



Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

June 5, 2015

To: Governor's Office, Tim Baker, State Capitol, Room 204, P.O. Box 200801, Helena, MT 59620-0801
Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601

Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP
Commissioners			

Fisheries Division	Legal Unit	Wildlife Division	Design & Construction
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MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202

MT State Parks Association, P.O. Box 699, Billings, MT 59103

MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620

James Jensen, Montana Environmental Information Center, P.O. Box 1184, Helena, MT 59624

Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624

George Ochenski, P.O. Box 689, Helena, MT 59624

Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771

Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624

Wayne Hurst, P.O. Box 728, Libby, MT 59923

Jack Jones, 3014 Irene St., Butte, MT 59701

Jack Atcheson, 2309 Hancock Avenue, Butte MT 59701

U.S. Army Corp of Engineers, 10 W 15th St #2200, Helena, MT 59629

U.S. Fish and Wildlife Service, 585 Shepard Way, Suite 1, Helena, MT 59601

U.S. Fish and Wildlife Service, 420 Barrett Street, Dillon, MT 59725

Big Hole Watershed Committee, P.O. Box 931, Butte, MT 59703

Montana Trout Unlimited, P.O. Box 7186, Missoula, MT 59807

Dan Vermillion, FWP Commissioner, Livingston MT

Earnest and Colleen Bacon, 2215 Fishtrap Creek Road, Wisdom, MT 59761

Dept. of Natural Resources and Conservation, 730 N. Montana Street, Dillon, MT 59725-9424

George Grant Chapter of Trout Unlimited, P.O. Box 563, Butte, MT 59703

Skyline Sportsmen, P.O. Box 173, Butte, MT 59703

Anaconda Sportsmen, 2 Cherry, Anaconda, MT 59711

E.T. Bud Moran, Chairman CSKT, PO Box 278, Pablo, MT 59855

Al Lubeck, 2710 Amherst, Ave, Butte, MT 59701

Adam Rissien, ORV Coordinator, Wildands CPR, PO Box 7516, Missoula, MT 59807

Josiah Pinkham, Tribal Arch., Nez Perce Tribe, PO Box 365, Lapwai, ID 83540

Ladies and Gentlemen:

Montana Fish Wildlife and Parks (FWP) is proposing to restore native fish species including westslope cutthroat trout and Arctic grayling to Long Branch Creek and Schultz Creek in the Big Hole River drainage in southwest Montana. Non-native rainbow trout and Yellowstone cutthroat trout are present in Long Branch Creek upstream of natural waterfall fish barrier near the confluence with Rock Creek (near Glen). Non-

native Yellowstone cutthroat trout are present in Schultz Creek upstream of a natural waterfall near the confluence with Bender Creek (near Wisdom). These non-native fish would be removed using rotenone and westslope cutthroat trout and Arctic grayling would be restocked into Long Branch Creek and westslope cutthroat trout only would be restocked into Schultz Creek. Rotenone applied to the streams would be neutralized at the fish barriers using potassium permanganate preventing fish from being killed downstream of the proposed project areas.

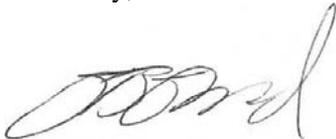
This EA is available for review in Helena at FWP's Headquarters, the State Library, and the Environmental Quality Council. It also may be obtained from FWP at the address provided above, or viewed on FWP's internet website: <http://www.fwp.mt.gov> .\

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. Public comment will be accepted until July 5, 2015 @ 5:00 pm. Comments should be sent to the following:

Montana Fish, Wildlife & Parks
Long Branch/Schultz Creek Native Fish Restoration
Attn: Jim Olsen
1820 Meadowlark Ln.
Butte, MT 59701

Or e-mailed to: jimolsen@mt.gov

Sincerely,

A handwritten signature in black ink, appearing to read 'S. Sheppard', written in a cursive style.

Sam B. Sheppard
Region Three Supervisor

MONTANA FISH, WILDLIFE & PARKS
FISHERIES BUREAU

**Environmental Assessment for Native Fish Restoration in Two
Small Streams in the Big Hole River Drainage**

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: The proposed action would restore native westslope cutthroat trout (WCT) in Long Branch Creek and Schultz Creek. Both streams have natural barriers precluding upstream fish movement. Long Branch Lake is located on Long Branch Creek and is a shallow (3 ft deep) lake that would be included in the WCT restoration project. Genetic evidence suggests both streams harbored native populations of WCT, but non-native rainbow and Yellowstone cutthroat trout have been introduced to the streams and have hybridized with the WCT. Hybridized trout present in the streams upstream of the fish barriers are proposed for removal using the piscicide rotenone in the formulation of CFT Legumine (5% rotenone). WCT from non-hybridized populations would be used to repopulate these once the hybridized trout are removed. Arctic grayling, which are not native to Long Branch Creek but are native to the Big Hole River drainage and a species in need of conservation, would also be introduced to Long Branch Creek once non-native fish are removed.

B. Agency Authority for the Proposed Action:

- Fish, Wildlife & Parks (FWP) is required by law (§87-1-201(9)(a) Montana Code Annotated [MCA]) to implement programs that manage sensitive fish species in a manner that assists in the maintenance or recovery of those species, and that prevents the need to list the species under § 87-5-107 MCA or the federal Endangered Species Act. Section 87-1-201(9)(a), M.C.A.
- FWP is a signatory to the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999, 2007) which states: “The management goal for WCT in Montana is to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations.”
- According to the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure conservation populations of WCT to 20% of the historic distribution (FWP 2012). Populations of WCT are considered secure by FWP when they are isolated from non-native fishes, typically by a physical fish passage barrier, have a population size of at least 2,500 fish, and occupy sufficient (5 to 6 miles)

habitat to assure long-term persistence. Currently WCT (including slightly hybridized population > 90% WCT) occupy approximately 8% of their historic habitat.

C. Estimated Commencement Date: Fish removal in both streams: Mid July to early September 2015 and 2016.
Restocking with WCT in 2016 and grayling /or 2017

D. Name and Location of the Project: Environmental Assessment for Native Fish Restoration in two small streams in the Big Hole River Drainage

Long Branch Creek is located in Beaverhead County approximately 15 miles southwest of the town of Melrose, Montana; T3S, R10W Sec 31 and T3S R11W Sec 33,34,35,36. Schultz Creek is also in Beaverhead County approximately 30 miles northwest of Wisdom, Montana; T1N R18W Sec, T1N R17W Sec 6, 7, 8.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian –Stream miles included in the proposed action include approximately 6 miles of Long Branch Creek and 3 miles of Schultz Creek for a total of roughly 9 miles. Long Branch Lake is 4.0 acres.
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

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

The cutthroat trout is Montana's state fish. Westslope cutthroat trout *Oncorhynchus clarkii lewisi* (WCT) were first described by the Lewis and Clark Expedition in 1805 near Great Falls, Montana, and are recognized as 1 of 14 interior subspecies of cutthroat trout. The historical range of WCT includes Idaho, Montana, Washington, Wyoming, and Alberta, Canada. In Montana, WCT occupy the Upper Missouri and Saskatchewan River drainages east of the Continental Divide, and the Upper Columbia Basin west of the Divide. Although still widespread, WCT distribution and abundance in Montana has declined significantly in the past 100 years due to a variety of causes including introductions of nonnative fish, habitat degradation, and over-exploitation (Hanzel 1959, Liknes 1984, McIntyre and Rieman 1995, Shepard et al. 1997, Shepard et al. 2003). Reduced distribution of WCT is particularly evident in the Missouri River drainage where genetically unaltered WCT are estimated to persist in less than 5% of the habitat they once occupied, and most remaining populations are restricted to isolated headwater habitats (Shepard et al. 2003; Shepard et al. 2005). Further, many of these remaining populations are at risk of extirpation due to small population size and the threats of competition, predation and hybridization with non-native trout species.

