South Fork Flathead Watershed
Westslope Cutthroat Trout Conservation Program
Final Environmental Impact Statement

Bonneville Power Administration
July 2005

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Responsible Agency: U.S. Department of Energy (DOE), Bonneville Power Administration (BPA)

Cooperating Agencies: U.S. Department of Agriculture, Forest Service (FS) and State of Montana Fish, Wildlife, and Parks (MFWP) Department

Title of Proposed Project: South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program

State Involved: Montana

Abstract: In cooperation with MFWP, BPA is proposing to implement a conservation program to preserve the genetic purity of the westslope cutthroat trout populations in the South Fork of the Flathead River drainage. The South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program constitutes a portion of the Hungry Horse Mitigation Program. The purpose of the Hungry Horse Mitigation Program is to mitigate for the construction and operation of Hungry Horse Dam through restoring habitat, improving fish passage, protecting and recovering native fish populations, and reestablishing fish harvest opportunities. The target species for the Hungry Horse Mitigation Program are bull trout, westslope cutthroat trout, and mountain whitefish. The program is designed to preserve the genetically pure fluvial and adfluvial westslope cutthroat trout (*Oncorhynchus clarki lewisi*) populations in the South Fork drainage of the Flathead River. To accomplish the goals, MFWP is proposing to remove hybrid trout from identified lakes in the South Fork Flathead drainage on the Flathead National Forest and replace them with genetically pure native westslope cutthroat trout over the next 10-12 years. Some of these lakes occur within the Bob Marshall Wilderness and Jewel Basin Hiking Area. Currently, 21 lakes and their outflow streams with hybrid populations have been identified and are included in this proposal. Other lakes may also be included as additional information is discovered. BPA funds would be used to implement this project. These activities would occur on lands administered by the FS.

BPA described and analyzed the proposed action and alternatives in a draft environmental impact statement (DEIS) released in June 2004. BPA is considering the following alternatives:

- Alternative A: (No Action) Status Quo Management
- Alternative B: (Proposed Action) Fish Toxins-Combined Delivery and Application Methods
- Alternative C: Fish Toxins-Motorized/Mechanized Delivery and Application Methods
- Alternative D: Suppression Techniques and Genetic Swamping

This abbreviated final environmental impact statement (FEIS) contains the changes made to the DEIS, comments received on the DEIS, and BPA's written responses to the comments. The FEIS should be used as a companion to the DEIS, which contains the full text of the affected environment, environmental analysis and appendices. BPA expects to issue a Record of Decision on the proposed project in summer 2005.

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For additional copies of this document, please call 1-800-622-4520 and ask for the document by name. Or you can request additional copies by writing to:

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ATT : Public Information Center - CHDL-1

The FEIS is also on the Internet at:
http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/.

For additional information on DOE NEPA activities, please contact Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, EH-42, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585, phone: 1-800-472-2756 or visit the DOE NEPA Web site at www.eh.doe.gov/nepa.

Contents

List of Tables

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Summary

This is the final environmental impact statement (FEIS) for the proposed South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program. This document has been prepared as an "abbreviated" FEIS pursuant to the Council on Environmental Quality's (CEQ) National Environmental Policy Act (NEPA) regulations because there have been no substantial changes to the proposed action, alternatives, or environmental analysis presented in the Draft EIS (DEIS) (dated June 2004). Consistent with 40 C.F.R. 1503.4(c), this abbreviated FEIS provides comments received on the DEIS, agency responses to these comments, and any changes made to the DEIS. This FEIS should be used as a companion document to the DEIS, which contains the full text of the affected environment, environmental analyses, and appendices. For readers of this FEIS who do not already have a copy of the DEIS, copies may be obtained by:

- Calling BPA's document request line at 1-800-622-4520; record your name, address, and which documents you would like, or
- Accessing the DEIS on BPA's Web site at: http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/, or
- Writing to: Bonneville Power Administration
  PO Box 3621
  Portland, OR 97208
  ATT: Public Information Center - CHDL-1

The remainder of this summary provides an overview of the proposed action and alternatives, the lead and cooperating agencies, the comment period for the DEIS, and changes to the DEIS. Chapter 1 presents comments (copies of letters, e-mails, comment forms, and public meeting comments) on the DEIS and agency responses to these comments.

Proposed Action and Alternatives

Scope of Project

Twenty-one specific lakes and their designated stream segments are targeted for treatment. Additional information about the sites including location, size, and specifics about the methods of and procedures proposed for treatment can be found in Appendix C of the DEIS. Although there is no specific information indicating other hybrid lakes and streams are present in the South Fork, if any other lakes and streams in the South Fork Flathead are discovered at some time in the future to contain hybrid trout, these may also need to be treated (see Section 2.2 of the DEIS).

A list of lakes currently under consideration include the following:

- Black
- Blackfoot
- Clayton
- George
- Handkerchief
- Koessler
- Lena
- Lick
- Lower Big Hawk
- Lower Three Eagles (genetic analysis pending)
- Margaret
- Necklace Chain of Lakes ("Smokey Creek Lakes") – total of four
- Pilgrim
- Pyramid
- Sunburst
- Upper Three Eagles
- Wildcat
- Woodward

The determination to treat lakes and streams other than those 21 listed above would be made only if hybridization was determined through genetic analysis.

