfer of WCT, donor populations would be sampled for disease and permission for the transfer would be requested from the FWP Fish Health Committee.

Under this proposal, non-native fishes in Chicago Gulch would be removed using EPA registered piscicides containing rotenone. Prenfish™, CFT Legumine™, and Prentox Cube Powder® all contain rotenone as their active ingredient and perform similarly. All the aforementioned products are listed but not all products would necessarily be used. Rotenone kills fish by blocking respiration at the cellular level. Rotenone would be applied to the waters of the project area at concentrations up to 4 parts per million (ppm) of formulation as per product label. Bioassays would be conducted prior to the treatment to determine the actual concentration necessary. Distance between rotenone drip stations would be based on the results of on-site bioassays and water velocities in the stream. Backpack sprayers would be used in areas of standing water and in springs and seeps on the stream margins. In addition, powdered rotenone (Prentox Cube Powder®) may be mixed with sand and gelatin and placed in springs and seeps. The project would occur during summer or early fall of 2012 – 2014. At least two treatments would likely be necessary to ensure complete eradication of non-native fishes. Rotenone degrades quickly in streams and typically persists for less than 14 days. Chicago Gulch often goes subterranean immediately downstream of the project area so neutralization with potassium permanganate may not be necessary. Potassium permanganate would be kept on site and if needed for detoxification applied at 1-6 ppm.

Genetically pure WCT occupy about 8% of their historical range in the western United States (Shepard et al. 2003) and less than 4% of their historical range in northcentral Montana within the Missouri River Drainage (Moser et al. 2008). The Musselshell Drainage as a whole is generally not considered a part of the historical range of WCT. However, natural trans-basin transfers of WCT have likely occurred in the past; specifically, on Half Moon Creek in the Flatwillow Drainage. Establishing a WCT population outside of the WCT historical distribution would at a minimum provide replication of a native WCT population and provide refugia, redundancy, and a source of live fish or gametes should the donor population ever be extirpated from its natal stream due to catastrophic events (e.g. fire, drought). There are two populations of WCT in the headwaters of the Musselshell, Half Moon Creek (Flatwillow drainage) and Collar Gulch (Box Elder drainage). These are the furthest east WCT populations in Montana streams. Collar Gulch was likely stocked circa 1950 and Half Moon is considered native (Shepard et al. 2003). Major threats to WCT include competition and hybridization with non-native rainbow trout (Leary et al. 1995; Hitt et al. 2003), competition with brook trout (Dunham 2002; Peterson et al 2004), and isolation of remaining pure populations above barriers in short headwater sections of stream. These small isolated populations are at risk of extinction from catastrophic events (e.g. fire, drought) and may eventually suffer negative consequences of genetic inbreeding (Wang et al. 2002). Projects which restore WCT are necessary to ensure the continued survival of WCT in northcentral Montana and elsewhere. In addition, projects that stabilize and increase WCT populations may help prevent future efforts to list WCT under the federal Endangered Species Act. This proposed action would protect and expand WCT in the Judith Mountains from one to two populations. Total WCT habitat in the Judith Mountains would increase from approximately 1.5 miles to 5.5 miles. The resulting increase should reduce risks of potential impacts of catastrophic events (e.g. fire, drought). In the mid-1990's the Collar Gulch population contained about 300 WCT > 3 inches fork length (Shepard et al. 1996). Minimum population sizes necessary for long term persistence can vary widely and are generally believed to be highly circumstance and species specific, depending on the environment and life history characteristics of the species (Flather et al. 2011). However, the existing Collar Gulch population survives at a level much lower than the 2,500 minimum WCT population size recommended by Hilderbrand and Kershner (2000) for long term persistence (>100 years). Collar Gulch drains less than 2 square miles, which is also much less than the 5.6 square miles (minimum watershed size) area recommended as a coarse filter for translocations by Harig and Fausch (2002). It is predicted that a population of WCT in Chicago Gulch would be very robust (>2,500 individual fish). Once the WCT population is restored; management alternatives, which include limited harvest, would be considered.

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, Oceania, 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 that used to kill fish.