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

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

There are a total of 47 remaining populations of WCT in the Big Hole drainage. Of the 47, at least 39 are considered at risk (an additional 5 have unknown population status). An at-risk population is one that is not likely to persist over the long-term because of poor habitat, small population size and/or the presence of non-native species. A protected population is one that is isolated from non-native species but is threatened because of small population size and or limited habitat and the possibility of stochastic events such as fire or flood causing extirpation. There are four WCT populations in the Big Hole that are considered protected, but they are at risk of extirpation from catastrophic events (e.g. fire, drought) and may eventually suffer negative consequences of genetic inbreeding (Wang et al. 2002). A secure population is one that is isolated from the threats of non-native species and occupies adequate habitat and at a high enough density to have a high probability of persisting through time. Hilderbrand and Kershner (2000) recommended a 2,500 fish minimum WCT population size for long-term persistence (>100 years). Harig and Fausch (2002) recommended the minimum amount of occupied habitat per population is 5.6 square miles (minimum watershed size) for increases likelihood of success of translocation projects. Only one population of WCT in the Big Hole drainage meets these minimum criteria for increased likelihood of long-term presentence. The other 46 remaining populations occupying 126 miles of stream (6 % of historically occupied habitat), including those whose status is unknown, are at risk. These rare local populations maintain the remaining genetic diversity of the species and each may perpetuate adaptive traits that are important to the species as a whole (Leary et al. 1998). Data collected from streams in the Big Hole drainage over the past 6 years indicate that many of the WCT populations in the drainage have dramatically declined or have been completely extirpated in the past 10 years (Olsen 2010). If actions are not taken to conserve the fish species in the Big Hole, more populations will be lost. Projects which restore WCT are necessary to ensure the continued survival of the species in the

Big Hole drainage and elsewhere. In addition, efforts to stabilize and increase WCT populations will help prevent future listing of WCT under the Endangered Species Act.

Significant progress has been made toward WCT conservation in the upper Missouri River drainage. There have been 30 projects completed over the past 10 years which have resulted in the securing 226 miles of stream for WCT with plans to complete several more projects in the next few years. Considering that as of 2008 WCT occupied only 466 of the 11,041 miles of historically occupied habitat (4.2%), the recent restoration of over 200 miles of stream represents a 50% increase in WCT populations in the upper Missouri River system. An additional 16 WCT restoration projects have been conducted in the lower Missouri River downstream of Holter Dam that have restored 88.5 miles of stream for cutthroat trout. In the Big Hole River drainage there have been 11 projects completed over the past four years totaling 57 miles of stream restored. Restoration of WCT to Long Branch and Schultz creek would add an additional nine miles of stream for native fish for a total of 66 miles. As of 2008 there were 46 populations of WCT in the Big Hole Drainage that occupied approximately 129 miles. Of the 46 populations in the Big Hole, 14 exist upstream of fish barriers in the absence of non-native species which have a greater probability of at least short term persistence. These populations occupy approximately 37 miles of stream. Therefore, if Shultz and Long Branch creeks are restored the amount of habitat WCT occupy in the Big Hole drainage will have nearly tripled to over 100 miles of stream. According to the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure conservation populations of WCT to 20% of the historic distribution (FWP 2012). In the Big Hole River drainage where WCT historically occupied approximately 2,141 miles of stream the restoration goal will be to have secured WCT populations in roughly 400 miles of streams. If the proposed projects are completed, WCT conservation will be at ¼ of the way to reaching the proposed goal.

The goal of the proposed project is to restore WCT to Long Branch and Schultz Creek in the Big Hole River drainage. Genetic evidence suggests that both streams at one time harbored native populations of WCT but rainbow trout and Yellowstone cutthroat trout have been introduced to the streams and have hybridized with WCT. To restore WCT to these streams hybridized trout would be removed from the stream using the piscicide rotenone in the formulation of CFT Legumine. Once the trout are removed (removal is anticipated in 1 or 2 treatments of the streams), the streams will be restocked with non-hybridized WCT. It is likely that non-hybridized WCT from nearby Hellroaring Creek and Bender Creek or other populations in the Big Hole would be used to repopulate Schultz Creek. The source of WCT to repopulate Long Branch Creek has not been identified but will likely be of Big Hole origin. Additional information about each stream is given below followed by a more detailed explanation of fish removal.

The Big Hole is also the last remaining drainage where native fluvial (river/stream dwelling) Arctic grayling remain in the lower 48 states. Currently, Arctic grayling are present in less than 15% of their historic range. Arctic grayling are classified as a Montana Species of Concern by FWP because of their reduced abundance and diminished distribution in recent decades. In addition, Arctic grayling have a 20+ year history of being petitioned for protection under the Endangered Species Act (ESA). Over

the ESA listing history, the United States Fish and Wildlife Service (USFWS) has considered the Arctic grayling to be warranted for protection under ESA but precluded by higher priority species. A recent legal settlement between the USFWS and litigants agreed to make a final decision on a variety of species, including Arctic grayling by 2015. A preliminary decision was released in August of 2014 and the USFWS determined that Arctic grayling in the upper Missouri River system did not warrant listing as threatened or endangered. This determination was quickly followed by a lawsuit contesting the decision and a final determination is to be made by October 2015.

The hypothesized reasons for the decline of Arctic grayling include: habitat degradation, overexploitation and impacts from non-native species. A variety of impacts have caused Arctic grayling habitat to degrade including stream dewatering, channel modifications, over-grazing, riparian vegetation removal, and irrigation infrastructure modifications. There are not irrigation diversions or channel alterations in Long Branch Creek. There are some grazing impacts but these are minor and are being addressed by the US Forest Service and the lessees. In general, overexploitation (i.e., fish harvest) is an issue that has been addressed through the enforcement of the catch and release only regulation for fluvial grayling. Using deductive reasoning, some biologists have hypothesized that non-native fish (primarily non-native trout) have caused grayling declines. Very little scientific data exist to determine if non-native trout are causing Arctic grayling declines. Further, a paucity of data exist that documents competition or predation from non-native fishes on Arctic grayling, let alone data to suggest a population level effect on Arctic grayling makes the interaction between grayling and non-native fish unclear.

In addition to restoring WCT to Long Branch Creek, Arctic grayling would be introduced in an attempt to establish a resident population of fish in the stream and in Long Branch Lake. The majority of stream in Long Branch Creek is a low gradient, meandering stream channel with high quality pools and abundant spawning habitat. This type of habitat is very similar to the type of habitat present in the upper Big Hole River where grayling are present. If the introduction is successful, Long Branch Creek would represent the only tributary population of fluvial Arctic grayling in the Big Hole drainage to exist in the absence of non-native fish.

Long Branch Creek

Long Branch Creek is a tributary to Rock Creek which drains into the Big Hole River near the town of Glen. It drains from the East Pioneer Mountains southwest of Melrose (Figure 1) and is located entirely on the Beaverhead Deerlodge National Forest. The creek is characterized by a series of wide meadow reaches interrupted by short sections of steep boulder cascades. The stream has one major tributary that enters from the north and also harbors a small fish population. Not too far downstream of the confluence of this tributary, the stream enters Long Branch Lake. This lake is located in a large meadow and is very shallow (< 3ft deep) with a silt bottom. The outlet stream from the lake is wide and relatively deep with frequent pools. The stream substrate consists primarily of decomposed granite sand with some gravel and large boulders. Approximately one mile downstream of the lake, the stream tumbles down a large boulder cascade. At one location in this cascade, the stream is completely subterranean for

approximately 200 yards. There is no evidence of surface flows even during high water but the water can be heard under foot cascading through the rocks (Figure 2). This very high gradient reach appears to function as a fish barrier precluding upstream fish passage. Immediately downstream of the cascade reach brook trout and brown trout are present in addition to hybridized trout, but no brook or brown trout are captured upstream of the cascade reach.

The fishery in Long Branch Creek upstream of the cascade consists of a mix of rainbow, Yellowstone cutthroat and westslope cutthroat and hybrids between the three fish. The proportion of rainbow trout in the system is greatest near Long Branch Lake and the proportion of WCT is greatest near the headwaters of the stream. Trout numbers are greatest in the vicinity of Long Branch Lake, particularly in the outlet stream and in the most upstream meadow reach. Spawning gravels are more prevalent in these reaches which may explain the greater fish density. There is no FWP stocking record for Long Branch Creek or Long Branch Lake so it is unclear how rainbow trout and Yellowstone cutthroat trout were introduced to the system.

