Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

March 24, 2011

To: Governor's Office, Mike Volesky, 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

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
Beaverhead Conservation District, 420 Barrett Street, Dillon, MT 59725
U.S. Army Corp of Engineers, Helena
U.S. Fish and Wildlife Service, Helena
U.S. Fish and Wildlife Service, 420 Barrett Street, Dillon, MT 59725
Montana Trout Unlimited, P.O. Box 7186, Missoula, MT 59807
Dan Vermillion, FWP Commissioner, Livingston MT
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
Ted Harrison, 26000 HWY 278, Dillon, MT 59725
Don Harrington, 7300 Ten Mile Rd., Dillon, MT 59725
Chad Holland, 20875 HWY 278, Dillon, MT 59725
Carl and Martha Davis, PO Box 187, Dillon, MT 59725
Tex Marchesseau, 1725 Polaris RD, Dillon, MT 59725
William Clark, 3001 Moulton St., Butte, MT 59701
William Bevis, 2500 Raymond Ave., Missoula, MT 59802
Manuel Vasquez, 4233 Helix Del Sur, La Meas, CA 91941
Robert Sabbe, 3325 Spa St., San Diego, CA 92105
Greg Felder, PO Box 804, Jackson, MT 59736
Martin Landa, Georgia Mines Inc., 2034 Pine Island Circle, Mirmar Beach, FL 54155
Susan Mertz Trust, PO Box 894, San Clemente, CA 92674
Duwane Sand, 398 Bayers Ln., Twin Bridges, MT 59754
Beaverhead County Commission, 2 South Pacific St. STE #4, Dillon, MT 59725-4000

Jude Hammer, Dillon Ranger District, 420 Barrett St., Dillon, MT 59725-3572
Dan Downing, Wisdom Ranger District, PO Box 238, Wisdom, MT 59761
Paul Hutchinson, Bureau of Land Management, Dillon Field Office, 1005 Selway Drive, Dillon, MT 59725
Beaverhead Outdoors Association, C/O Dave Walton, 911 S. Washington, Dillon, MT 59725
Dave Delisi, Lewis and Clark Chapter of Trout Unlimited, 76 Sundowner Rd. Sheridan, MT 59749

Ladies and Gentlemen:

The enclosed Environmental Assessment (EA) has been prepared for a project proposal intended to help conserve a genetically pure westslope cutthroat trout population in Dyce Creek, a tributary to the Grasshopper Creek approximately 8 miles SE from Polaris, MT. This project proposes remove non-native brook trout and hybridized westslope cutthroat trout upstream of an existing barrier using rotenone. The treated reaches of Dyce Creek would be re-stocked with westslope cutthroat trout through natural recolonization (upstream sources) and transfer of genetically pure fish or eggs from the headwaters of the East Fork to the treated area.

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 April 30, 2011 at 5:00 pm. Comments should be sent to the following:

Montana Fish, Wildlife & Parks
Cherry Creek Westslope Cutthroat Restoration
Attn: Lee Nelson
415 South Front Street
Townsend, MT 59644

Or e-mailed to: leenelson@mt.gov

Sincerely,

Patrick J. Flowers
Region Three Supervisor

DRAFT
ENVIRONMENTAL ASSESSMENT

REMOVAL OF NONNATIVE BROOK TROUT AND HYBRIDIZED CUTTHROAT TROUT WITH ROTENONE IN DYCE CREEK

March 2011

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Native fish species (westslope cutthroat trout) conservation.

B. Agency Authority for the Proposed Action:

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

C. Estimated Commencement Date: Late July to early September 2011

D. Name and Location of the Project: Environmental Assessment for the Conservation of Native Westslope Cutthroat Trout in Dyce Creek by removal of Nonnative Brook Trout and Hybridized Cutthroat Trout with Rotenone

