**MONTANA FISH, WILDLIFE & PARKS**
**FISHERIES DIVISION**

# Blossom Lakes and Creek Fisheries Rehabilitation
# Final Environmental Assessment

**June 29, 2009**

**Draft environmental assessment for the rehabilitation of Upper and Lower Blossom Lakes and Blossom Creek to a native fish community by removing nonnative brook trout through piscicide application and subsequent restocking with native westslope cutthroat trout.**

## PART I: PROPOSED ACTION DESCRIPTION

**A. Type of Proposed Action:** Restore and protect native fish in Blossom Creek while retaining angling opportunity in the Blossom Lakes by removing nonnative brook trout (*Salvelinus fontinalis*) with rotenone-based piscicide and restocking with native westslope cutthroat trout (*Oncorhynchus clarki lewisi*).

**B. Agency Authority for the Proposed Action:** Montana Fish, Wildlife & Parks (MFWP) "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under Statute 87-1-702.

**C. Estimated Commencement Date:** This project will commence the week of August 17, 2009, starting with electrofishing rescue of native fishes in Blossom Creek and continuing with rotenone-based piscicide application in the lakes and creek. Rotenone application is planned for the week of August 24, 2009. Electrofishing rescue of native fish below the waterfall barrier (see map) will take place directly before rotenone treatment, and rescued fish will be returned to the creek after rotenone treatment. Electrofishing will be conduced in summer 2010 to evaluate the effectiveness of piscicide treatment. If brook trout persist, localized piscicide treatment in areas of persistence may be necessary to remove them.

**D. Name and Location of Project:** This project is referred to as the Blossom Lakes Fisheries Rehabilitation Project, and its primary purpose is to remove brook trout from the lakes and outlet stream to protect native fish stocks downstream. The project will also extend the range of native westslope cutthroat trout into new territory through stocking of the lakes and provide higher quality angling as a result. This project will be conducted on Upper and Lower Blossom Lakes and Blossom Creek between the lakes and downstream to the confluence with Glidden Gulch. These waters are located approximately 25 miles west of the town of Thompson Falls, Montana. Specifically, the project area is located within Township 46 North, Range 32 West, Sections 20, 21, 22, 29 & 30, Sanders County, Montana (Figure 1). The US Forest Service (Lolo NF) manages all the property where the proposed activities would occur.