The removal of hybridized trout in Long Branch Creek and Long Branch Lake would occur through the application of the piscicide rotenone. The formulation of rotenone proposed would be CFT Legumine (5% rotenone) and it would be applied to stream and lake at a concentration of one part per million parts of water. It is anticipated that the chemical would remain active in the stream less than 24 hours and active in the lake less than 3-7 days. The CFT Legumine would be neutralized using potassium permanganate immediately downstream of the cascade fish barrier and before entering Rock Creek. Neutralization of the piscicide will prevent any fish in Rock Creek or waters downstream from being affected by the treatment of Long Branch Creek. Treatment of the Long Branch system will likely take 2-4 days.

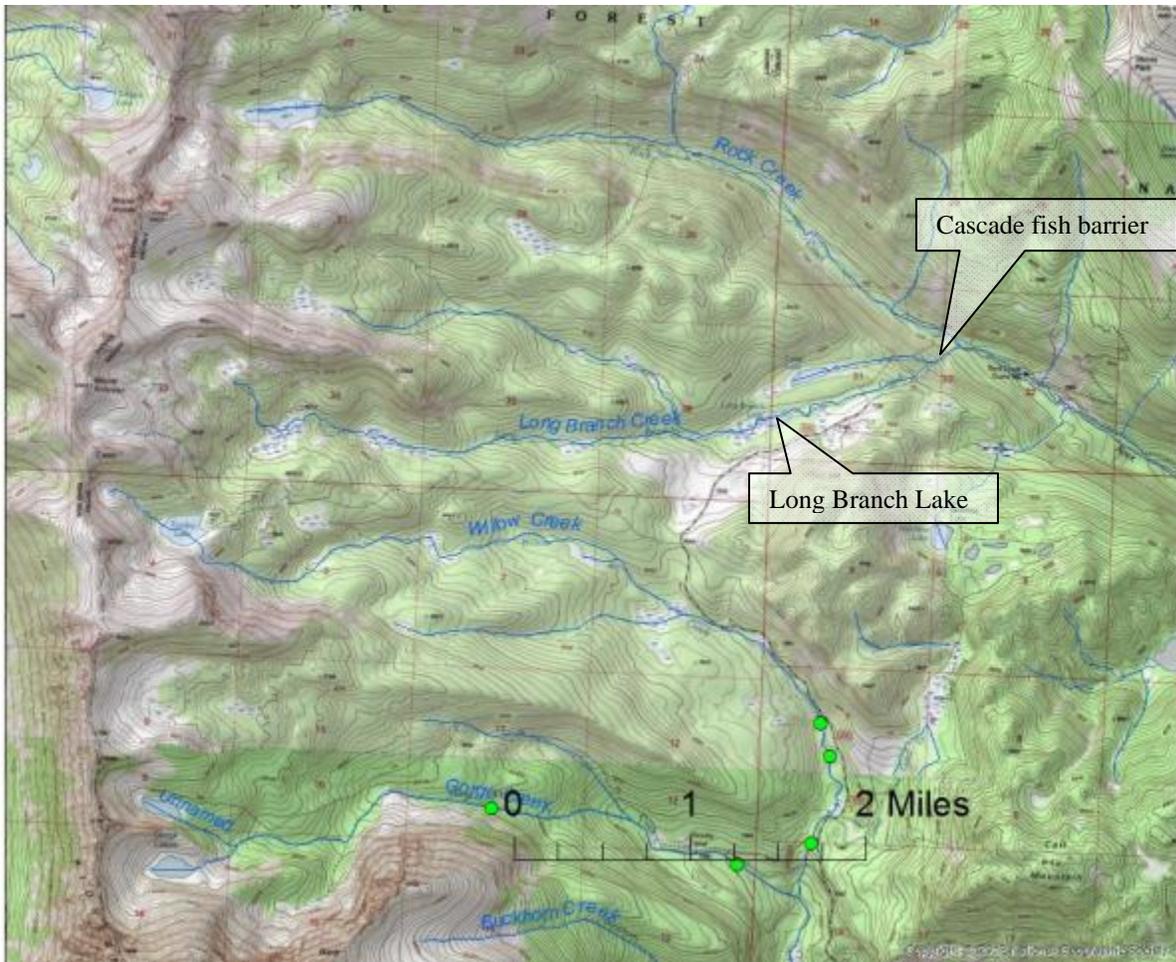


Figure 1. Long Branch Creek drainage located southwest of Melrose, Montana.

Figure 2. Barrier Cascade on Long Branch Creek. Picture taken at midway point of cascade where surface flow is visible in lower left part of photo. Water flows from the bottom of the photo to the point shown below, but is not visible from the surface.



Water exiting cascade
before entering Rock Creek

Schultz Creek

Schultz Creek is a tributary to Johnson Creek which drains into the North Fork of the Big Hole River approximately 20 miles northwest of Wisdom (Figure 3). The entire drainage is located on land owned and managed by the Beaverhead Deerlodge National Forest. The Tie Creek Fire burned the majority of the Schultz Creek drainage, in addition to the thousands of surrounding acres, in mid 2000's. Prior to the fire, Schultz Creek was surrounded by a mature, thick spruce forest. Now that the forest canopy is removed, willows have replaced the mature spruce trees as the dominant type of woody riparian vegetation. Large woody debris is abundant in the stream owing to the burned trees that have fallen across the channel. The wood has created high quality pools with abundant and clean spawning gravels and very good trout habitat. Prior to the confluence with Johnson Creek, Schultz Creek cascades through a short but steep bedrock area where there are multiple fish barriers (Figure 4) preventing upstream fish passage.

The fishery in Schultz Creek consists of a hybridized cutthroat trout (54% WCT, 46% Yellowstone cutthroat trout). There is no stocking record for Schultz Creek so it is unclear how or when Yellowstone cutthroat trout were introduced to the stream. It is likely that the WCT present in the stream were native. To restore non hybridized WCT to Schultz Creek, the hybridized fish present today would be removed using rotenone. The rotenone will be neutralized immediately downstream of the cascades before the water enters Johnson Creek; therefore there will be no fish affected downstream of the immediate project area. Once fish are removed, the stream will be restocked with non-hybridized WCT from the Big Hole drainage. Schultz Creek provides an opportunity to replicate other nearby WCT populations that are at a high risk of extirpation. The Bender Creek population of WCT, located on 3 miles north of Schultz Creek, is isolated to the very headwaters of the stream and is fewer than 100 fish. Previously thought to be isolated from brook trout by a series of cascades, brook trout were found in the headwaters of Bender Creek in 2013. Similarly the headwaters of Hellroaring Creek, only 6 miles north of Schultz Creek, are reported to harbor a non-hybridized population of WCT, but this population has not been sampled in 25 years. If WCT are present in Hellroaring Creek it would also be a candidate to repopulate Schultz Creek.