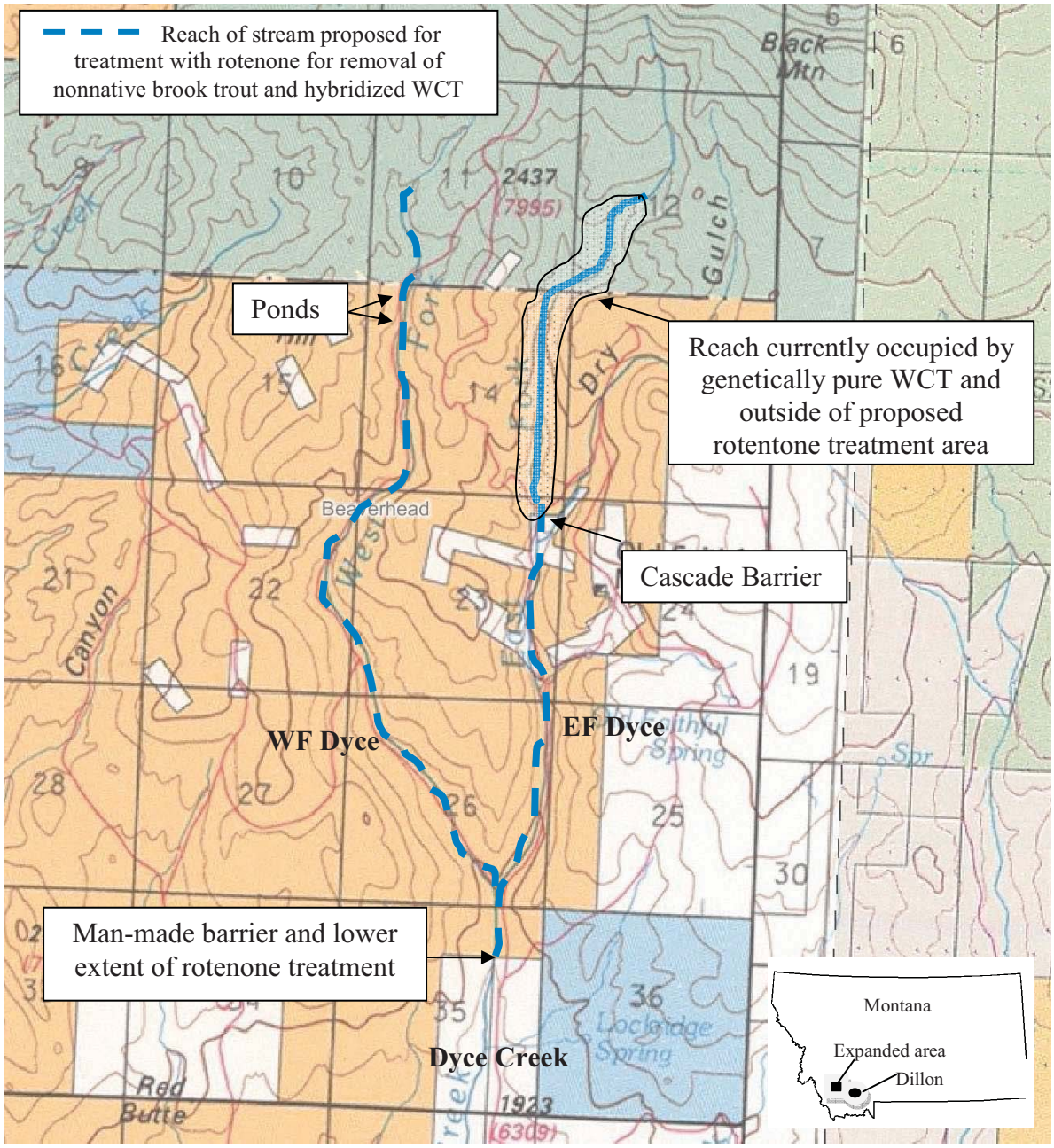
The project site is located in Beaverhead County approximately eight miles southeast from the town of Polaris, MT: T6S, R12W, S11, 12, 14, 22, 23, 26 and 35 (Figure 1). Dyce Creek (including East and West Forks) is a tributary to Grasshopper Creek in the Beaverhead River drainage. The U.S. Bureau of Land Management, Dillon Field Office (BLM), and the Beaverhead- Deerlodge National Forest/Dillon Ranger District (USFS), manage federal lands adjacent to the stream in the project area. There are several private in-holdings adjacent to the stream within the proposed project area.

E. Project Size (acres affected)

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

4. Wetlands/Riparian – The treated length of Dyce Creek, including portions of the East and West forks, would be approximately 6.4 miles of stream length.
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

Figure 1. Map depicting the location of Dyce Creek and reaches of stream proposed for removal of brook and hybrid trout with rotenone.



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

Location of the Proposed Action

Dyce Creek is a small (less than 5 foot width and less than 2.0 cfs at base-flow) tributary to the Grasshopper Creek near Polaris, MT (Figure 1). The proposed project location includes the West Fork of Dyce (4.0 miles), lower reach of the East Fork of Dyce (2.0 miles), and a short reach of the mainstem Dyce (0.4 miles) below the confluence of the forks. The lower extent of the proposed project would be at a migratory fish barrier constructed in 2004 (additional details given below). Two in-stream, man-made ponds (0.25 and 0.75 acres, 12 feet maximum depth), exist near the headwaters of the West Fork. The Dyce Creek drainage maintains suitable habitat for relatively robust trout populations, and land management activities by the BLM and USFS are consistent with native trout conservation (see Attachment 1).

Background and Need for the Proposed Action

Westslope cutthroat trout (WCT; *Oncorhynchus clarkii lewisi*), Montana's state fish, has declined in abundance, distribution, and genetic diversity throughout its native range (Shepard et al. 2003). Reduced distribution of WCT is particularly evident in the Missouri River drainage of Montana where genetically pure populations are estimated to persist in about 5% of habitat they historically occupied. Major factors contributing to this decline include competition with nonnative brook (*Salvelinus fontinalis*), brown (*Salmo trutta*) and rainbow trout (*O. mykiss*) that were first introduced to Montana in the 1890's, hybridization with rainbow and Yellowstone cutthroat trout (*O. c. bouvieri*), habitat changes, and isolation to small headwater streams. Due to these threats, most remaining WCT populations in the Missouri River drainage are considered to have a low likelihood of long-term (100 years) persistence unless conservation actions are implemented (Shepard et al. 1997).