Alternatives Under Consideration

BPA is considering the following alternatives:

- Alternative A: (No Action) Status Quo Management
- Alternative B: (Proposed Action) Fish Toxins-Combined Delivery and Application Methods
- Alternative C: Fish Toxins-Motorized/Mechanized Delivery and Application Methods
- Alternative D: Suppression Techniques and Genetic Swamping

The No Action alternative would maintain current management practices, including current fish stocking practices, angling regulations, and future fish stocking. BPA would make no effort to affect the westslope cutthroat population in the South Fork, which would provide no means to prevent hybrid trout from moving downstream to pioneer new areas. These hybrid trout would continue to compromise the genetic integrity of the genetically pure westslope cutthroat trout by interbreeding and likely creating new hybrid populations in the South Fork Flathead drainage. If Alternative A: No Action is implemented, hybridization would continue to threaten the genetic purity of the westslope cutthroat populations and could also lead to future restrictions on angling, affect angling opportunities, and management for this species. The No Action Alternative could also lead to an Endangered Species Act (ESA) listing of the westslope cutthroat trout and more severe restrictions for all activities affecting the species in the subbasin.

Alternative B would use a combination of motorized/mechanized (i.e., aircraft, motor boats) and non-motorized/non-mechanized (i.e., livestock, hiking) means to access all project sites and apply fish toxins to remove hybrid trout from the lakes and designated portions of the outflow streams, and then restock the lakes and streams with genetically pure westslope cutthroat trout.

Before re-stocking with fish, Montana Fish, Wildlife and Parks Department (MFWP) would install sentinel fish cages in each lake to determine if the water conditions are appropriate, and if so, the lake and stream would be stocked in order to establish genetically pure cutthroat populations in sufficient quantities to dominate any hybrid fish that might remain, and to re-establish the fishery. MFWP would determine future stocking amounts and frequency on a case-by-case basis.

Monitoring of the restocked fish would continue for several years to determine population viability and associated characteristics, determine program success such as presence and degree of natural reproduction, genetic purity, angling quality, and growth rates of fish.

Alternative C is similar to Alternative B in all respects, but differs in the method used to transport materials, equipment and supplies to the project sites and in the application of fish toxins to the lakes. The main difference is in the use of aircraft as the sole means of transport.

Alternative D proposes the combined use of two or more mechanical removal strategies to reduce hybrid trout numbers in an effort to protect downstream genetic purity of the westslope cutthroat. This alternative would rely on the use of mechanical fish collection methods as a means to suppress the hybrid trout populations by removing as many fish as possible. When population levels are adequately reduced, intensive fish stocking would commence on a "frequent or annual" basis (swamping) in an attempt to dominate the remaining hybrid trout in the lakes.

Lead and Cooperating Agencies

BPA is the lead federal agency and supervises the preparation of the EIS. The proposed activities would occur on lands administered by the U.S.D.A. Forest Service, so the Forest Service is a cooperating agency. The program is being proposed by the State of Montana Fish, Wildlife, and Parks Department.

Draft EIS Comments

The Draft EIS was distributed to agencies, tribes, groups, individuals and libraries in June 2004. A public review period was open until August 20, 2004. A public meeting was held on July 12, 2004 in Kalispell, Montana to accept public comment on the draft document. During the comment period, 40 individuals, groups or agencies submitted remarks that resulted in 560 comments. Issues raised in the comments included the following:

- Fish Restocking/Fishless Lakes
- Fisheries Genetics (WCT)
- Fish Removal, Piscicides
- Non-target Species
- Wilderness/Access Methods
- Recreation
- Socioeconomics

- Water Quality
- Necessity of Project (Government Spending/Success of Project)
- Comment on Alternatives &/or Suggestions
- Monitoring Plans
- Human Health
- Other Resource Issues/Comments

Copies of comments made on the DEIS and BPA's responses to those comments are in Chapter 1.

Changes to the Draft EIS

There are no major changes to the DEIS that was released in June 2004. The following are additions or corrections made to the DEIS in response to comments.

Chapter 1 Purpose of and Need for Action

On page 1-7, the broodstock referred to is the M012 fish.

Chapter 2 Proposed Action and Alternatives

On page 2-18 "...Appendix B gives estimates..." should read Appendix **C**.

Section 2.4.3.4 should be titled "**Summary of Transportation Methods.**"

Add to Section 2.4.1.1:

Pages 2-8, 2-9, 3-11 and D-5 refer to the restocking of lakes treated with rotenone to restore angling. In the case of Tom Tom and Whale lakes, these were restocked with two-year old westslope cutthroat trout between 8 and 11 inches long. Angling was restored immediately. Although the size of these fish was not the same as those removed, angling was restored much more rapidly than stocking young of the year-sized fish. These populations have been monitored annually since 2002, and angling continues to be good. In addition to restoring the angling by stocking larger sized fish, in both cases, the natural production capability was restored. Each year since 2002, these lakes have produced wild westslope cutthroat trout that contribute to maintaining the populations.