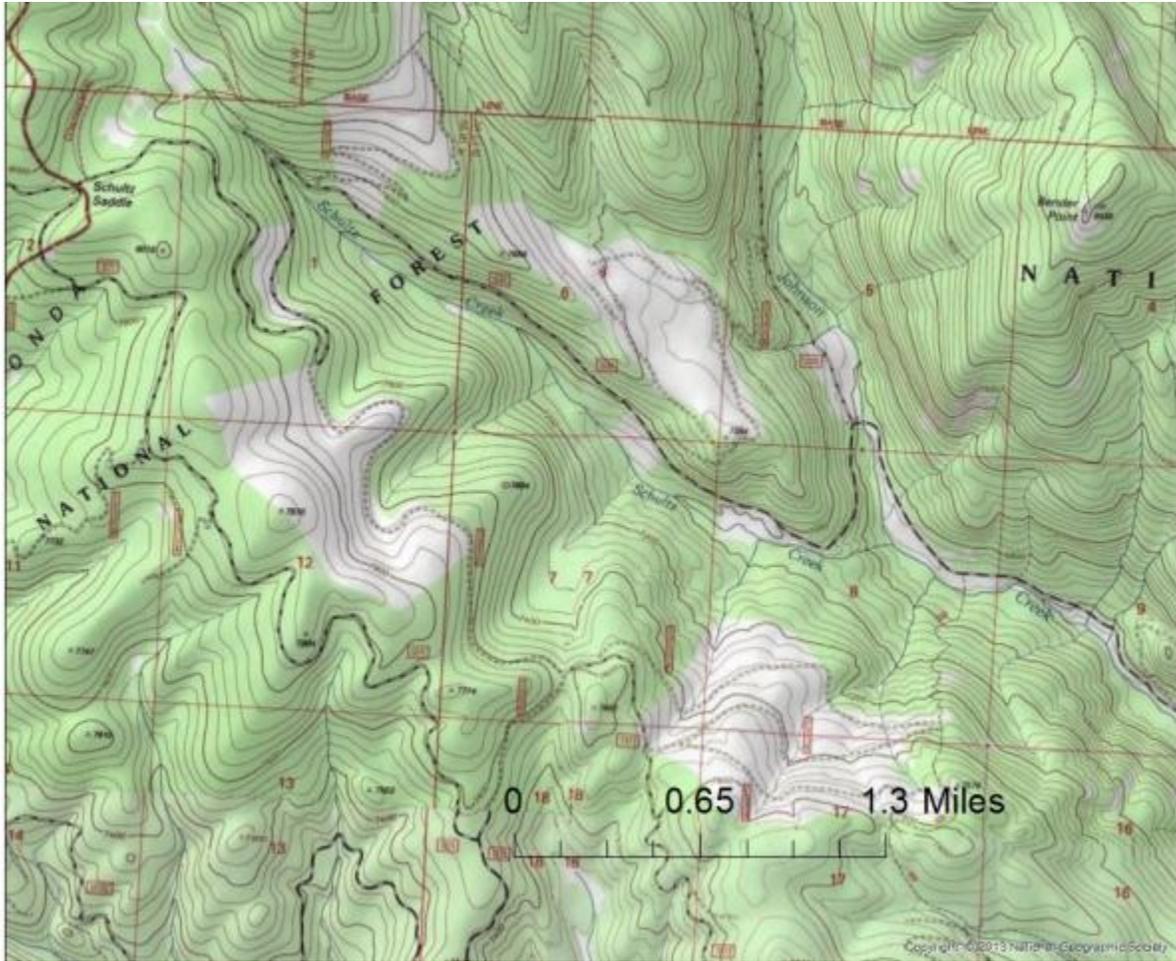


Figure 3. Schultz Creek drainage located approximately 20 miles west of Wisdom, Montana.

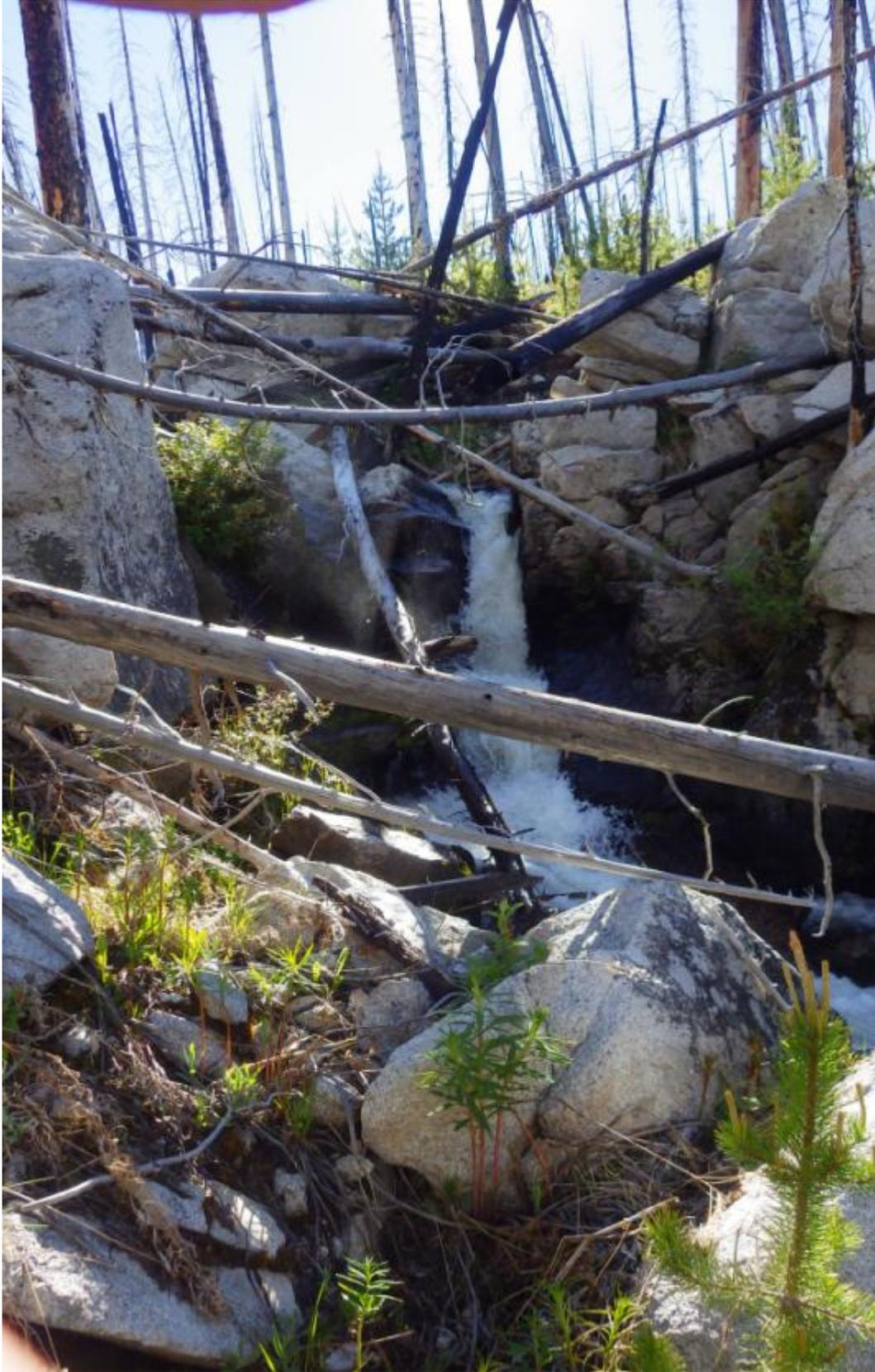


Figure 4 . Waterfall fish barrier on Schultz Creek.

Review of Rotenone Application

Rotenone is a commonly used piscicide that is highly targeted at fish and has no impact on other terrestrial plants and animals and few impacts to non-target aquatic life at fish killing concentrations. FWP has a long history of using rotenone to manage fish populations in Montana that span as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s.

Rotenone 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. The most common route of exposure to non-gill breathing animals is through ingestion. Rotenone is readily broken down by digestive processes and is not well absorbed through the digestive system and thus terrestrial animals can tolerate exposure to concentrations much higher than those used to kill fish.

The label requirements for product concentration in streams is 1 part CFT Legumine (5% rotenone) to one million parts water (1 ppm). Spring areas may also be treated with the powder formulation of rotenone (Prentox, 7% rotenone) or a sand/powder mix to prevent fish from seeking these areas as freshwater refuges during the application. The proposed streams would be treated using drip stations which are containers that administer diluted CFT Legumine to the stream at a constant rate. These drip stations would administer Legumine to the stream at a rate of 1 ppm for 4 hours. In addition, backwaters, spring areas and small tributaries would be treated with backpack sprayers according to the CFT Legumine label specifications. The total amount of Legumine to be applied to each stream is unknown because the amount is dependent on the flow rate of the stream and the distance downstream the chemical would remain active (determined by on-site bioassay at the time of the treatment). Assuming a typical creek is flowing 1.5 cfs and there is 1.5 miles of stream within the treatment area and the chemical remains active for 0.75 miles (i.e., 0.75 mile spacing between application points), 1.2 liters of CFT Legumine would be required to treat the entire 1.5 miles of stream. It is expected that fish killing concentrations of Legumine would be present in the streams for only 24-48 hrs after application, after which time the Legumine would have naturally detoxified and diluted to below fish killing concentrations.