The boundaries for the treatment would be from approximately 0.20 miles upstream of the forks of Chicago Gulch Creek downstream to the end of fish habitat in state section 35 (Figure 1). The waters between these two points would be treated with Prenfish™ or CFT Legumine (5% liquid rotenone) with toxicant effects limited to the stream length within these boundaries. We would follow the label recommendations for concentrations for “normal pond use” (i.e. 0.5 to 1 part per million CFT Legumine or 0.025 to 0.050 ppm active rotenone) but on-site assays using caged fish would determine the appropriate concentrations needed. Streams similar to Chicago Gulch where rotenone has recently been used to restore WCT required no more than 1 ppm CFT Legumine. Liquid rotenone would be applied to the stream at regularly spaced intervals determined by bioassays because of dilution and natural detoxification as rotenone moves downstream. Rotenone would be applied through the use of a drip station. Each drip station dispenses a precise amount of diluted rotenone into the stream over a 4 to 8 hour period, based on measured stream discharge. A mixture of powdered rotenone (Prentox 7% rotenone), sand, and gelatin may be applied on a limited basis. A powdered rotenone mix would only be used in springs, seeps and other areas that have the potential to provide refugia for the target fish. When the treatment ends, fresh water from untreated areas upstream would begin to dilute the piscicide concentration. Oxidation, breakdown from exposure to sunlight, and physical breakdown would continue to naturally neutralize remaining rotenone in Chicago Gulch Creek. Beaver dams would be temporarily removed with backhoes, by hand or with dynamite to increase the effectiveness of rotenone treatments. Appropriate permits for stream work would be obtained. As indicated in Figure 1, the beaver dams were all located on BLM or State lands in 2007.

Chicago Gulch is normally dry downstream of the proposed treatment area, and even in the extremely high water year of 2011, was completely dry at the county road bridge in October. If during treatment, the length of dry channel is less than two miles, sentinel fish would be held in the area of stream recharge. In the unlikely event these sentinel fish show signs of rotenone toxicity, detoxification would be initiated. According to the CFT Legumine label, potassium permanganate should be applied to water at the appropriate concentration to compensate for organic demand of the stream and/or lake bottom so that enough remains to neutralize the rotenone. The discharge of the stream would be measured prior to treatment and the potassium permanganate would be applied at the rate specified on the CFT Legumine label. In addition, on-site monitoring using a colorimeter would be used to evaluate the appropriate amount of permanganate necessary to neutralize the rotenone. Potassium permanganate requires 15 to 30 minutes of contact time to fully detoxify the rotenone.

Caged fish would be used to ensure that non-native fishes are effectively removed between drip stations. In addition, after the application, we would use caged fish to evaluate when the waters are no longer toxic to fish and when fish can be restocked. The CFT Legumine label specifies that once caged fish show no signs of distress within 4 hours, the stream water is considered no longer toxic, and detoxification can be discontinued. Previous treatments have shown that fish

rapidly decay and are difficult to find even after a few days post treatment. However, large accumulations of dead fish would be collected and buried on site or scattered throughout the area to prevent animal attraction to a specific site.

We would expect complete removal of brook trout after 1 to 2 treatments. If the objectives of the project were not met after the first two treatments, additional treatments may be conducted to fulfill the objectives of the project. Effectiveness of the first treatment would be ascertained through electrofishing surveys and netting of beaver ponds in the treated section of Chicago Gulch Creek.

We propose to restock Chicago Gulch Creek with WCT when all non-native fishes are removed. Live fish (juveniles and adults) and/or eyed eggs hatched in on-site incubators would be obtained from a non-hybridized population of WCT from Half Moon Creek and/or Collar Gulch, located in the Flatwillow/Box Elder drainages (respectively) of the Judith and Snowy Mountains. If fish from those populations are not available, other pure wild populations would be considered for transfer. Transfers would follow all FWP policies for wild fish transfers, including completion of a wild fish transfer request, consultation with and approval by the FWP Fish Health Committee, disease testing, and genetic testing.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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		Yes	1d
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

Comment 1d: Beaver dams would be temporarily removed to improve effectiveness of the rotenone treatment. All permits necessary to work in and around Chicago Gulch Creek would be obtained and may include Montana Stream Protection Act (SPA 124) and Short-Term Water Quality Standard for Turbidity permits (318 Authorization). Construction Best Management Practices to reduce erosion and sedimentation would be followed. Beaver dams may be temporarily removed with backhoes, by hand or with dynamite to increase the effectiveness of rotenone treatments. In recent years the Beaver dams have all been on private or state lands (Figure 1).