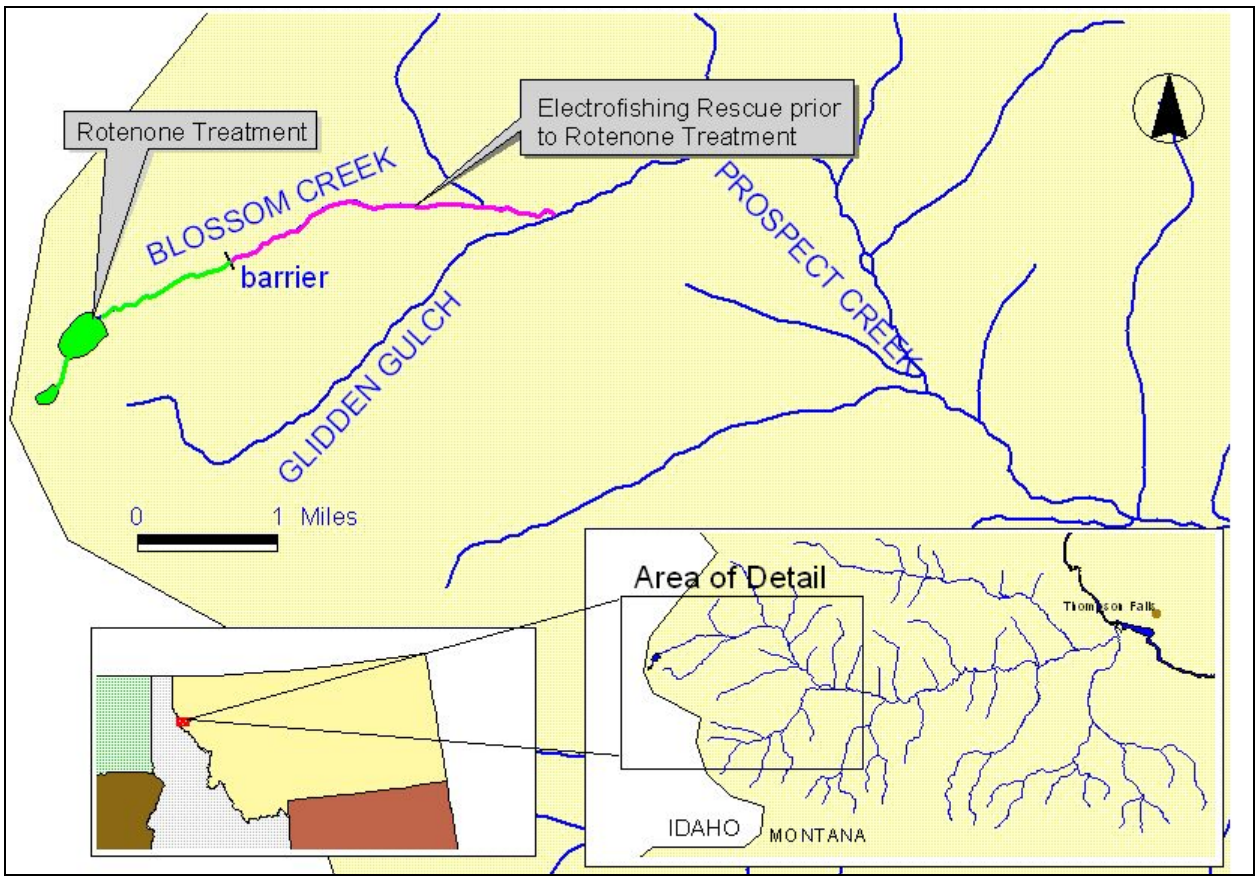


**Figure 1. Treatment area of Blossom Lakes and Blossom Creek, with color denoting treatment extent and type.**

**E. Project Size (acres affected):**

1. Developed/Residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – Upper Blossom Lake is approximately 8 acres in area with an average depth of 9.5 ft., lower Blossom Lake is larger at 24 acres and an average depth of 36.6 ft. Blossom Creek between the lakes is approximately 1/2 mile in length, while the creek length is approximately 3 miles from the lower lake to the confluence with Glidden Gulch. The upper lake has no inflowing inlet tributary (groundwater and snowmelt fed). Flow in the creek was visually estimated in autumn 2008: less than 1 cfs at upper lake outlet, less than 1 cfs at lower lake inlet, and 1 – 2 cfs at lower lake outlet.
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 Blossom Lakes and Creek are located approximately 25 miles west of Thompson Falls, Montana, in the upper portion of the Prospect Creek watershed. The upper lake is about 8 acres in area with a mean depth of 9.5 ft., lower Blossom Lake is 24 acres and a mean depth of approximately 36.6 ft. Blossom Creek between the lakes is 1/2 mile in length, while the creek length is approximately 3 miles from the lower lake to the confluence with Glidden Gulch. The upper lake has no inflowing tributary (groundwater and snowmelt fed). Flow in the creek was visually estimated at key locations in autumn 2008: less than 1 cfs at upper lake outlet, less than 1 cfs at lower lake inlet, and 1 – 2 cfs at lower lake outlet. The lakes are accessed via a USFS trail that runs approximately 2 miles, starting at a parking area on Thompson Pass. The trail is part of the CC divide trail that follows the MT/ID border. The lakes provide recreational backcountry fishing for campers and hikers, as well as a primitive camping area. All records indicate that it has been a brook trout fishery since stocking in the mid-20$^{th}$ century, although no original stocking record was found. Attempts have been made to improve the fishery through stocking of rainbow trout in the 1980s and westslope cutthroat trout in more recent years, but have met with little success. The brook trout inhabiting both lakes are small (average 7" in length), even though fish densities do not appear to be inflated. Nevertheless, it remains a relatively popular backcountry fishery, primarily because of the ease of the hike and plentiful camping locations (MFWP estimated angler days per year: 88 (2003), 105 (2005), 57 (2007). Blossom Creek is not a popular fishery, with difficult access through dense timber and steep canyons for small fish.

The self-sustaining brook trout population in the Blossom Lakes and Creek has recently been identified as an emerging threat to native salmonids in Upper Prospect Creek (UPC) (Horn and Tholl 2008). Brook trout can harm bull trout (an ESA threatened species) through hybridization and westslope cutthroat trout (Montana species of special concern) through competition. This brook trout population has existed in the lakes for decades, but has remained in the extreme upper reaches of the drainage. Brook trout now appear to be extending their local range downstream. They are already overlapping westslope cutthroat trout range in Blossom Creek and are moving towards the area of bull trout inhabitation in UPC. In 2003 lower Blossom Creek was sampled and only westslope cutthroat trout and juvenile bull trout were found. In 2007 this area was revisited, but produced a combination of westslope cutthroat and brook trout, no bull trout. This was the first record of brook trout in lower Blossom Creek, only a few kilometers from the area of UPC with a resident bull trout population. A more comprehensive survey was undertaken in 2008, sampling both lakes and most of the creek downstream of lower Blossom Lake. Brook trout were the only fish species found in both lakes and in Blossom Creek above a 10+-foot waterfall barrier (see map). Below the waterfall barrier, a combination of westslope cutthroat and brook trout were found. The relative abundance of brook trout to westslope cutthroat had doubled from 2007 to 2008 in the lower portion of Blossom Creek. To date, no brook trout have been found in mainstem UPC, but with the apparent increase of brook trout a few kilometers upstream, the possibility of brook trout invading UPC appears high.