Dyce Creek maintains one of the 18 identified WCT "conservation" populations in the Beaverhead River drainage. The population consists of both genetically unaltered (i.e., "pure" or non-hybridized) WCT, and hybrid WCT that are genetically mixed with nonnative rainbow trout (up to 2% level of hybridization). The origin of the rainbow trout hybridization is unknown. Based on recent genetic analysis, WCT that occupy the East Fork are genetically pure, while the mainstem, West Fork and ponds at the head of the West Fork are occupied by hybridized WCT (Figure 1). Nonnative brook trout are also present in the mainstem, West Fork, and lower reach of the East Fork below a natural cascade barrier.

The Dyce Creek WCT population has been classified as "at-risk" by local fisheries biologists (FWP, BLM, USFS) due to several threats. The primary concerns include competition from nonnative brook trout and the potential for loss of genetically pure WCT in the East Fork. Brook trout displacement of WCT is common where the species distributions overlap, and is recognized as an important reason for the loss of many WCT populations in Montana. This displacement has been attributed to a size and competitive advantage young brook trout incur due to timing of reproduction (Shepard and Nelson 2004). Due to these concerns, an effort was initiated in 2004 to mechanically remove brook trout from headwater reaches of Dyce Creek with multiple-pass electrofishing (Dyce Creek Brook Trout Removal EA, FWP, Bozeman, 21 July 2004 Decision Notice). This project included construction of the fish barrier on the mainstem of Dyce to

prevent additional invasion of nonnative trout (Figure 1; Dyce Creek Fish Barrier, BLM, Dillon Field Office, MTO-50-04-04, 3 March 2004 FONSI), and annual removal of brook trout in stream reaches where they co-occur with WCT upstream of the barrier. Through 2010, it is estimated that this effort has reduced brook trout abundance by 80 to 95%, but due to the complexity of the stream habitat (e.g., overhanging vegetation and debris jams) it is not expected that brook trout can be eradicated using electrofishing only, particularly in the West Fork of Dyce (Paul Hutchinson, Fisheries Biologist, Dillon BLM, personal communication).

The genetic status of WCT (i.e., pure or hybridized with a nonnative species) is a primary concern in the conservation and management of the species, and is a significant issue in Dyce Creek. In some locations, slightly hybridized WCT are managed as conservation populations, while in streams where genetically pure WCT remain, hybrids can be considered a threat. In the Dyce Creek drainage, hybridized WCT in the mainstem and West Fork are considered a threat to pure WCT in the East Fork. It is expected through time the lower reach of the East Fork would be invaded by hybridized WCT, because a physical barrier does not prevent fish from moving between the forks of the stream. The cascade barrier that currently isolates a short reach of stream in the upper East Fork is likewise not considered a long-term or "fail-proof" barrier, and the capture of a single brook trout above the structure suggests fish may pass over it under certain stream flow conditions.

Invasion of hybridized WCT to lower and upper reaches (above the cascade) of the East Fork would result in the loss of all genetically pure WCT in the Dyce Creek drainage. While the level of potential hybridization would not be great, it could result in unknown changes to the natural characteristics of the population. Any level of hybridization additionally would likely prevent the Dyce Creek population from being used as a donor source for WCT restoration efforts in other drainages, based on current WCT management practices.

Preservation of remaining WCT populations, like in Dyce Creek, is the primary strategy for conservation of WCT in Montana (FWP 2007). Few WCT populations are considered "secure" in the Missouri River basin, and efforts to protect remaining populations are necessary to ensure continued persistence of the species in the basin. 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 whole (Leary et al. 1998). For these reasons, their disappearance would be a significant loss for WCT conservation efforts, and may result in additional calls for the species to be listed under the federal Endangered Species Act.

Proposed Action

The proposed action is to remove all nonnative brook trout and hybridized WCT in the Dyce Creek drainage upstream of the constructed fish barrier using rotenone-based piscicides (CFT Legumine ™ and Prentox ™ rotenone; Figure 1). Treated reaches would include the mainstem above the barrier, the entire West Fork, and the East Fork up to the natural cascade barrier (total of 6.4 stream miles). Fish may be impacted within the half mile reach of the main stem below the barrier where rotenone is being detoxified. Prior to the treatment, genetically pure WCT occupying the lower reach of the East Fork would be captured with electrofishing and held upstream of the treatment area. After the treatment has been completed, genetically pure WCT

(live fish or eggs) from the East Fork would be transferred to the upper reaches of the West Fork to reestablish WCT in that portion of the drainage. It is anticipated that WCT would naturally recolonize the lower reaches of the East and West forks and the mainstem over a several year period.

The proposed project would eliminate the threats (brook and hybrid trout) that led to the current Dyce Creek WCT population classification of "at-risk", and result in genetically pure WCT population occupying 7.8 miles of stream. A protected, genetically pure WCT population of this size in the upper Missouri River drainage is rare. Dyce Creek below the fish barrier would continue to be maintained as a brook trout fishery.

FWP has a long history of using rotenone to manage fish populations in Montana that span as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control parasites such as lice on domestic livestock (Ling 2002).