2. WATER	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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				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 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				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 pesticide to surface water to remove unwanted fish. The impacts would be short term and minor. Prentox (7% powder) and CFT Legumine (5% liquid) rotenone are EPA registered pesticides and are safe to use for removal of unwanted fish. The concentration of CFT Legumine (5% liquid) proposed is 0.5 to 1 part per million, but could be adjusted within the label allowed limits based upon the results of on-site assays. Prentox (7% powder) may be used in a sand and gelatin mix to treat springs and seeps within the treatment area. In the unlikely event rotenone treated water passes the dry channel fish barrier, it would be neutralized by applying potassium permanganate to the

stream per FWP policy. Addition of potassium permanganate to the stream turns the stream purple for a short distance downstream.

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 Engstrom-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°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°F pond water 14 days after a treatment. By day 18 the concentrations were sub lethal to trout. The second mode of 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 at the downstream end of the treatment. 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 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 2007). We would expect the treated stream above to naturally detoxify within 48 hours of the treatment. The treated stream would rapidly detoxify though addition of fresh water from untreated upstream sources and through the aforementioned physical and chemical breakdown processes. Inert ingredients (e.g. carriers) in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication. Dead fish would be left on-site in the water. Previous treatments have shown that fish rapidly decay and are difficult to find even after a few days post treatment. In addition, dead fish provide nutrients to the stream, benefiting primary and secondary production. If significant numbers of dead fish accumulate they may be disbursed over the landscape or buried on site.

Comment 2c: Beaver dams would be temporarily removed which would temporarily increase flows and turbidity locally, and may temporarily cause less stream flow as water pools behind the dams after treatment is complete and beavers repair the dams

Comment 2f: No contamination of groundwater is anticipated to result from this project. The DNRC water right database indicates there are five active groundwater supplies within 0.5 miles of the project area. However, we would work closely with the land owners to supply alternative water and/or monitor their wells if necessary. 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 sign 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 21 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 (Don Skaar, personal communications).

Comment 2j: The CFT Legumine label states “...Do not use water treated with rotenone to irrigate crops or release within 0.5 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 two irrigation diversions within 0.5 miles of the project area. We will work with the landowner to insure that treated water would not be diverted onto cropland. The only domestic sources within 0.5 miles are wells and ground water, which are discussed in section 2f. The treatment zone would be thoroughly posted on public land to caution against use of the water while rotenone is being applied and thereafter for a precautionary period, about 4-5 days total.

Comment 2m: A federally mandated change to the permitting process for ALL pesticide applications became effective November 1, 2011. If the project is approved, FWP would submit a Notice of Intent (NOI) to work under Montana DEQ’s Pesticide General Permit. FWP would also apply for 318 Authorization for a Short-Term Exemption from Water Quality Standard for Turbidity (Montana DEQ) if the proposed action includes temporary removal of beaver dams.

Cumulative Impacts: The proposed action of piscicide treatment would have a short term impact on water quality (piscicides and increased turbidity) in Chicago Gulch Creek. These impacts would attenuate through time and would not impact the productivity of fisheries resources after restocking. We do not expect the proposed action to result in other actions that would create cumulative impacts to water resources in Chicago Gulch Creek. Nor do we foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to land resources related to treatment of Chicago Gulch Creek with piscicides or the associated beaver dam removal.

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		No	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: If detoxification is necessary (i.e., the downstream channel is not dry), a gasoline generator may be used to run a power auger at the lower end of the treatment area to dispense powdered potassium permanganate (detoxifying agent). The generator would produce some exhaust fumes that would dissipate rapidly.

Comment 3b: Most commercial formulations of rotenone contain aromatic petroleum solvents. Odors associated with these solvents disperse rapidly during application. In addition, CFT Legumine does not contain the same level of aromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations (i.e. Prenfish) and as a consequence does not have the same odor concerns.