As brook trout are increasing their local range downstream in Blossom Creek and pose a threat to native fish in the upper portion of Prospect Creek, we are proposing the Blossom Lakes and Creek rehabilitation project to remove brook trout. It is proposed that rotenone piscicide treatment be conducted in both Blossom Lakes and Blossom Creek down to the confluence with Glidden Gulch during the last week of August 2009. This will remove all or nearly all brook trout from the drainage, meeting the primary goal to protect native salmonids. Several measures will also be taken to fulfill the secondary goals of expanding local westslope cutthroat trout range and maintaining angling opportunity for the public. Immediately prior to rotenone treatment, electrofishing will be conducted in Blossom Creek, below the waterfall barrier, to rescue wild westslope cutthroat and bull trout. These fish will be transported to an Avista Corp. fish

holding facility near Noxon, Montana, and remain there until rotenone treatment is completed (estimated 1-2 weeks). We do not expect to rescue all native trout from Blossom Creek, but to save enough individuals to ensure survival of a breeding population. Any brook trout captured during electrofishing will be used as sentinel fish during rotenone application. Upon completion of rotenone treatment, and water quality returning to suitable conditions for fish survival, wild westslope cutthroat trout will be returned to Blossom Creek, below the waterfall barrier. None will be taken to the lakes, as they will remain toxic to fish for several weeks. Lakes will be stocked the following summer with hatchery westslope cutthroat trout from the MFWP facility in Anaconda, Montana, to provide angling opportunity. These hatchery fish are from the same stock used to plant other Sanders County Lakes.

The total treatment zone for this project runs from the upper lake downstream to the confluence of Blossom Creek and Glidden Gulch. That treatment zone will be broken into two areas. Above the waterfall barrier only rotenone piscicide will be used to remove brook trout. Below the waterfall electrofishing rescue will occur prior to rotenone treatment. Blossom Lakes and Creek will be treated with Prenfish brand 5% rotenone (liquid formulation). Label recommendations for normal pond/lake application concentrations will be used when treating Blossom Lakes and Creek above the waterfall. The recommended concentration of 1 mg/L should be sufficient to kill brook trout in both moving and still water. On-site bioassays of caged fish will be used to verify that this concentration is working efficiently.

MFWP has a long history of using piscicides to manage fish populations in northwestern Montana. From 1948 through present, the department has completed over 130 rotenone projects for a variety of reasons, but principally to improve angling quality and for native fish conservation.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family, including jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.), that are found in Australia, Oceania, southern Asia, and South America. Native people have used rotenone 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.

Rotenone piscicides act 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. Animals that do not have gills do not have this rapid absorption route into the bloodstream and can tolerate exposure to concentrations much higher than that used to kill fish. In essence, most nontarget organisms are not affected at fish-killing concentrations.

Electrofishing is a widely accepted and used fish sampling technique that is nonlethal. A low-amperage electrical current is introduced into the water body that temporarily interferes with the nervous system of aquatic animals. They are nearly paralyzed for a few moments, when they can be collected with nets. When undertaken by experienced personnel, electrofishing is an efficient and nonharmful way to collect fish. The use of electrofishing in areas with both native and nonnative fishes will allow us to rescue natives with little to no expected mortality.

Most materials and equipment will be transported to the treatment sites by helicopter. However, equipment for drip stations, including small quantities (less than 3 gallons) of rotenone piscicide, will have to be transported by hand (in backpacks or buckets) to some stream-side application sites. Rotenone will be dispensed in the lakes by boat, drip stations in the creek, and backpack sprayers in springs and/or marshy areas around the lakes and creek. Rotenone will be dispensed at label-recommended

concentrations into the lakes from two small motorboats via siphons. Only one boat will be required to treat upper Blossom Lake, while both boats will be used in the lower lake. A total of 26 gallons Prenfish brand piscicide will be required to treat the upper lake, 293 gallons in the lower lake. Once treated, water in the lakes will remain toxic to fish for several weeks, and water leaving the lakes and entering the creek will also be toxic. This is acceptable, as we want to treat the creek as well. However, this water will naturally detoxify as it moves downstream. We will place rotenone drip stations downstream of the lakes to recharge the rotenone concentrations throughout the treatment zone. The number and spacing of drip stations will be determined through travel time studies in the summer of 2009, several weeks prior to treatment. It is generally recommended that 1-2 hours travel time is sufficient for drip station placement (Finlayson et al. 2000). Blossom Creek is a high gradient stream (average 10%) with significant turbulence, and natural detoxification rates are expected to be high. We will, therefore, place drip stations close to the one-hour travel time intervals. We estimate that a maximum of one drip station will be required between the two lakes, and three to five will be needed between lower Blossom Lake and the confluence with Glidden Gulch. As previously mentioned, on-site bioassays with live fish will be used to determine the efficacy of drip station treatments, and drip station rates will be adjusted accordingly. The total volume of rotenone piscicide required for drip station applications will vary with stream flow (which will be measured directly prior to treatment), but should not exceed 10 gallons total. In addition to boat and drip station application, several personnel will hand-apply a diluted solution of rotenone (via hand-held sprayers) in marshy areas, backwaters, spring seeps, and any other area that might provide refuge for brook trout during treatment. These three methods will constitute the entire volume of rotenone applied in the Blossom drainage.