To prevent the CFT Legumine from traveling downstream of the proposed treatment area, potassium permanganate would be used to neutralize any rotenone remaining in the stream at the fish barrier site (see Comment 2a below, p 21). The CFT Legumine label states that a minimum of 20-30 min of contact time between rotenone treated waters and the applied neutralizing agent (potassium permanganate) is necessary to fully detoxify the rotenone. Because the rotenone is not instantly detoxified downstream of the barrier site, a detoxification zone would be

established. The detoxification zone is defined as the distance the stream travels in 20-30 minutes downstream of the fish barrier as determined by a stream dye test (in the proposed streams likely less than ¼ mile). It is likely that in both Long Branch and Schultz creeks that the detoxification zone will extend to the confluence of Rock and Johnson creeks respectively. The dilution process into these larger parent streams will also aid in the rapid breakdown of the rotenone to non-toxic levels. Potassium permanganate is readily oxidized by natural processes in the stream and therefore it is imperative that adequate permanganate be applied to the stream to still be present and active at 15-30 min of travel time downstream. The determination of the appropriate amount of permanganate to fully neutralize any remaining rotenone is derived by on-site testing. Stream discharge would be measured prior to detoxification and the potassium permanganate would be applied at the rate specified on the CFT Legumine label (3-5 ppm) and adjusted based on on-site testing results. Neutralization would commence according to the FWP Rotenone Detoxification Policy which states that detoxification with potassium permanganate begin no less than two hours before the theoretical arrival time of treated waters at the detoxification station. A chlorine meter would be used at the end of the detoxification zone to ensure adequate oxidation potential (0.5-1.0 ppm KMnO_4) is present after 30 min of contact time to completely neutralize the rotenone. In addition to direct measurement of the oxidation potential of the water, caged fish (westslope cutthroat trout from the Anaconda Hatchery, or brook trout captured in individual streams) would be placed in the stream to monitor the effectiveness of the detoxification station during the treatment. Caged fish would be placed downstream of the detoxification zone and monitored. Distress or the lack thereof in these caged fish indicates whether or not the detoxification station is effectively neutralizing the CFT Legumine. The survival of caged fish placed in the creek immediately upstream of the detoxification station indicates when rotenone is no longer present in the stream and when detoxification is no longer required. The label states that if sentinel fish in treated stream water show no signs of distress within four hours, the stream water is considered no longer toxic, and detoxification can be discontinued. Neutralization would continue until the theoretical time in which all treated waters have passed the fish barrier and when sentinel fish can survive for an additional four hours. It is anticipated that this would occur in the proposed streams within 24-48 hrs after rotenone application.

Dead fish resulting from the rotenone treatment in the streams and lake would be left on-site in the water. Studies in Washington State indicate that approximately 70% of rotenone-killed fish sink and do not float (Bradbury 1986) and decompose within a week or two. Dead fish stimulate plankton and other invertebrate growth and aid in invertebrate recovery following treatment.

If all the hybridized trout are not removed during the first treatment on each stream, it may be necessary to implement a second treatment the following year to achieve the desired objectives of complete removal of non-native fish. To determine if complete fish removal is achieved, streams would be electrofished the spring and summer following treatment. A second treatment would be proposed for the following year if the objectives of the project were not met and non-native fish were found in the streams. In the event that an additional treatment is necessary, landowners, stakeholders and other interested parties would be notified.

To keep the public from being exposed to rotenone treated waters public access would be closed to both streams during treatment. Public roads and other access points (i.e., trailheads) would be signed during the stream treatments. Additional signs would be placed at stream crossings informing the public of the presence of treated waters and to keep out.

Funding

Project expenses listed below would be covered under standard FWP and US Forest Service budgets including FWP’s license dollar only budgets for the application of rotenone. Supplies and material including CFT Legumine have already been purchased under other projects and no additional funding will be necessary. Expected expenses are reviewed in Table 2. This table does not include personnel expenses.

Table 2. Projected expenses for the proposed westslope cutthroat trout restoration projects.

Expenses	NUMBER OF UNITS	UNIT DESCRIPTION*	COST/UNIT	TOTAL COST
CFT Legumine	8	gallon	\$79.80	\$638.40
Potassium permanganate	150	pounds	\$1.12	\$168.00
		Project Total		\$806.40

PART II. ALTERNATIVE

Alternative 1 – No action

The no action alternative would allow status quo management to continue. Hybridized trout fisheries in both streams would remain the same. The “No Action” alternative would not fulfill the State’s obligation to conserve native fish species and take action to prevent their listing as Threatened or Endangered under the Endangered Species Act. Also, if no action is taken in Schultz Creek an opportunity to replicate individual or multiple populations in habitat formerly occupied by WCT would be lost. It is likely that WCT in Bender Creek will be extirpated within the next 10 years if conservation actions are not taken. Because of the lack of suitable locations to establish fish migration barriers and the cost of establishing artificial fish barriers, it is very difficult to conserve some populations of WCT in their native habitat. Population replication (i.e., moving fish to another fishless stream with suitable habitat) may be the only means of making sure a particular population is not extirpated. The loss of any native fish populations would be a large set-back for WCT conservation. Although the No Action alternative would not accomplish the goals of WCT conservation, it would not have the potential negative impacts of the proposed action such as temporary impacts to non-target aquatic invertebrates. The No Action alternative would have the fewest impacts to recreation and fishing in the area. Long Branch Lake has a primitive camping area and likely receives some angling pressure. The No Action Alternative would maintain the existing fishery and provide uninterrupted opportunities for angling as opposed to the proposed action which would result in the temporary lack of a fishery in the stream and lake between fish removal and restocking and would temporarily restrict access to the stream and lake.

Alternative 2 – Proposed Action: Restoration of westslope cutthroat trout in Schultz Creek and WCT and Arctic grayling in Long Branch Creek through the removal of hybridized trout using rotenone and restocking of native fish.

Hybridized trout would be removed from the streams upstream of fish barriers using rotenone in the formulation of CFT Legumine (5% rotenone). The rotenone would be detoxified within ¼ mile downstream of the fish migration barriers using potassium permanganate to prevent impacts to non-target areas. Once fish removal is achieved and rotenone is no longer present in the streams, non-hybridized WCT would be stocked into Schultz Creek and WCT and Arctic grayling would be stocked into Long Branch Creek. This alternative offers the highest probability of achieving the goal of conserving native fish species. Successful completion of the proposed action would result in approximately nine miles of habitat that would be secured for WCT and six miles for Arctic grayling in the Big Hole drainage. Further, populations of WCT in the Big Hole drainage that are at high risk of extirpation would be conserved, particularly in Schultz Creek.

Alternative 3 –Mechanically remove hybridized trout from the Long Branch and Schultz creeks.

This alternative would involve removal of non-native hybridized fish in Long Branch and Schultz creeks but it would use electrofishing rather than rotenone to remove fish. Multiple-pass electrofishing has been used to eradicate nonnative trout from several small streams in northcentral Montana (Big Coulee, Middle Fork Little Belt, and Cottonwood creeks) and in SW Montana (Muskrat, Whites and Staubach creeks). Electrofishing can be an effective means of capturing fish in streams; however, electrofishing has limitations. Generally it is only 50 -70% efficient at capturing fish depending on the type of habitat and fish size distribution. Electrofishing is inefficient at capturing juvenile fish and generally electrofishing removal efforts require multiple years to allow juvenile fish to grow to the size where they can be captured. Electrofishing is also very labor intensive. The project reaches where electrofishing removals have been successful were generally less than three miles in length and required up to 25 electrofishing removal passes over several years to eradicate the unwanted species. Each electrofishing pass generally requires a crew of three to nine people. Eradication of hybridized trout from the proposed streams with electrofishing would be difficult because of the length of stream involved (nine miles total) and the complexity of the habitat. For example, electrofishing removal efforts in McVey Creek near the town of Wisdom in the early 1990's and from 2005-2007 were not successful at achieving a significant reduction in brook trout numbers in the stream. To achieve complete removal of hybridized trout from the Long Branch and Schultz creeks with electrofishing would require a 4 – 5 year commitment to removals, with 3-4 crews (6-12 people) for a minimum of 2-4 weeks each year. Such an effort would be impractical and cost prohibitive. Further, given the length of the stream and the complexity of the habitat, it is unclear whether 100% removal of hybridized trout could be achieved. For these reasons this alternative was eliminated from further consideration. Although Alternative 3 is less likely to accomplish the goals of native fish conservation in Schultz and Long Branch creeks, it would not have the potential negative impacts of the proposed action such as temporary impacts to non-target aquatic invertebrates. Alternative 3 would also have the greatest impact on angling

because it would potentially take the longest time to completely remove hybridized trout before native fish could be restocked.

Alternative 4: Use angling to eliminate hybridized trout from Long Branch and Schultz creeks.