Previous treatments have shown that fish rapidly decay and are difficult to find even after a few days post treatment. However, any large accumulations of noxious smelling dead fish would be collected and buried on site or scattered throughout the area.

Cumulative Impacts: Impacts to air quality from the proposed actions of piscicide treatment would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to air quality in Chicago Gulch Creek. Nor do we foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to air quality related to treatment of Chicago Gulch Creek with piscicides or associated removal of beaver dams.

4. <u>VEGETATION</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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				4c
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X		Yes	4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Vehicles would be used along public and private roads for access. During treatment, workers would park near Chicago Gulch and walk along the creek to their drip stations. There would be some trampling of vegetation along the stream during the removal of beaver dams and during placement and monitoring of drip stations and sentinel fish locations. The degree of impact to vegetation is not anticipated to affect plant vigor. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling of vegetation are expected to be short term and minor. The beaver dams on Chicago Gulch Creek washed out during 2011. Since the beaver dams are less than 2 years old, the temporary removal or notching of the dams, are anticipated to have limited impacts on the stream hydrology. Beaver would be expected to rebuild the dams rapidly.

Comment 4c: The Montana Natural Heritage Program web site (<http://mtnhp.org/>) listed no plant species of concern in the project area.

Comment 4e: Machinery and equipment used during the project may inadvertently carry noxious weeds to the project site. Proposed mitigation includes: Washing all equipment and vehicles before entry onto the project site and removal of mud, dirt, and plant parts from project equipment before moving into project area.

Cumulative Impacts: Impacts to vegetation from the proposed action would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to vegetation in Chicago Gulch Creek. If the new fishery were to attract more recreational use, vegetation could potentially suffer from increase trampling. However, based on use patterns of other WCT fisheries, we would conclude that it is very unlikely that the new WCT fishery would attract significant interest and associated higher use levels. Furthermore, suitable WCT habitat in Chicago Gulch Creek requires an extensive hike for legal public access. There is public access at the lower end of the project area on state lands. Fishing in the easily accessible area would probably be poor and short-term due to the intermittent nature of the stream. We do not foresee any other activities in the basin that would add to impacts of the

proposed action. As such there are no cumulative impacts to vegetation related to treatment of Chicago Gulch Creek with piscicides or the associated temporary beaver dam removal.

5. FISH/WILDLIFE	IMPACT	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)			X			See 5d

Comment 5b: The proposed action is to remove all of the non-native fish in Chicago Gulch Creek and its tributaries to the downstream end of trout habitat in Section 35. After completion of the project, WCT would be transferred to the treated portion of stream thus reducing risks of extinction of WCT through transfer of the remaining non-hybridized WCT populations in the Box Elder and/or Flatwillow drainages. Non-native brook trout are the only salmonid species residing in Chicago Gulch Creek. WCT, once established, would occupy a similar niche to that of brook trout. It is predicted that a restored population of WCT in Chicago Gulch Creek would be robust (>2,500 individual fish). Once the WCT population is restored, management alternatives, which include limited harvest, would be considered.

Comment 5c:

Aquatic Invertebrates:

In general, most studies report that aquatic invertebrates, except zooplankton are much less sensitive to rotenone treatment than fish (Schnick 1974). 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). 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. 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). In northcentral Montana, aquatic invertebrates are routinely collected prior to transfers of WCT to fishless habitat (Petty Creek, N. Fk. Ford Creek, Lonesome Creek, etc.). Most invertebrates collected prior to transfers were commonly found throughout Montana and in no cases were rare or endangered species of invertebrates discovered (Daniel Gustafson, personal communication). These collections, in high elevation, remote stream reaches, indicate that the probability of eliminating a rare or endangered species in Chicago Gulch Creek is very unlikely. Moreover, there were no aquatic invertebrates listed for this area in the Montana Natural Heritage Program species of concern database. Headwater reaches of Chicago Gulch Creek that do not hold fish would not be treated with fish piscicides and may provide a source of aquatic invertebrate colonists. In addition, recolonization would include aerially dispersing invertebrates from downstream areas of Chicago Gulch Creek (e.g. mayflies, caddisflies). The small size of the treatment (4.5 miles of stream) and the proximity of source areas should aid in rapid recovery of the Chicago Gulch Creek aquatic community. The aquatic invertebrate community structure in Chicago Gulch Creek may be temporarily affected by the treatment (i.e., ratio of gilled to non-gilled invertebrates). Natural caused (e.g., fire) and anthropogenic (livestock grazing) disturbances also impact the structure of aquatic invertebrate communities (Wohl and Carline 1996; Mihuc and Minshall. 1995; Minshall 2003). Fire caused changes in trophic dominance may last greater than 15 years because of post fire changes to stream geomorphology and riparian species composition (Minshall 2003). Treatment with piscicides temporarily changes the ratio of certain invertebrate species. This would necessarily have far less of an impact than long term physical changes to the stream/riparian interface. Impacts to the stream channel and the benthic community from temporary beaver dam removal would be localized and minor.