Because we will be recharging rotenone concentrations at drip stations along Blossom Creek, detoxification will be required at the end of the treatment zone. Rotenone used in treating the creek will be detoxified with a potassium permanganate solution upstream of the confluence with Glidden Gulch. This will prevent any unwanted mortality of fish downstream. The concentration of potassium permanganate required to neutralize the rotenone piscicide should be 3-5 mg/L, depending on the persistence of rotenone to that point. This concentration will be adjusted based on the reaction of on-site caged fish assays above and below the detoxification point as well as downstream potassium permanganate residuals (measured with chlorine meter). In addition to potassium permanganate detoxification of rotenone, dilution by Glidden Gulch will provide some safeguard against unwanted mortality of downstream fish.

Treatment will occur in an upstream to downstream fashion. The upper lake and outlet stream will be treated first, followed by the lower lake and creek down to the detoxification point. Rotenone application will occur in a single day. Lake application will occur until all piscicide is distributed evenly through the lakes, and drip stations in the creek will be operated for 4-5 hours. The detoxification station at the confluence of Blossom Creek and Glidden Gulch will be operated in conjunction with drip stations in the creek below lower Blossom Lake. Once drip station operation ceases and the water has time to flow past the detoxification point, potassium permanganate should no longer be needed. Rotenone decomposes rapidly in turbulent, moving waters, and all treated water leaving the lower lake should naturally detoxify well before it reaches the end of the treatment zone. This will be confirmed by the survival of caged fish above the detoxification point for 24 hours after drip stations have stopped. Until caged fish survive, the detoxification station will continue to operate.

Dead fish that surface will 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). Dead fish stimulate plankton growth and aid in plankton recovery, which will improve recovery time for other aquatic organisms in the waters (i.e., insects), and will provide a better food base for stocked westslope cutthroat

trout the following year. Any terrestrial animals that consume these dead fish should be unaffected by residual rotenone. Residuals should be very low, as dead fish will have had only short exposure to rotenone, and could not accumulate significant amounts in their body tissues over that period. Also, animals have the ability to neutralize rotenone in their digestive systems in moderate amounts (AFS 2002).

Effectiveness of the rotenone treatment will be monitored in the lakes a few weeks after treatment has been completed and before ice forms on the lakes. Gill nets, angling, and visual observation will be used in both the lakes to determine if any brook trout were able to survive the rotenone treatment. In addition, electrofishing surveys will take place the following summer in Blossom Creek. If it is determined that a substantial number of brook trout avoided the treatment, restocking of hatchery westslope cutthroat trout may be postponed and a second application of rotenone planned for the following year.

The wild fish (native species only) captured via electrofishing prior to and held during rotenone treatment will be returned to Blossom Creek after treatment. Because the lake will stay toxic for several weeks, and water leaving the lower lake will maintain toxicity in the upper portion of the creek, wild fish will be released only in the lower portion of the drainage. The exact locations of release will be determined by the survival of the caged fish assays set throughout the stream.

## PART II. ALTERNATIVES

### *Alternative 1 – No Action*

The no-action alternative would allow status quo management to continue, which would leave the brook trout population in Blossom Lakes and Creek to continue expanding downstream. Continued expansion will eventually impact the downstream population of threatened bull trout in Prospect Creek. Expansion will also result in displacement of native westslope cutthroat trout in Blossom Creek and, potentially, neighboring creeks.

### *Alternative 2 – Rotenone Removal of Brook Trout with Restocking of Westslope Cutthroat Trout (Proposed Action)*

The proposed action involves removing brook trout from the two Blossom Lakes and Blossom Creek between the lakes and downstream to/near the confluence with Glidden Gulch using a rotenone-based piscicide. Prior to rotenone treatment, electrofishing will be used below the waterfall to selectively rescue westslope cutthroat and bull trout in the creek. Soon after rotenone treatment ceases, those rescued fish will be returned to Blossom Creek. The spring/summer after rotenone treatment the lakes will be stocked with westslope cutthroat trout. Westslope cutthroat are expected to thrive in these lakes, and should naturally colonize the stream segments above the waterfall barrier. This alternative offers the highest probability of achieving the goals of protecting and enhancing native fish populations in the upper Prospect Creek watershed while maintaining the recreational fishery in the Blossom Lakes.

### *Alternative 3 – Mechanical and Electrofishing Removal*

This alternative would involve using gill nets and/or trap nets to remove brook trout from the lakes, then stocking westslope cutthroat trout to improve angling quality. In addition to gill netting, electrofishing would be required throughout the entire length of Blossom Creek.

Gill netting has been used successfully to remove unwanted fish from lakes. 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 four-year period in Bighorn Lake to remove the population, which totaled 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 gill nets and to avoid them. These researchers reported observing brook trout avoiding gill nets within about 2 hours of being set. It is apparent from this study that the probability of successfully removing all brook trout from Blossom Lakes with gill nets would be low.

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 them using gill nets 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 gill nets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake leant itself to a successful fish eradication using gill nets. Their criteria for successful fish removal using gill nets 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, the maximum size of a lake that they felt could be depopulated using gill nets was 7.4 surface acres and 32 feet deep.