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

Specifics of the Proposed Treatment

The boundaries for this treatment would include the entire West Fork of Dyce including the two man-made ponds, the lower reach of the East Fork of Dyce below the cascade barrier, and the mainstem of Dyce below the confluence of the East and West forks to a point about 0.5 miles below the constructed barrier (Figure 1). The total stream length treated would be 6.4 miles. The identified stream reaches would be treated with CFT Legumine ™ 5% liquid rotenone, and springs and seep potentially treated with Prentox™ 7% powdered rotenone. The toxic effects of the rotenone would be contained within the boundaries of the project area.

On site assays using caged fish would determine the appropriate rotenone concentration and treatment times (bioassays). The effective concentration is expected to be consistent with the label recommendations for concentrations for "normal pond use" (i.e., 0.5 to 1 part per million [ppm] CFT Legumine or 0.025 to 0.050 ppm active rotenone). Streams similar to Dyce Creek where rotenone has recently been used to remove nonnative trout species required no more than 1.0 ppm CFT Legumine. Rotenone would be primarily applied through the use of drip stations. Each drip station dispenses a precise amount of diluted rotenone into the stream (based on

measured stream discharge in cubic feet per second). Liquid rotenone would be applied to the stream at regularly spaced intervals based on the bioassays, and are expected to be no more frequent than two hour stream travel time. The application period would also be determined by the bioassays, but would likely be no more than four hours. Backpack or similar-type sprayers would also be used to disperse liquid rotenone in the man-made ponds and standing water areas outside the active stream channel where stream flow is minimal. If needed, a small boat may be used to help disperse the rotenone in the ponds. A mixture of powdered rotenone (Prentox 7% rotenone), sand, and gelatin may be applied on a very limited basis. A powdered rotenone mix would only be used in springs and seeps that have the potential to provide refuge for the target fish.

The treatment period would last for an estimated two to four days to remove fish from the stream and associated ponds. Treatments would start in the upstream reaches of each fork, and progress downstream treating a subsection of the project area each day. Block nets would be placed each night to prevent fish from moving into untreated reaches of stream. When the treatment ends, fresh water from untreated areas upstream would begin to dilute the piscicide concentration and oxidation would continue to break down remaining rotenone in the treated reaches of Dyce Creek.

Any rotenone passing downstream of the lower bounds of the treatment area (below the fish barrier; Figure 1) would be detoxified with the addition of potassium permanganate to the stream. According to the CFT Legumine label, potassium permanganate should be applied to water at the appropriate concentration to compensate for organic demand of the stream and/or lake bottom so that enough remains to neutralize the rotenone. The discharge of the stream would be measured prior to treatment and the potassium permanganate would be applied at an appropriate rate to meet organic demands and to neutralize the rotenone. Potassium permanganate requires 15 to 30 minutes of contact time to fully detoxify the rotenone, which should be no more than 0.25 to 0.5 miles of travel time in Dyce Creek. Effectiveness of the potassium permanganate will be measured using two methods: Caged fish below the detoxification station would be used to measure the toxicity of the water to ensure detoxification objectives have been met, and a colorimeter would be used to measuress potassium permanganate concentration in the stream.

After the application, FWP would use caged fish to evaluate when the waters are no longer toxic to fish. The CFT Legumine label specifies that once caged fish show no signs of distress within four hours, the stream water is considered no longer toxic, and detoxification can be discontinued.

Previous treatments have shown that dead fish rapidly decay and are difficult to find even after a few days post treatment. Dead fish provide nutrients to the stream, benefiting primary and secondary production. If large accumulations of dead fish are found, however, they would be collected and dispersed to reduce attractiveness to scavengers.

If all target fish (brook and hybrid trout) are not removed the project reaches during the first treatment, it may be necessary to implement a second treatment the following year (late July to early September 2012) to achieve the desired objectives. Effectiveness of the first treatment

would be ascertained through electrofishing surveys of the treated sections of Dyce Creek and associated tributaries. The same measures and precautions used during the first treatment would be applied in the event a second treatment is necessary.

The treated reaches of Dyce Creek would be re-stocked with WCT through both natural recolonization and transfer of genetically pure fish or eggs from the headwaters of the East Fork to the headwaters of the West Fork. Transfers would follow all FWP policies for wild fish transfers, including as necessary: consultation with the FWP Fish Health Committee, completion of a wild fish transfer request, disease testing, and genetic testing.

Benefits of the Proposed Project

The primary purpose of this project is to help achieve the goal of ensuring the long-term, self-sustaining presence of WCT in the upper Missouri River drainage by securing a genetically pure WCT population in the Dyce Creek drainage. With successful removal of nonnative brook and hybrid trout, the benefits of the proposed effort would include:

- Securing a rare, genetically pure, upper Missouri River WCT population.
- Fulfilling the State's obligation to protect all genetically pure WCT populations (FWP 2007).
- Conserving a genetically pure WCT population that may be used as a donor source to help establish WCT in additional streams.
- Reducing threats that may encourage requests for listing WCT under the Endangered Species Act.