Mammals, Birds, and Amphibians:

Mammals are generally not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) involved feeding a form of rotenone to rats and dogs as part of their diet for periods of six months to two years and observed effects such as diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause

tumors or reproductive problems in mammals. 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 the compound under field conditions is by drinking lake or stream water, 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 (39.5 mg/kg * 0.350 kg = 13.8 mg = 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 (30.4 mg/kg * 1 kg = 30.4 mg = 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.*

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) second, 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. 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 other 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 it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is 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 LC₅₀ 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.*

Also, if temporary reductions in aquatic invertebrates occur, insectivorous species such as American dippers (*Cinclus mexicanus*) may be impacted to the extent that they rely on aquatic invertebrates for food. Aquatic invertebrate communities typically recover rapidly from disturbance and impacted birds and mammals are mobile and would likely emigrate to nearby habitats until full recovery of the aquatic community.

Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation), and southern leopard frog tadpoles were between 3 and 10 times more tolerant than fish. Grisak et al. (2007) conducted laboratory studies on long toed salamanders, Rocky Mountain tailed frogs, and Columbia spotted frogs and concluded 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.

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 we would expect the impacts to non-target organisms to range from non-existent to short term and minor.

Comment 5d: Chicago Gulch Creek would be stocked with WCT when all non-native fishes are removed. Live fish (juveniles and adults) or eyed eggs (in-stream incubators) would be transferred from a non-hybridized population of WCT located in the Judith and/or Big Snowy Mountains. Transfers would follow all FWP policies for wild fish transfers, including:

consultation with the FWP Fish Health Committee, completion of a wild fish transfer request, disease testing, and genetic testing. WCT are found in the adjacent Collar Gulch drainage, which is not currently considered as part of the native WCT range (Shepard et al. 2003). Chicago Gulch may not be part of the native range of WCT but provides a way to conserve the genetic legacy of the unique Collar Gulch and native Half Moon populations.

The proposed project would involve transfer of WCT from one or two populations (Half Moon Creek, Flatwillow and/or Collar Gulch, Box Elder drainages) to about 4.5 miles of habitat on Chicago Gulch Creek. Transfers would be completed after the non-native brook trout are removed. Live fish transfers and eyed eggs transfers have successfully established WCT cutthroat populations in the past in northcentral and southwest Montana. Several measures would be taken to reduce potential impacts to the aquatic habitat. These include: disease testing of fish in the donor streams, amphibian surveys of the recipient stream, and invertebrate surveys of the recipient stream. The FWP wild fish transfer policy would be followed and WCT would not be transferred until approved by the FWP Fish Health Committee.

Disease testing: Disease samples would be collected from donor streams prior to the transfer. Up to 60 WCT from each population would be collected; numbers would be based on the fish transfer protocol and recommendations from fish health personnel. In Half Moon Creek, brook trout downstream of the WCT population may also be used as a surrogate for testing. Results from fish disease sampling would be used as part of the basis for a FWP Fish Health Committee decision. If diseases are found in the extant Musselshell populations, other donor populations may be used instead.

Genetic Analyses: Sixteen samples from 1981 and 27 samples from 1999 were collected from Collar Gulch Creek. All fish tested in Collar Gulch Creek were non-hybridized. Thirty three genetic samples were collected from Half Moon Creek from 1994 to 2002. All fish tested in Half Moon Creek tested as non-hybridized. An additional 50 genetic samples will be collected from both Collar Gulch Creek and Half Moon Creek in 2012. Transfers would not proceed until genetic purity is confirmed. If necessary, other pure WCT populations obtained from separate drainages may be considered for transfer.