Deploying gill nets and traps requires the use of some sort of watercraft and frequent presence at the site to check and reset nets. Blossom Lakes are approximately two miles from the nearest road, and the only watercraft available would have to be brought in on the trail or left on site. This alternative seems impractical and would require overcoming many logistical constraints. In addition, there would be an incredible time commitment required to attempt this method. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives.

### *Alternative 4 – Stocking the Lakes with Westslope Cutthroat Trout*

This alternative involves stocking the lakes with westslope cutthroat trout in the presence of brook trout. The hope with this alternative would be that westslope cutthroat trout could displace the brook trout. However, this alternative was tried in the early 2000s with no observed success. Brook trout are known to out-compete and displace cutthroat trout under many conditions (McGrath and Lewis 2007, DeStaso and Rahel 1994), and apparently have done so in the Blossom Lakes. To date, no westslope cutthroat trout have been observed in the Blossom Lakes, despite relatively recent stocking efforts. Based on the past attempt and these considerations, this alternative has a low probability of meeting the objectives.

## PART III. ENVIRONMENTAL REVIEW

### A. PHYSICAL ENVIRONMENT

| **1. LAND RESOURCES**<br><br>**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 | | | | |

| 2. WATER<br><br>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 floodwater or other flows? | | X | | | | |
| d. Changes in the amount of surface water in any water body or creation of a new water body? | | X | | | | |
| e. Exposure of people or property to water-related hazards such as flooding? | | X | | | | |
| f. Changes in the quality of groundwater? | | X | | | | 2f |
| g. Changes in the quantity of groundwater? | | X | | | | |
| h. Increase in risk of contamination of surface or groundwater? | | | X | | Yes | See 2a & 2f |
| i. Effects on any existing water right or reservation? | | X | | | | |
| j. Effects on other water users as a result of any alteration in surface or groundwater quality? | | X | | | | |
| k. Effects on other users as a result of any alteration in surface or groundwater quantity? | | X | | | | |
| l. Will the project affect a designated floodplain? | | X | | | | |
| m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a) | | | X | | Yes | 2m |

**Comment 2a.** This project is designed to intentionally introduce a piscicide (fish pesticide) to surface water to remove unwanted fish. The impacts would be short term and minor. Prenfish rotenone is an EPA-registered compound and is safe to use for removal of unwanted species of fish when handled properly. The concentration of Prenfish rotenone proposed is 1 mg per liter of water, but may be adjusted based upon the results of on-site assays.

There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone does not persist long in the environment, and the natural rate of breakdown varies with water chemistry, water temperature, exposure to organic substances, exposure to oxygen, and sunlight intensity (Ware 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 $32^{o}$ 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 sublethal 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 concentration of Prenfish applied. Detoxification is accomplished after about 20-30 minutes of mixing between the two compounds (Prentiss Inc. 1998). Potassium permanganate is routinely added to municipal water supplies for the control of compounds causing taste and odors. When all three of these detoxification methods are employed together, rotenone can be neutralized relatively quickly, from hours to a few days.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone-killed fish in Washington lakes never surface. Although no trout were involved with his study, Parker (1970) reported that at water temperatures of 40$^{o}$F and less, dead fish required 20-41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (<50$^{o}$F) and deep water (>15 feet). Blossom Lakes will most likely meet these criteria during an autumn treatment. Bradbury (1986) reported that 9 of 11 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 stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish. This change in water chemistry is viewed as a benefit to stimulate plankton growth. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

**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, rotenone was not 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. 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. 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.

There are no human-used wells within several miles of the proposed treatment locations. We expect no contamination of ground water from rotenone treatment.

**Comment 2m:** MFWP will apply for a short-term exemption of surface water quality standards from Montana DEQ under Section 308 of the Montana Water Quality Act.

| 3. AIR<br><br>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 13c) | | | X | | | 3a |
| b. Creation of objectionable odors? | | | X | | | 3b |
| c. Alteration of air movement, moisture, or temperature patterns, or any change in climate, either locally or regionally? | | X | | | | |
| d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants? | | X | | | | |
| e. Will the project result in any discharge that will conflict with federal or state air quality regs? | | X | | | | |

**Comment 3a:** Emissions from outboard motors and helicopter turbine exhaust would be created, but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

**Comment 3b:** Liquid-formulated rotenone does contain aromatic solvents that make it soluble in water. This smell of these solvents may last for several hours to several days, depending on air and water temperatures and wind direction. These relatively "heavy" organic compounds tend to sink (remain close to the ground) and move downwind. The California Department of Pesticide Regulation (CDPR 1998, cited in Finlayson et al. 2000) found no health effects from this smell. Applicators would have the greatest contact with these odors, but would be protected because they would be wearing respirators as the product label recommends. Any impacts caused by objectionable odors would be short term and minor.