PART II. ALTERNATIVES

Alternative 1 – No Action

The no action alternative would include cessation of on-going efforts to suppress brook trout with electrofishing. Brook trout would increase in abundance – likely resulting in decreased abundance and distribution of both genetically pure and slightly hybridized WCT in the upper Dyce Creek drainage through competition. Over time, it is possible that brook trout competition could lead elimination of WCT in the mainstem, West Fork and lower reach of the East Fork of Dyce Creek. The continued presence of hybridized WCT would be considered a threat to genetically pure WCT currently occupying the lower and upper East Fork. There would be no opportunity to expand the distribution of genetically pure WCT in the Dyce Creek drainage. The "No Action" alternative would not fulfill the State's obligation to protect all genetically pure WCT populations (FWP 2007), and would not reduce threats that encourage requests for listing WCT under the Endangered Species Act.

Alternative 2 (Proposed Action) – Removal of brook and hybrid trout with rotenone and transfer of genetically pure WCT to treated reaches

The proposed action would include removal of existing nonnative brook trout and hybridized WCT from the upper reaches of Dyce Creek with rotenone and subsequent restocking of the treated portions of the drainage with genetically pure WCT from the East Fork of Dyce Creek.

The predicted benefits of Alternative 2 include:

- Securing a rare, genetically pure, upper Missouri River WCT population.
- Increase the distribution of genetically pure WCT in the Dyce Creek drainage from 3.5 miles to 7.75 miles of stream.
- Fulfilling the State's obligation to protect all genetically pure WCT populations (FWP 2007).
- Conserving a genetically pure WCT population that may be used as a donor source to help establish WCT in additional streams.
- Reducing threats that may encourage requests for listing WCT under the Endangered Species Act.

Alternative 3 – Electrofishing removal of brook and hybridized trout.

Multiple-pass electrofishing has been used to eradicate unwanted trout (primarily nonnative brook 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 has been used annually since 2004 to remove brook trout from the proposed treatment reach of Dyce Creek. Through 2009, it is estimated that this effort has reduced brook trout abundance by 80 - 95%, but due to the complexity of the stream habitat (e.g., over hanging vegetation and debris jams), and length of the project reach (six miles), it is not expected that brook trout can be eradicated using electrofishing only (Paul Hutchinson, Fisheries Biologist, Dillon BLM, personal communication). Continuing efforts to remove brook trout with electrofishing, and including removal of hybridized WCT, would require significant labor resources on an annual basis for an indefinite period of time. Electrofishing is not likely to result in eradication of either brook trout or hybridized WCT, therefore, the overall goal of protecting and expanding the genetically pure WCT population would not be achieved.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce		X				

productivity or fertility?						
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> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
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 (surface only)		YES	see 2af
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge			X		YES	2m

that will affect federal or state water quality regulations? (Also see 2a)						

Comment 2a: The proposed project is designed to intentionally introduce a piscicide to surface water to remove unwanted fish. The impacts would be short term and minor. Prentox (7% powder) and CFT Legumine (5% liquid) rotenone are EPA registered pesticides and are safe to use for removal of unwanted fish. The concentration of CFT Legumine (5% liquid) proposed is 0.5 to1 part per million, but could be adjusted within the label-allowed limits based upon the results of on-site assays. Prentox (7% powder) may be used in a sand and gelatin mix to treat on a very limited bases any springs and seeps within the treatment area.

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 fifteen to thirty minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007).

FWP would expect the treated stream above the barrier to naturally detoxify within 48 hours of the treatment. The treated stream would rapidly detoxify through addition of fresh water from untreated upstream sources and through the aforementioned physical and chemical breakdown processes. Inert ingredients (e.g. carriers) in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication. It is anticipated that most dead fish would be left on-site in the water. Previous treatments have shown that fish rapidly decay and are difficult to find even after a few days post treatment. In addition, dead fish provide nutrients to the stream, benefiting primary and secondary production. Large accumulations of dead fish, however, would be collected and dispersed throughout the system to avoid attracting scavengers.

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. A Kalispell-area pond was treated with Prenfish 5% rotenone in 1998. Water from a well, located 65 feet from the pond, was analyzed and no sign of rotenone was detected. Another Kalispell-area pond was treated with Prenfish 5% rotenone in 2001. Water from a well located 200 feet from that pond was tested four times over a twenty-one day period and showed no sign of contamination. FWP treated a small pond near Thompson Falls in 2005 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.

Inert ingredients in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication.

Comment 2j: The CFT Legumine and Prentox labels state "….Do not use water treated with rotenone to irrigate crops or release within one-half 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 or potable water intakes within proposed treatment area, and any irrigation system within one-half mile of the lower bounds of the project would be closed during treatment. The treatment zone will be thoroughly posted to caution against use of the water while rotenone is being applied (two to four days), and thereafter for a precautionary period: four to six days total. If necessary, temporary fencing would be used to prevent livestock use of the treatment area and the half mile reach of stream below the project reach. An alternative livestock water source would also be provided as necessary. Rotenone passing downstream of the lower bounds of the treatment area (below the fish barrier; Figure 1) would be detoxified with the addition of potassium permanganate to the stream. Impacts to irrigation and potable water intakes, therefore, would be short term and minor and would be mitigated as necessary.

Comment 2m: FWP would apply for an exemption of surface water quality standards for the purpose of applying a pesticide from Montana DEQ under section 308 of the Montana Water Quality Act.