Aquatic Invertebrates and Amphibians: No amphibians have been collected or observed in Chicago Gulch Creek.

Aquatic invertebrates in Chicago Gulch Creek would not be impacted by a transfer of WCT. Non-native brook trout are the only salmonid species residing in Chicago Gulch Creek. WCT, once established, would occupy a similar niche to that of brook trout. Effects on invertebrate communities from a different salmonid (WCT) would likely be relatively minor. Replacement of a non-native salmonid population with a native population may actually benefit aquatic and terrestrial organisms through trophic cascades (Benjamin et al. 2011).

Comment 5f: Amphibians were not seen in the vicinity of Chicago Gulch during late summer surveys conducted by the Bureau of Land Management in 2005. Amphibian species which may be present in the project area are boreal toads (*Bufo boreas*), boreal chorus frogs (*Pseudacris maculata*), northern leopard frogs (*Rana pipens*) and tiger salamanders (*Ambystoma tigrinum*).

Northern leopard frogs and boreal chorus frogs have been found in the Judith Mountains. Northern leopard frogs are a BLM sensitive species with documented declines in western Montana. In Fergus County, these frogs are listed as S4, which means they are apparently secure, though they may be quite rare in parts of its range, and/or are suspected to be declining. They are very common in northcentral Montana with nearly 500 observations in 2006 (Tabor 2006). All of the amphibian species that could be present in the project area prefer to breed in the standing water of ponds, rather than in streams. The areas where rotenone use is proposed in this project are primarily running water. Also, most amphibian larvae (tadpoles) would have already undergone metamorphosis to the less vulnerable adult stage when the proposed stream treatment would occur.

There are no threatened or endangered species in the area. Hoary bats, Townsend's big eared bat and northern goshawk were listed for this area in the Montana Natural Heritage Program species of concern database. The Montana Heritage Program did list several species of concern downstream of the treatment area but not in the treatment zone, and the list included Grasshopper Sparrow, Spragues Pipet, Great Blue Heron, Long-billed Curlew, Brewers Sparrow, and Prebles Shrew. Management indicator species that may infrequently use the area and could ingest fish include black bear, mountain lion, bobcat, and golden eagle. None of these species would be affected by ingestion of dead fish (see comment 5c).

Cumulative Impacts: Impacts to fish and wildlife from the proposed action would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to fish and wildlife resources in Chicago Gulch Creek. If the new fishery was to attract more recreational use, fish and wildlife resources could potentially suffer from the increased presence of humans. However, based on use patterns of other WCT fisheries, we conclude that it is very unlikely that the new WCT fishery would attract significant interest and associated higher use levels. Furthermore, suitable WCT habitat in Chicago Gulch Creek requires an extensive hike for legal public access. There is public access at the lower end of the project area on state lands. Fishing in the easily accessible area would probably be poor and short-term due to the intermittent nature of the stream. The current fishery would be replaced by a WCT fishery that occupies a similar niche and would provide similar ecological functions. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to non-target organisms related to construction of the treatment of Chicago Gulch Creek with piscicides or the associated temporary removal of beaver dams.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Increases in existing noise levels?			X			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: During piscicide treatment and stocking of WCT, there would be increased use of the privately owned trailhead for staging, increased foot traffic, and limited use of motorized off road vehicles to ferry equipment for treatment. Removal of beaver dams may use explosives which would be loud when the dynamite is ignited. Alternatively backhoes may be used which would require using diesel powered equipment which emit exhaust and can be loud. In either case, it is unlikely neighbors will be disturbed to a significant lever. Any disturbance will be short term and minor.

Cumulative Impacts: Increases in noise from the proposed action would be short term and minor. We do not expect the proposed action to result in other actions that would create increased noise in the Chicago Gulch Creek stream corridor. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to noise from the proposed treatment of Chicago Gulch Creek with piscicides or associated temporary beaver dam removal.