Dead fish would result from this project and may cause objectionable odors. This condition is greatly reduced during fall applications. We would expect odors from dead fish to be short term and minor.

| 4. VEGETATION<br><br>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:** The Blossom Lakes are located in an area with limited staging sites to conduct this treatment. This would require staging all activities from a few areas, which may cause trampling of shoreline vegetation. Rotenone does not have an effect on aquatic plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor.

| 5. FISH/WILDLIFE<br><br>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 | | | | |
| f. Adverse effects on any unique, rare, threatened, or endangered species? | | | x | | 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 | | x | See 5f and 5g |
| 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:** This project is designed to eradicate unwanted fish. Brook trout are a game species that would be eliminated from the Blossom Lakes and Creek. Our surveys indicate that no other fish species are present in the lakes, but native westslope cutthroat and bull trout are present in Blossom Creek below the waterfall. To mitigate effects on native fish populations, electrofishing rescue will occur prior to rotenone treatment, and those rescued fish will be returned to the creek after toxicity abates. The impacts of brook trout removal will be short term and minor because the lakes will be restocked with westslope cutthroat trout, and they will also pioneer sections of the stream above the waterfall. Native fish in the electrofishing section of Blossom Creek may experience some stress from handling, but little to no mortality on these fish is expected. No other game species or birds should be negatively affected.

**Comment 5c**: Nongame (nontarget) species that would be impacted include zooplankton, some aquatic insects, and possibly some amphibians. Numerous studies indicate that rotenone has temporary or minimal effects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little effect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the nontarget insect community of a stream. Kiser et al. (1963) reported that 20 of 22 zooplankton species reestablished themselves to pretreatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that three Missouri ponds treated with rotenone showed little short-term and no long-term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and recolonization was rapid and reached near pretreatment levels within eight months.

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. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. The impacts to these nontarget organisms would be short term and minor.

The effect of rotenone on nontarget organisms has been studied extensively. Mammals in general are not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). In laboratory tests, forms of rotenone were fed to rats and dogs as part of their diet for periods of six months to two years (Marking 1988). Researchers observed effects such as diarrhea, decreased food consumption, and weight loss, and reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. CDFG (1994) studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose. 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. Brooks and Price (1961) reported that this amount is more on the order of 49 gallons. 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 it is slightly toxic to wild fowl, but to kill Japanese quail required 4,500-to-7,000 times more than is used to kill fish. 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) 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). Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10-day period did not suffer any reproductive dysfunction. Rotenone was found to have no direct role in fetal development of rats that were fed unrealistically high concentrations of rotenone. 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.

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. (2005) conducted laboratory studies on long-toed salamanders, tailed frogs, and Columbia spotted frogs and concluded that the adult life stages of these species would not suffer an acute response to rotenone, but the larval and tadpole stages could be affected by rotenone at fish-killing concentrations. These authors recommended implementing rotenone treatments at times when the larvae and tadpoles are not present, such as the fall, to reduce potential for impacts.

It is important to note that nearly all of these examples involved subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not be exposed to rotenone during normal use in fisheries management.

Based on this information we would expect the impacts to nontarget terrestrial organisms to range from nonexistent to short term and minor. Impacts on nontarget aquatic organisms should be relatively minor and will be monitored before and after treatment. In the lakes vertical plankton tows will be conducted directly before and annually for two years after treatment to monitor changes in plankton community associated with rotenone treatment. Also, we will conduct stream macroinvertebrate sampling in Blossom Creek to monitor changes to aquatic insects. This will be done prior to and annually for two years after rotenone treatment.

**Comment 5d:** As part of this project, westslope cutthroat trout will be stocked in Blossom Lakes following the rotenone treatment specifically. This will meet the secondary goals of this project to expand local range of westslope cutthroat trout and maintain and improve angling opportunity in the lakes. Our recent surveys have not detected any westslope cutthroat trout in either of the Blossom Lakes or the creek above the waterfall barrier. However, this species is native to the drainage and is present below the

waterfall. Any migration of stocked westslope cutthroat trout downstream should have little to no population-level impact on the downstream population of wild westslope cutthroat trout. There may be some genetic inter-mixing if stocked fish migrate downstream and mate with wild individuals; however, the proportion of wild fish to stocked fish should minimize any negative effects this would have on the local genotype. Stocked fish will be the M012 strain, which are of S.F. Flathead River origin. This is the same strain stocked throughout Sanders County's other high mountain lakes.

**Comment 5f**: There may be minor impacts on bull trout, a threatened species, from rotenone treatment in Blossom Creek, below the waterfall barrier. One individual bull trout was captured in the lower portion of Blossom Creek in 2003; none were captured in 2007 or 2008. We do not expect to encounter many bull trout in the creek, but the possibility of incidental take of a few individuals is possible. This incidental take has been permitted through FWP's allowed management activities, Section 6 permit from the US Fish and Wildlife Service. To reduce the likelihood of bull trout mortality, any individuals encountered during the electrofishing rescue portion of this project will be transported and held at the facility at Noxon Dam until they can be safely returned to the stream. During transport they will experience handling stress, but we do not expect this stress to be lethal.

No other threatened or endangered species should be significantly affected by this project. Dead fish will result from this project. It is possible that carnivores and/or scavengers will consume some rotenone-killed fish. These include bald eagles, osprey, kingfishers, black and grizzly bears, wolves, and several members of the weasel family. All of these species are present in the general area of the Blossom Lakes, but there is no indication that any are dependant on those water bodies for food. Any consumption of rotenone-killed fish by any of these species should cause no negative impacts for reasons detailed in Section 5c.