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

emissions of pollutants?						
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: A small outboard motor may be used to help disperse rotenone in the man-made ponds. Emissions from outboard motors would be created, but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b: CFT Legumine does not contain the same level of aromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations and as a consequence does not have the same odor concerns and has less inhalation risks. Dead fish would result from this project and may cause objectionable odors, though previous treatments have shown fish decay rapidly and are difficult to find even after a few days post treatment.

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

Comment 4a: Prior to and during treatment there would be some human trampling of vegetation along the stream during the placement and monitoring of drip stations and sentinel fish locations. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor.

5. FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		yes	5b
c. Changes in the diversity or abundance of			X		yes	5c

nongame species?						
d. Introduction of new species into an area?		X				5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X		yes	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				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				See 5d

Comment 5b: The proposed action is expected to result in an increase in abundance of genetically pure, native WCT, and elimination of nonnative brook trout and hybridized WCT in the upper reaches of Dyce Creek. The Dyce Creek drainage historically would have supported genetically pure WCT in about 11.5 miles of stream from the headwaters to the stream mouth. Currently, the distribution of genetically pure WCT is about 3.5 miles in the East Fork of Dyce only, with the remainder of the drainage occupied by brook trout and hybridized WCT. Post treatment, WCT would be reestablished throughout the upper reaches of Dyce Creek (7.8 miles of stream) through natural recolonization and transfer of fish from the East Fork to the West Fork.

The proposed project in Dyce Creek is considered a minor impact because the current brook trout fishery is nominal (based on angler use data), and brook trout will continue to be abundant in the lower reaches of Dyce Creek, and numerous other streams in the Beaverhead River basin. The project is intended to increase the abundance and range of genetically pure WCT, a rare and unique resource with limited distribution in the Missouri River drainage. Westslope cutthroat trout are currently protected by catch-and-release regulations in most streams in the central fish district, including Dyce Creek. Restoration efforts like the proposed action are intended to increase overall WCT abundance, which may result in greater fishing opportunities and harvest for this rare native species in the future.

Comment 5c: Nongame (non-target) animals that could be potentially impacted by the proposed project include aquatic invertebrates, mammals, birds, amphibians, and reptiles. As described below, the expected population level impacts to non-target organisms to range from non-existent to short term and minor. It is also important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management.

Aquatic Invertebrates:

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

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

Aquatic invertebrates are routinely collected prior to transfers of WCT to historically fishless habitat in headwater mountains streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, and Whitehorse creeks) in southwest Montana as part of a MEPA process . In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in western Montana, and in no cases have threatened or endangered species been discovered. The same type of aquatic invertebrate assemblage would be expected in Dyce Creek, and the possibility of eliminating a rare or endangered species is very unlikely.

Mammals and Birds

Mammals are generally not affected by rotenone treatments because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) involved feeding forms of rotenone to rats and dogs as part of their diet for periods of six months to two years. Effects observed included diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. Studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the

only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half pound animal would need to drink 33 gallons of water treated at 2 ppm.

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

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (39.5 mg/kg * 0.350 kg = 13.8 mg = 13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30.4 mg/kg * 1 kg = 30.4 mg = 30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

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

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants, and 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 lethal doses for Japanese quail were 4500 to 7000 times more than used to kill fish.

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

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

A reduced abundance of aquatic invertebrates and fish may temporally impact local mammals and birds that may prey on these species (e.g, American dipper and mink). The aquatic invertebrate community would recover rapidly from a piscicide treatment, while it would be several years for a trout abundance to reach levels prior to treatment. Impacted birds and mammals are mobile and would likely emigrate to nearby habitats until full recovery of the aquatic community.

Amphibians and Reptiles

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

Based on this information FWP would expect population level impacts to non-target organisms to range from non-existent to short term and minor. These impacts may include temporary displacement during recolonization of aquatic invertebrate communities and WCT. FWP would assess the environmental impacts of this project on non-target organisms by monitoring the aquatic invertebrate community with samples collected pre- and post-treatment.

Comment 5d: Genetically pure WCT would be transferred (live fish or eyed eggs) from the headwaters of the East Fork of Dyce to the WF of Dyce when all nonnative fish (brook and hybrid trout) are removed. WCT are the native trout to the Dyce Creek drainage. Transfers would follow all FWP policies for wild fish transfers, including: consultation with the MT Fish Health Committee, completion of a wild fish transfer request, disease testing, and genetic testing.

Comment 5f: There are no threatened or endangered species known to reside in the proposed treatment area in Dyce Creek. Some sensitive terrestrial species that may occasionally occupy the Dyce Creek drainage and could potentially ingest dead fish or treated stream water include great gray owls (*Strix nebulosa*), golden eagles (*Aquila chrysaetos*), northern goshawk (*Accipiter gentilis)*, gray wolf (*Canis lupus*) and wolverines (*Gulo gulo*). None of these species, or other mammals and birds common to the area would be affected by ingestion of dead fish or treated stream water (see comment 5c).

Dyce Creek is within the range of the boreal toad *(Bufo boreas)*, which is listed as a sensitive species by the USFS and BLM. As previously discussed in Comment 5c, rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive.
Any reduction in amphibian abundance would be expected to be short term and minor because of the low sensitivity of adults to rotenone, and the likelihood that larval amphibians would have metamorphosed to air-breathing forms by the proposed treatment date in late August.