FWP has the authority under commission rule to modify angling regulations for the purpose of removing unwanted fish from a lake or stream. Unfortunately, this method would not likely result in complete fish removal or even hybridized trout suppression for a number of reasons. First, the proposed streams are small and likely currently receive little fishing pressure. Attracting anglers to the streams to harvest hybridized trout would be very difficult because of the remoteness of the sites, small size of the streams and small size of fish. Recreational angling has been shown to reduce the average size of fish and reduce population abundance, but rarely if ever has it been solely responsible for eliminating a fish population. Using angling techniques alone in the stream would not result in removal of hybridized trout and would not achieve the objective of conserving native fish. For these reasons this method of fish removal was considered unreliable at achieving the objective of complete fish removal and was eliminated from further analysis.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u>	IMPACT	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				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. <u>WATER</u>	IMPACT	None	Minor	Potentially	Can	Comme
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Will the proposed action result in:	Unknown			Significant	Impact Be Mitigated	nt Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		Yes	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
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	2a,f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		Yes	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?			X		Yes	2k
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 hybridized trout. The impacts would be short term and minor. CFT Legumine (5% rotenone) is an EPA registered pesticide and is safe to use for removal of unwanted fish, when handled and applied according to the product label. The concentration of rotenone proposed for use is one part formulation to one million parts of water (ppm).

To reduce the impact of the piscicide on water quality, a detoxification station would be established immediately downstream of the fish barrier. 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 method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). FWP expects the streams would naturally detoxify down to the fish migration barrier within 24-48 hr after application of CFT Legumine because of natural breakdown processes and dilution from freshwater sources. At the fish barrier, potassium permanganate would be used to detoxify any remaining rotenone present in the stream and prevent fish killing concentrations of rotenone from traveling more than ¼ mile downstream.

Dead fish would result from this project. 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 from decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the water through bacterial decay. This action may be beneficial because it would stimulate algae production and would start the stream toward production of invertebrates. 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, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no evidence of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 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. In Soda Butte Creek near Cooke City, Montana, a well at a Forest Service campground located 50 ft from a treated stream was tested immediately following and 10 months after treatment with Prenfish and no traces of rotenone

were found (Olsen 2006). Because rotenone is known to bind readily with stream and lake substrates, FWP does not anticipate any contamination of ground water as a result of this project.

Comment 2j: The CFT Legumine label states "...Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir..." There are no irrigation diversions located within the proposed treatment areas. Irrigation diversions are present on the mainstem of Johnson Creek downstream the Schultz Creek and on Rock Creek downstream of the confluence with Long Branch Creek, but none within several miles. Any rotenone treated waters would be fully neutralized before reaching these diversions.

Comment 2m: FWP would submit a Notice of Intent for the purpose of applying a pesticide to a stream from Montana DEQ under the Pesticide General Permit.

Cumulative Impacts: The proposed action of piscicide treatment would have a short term impact on water quality (piscicides) in Long Branch Creek and Schultz Creek. Because of the rapid breakdown rate of CFT Legumine and active neutralization at the fish barriers, these impacts would attenuate through time and would not impact long-term water quality or the productivity of fisheries resources after restocking. FWP does not expect the proposed actions to result in other actions that would create cumulative impacts to water resources in the proposed streams nor does FWP foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to water resources related to treatment of proposed streams with piscicides or the associated barrier construction.

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

Comment 3b: The advantage of CFT Legumine over other rotenone products is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene which have a strong odor. By comparison, Prenfish has a strong chemical odor after application as opposed to CFT Legumine which is virtually odor-free and performs nearly identically to Prenfish.

Cumulative Impacts: Impacts to air quality from the proposed actions would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to air quality in the Long Branch or Schultz creeks. Nor does FWP 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 the proposed streams with piscicides or associated barrier construction.

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			4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: There would be some disturbance of vegetation along the stream during the proposed treatment due to increase foot traffic. These impacts should be minimal because all streams have existing trails (some primitive) or roads that provide good foot and/or vehicular access to the sites. FWP anticipates any impacts to plants resulting from trampling would be unnoticeable within one growing season. Rotenone does not affect plants at concentrations used to kill fish. Vegetation disturbances are expected to be short term and minor.

Comment 4c: There are no plant Species of Concern listed by the Montana Heritage program in the Long Branch Creek drainage. Lemhi beardtongue is listed as a Species of Concern that potentially occurs within Johnson Creek drainage. No impact to this species is anticipated as a result of the proposed action because Lemhi beardtongue is a plant found in sagebrush-grassland community types which are not present in Schultz Creek. Further, rotenone has no impacts on aquatic or terrestrial plant species at fish killing concentrations. Some trampling is possible due to increase foot traffic along the proposed streams; however, these impacts should be minimal because all streams have existing trails or roads that provide good foot and/or vehicular access to the sites.

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. Subsequent weed monitoring and removal may be performed if warranted.

Cumulative Impacts: Impacts to vegetation from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to vegetation in the proposed native fish restoration streams. If the new fisheries were to attract more recreational use, vegetation could potentially suffer from increase trampling. However, based on other similar native fish fisheries and their limited angling use, FWP would conclude that it is very unlikely that the new WCT fisheries would attract significant interest and associated higher use levels. FWP does not foresee any other activities in the basins proposed for native fish restoration that would add to impacts of the proposed action. As such there are no cumulative impacts to vegetation related to the proposed action.

5. <u>FISH/WILDLIFE</u>	IMPACT Unknown	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				
e. Creation of a barrier to the migration or movement of animals?				X	No	5e
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?			X			5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X		Yes	See 5f
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)			X			5i

Comment 5b: This project is designed to eradicate hybridized trout (a game fish) in Long Branch Creek and Schultz Creek upstream of fish migration barriers. However, these impacts are minor and temporary because WCT and Arctic grayling (also game fish) would be restocked

and repopulate the streams. Therefore, there would be no net loss of habitat occupied by self-sustaining populations of wild game fish. There would be no proposed changes in the fishing regulations as a result of this project; therefore, once WCT and Arctic grayling become established it will be catch and release only for cutthroat trout and grayling in streams and a five fish limit in lakes. It is possible that once WCT become established in the streams, they may be able to support some degree of angler harvest, but that determination will have to be made in the future. Rotenone when applied at fish killing concentration has no impact on terrestrial wildlife including birds and mammals that consume dead fish or treated water.

Comment 5c: Non-game non-target species that could be impacted include some aquatic insects and potentially larval stages of amphibians. Columbia spotted frogs and western toads have been documented in the area and are potentially present at both streams. Metamorphosed amphibians that breathe air are not affected by rotenone at fish killing concentrations; however, non-metamorphosed tadpoles that respire through their skin and/or gills are affected. The timing of these projects should mitigate any impacts to spotted frogs and western toads because most would have metamorphosed by late summer when the rotenone treatments are proposed.

Aquatic Invertebrates:

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic invertebrates. The most noted impacts are temporary and often substantial reduction in invertebrate abundance and diversity. In a study of the impacts of a rotenone treatment in Soda Butte Creek in south-central Montana, aquatic invertebrates of nearly all taxa declined dramatically immediately post rotenone treatment; however, only one year later nearly all taxa were fully recovered and at greater abundance than pre treatment (Olsen and Frazer 2006). One study reported that no long-term 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). Some have reported delayed recovery of taxa richness (number of taxa present) following rotenone treatments, but many of these treatments were at higher concentrations than proposed in this treatment (Mangum and Madrigal 1999). Finlayson et al. (2010) summarized high concentrations of rotenone (>100 ppb) and treatments exceeding eight hours, typically resulted in severe impacts to invertebrate richness and abundance. Conversely, lower rotenone concentrations (<50 ppb) and treatments less than eight hours, resulted in less impact to invertebrate assemblages. Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for these projects (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g. fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall. 2005; Minshall 2003), though the physical impacts and resulting modifications of invertebrate assemblages after these types disturbances can last for a much longer period than a piscicide treatment.

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

The possibility of eliminating a rare or endangered species of aquatic invertebrate in the proposed streams by treating with rotenone in the formulation of CFT Legumine is very unlikely. Montana Natural Heritage lists no Species of Concern or Potential Species of Concern of aquatic invertebrates in either of the streams proposed for WCT restoration. In SW Montana, as part of separate environmental analysis processes, aquatic invertebrates have been routinely collected prior to WCT restoration projects in mountain streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse, Soda Butte creeks). In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in southwestern Montana, and in no cases have threatened or endangered species been discovered. FWP expects that the proposed streams contain the same type of aquatic invertebrate assemblages found in other nearby streams and the possibility of eliminating a rare or endangered species is minimal. Aquatic invertebrates would be collected from each stream prior to treatment with CFT Legumine and one year post treatment to monitor the recovery of aquatic invertebrate populations.