**Comment 5g.** Terrestrial species in the area may be stressed, and temporarily displaced, by human presence and noise from equipment used in the treatment. Primarily, the noise and smell from the helicopter and motor boats will be present for portions of a 2-day period. We expect that any displaced animals will return to the area in a relatively short time.

**Comment 5h.** Any bull trout captured during the electrofishing rescue will experience increased stress due to handling and transport (see 5f). Any animals, including threatened or endangered species, in the immediate area of Blossom Lakes may be affected by human presence during rotenone treatment. Primarily, animals may be temporarily stressed by the noise created by boat motors, the helicopter motor and the relatively large number of people present in the area. These stressors will be of short duration and should be minor, with treatment personnel concentrated in the area around the lakes for two days.

**B.HUMAN ENVIRONMENT**

| 6. NOISE/ELECTRICAL EFFECTS<br><br>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 | | | 6a |
| b. Exposure of people to severe or nuisance noise levels? | | X | | | | |
| c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property? | | X | | | | |
| d. Interference with radio or television reception and operation? | | X | | | | |

**Comment 6a:** Blossom Lakes are located approximately two miles from the nearest road. To complete the project in an efficient manner, equipment will be transported to the lakes via helicopter. Additionally, noise from the crew and outboard boat motor will be present during rotenone deployment. The noise generated from these sources will be short term (1 - 2 days) and minor. Little noise is created by electrofishing crews using backpack, battery-powered equipment.

| 7. LAND USE<br><br>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 | | | | yes | 7a |
| b. Conflict with a designated natural area or area of unusual scientific or educational importance? | | X | | | | |
| c. Conflict with any existing land use that would constrain or potentially prohibit the proposed action? | | X | | | | |
| d. Adverse effects on or relocation of residences? | | X | | | | |

**Comment 7a:** The entire area to be treated is within the Lolo National Forest. Current public use is primarily for outdoor recreational purposes (camping, hiking, fishing, etc.). The primary impact to land use will be the closure of the lake areas to fishing and camping during treatment (2 days). Treatment will occur mid-week to avoid weekend recreators and reduce the number of individuals impacted. Notification of treatment dates will be provided to the public via local media outlets, and signage will be placed at the trailheads that lead to the lakes, as well as around the lake areas. The only commercial activity that could be affected by this treatment would be outfitter services, particularly hunting. However, as treatment is scheduled for the last week of August, no hunting seasons will be open.

| 8. RISK/HEALTH HAZARDS<br><br>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 of 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 will be limited to the applicators. All applicators will wear safety equipment listed on the product labels, such as respirator, goggles, rubber boots, Tyvek overalls, and nitrile gloves. All applicators will be trained on the safe handling and application of the piscicide. At least one, and most likely several, Montana Department of Agriculture-certified pesticide applicator(s) will supervise and administer the project. Rotenone and potassium permanganate will be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill.

**Comment 8b:** MFWP has a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team, such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, and 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 MFWP, the need for 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 effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are: 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<br>UF = 1000<br>aRfD = 15 mg/kg/day = 0.015 mg/kg/day<br>1000 | Acute PAD = 0.015 mg/kg/day | Developmental toxicity study in mouse (MRID 00141707, 00145049)<br>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<br>UF = 1000<br>cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day<br>1000 | Chronic PAD = 0.0004 mg/kg/day | Chronic/oncogenicity study in rat (MRID 00156739, 41657101)<br>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)<br>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<br>10% dermal absorption factor | Residential MOE = 1000<br>Worker MOE = 1000 | Reproductive toxicity study in rat (MRID 00141408)<br>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<br>100% inhalation absorption factor | Residential MOE = 1000<br><br>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 dose, 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 nonedible 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 95$^{th}$ percentile (see Table 5). It is appropriate to consider the 95$^{th}$ 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 principal 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; next, 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 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. Dead fish would be collected and sunk in the lake/stream or removed from the site.

Aside from the rotenone itself, liquid formulations [Prenfish] also consist of petroleum emulsifiers.

Finlayson et al. (2000) wrote regarding the health risks of these constituent elements:

> *" . . . the EPA has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The California Environmental Protection Agency found that adverse impacts from properly conducted, legal uses of liquid rotenone formulations in prescribed fish management projects were nonexistent or within acceptable levels (memorandum from J. Wells, California Department of Pesticide Regulation, to Finlayson, 3 August 1993). Liquid rotenone contains the carcinogen trichloroethylene (TCE). However, the TCE concentration in water immediately following treatment (less than 0.005 mg TCE per liter of water [5 ppb]) is within the level permissible in drinking water (0.005 mg TCE per liter of water, EPA 1980b). None of the other materials including xylenes, naphthalene, piperonyl butoxide, and methylnaphthalenes exceed any water quality criteria guidelines (based on lifetime exposure) set by the EPA (1980a, 1981a, 1993). Many of these materials in the liquid rotenone formulations (trichloroethylene, naphthalene, and xylene) are the same as those found in fuel oil and are present in waters everywhere because of the frequent use of outboard motors . . ."*

California Department of Fish and Game (CDFG, 1994) calculated that the maximum expected level of these contaminants following a treatment level of 2 ppm formulation are TCE 1.1 ppb; toluene 84 ppb; xylenes 3.4 ppb; naphthalene 140 ppb.