Westslope cutthroat trout, including some populations of slightly hybridized WCT, are considered a sensitive species. The intent of the proposed project is to remove slightly hybridized WCT from the Dyce Creek drainage in order to protect and expand the range of genetically pure WCT. The removal of hybridized WCT is expected to be a short term and minor impact because genetically pure WCT will be transferred to or naturally recolonize portions of the drainage where hybrids are removed (see comment 5d).

Comment 5i. See comment 5d.

B.<u>HUMAN ENVIRONMENT</u>

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

electromagnetic effects that could be detrimental to human health or property?						
d. Interference with radio or television reception and operation?		X				

Comment 6a: The noise generated from this project would be short term and minor, including vehicles and potentially a small, outboard boat motor.

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

Comment 7c: The Dyce Creek drainage is easily accessed by public roads, and there exists potential for recreational use of the area during the treatment period. Road access to the upper Dyce Creek drainage would be closed for five to seven days during the active treatment phase of the project to minimize public access to the area during treatment. Additional warnings through news releases, signing the project area, road closure and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters. At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be planned when livestock are pastured elsewhere or livestock would be prevented from accessing the stream during the treatment period.

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

c. Creation of any human health hazard or potential hazard?			X		YES	see 8a,c
d. Will any chemical toxicants be used?			X		YES	see 8a

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

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

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for 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 = 15 mg/kg/day = 0.015 mg/kg/day 1000	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

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

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

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

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

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

As for recreational exposure, the EPA concludes no risk to adults from by dermal and incidental ingestion entering treated water following the application, 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 a temporary closure would preclude many from being in the area. Proper warning through news releases, signing the project area, road closure and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters or dead fish.

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

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

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

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

The advantage of CFT Legumine over Prenfish, an additional liquid rotenone product, is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish. Prentox, or powdered rotenone, is simply the ground up roots of the *Derris* plant, and as a consequence contains no petroleum or other man-made ingredients. The toxicity of Prentox is therefore attributed exclusively to the rotenoid compounds.

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.

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

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

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

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

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

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

Comment 11c: There would be a temporary loss of angling opportunity in the upper Dyce Creek drainage between the time of fish removal and for several years (five to ten) until genetically pure WCT have been reestablished throughout the drainage. The brook trout fishery would be eliminated above the barrier, though the brook trout fishery would remain in lower Dyce Creek and in numerous streams throughout the local area. In most cases, cutthroat trout fisheries in streams in Montana are catch and release only. FWP would evaluate whether the fishery could support harvest after full reestablishment of WCT in the Dyce Creek drainage. Regulations could possibly be changed to allow anglers the option of harvesting WCT for consumption.

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

Comment 12 c. The project site is located within the aboriginal range of several Native American tribes. Cultural officers for tribes which would have interest in this project will be contacted through the MEPA process to identify any potential effects on existing religious or sacred uses of the area. There will be no ground-breaking activities associated with this project, and there are no known potential impacts to historical, cultural or religious values.

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

Comments 13e and f: FWP has a long history of completing rotenone projects,- however, the use of piscicides can generate controversy from some people. It is not known if this project would have organized opposition. Informal discussions with private landowners adjacent to the proposed project area have resulted in no significant issues being expressed. Public outreach and information programs can educate the public on the use of pesticides, and a public open house concerning the project will be held in Dillon during the public comment period. FWP has also worked closely with the local BLM and USFS staff during the development of this project, and no significant issues have been identified.

Comment 13g: FWP consulted with the BLM Dillon Field Office and USFS Beaverhead-Deerlodge National Forest during the planning and development phases of this project. No special use permit is required by FWP. The following permit would be required from the MT Department of Environmental Quality:

- DEQ 308 - (authorization for short term exemption of surface water quality standards for the purpose of applying a fish toxicant)

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) *Is an Environmental Impact Statement Required (EIS)?*

No. An EIS is not required under the Montana Environmental Policy Act (MEPA) because the project lacks significant impacts to the physical, biological or human environment. Impacts of the proposed action are expected to be localized, short-term and minor, and are appropriately addressed through an Environmental Assessment.

B) *Public involvement:*

The public will be notified through local newspapers and through contact with local landowners, sporting and recreational groups, and others who have previously indicated interest in similar projects. This EA will also be published on the Montana Fish, Wildlife & Parks web page (http://fwp.mt.gov/default.html). A public open house to discuss the proposed project will be held in Dillon on April 13th, 2011, 7:00 PM., at the Beaverhead-Deerlodge National Forest Office, 420 Barrett St, and in Butte, April 13th, 2011, 7:00 PM, at the FWP Office, 1820 Meadowlark Lane. The public comment period will be open for 30 days. This level of public involvement is believed adequate for the proposed project as recent and similar type piscicide efforts completed by FWP have produced no significant issues or controversy.

C) *Addresses to submit written comments:*

There is a 30-day comment period for this EA. Written comments can be mailed or emailed to the address below, and must be received by 5:00 pm, April 24, 2011. Please include name and address with any comment.