7. LAND USE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				7a
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		No	7c
d. Adverse effects on or relocation of residences?		X				

Comment 7a: The proposed action would eventually result in a change from a brook trout fishery to a WCT fishery. A change to management of Chicago Gulch Creek as a WCT fishery would not lead to imposition of additional requirements for land users or reduction in the use of Chicago Gulch Creek for livestock as detailed in the Candidate Conservation Agreement with Assurances for Westslope Cutthroat Trout. This agreement releases the landowner from any regulatory restrictions, should the species ever become listed under the Endangered Species Act. This document has been signed by the landowner, BLM, FWP and FWS.

Comment 7c:

During treatment with rotenone, the public areas at the upstream and downstream end of the project would be closed for several days. The length of the closure would depend on the amount of time the treated reach remained toxic to fish. The label for CFT Legumine states that detoxification should be terminated when replenished fish survive and show no signs of stress for at least four hours. We would expect the treated water to be non-toxic to fish in 24 to 48 hours after the input of rotenone. Therefore, it can reasonably be expected that any closures would last 4 to 5 days total. The treatment would be implemented well after spring runoff, which could be as early as July 15 in dry years. At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be planned when livestock are pastured elsewhere or livestock would be temporarily moved to adjacent pastures during the treatment period.

Cumulative Impacts: Impacts on land use from the proposed action would be short term and minor. We do not expect the proposed action to result in other actions that would impact land use in the Chicago Gulch Creek stream corridor. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to land use from the proposed treatment of Chicago Gulch Creek with piscicides or associated temporary beaver dam removal.

8. <u>RISK/HEALTH HAZARDS</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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 8a&c
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 labels and MSDS (Material Safety Data) sheets such as respirator, eye protection, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. Personnel responsible for application of the detoxifying agent (potassium permanganate) would also be trained on its safe handling and application. At least one, and most likely several, Montana Department of Agriculture certified pesticide applicators 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, spill contingency plans, first aid, emergency responder information, personal protective equipment, monitoring and quality control, etc. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP, the risk of outside emergency response is minimal and any effects 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 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 effects 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 1,000. 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 = <u>15 mg/kg/day</u> = 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 = <u>0.375 mg/kg/day</u> = 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). 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, the use of active detoxification measures by applicators such as potassium permanganate. Next, properly following piscicide labels which prohibit the use near water intakes. 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 from dermal and incidental ingestion, but requires a waiting period of 3 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 a temporary closure would preclude many from being in the area. Proper warning through news releases, signing the project area, 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 Fennodefo99™ 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 CFT 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 CFT 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 CFT Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and *I*-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 CFT 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 CFT Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis by Fisher (2007) concluded the following regarding the constituent ingredients in CFT 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 physical chemistry 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 CFT 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 CFT

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 (chewing), 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.

Cumulative Impacts: Health hazards from the proposed action and the connected action of temporary beaver dam removal would be short term and mitigated through use of proper safety equipment, etc. We do not expect the proposed action to result in other actions that would increase the risk of health hazards in the Chicago Gulch Creek stream corridor. We do not foresee any other activities in the basin that would add to health impacts of the proposed action. As such there are no cumulative impacts related health hazards from the proposed treatment of Chicago Gulch Creek with piscicides.

9. <u>COMMUNITY IMPACT</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
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 would be a temporary loss of angling opportunity in Chicago Gulch Creek between the time of fish removal and for several years after fish stocking. Chicago Gulch Creek requires an extensive hike for legal public access to good WCT habitat, so impacts to the general public would be small. There is public access at the lower end of the project area on state lands. Fishing in the easily accessible area is poor and would continue to be limited due to the intermittent nature of the stream. Chicago Gulch Creek should be fully colonized with WCT within 5 years of project implementation. In most cases cutthroat trout fisheries in streams in Montana are catch and release only. After colonization of Chicago Gulch Creek we would evaluate whether the fishery could support harvest. If possible, regulations would be changed to allow anglers the option of harvesting WCT for consumption.

Cumulative Impacts: Impacts to recreation and aesthetics from the proposed action would be short term and minor. We do not expect the proposed action to result in other actions that would impact recreation/aesthetics in the Chicago Gulch Creek stream corridor. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to recreation/aesthetics from the proposed treatment of Chicago Gulch Creek with piscicides or associated beaver dam removal.