The product label states:

> *" . . . do not use dead fish for food or feed, do not use water treated with rotenone to irrigate crops or release within ½ mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond, or reservoir. . . . do not allow swimming in rotenone-treated water until the application has been completed and all pesticide has been thoroughly mixed into the water according to the labeling instructions. This product is flammable and should be kept away from heat and open flame . . ."*

The occupational risks to humans is low if proper safety equipment and handling procedures are followed as directed by the product labels (EPA 2007). The major risks to human health from rotenone come from accidental exposure during handling and application. This is the only time when humans are exposed to concentrations that are greater than that needed to remove fish. To prevent accidental exposure to liquid formulated or powdered rotenone, the Montana Department of Agriculture requires applicators to be:

- Trained and certified to apply the pesticide in use;
- Equipped with the proper safety gear, which, in this case, includes respirator, eye protection, rubberized gloves, and hazardous material suit;
- Have product labels with them during use;
- Contain materials only in approved containers that are properly labeled; and
- Adhere to the product label requirements for storage, handling, and application.

Any threats to human health during application would be greatly reduced with proper use of safety equipment.

There is an inhalation risk to ground applicators. To guard against this, ground applicators would be equipped with protective clothing, and eye and breathing equipment.

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. COMMUNITY IMPACT**<br><br>**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 | | | | x | 9d |
| e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods? | | X | | | | |

**Comment 9d.** The only commercial activity that could be affected by this treatment would be outfitter services, particularly hunting. However, as treatment is scheduled for the last week of August, no hunting seasons will be open. Treatment will occur mid-week to avoid weekend recreators and reduce the number of individuals impacted. Notification of treatment dates will be provided to the public via local media outlets, and signage will be placed at the trailheads that lead to the lakes, as well as around the lake areas.

| **10. PUBLIC SERVICES/TAXES/UTILITIES**<br><br>**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**<br><br>**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 | 11c & 7a |
| d. Will any designated or proposed wild or scenic rivers, trails, or wilderness areas be impacted? (Also see 11a, 11c) | | X | | | | |

**Comment 11c:** This project will remove one species of game fish (brook trout) from the Blossom Lakes, but will replace it with a native game fish (westslope cutthroat) to maintain an angling opportunity. The brook trout present in Blossom Lakes are small. Surveys of other lakes in the same general area indicate that westslope cutthroat trout will attain larger sizes than brook trout. This may result in increased use by anglers over time. The benefits of increased recreational use would outweigh any impacts associated with the actual treatment. Any impacts to aesthetics would be short term and minor and be directly associated with the actual rotenone treatment and immediate aftermath, including dead fish in the project area. No tourism report is necessary to quantify these impacts.

There will be no impacts on recreational use from the electrofishing portion of this project.

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

| 13. SUMMARY EVALUATION OF SIGNIFICANCE<br><br>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 | X | | | Yes | 13e |
| f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e) | X | X | | | | 13f |
| g. List any federal or state permits required. | | | | | | 13g |

**Comments 13e and f:** The use of pesticides can generate controversy from some people. Public outreach and information programs can inform the public on the use of pesticides. All treatment would occur on the Lolo National Forest, and consultation with representatives from the USFS has raised no opposition. Also, informal scoping of the public viewpoint through conversation with local citizens has raised little concern. No specific issues, concerns, or opposing viewpoints were identified or expressed during those discussions. MFWP has a long history of using rotenone for fisheries management in NW Montana, which includes application to over 130 streams and lakes from 1948 through present. It is not known if this project will have organized opposition.

**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).

## PART IV. EA CONCLUSION SECTION

*1. Based on the significance criteria evaluated in this EA, is an EIS required?* No

Based on information presented herein, overall impacts of the project will be minor, and there is no need for an environmental impact statement. The proposed action should meet the project objectives while posing minor, short-term impacts to the natural and human environment.

*2. Describe the level of public involvement for this project, if any, and given the complexity and the seriousness of the environmental issues associated with the proposed action, is the level of public involvement appropriate under the circumstances?*

The draft environmental assessment (EA) is being distributed to all individuals and groups listed in the cover letter. The EA will also be placed on the MFWP web site for review.

A public meeting will be held on April 21, 2009, at 5:30 p.m. in the upstairs courtroom of the Sanders County Courthouse, 1111 Main Street, Thompson Falls, to discuss this EA and the project. Verbal and written comments will be accepted. Contact Chris Horn (406) 827-9282 or Jon Hanson (406) 827-9320 for more information.

*3. Duration of comment period, if any*:

There is a 30-day public comment period for this document, and comments will be accepted through May 7, 2009. Please submit comments to Chris Horn at the address listed below (4).

*4. Name, title, address, and phone number of the person(s) responsible for preparing the EA:*

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