Lee Nelson
Montana Fish, Wildlife & Parks
415 South Front Street
Townsend, MT 59644
E-mail: leenelson@mt.gov

E) *Person responsible for preparing this EA document:*

Lee Nelson
Fisheries Biologist
Montana Fish, Wildlife & Parks
415 South Front Street
Townsend, MT 59644
(406) 495-3866

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Attachment 1:

Project support letters from the Bureau of Land Management, and Beaverhead-Deerlodge National Forest

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Dillon Field Office
1005 Selway Drive
Dillon, Montana 59725
Phone: 406-683-8000 Fax: 406-683-8066
http://www.blm.gov/mt

TAKE PRIDE IN AMERICA

In Reply To:

6500 (MTB050)

May 5, 2010

Lee Nelson
Montana Fish, Wildlife & Parks
415 South Front Street
Townsend, Montana 59644

Dear Lee Nelson:

This letter is the Bureau of Land Management's official support of the Dyce Creek westslope cutthroat trout restoration project. The Bureau of Land Management (BLM), Dillon Field Office, is committed to the restoration of native species, such as westslope cutthroat, and is prepared to assist Montana Fish, Wildlife and Parks in this project.

The Dillon field Office has been actively conducting projects to benefit native westslope cutthroat trout in the Dyce Creek drainage for several years. In 2006, the BLM completed a riparian exclosure in the headwaters of the West Fork that protects over ½ mile of stream and two ponds. In 2004 BLM installed a fish barrier in support of an ongoing non-native brook trout removal project that has allowed a significant increase in westslope cutthroat trout numbers. Since its initiation in 2004, 3126 brook trout have been removed from the drainage by physical means. Current livestock management entails a three season rest rotation system that has improved riparian and fishery habitat conditions within the drainage.

Once non-native brook trout removal has been completed, the BLM plans to begin habitat improvement projects to increase the number and quality of pool habitat in the drainage.

I believe that the BLM, Dillon Field Office is meeting the management goals for westslope cutthroat trout in the Dyce Creek drainage and will continue to strive to meet the objective the BLM was a signatory to under the cutthroat trout conservation agreement for westslope cutthroat trout in Montana. We look forward to continued joint efforts aimed at restoration and preservation of this native trout species.

If you have any questions or comments, please contact Paul Hutchinson, Dillon Field Office fisheries biologist, at 406-683-8052

Sincerely,

Tim Bozorth

Tim Bozorth
Dillon Field Office Manager

USDA United States Department of Agriculture | Forest Service | Beaverhead-Deerlodge National Forest Dillon Ranger District | 420 Barrett Street Dillon, MT 59725-3572 (406) 683-3900

File Code: 2670

Date: May 28, 2010

Mr. Lee Nelson
Montana Fish, Wildlife and Parks
415 S. Front St
Townsend, MT 59644

Dear Mr. Nelson,

This letter is to inform you of the Beaverhead-Deerlodge National Forest's (BDNF) support of the Dyce Creek, non-native brook trout removal project to conserve westslope cutthroat trout (WCT). We are pleased to be a partner with Montana Fish, Wildlife and Parks and BLM on this project. Westslope cutthroat conservation is an area of emphasis for the Fisheries Program on the Dillon District. This is evidenced by many years of inventories to document genetic purity and population distributions and the establishment of the Painter Creek and Brays Canyon Creek barriers.

We have been refining grazing management on this and other Districts across the Forest to reduce livestock impacts on fish habitat and working to understand WCT population level effects from redd trampling. This summer will culminate 5 years of study to determine rates of WCT redd trampling and the variability in the timing of spawning and egg and fry incubation periods across different thermal regimes exhibited by our streams. The data gathered has helped guide the development of alternatives in a Draft Environmental Assessment for Allotment Management Plans across 5 allotments; which we expect to release this for public comment by mid- summer.

This summer will also be the 3rd field season we've conducted Integrated Monitoring focused specifically on determining Forest-wide stream and riparian condition trends. It is our goal by the end of the summer to have completed, at least 130 surveys on previously established and randomly located stream reaches. By the end of 5 years we hope to have 250 survey sites which can be re-evaluated on a 5 year cycle. The sampling procedure was designed to provide a defensible determination of stream condition trends at the Forest scale, relative to our grazing management.

The recently completed BDNF Revised Land and Resource Management Plan provides substantial emphasis on westslope cutthroat trout conservation through the allocation of 57 Fisheries Key Watersheds. They represent some of the first formal land allocations for native trout on Forest Service lands in the western United States. The Revised Plan implements more stringent grazing standards than have previously been used on most cutthroat streams. It also directs administrative action by Forest officials whenever there is added risk to a population from failure to adhere to the annual operating plan for an allotment in a Fish Key Watershed.

The Dillon District is striving to meet WCT restoration and conservation goals. I believe our land management direction is consistent with your efforts to expand and secure the cutthroat trout population in Dyce Creek and in other streams across the Forest. We will continue to emphasize consistent implementation of that direction. We look forward to working with you on this and future projects to move toward accomplishment of the goals and objectives in the 2007 MOU and Conservation Agreement for Cutthroat Trout.

If you have questions or comments please contact Dan Downing, Zone Fisheries Biologist for the Dillon, Wisdom and Wise River Districts at (406) 832-3178.

Sincerely,

THOMAS D. OSEN
District Ranger

Cc: Dan Downing
Files