Based on these studies, FWP would expect the aquatic invertebrate species composition and abundance in the streams proposed for treatment with 1 ppm CFT Legumine (50 ppb rotenone) to return to pre-treatment diversity and abundance within one to two years after treatment. Therefore, the impacts to aquatic invertebrate communities should be short-term and minor.

Birds and Mammals:

Mammals are generally not affected by rotenone at fish killing concentrations because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume rotenone under field conditions is by drinking lake or stream water or consuming dead fish, a half pound animal would need to drink 16 gallons of water treated at 1 ppm to receive a lethal dose of rotenone.

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

When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an

*equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1,000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g * 1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

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 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 4,110 mg/kg, a 1,000-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.*

Amphibians and Reptiles:

Potential amphibians and reptiles found within the proposed treatment areas include: long-toed salamanders (*Ambystoma macrodactylum*), spotted frogs (*Rana pretiosa*), western toads (*Bufo boreas*) (amphibians), tailed frogs (*Ascaphus montanus*) and western terrestrial garter (*Thamnophis elegans*), common garter (*T. sirtalis*) and rubber boa (*Charina bottae*) snakes (reptiles). Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 ppm) but the

larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians. The proposed streams would be scheduled for treatment in August or September, which would reduce but not eliminate potential impacts to larval amphibians. Any reduction in amphibian abundance would be expected to be short term because of the low sensitivity of adults to rotenone, and because most larval amphibians, with the exception of tailed frogs would have metamorphosed by August, when the treatments are planned. Impacts to juvenile tailed frogs can be mitigated by capturing as many as possible and holding them in non-treated waters then releasing them back to the streams once the treatment is complete. Further, adult frogs would not be affected by the stream treatment and could lay eggs in the stream the following year. A reduced abundance of aquatic invertebrates may temporarily impact larval and adult amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment. Some snakes are known to consume fish from streams; therefore, there could be temporary reduction in available food as a result of the proposed piscicide treatments, but no reptiles present are known to be fish obligates.

Based on this information FWP would expect the impacts to non-target organisms the streams proposed for WCT restoration to range from non-existent to short term and minor.

Comment 5f:

Terrestrial Organisms:

It is possible that osprey, eagles or other birds would eat rotenone-killed fish. Bald eagles have been observed along the nearby Big Hole River. Conducting this project in the fall would not impact bald eagle nesting, and there would be no impacts to birds that consume rotenone-killed fish. See comment 5c for impacts to birds.

The project area is within potential grizzly bear habitat, but there are no known grizzly bears currently inhabiting the areas. This project should have little or no impact on grizzly bears because the bears are not dependent on fish for food. There would be no impact on grizzly bears that consume fish killed by rotenone or consume treated waters (See comment 5c for impacts to mammals). The project would not have an impact on grizzly bears other than potential short term displacement due to increased people presence along the streams.

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

Wolverine, fisher, bald eagle, northern goshawk, great blue heron, bobolink and greater sage grouse are listed as Species of Special Concern or Potential Species of Concern present in the

areas of the proposed action. None of these species should be substantially impacted by the restoration of WCT to the proposed streams. See comment 5g for minor potential impacts.

Aquatic organisms:

Westslope cutthroat trout, including some populations of slightly hybridized WCT, are considered a sensitive species and a species of special concern. The intent of the proposed project is to conserve WCT. The project would remove hybridized WCT from both streams. These fish have little conservation value because of their high degree hybridization with rainbow and Yellowstone cutthroat trout.

Western Pearlshell mussels are also an aquatic species of concern that are known to occur in the vicinity of the proposed project areas. However, no pearlshell mussels have been found in the immediate project areas proposed for WCT restoration. Recent data (Olsen 2014 unpublished data.) suggests that western pearlshell mussels are unaffected by rotenone at fish killing concentrations proposed for these projects.

Comment 5g. There is the potential for displacement of some animals during the implementation of this project (see Comment 5f). Mule deer, elk, other big game species and species mentioned above (Comment 5f) may be temporarily displaced as crews are present in the drainages performing the proposed work. However, these impacts should only be minor and temporary. The total treatment should be completed within 2-3 days in each stream. Motorized and foot access is currently present throughout most of the drainages proposed for WCT restoration and public access is present. Our presence would likely represent only a small and temporary increase in human activity.

Cumulative Impacts: Impacts to fish and wildlife from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to fish and wildlife resources within the proposed streams. If the new fisheries attract more recreational use, fish and wildlife resources could potentially suffer from the increased presence of people. However, based on use patterns of other WCT and Arctic grayling fisheries, FWP concludes that it is very unlikely that the new fisheries would attract significant interest and associated higher use levels. The current hybridized trout fishery would be replaced by native fisheries that occupy a similar niche and would provide similar ecological functions and provide for similar angling opportunities. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no negative cumulative impacts to non-target organisms related to construction and the treatment of the proposed streams. The restoration would result in a positive cumulative impact in that when combined with other WCT and Arctic grayling restoration projects, significant progress toward the conservation of these species is being made.

B.HUMAN ENVIRONMENT

<u>6. NOISE/ELECTRICAL EFFECTS</u>	IMPACT	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:	Unknown					
a. Increases in existing noise levels?		X				
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				

Cumulative Impacts: Increases in noise from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create increased noise in the streams or drainages proposed for native fish restoration. FWP does 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 the proposed streams with piscicides or associated barrier construction.

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

Comment 7c: During treatment with rotenone, public access to the project areas would be closed for several days to prevent public exposure to rotenone. The length of the closure would depend on the amount of time the treated streams remained toxic to fish but would not exceed five days. 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. FWP expects the

treated waters to be non-toxic to fish within 24-48 hours after application of rotenone. Therefore, it can reasonably be expected that any closures would last 2 to 4 days total. The treatment would be implemented in late summer (August-September). At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be coordinated such that livestock are pastured elsewhere or livestock would be temporarily moved to adjacent pastures during the treatment period if possible.

Cumulative Impacts: Impacts on land use from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact land use in the proposed restoration streams. FWP does 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 the proposed streams with piscicides or associated barrier construction.

8. <u>RISK/HEALTH HAZARDS</u>	IMPACT	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:	Unknown					
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 of the CFT Legumine. All applicators would wear safety equipment required by the product label and MSDS sheets. Such safety equipment may include respirator, goggles, rubber boots (waders), Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one Montana Department of Agriculture certified pesticide applicator would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill. See also Comment 8c for other review of risks to general public.

Comment 8b: FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, a spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an

implementation plan has been developed by FWP the risk of emergency response is minimal and any 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 UF = 1000 aRfD = $\frac{15 \text{ mg/kg/day}}{1000} = 0.015 \text{ mg/kg/day}$	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = $\frac{0.375 \text{ mg/kg/day}}{1000} = 0.0004 \text{ mg/kg/day}$	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain

Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity
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UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

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

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

“...When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone’s presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.

Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.

Acute dietary exposure estimates result in dietary risk below the Agency’s level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the “females 13-49 years old” subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)...”

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk: first, the rapid natural degradation of rotenone, second, using active detoxification measures by applicators such as potassium permanganate, third, properly following piscicide labels and the extra precautions

stated in this document and finally, proper signing, public notification or area closures which limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application by dermal and incidental ingestion, but requires a waiting period of three days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because treatment areas would be closed to public access. Signs would be in place to warn recreationists that the streams are being treated with rotenone and closed to entry. Proper warning through news releases, signing the project area, temporary road closure and administrative personnel in the project area should be adequate to keep 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 Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. 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 1-hexanol were likewise present but either analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

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

“...None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT LegumineTM 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 (Fennodefo^{99TM}) 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 Legumine MSDS states “...when working with an undiluted product in a confined space, use a non-powered air purifying respirator...and... air-purifying respirators do not protect workers in oxygen-deficient atmospheres...” It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

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.