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

13. SUMMARY EVALUATION OF SIGNIFICANCE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action, considered as a whole:						
a. Have impacts that are individually limited, but cumulatively considerable?		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				13d
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

Comment 13d: This project does not establish a precedent or likelihood that additional projects with significant environmental impacts would be proposed. We are not planning any additional rotenone WCT restoration projects in the Judith Mountains. Rotenone restoration projects are limited to sites that already have good barriers or locations where a barrier could be built; i.e. bedrock, incised channels, dry stream channels, etc.

Comments 13e and f: The use of pesticides can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. It is not known if this project would have organized opposition.

Comment 13g: The department consulted with the Bureau of Land Management and Montana DNRC state lands section during the planning and development phases of this project. No special use permit is required. The following permits would be required for the piscicide treatment and temporary removal of beaver dams: If the proposed project is approved, FWP would apply for a Notice of Intent (NOI) to operate under the Montana DEQ Pesticide General Permit. Permits that would likely be necessary prior to temporary beaver dam removal include; SPA 124 Permit - Montana Stream Protection Act, and 318 Authorization - Short-Term Water Quality Standard for Turbidity.

PART III. 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 Chicago Gulch Creek. Chicago Gulch Creek would continue to support a brook trout population. Creation of a new non-hybridized WCT population in the Box Elder Drainage would not occur. The genetic legacy of Half Moon Creek and/or Collar populations would not be protected by replication in other locations. The risk of WCT extinction in the headwaters of the Flatwillow and Box Elder drainages would not decrease.

Alternative 2 – Proposed Action

The proposed action includes removing existing non-native fish in Chicago Gulch Creek with rotenone and restocking with locally obtained non-hybridized westslope cutthroat trout.

The predicted benefits of Alternative 2 include:

- Increase in the total miles of non-hybridized WCT inhabited stream in the combined Flatwillow and Box Elder drainages from 7 to 11.5 miles (60% increase) and an increase of 200% in the Box Elder drainage.
- Genetic preservation through transfer of one to two existing populations of non-hybridized WCT in the headwaters of Flatwillow and Box Elder Creek.
- Fulfilling the State's obligation to restore and expand remnant genetically pure WCT populations (FWP 2007).
- Establishing a source of genetically pure WCT that could be used to assist in additional WCT restoration efforts.

Alternative 3 – Mechanical removal

Electrofishing has been used to remove unwanted fish from streams with some success in northcentral Montana (Big Coulee Creek, Middle Fork Little Belt Creek, and Cottonwood Creek; Moser 2008). Streams in which brook trout have been selectively removed to protect WCT have been shorter in length, do not have large beaver dams and are much less complex than Chicago Gulch Creek. In general, these efforts have been limited to simple 1st to 2nd order streams. To remove fish in small streams electrofishing efforts require repeated shocking of all habitats for an extended period of time. As an example, brook trout were selectively removed from Big Coulee Creek, a small stream (1.5 miles in length) in the Highwood Mountains. This effort required multiple pass backpack electrofishing (two crews over 1 to 2 weeks per year) for 6 years. If a few brook trout were missed in a project like this, additional removals could potentially be attempted, but would most likely be unsuccessful. Missed brook trout would rapidly re-colonize, displacing restored WCT. Moreover, attempts at electrofishing removals of brook trout in other

streams (e.g. South Fork of Warm Springs Creek near Clancy, MT) have failed despite intense efforts. For these reasons this alternative was eliminated from further consideration.

Persons responsible for preparing the EA: Anne Tews and David Moser

Date: 5/2/2012

List of agencies consulted during preparation of the EA:

FWP, BLM and the Montana Department of State Lands staff assisted with review of the document. BLM staff conducted most of the preliminary surveys of the proposed treatment area.

Duration of comment period:

The public comment period is 30 days after posting on the FWP website, which occurred on May 4, 2012. Due to unforeseen circumstances, comments submitted on the website page may not have been received. Therefore, the comment period has been extended and comments must be received by 5:00 PM June 18, 2012. Comments can be submitted online on the EA website page, mailed or emailed as shown below:

Submit written comments to: Montana Fish, Wildlife & Parks
c/o Chicago Gulch Creek EA Comments
P.O. Box 938
Lewistown, MT 59457

Or email antews@mt.gov

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