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 relevance of the results to the use of rotenone as a piscicide have been challenged based upon the following dissimilarities between the experimental methodology used and fisheries related applications: (1) the continuous intravenous injection method used to treat the rats leads to “continuously high levels of the compound in the blood,” unlike field applications where 1) the oral route is the most likely method of exposure, 2) a much lower dose is used and 3) potential exposure to rotenone is limited to usually only a matter of days because of the rapid breakdown of the rotenone following application. Further, dimethyl sulfoxide (DMSO) was used to enhance tissue penetration in the laboratory experiment (normal routes of exposure actually slow introduction of chemicals into the bloodstream), no such chemicals enhancing tissue penetration are present in the rotenone formulation proposed for use in this treatment. 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 high concentrations of rotenone. 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. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppb and are far below that administered during most toxicology studies.

A recent study linked the use of rotenone and paraquat with the development of Parkinson’s disease in humans later in life (Tanner et al. 2011). The after the fact study included mostly farmers from two states within the United States who presumably used rotenone for terrestrial application to crops and/or livestock. Rotenone is no longer approved for agricultural uses and is only approved for aquatic application as a piscicide. The results of epidemiological studies of pesticide exposure, such as this one have been highly variable (Guenther et al. 2011). Studies have found no correlations between pesticide exposure and PD (e.g., Jiménez-Jiménez 1992; Hertzman

1994; Engel et al. 2001; Firestone et al. 2010), some have found correlations between pesticide exposure and PD (e.g., Hubble et al. 1993; Lai et al. 2002; Tanner et al. 2011) and some have found it difficult to determine which pesticide or pesticide class is implicated if associations with PD occur (e.g., Engel et al. 2001; Tanner et al. 2009). Recently, epidemiological studies linking pesticide exposure to PD have been criticized due to the high variation among study results, generic categorization of pesticide exposure scenarios, questionnaire subjectivity, and the difficulty in evaluating the causal factors in the complex disease of PD, which may have multiple causal factors (age, genetics, environment) (Raffaele et al. 2011). A specific concern is the inability to assess the degree of exposure to certain chemicals, including rotenone, particularly the concentration of the chemical, frequency of use, application (e.g., agricultural, insect removal from pets), and exposure routes (Raffaele et al. 2011). No information is given in the Tanner et al. (2011) study about the formulation of rotenone used (powder or liquid) or the frequency or dose farmers were exposed to during their careers. There is also no information given about the personal protective equipment used or any information about other pesticides farmers were exposed to during the period of the study. It is also unclear in the Tanner et al. (2011) study the frequency and the dose individuals were exposed to during the time period of use. Without information on how much rotenone individuals were exposed to and for how long, it is difficult to evaluate the potential risk to humans of developing Parkinson's disease from aquatic applications of rotenone products.

The state of Arizona conducted an exhaustive review to the risks to human health of rotenone use as a piscicide (Guenther et al. 2011). They concluded:

“To date, there are no published studies that conclusively link exposure to rotenone and the development of clinically diagnosed PD. Some correlation studies have found a higher incidence of PD with exposure to pesticides among other factors, and some have not. It is very important to note that in case-control correlation studies, causal relationships cannot be assumed and some associations identified in odds-ratio analyses may be chance associations. Only one study (Tanner et al. 2011) found an association between rotenone and paraquat use and PD in agricultural workers, primarily farmers. However, there are substantial differences between the methods of application, formulation, and doses of rotenone used in agriculture and residential settings compared with aquatic use as a piscicide, and the agricultural workers interviewed were also exposed to many other pesticides during their careers. Through the EPA reregistration process of rotenone, occupational exposure risk is minimized by: new requirements that state handlers may only apply rotenone at less than the maximum treatment concentrations (200 ppb), the development of engineering controls to some of the rotenone dispensing equipment, and requiring handlers to wear specific PPE.”

It is clear that to reduce or eliminate the risk to human health, including any potential risk of developing Parkinson's disease, public exposure to rotenone treated water must be eliminated to the extent possible. To reduce the potential for exposure of the public during the proposed use of CFT Legumine to restore WCT, areas treated with rotenone would be closed to public access during the treatment. Signs would be placed at access points informing the public of the closure and the presence of rotenone treated waters. Personnel would be onsite to inform the public and escort them from the treatment area should they enter. Rotenone treated waters would be contained to the proposed treatment areas by adding potassium permanganate to the stream at the downstream end of the treatment reach (fish barrier). Potassium permanganate would neutralize any remaining rotenone before leaving the project area. The efficacy of the neutralization would be monitored using fish (the most sensitive species to the chemical) and a hand held chlorine

meter. Therefore, the potential for public exposure to rotenone treated waters is very minimal. The potential for exposure would be greatest for those government workers applying the chemical. To reduce their exposure, all CFT Legumine label mandates for personal protective equipment would be adhered to (see Comment 8a).

Cumulative Impacts: Health hazards from the proposed action and the connected action of barrier construction would be short term and mitigated through closure of treatment areas to public and use of proper safety equipment, etc. Because rotenone in all formulations including CFT Legumine breaks down quickly and does not bioaccumulate, there should be no long-term or cumulative impacts of the application of the piscicide. FWP does not expect the proposed action to result in other actions that would increase the risk of health hazards in the streams proposed for restoration. 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 treatments.

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. <u>PUBLIC SERVICES/TAXES/UTILITIES</u>	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		X				

supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____						
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			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 Long Branch and Schultz creeks for several years after treatment as the cutthroat trout repopulate the streams and Long Branch Lake. Both streams are accessible to the public and lie on public lands administered by the Forest Service. However, once WCT are established and reproducing, they should provide the same angling opportunities as the prior hybridized trout fisheries. It should be noted that the proposed streams are small and do not likely receive much angling pressure. Further, there are adjacent streams and areas downstream of fish barriers whose angling opportunities will not have changed as a result of the proposed action. The streams proposed for WCT restoration should be fully colonized with WCT within five years of project implementation and should provide the same angling opportunity to catch wild trout as

pretreatment. In most cases cutthroat trout fisheries in streams in Montana are catch and release only. After colonization, FWP would evaluate whether the fishery could support harvest. If appropriate, regulations would be changed to allow anglers the option of harvesting WCT for consumption from the proposed streams.

Cumulative Impacts: Impacts to recreation and aesthetics from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact recreation/aesthetics in the streams proposed for restoration. FWP does 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 action.

12. <u>12/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? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				

d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X		Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X			13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of piscicide can generate controversy. Public outreach and information programs can inform the public on the use of pesticides and the impacts and risks associated with its use. It is not known if this project would have organized opposition. Similar projects proposed and implemented from 2011-2014 had limited opposition.

Comment 13g: The following permit would be required:

MDEQ Pesticide General Permit

PART IV. OVERLAPPING AGENCY JURISDICTION

- A. Name of Agency and Responsibility
 - a. Montana Department of Environmental Quality – NDPES Discharge Permit for application of CFT Legumine.
 - b. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom and Dillon Ranger Districts for land management, including grazing management, and temporary closure of areas on Forest Service during treatment.

PART V. AGENCIES THAT HAVE CONTRIBUTED OR BEEN CONTACTED

- A. Name of Agency
 - a. Montana Department of Environmental Quality.
 - b. Montana Department of Fish, Wildlife & Parks – wildlife bureau
 - c. Montana Natural Heritage
 - d. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom and Dillon Ranger Districts

PART VI. ENVIRONMENTAL IMPACT STATEMENT REQUIRED?

After considering the potential impacts of the proposed action and possible mitigation measures, FWP has determined that an Environmental Impact Statement is not warranted. The impacts of native fish restoration as described in this document are minor and/or temporary and mitigation

for many of the impacts is possible. The primary negative impacts as a result of this project are temporary reductions in aquatic invertebrate abundance as a result of toxic effects of rotenone and impacts to tailed frog tadpoles in Schultz Creek. Impacts to aquatic invertebrates have been shown to be short term (1-2 years) and minor and invertebrate communities are very resilient to disturbances such as treatment with rotenone. Mitigation measures such as neutralization of rotenone and not treating sections of stream that do not contain fish but do contain tailed frog tadpoles should reduce the impacts to this non-target species. Further, the benefit to native WCT and Arctic grayling, both species in need of conservation, would balance the potential negative impacts to other species.

Prepared by : Jim Olsen, Fisheries Biologist Date: June, 5, 2015

Submit written comments to: Montana Fish, Wildlife & Parks
c/o Big Hole WCT Restoration EA comments
1820 Meadowlark Ln.
Butte, MT 59701

Comment period is 30 days. Comments must be received by July 5, 2015.

PART V. REFERENCES

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