Add to Section 2.4.1.2:

Powdered rotenone was ruled out as the primary form of rotenone due to the additional logistical and time requirements necessary to mix the material on site. Questions raised during the comment period of the DEIS made MFWP re-consider using powdered rotenone for at least a portion of the application. The rotenone label indicates that powdered form can be applied by *"...placing undiluted powder in a burlap sack and trail behind the boat...when treating deep water (20 to 25 feet) weight bag and tow at desired depth..."* On this basis, it may be beneficial in some cases to use powdered rotenone partially for application in some deep lakes. This would reduce the amount of liquid formulated rotenone necessary, which would reduce the number of transport trips, and reduce the amount of time and effort required to pump treated surface water to deep water zones. Liquid rotenone would still be the principle form of the rotenone, but powder would be used in concert for deep-water application. The powdered form typically has 7.5% active ingredient versus 5% in the liquid form.

This strategy would reduce the amount of emulsifier applied to the environment. The human health threats would be similar to the liquid formulation. Because the powdered form would be used for specific application to deep water zones, it would be transferred to permeable containers (burlap sack) and stored in plastic bags prior to the treatment, then transported to the site by helicopter. Handling on site would be reduced to fixing the sacks to a rope at the appropriate depth and placing them in the water for towing behind a boat.

The main difference in the precautionary statements for both forms of rotenone are in the type of respirator system required for applicators. A NIOSH approved respirator system with any N,R,P, or HE filter is required when using the powdered form and an OV canister with any R,P, or HE filter is required when using the liquid formulation.

Add to Section 2.4.1.3:

The following information was reported in Grisak (2003c):

Other compounds that will readily bind with antimycin to detoxify it include activated charcoal and natural substances like leafy vegetation and water plants. It does not enter ground water supplies because it binds rapidly with organic compounds in soil and in water (Romeo, 2002).

Water temperature has an influence on the efficacy of antimycin (Walker et al 1964, Gilderhaus et al. 1969, Marking and Dawson 1972). Longer exposure times are required in colder water to produce mortality in trout (Tiffan and Bergersen 1996). For this reason, antimycin will naturally detoxify quicker in warmer water than in colder water. Water treated at 39°F required two to three times as much exposure time for mortality than water treated at 71°F (Lee et al. 1971).

Antimycin degrades rapidly in water and detoxification under field conditions can be complete within 24 to 96 hours (Walker et al. 1964; Lennon 1970). Sunlight will also break down antimycin. Lee et al. (1971) reported that when in aqueous solution in sunlight and shade, it had a half-life of less than 20 minutes.

Marking (1973) reported that the performance of antimycin decreases dramatically when the pH of the water is over 8.5. The pH values measured from lakes in this project are fairly consistent. The mean pH value for project lakes is 6.8 and ranges from 6.2 to 7.7 (see Table 6 for listing of some values). Based on this information antimycin would be expected to perform at its most effective level under these water conditions.

Based on half life toxicity studies conducted by Marking (1973, 1975), Marking and Dawson (1972) and Berger (1966), and the measured pH values of lakes proposed in this project (range 6.2-7.7), the expected toxicity of antimycin to fish in the project lakes would last for 2-7 days. This rate would be slightly influenced by water temperature and sunlight intensity during the application. Trout are highly sensitive to antimycin. Contact time necessary to cause death ranges from 1-4 hours and the effects are irreversible (Gilderhus et al. 1969; Gilderhus 1972). Rosenlund and Stevens (1992) reported that this time is actually protracted during field applications but once exposed, trout are usually dead within 48 hours. Because fish cannot taste or smell antimycin, the compound does not repel fish like other toxicants can (Lennon 1970; Berger 1966). For this reason fish do not intentionally avoid exposure to the compound.

Appendix D of the DEIS provides information on the proper management of rotenone.

Add to Section 2.4.5:

We acknowledge that the DEIS lacks detailed information on the design and function of drip stations that would function as detoxification stations. This project will likely employ the use of two different designs of drip stations to dispense potassium permanganate for detoxification. The California 5-gallon Drip Can design was recently experimented with and found to perform nicely in administering a consistent and constant concentration of liquid. This method has been used extensively in California for numerous fish control projects. The other design is known as the Lightweight Constant-Flow Device referred to in Stefferud and Propst (1996).

The drip station, when used to dispense neutralizing agent, works by administering a constant and steady flow of liquid over a 1-4 hour period. Typically the container is 5-gallons, but can be as large as 200 gallons, depending on access to the project site. A known and pre-calculated concentration is placed in the container and administered over a known and per-calculated period of time. An attendant is required to monitor the drip station and make periodic evaluations and adjustments to the flow rate, if necessary. Typically caged fish are placed upstream of the detoxification station to make sure the treatment is successful up to that point. A second cage with fish is placed downstream of the detoxification station to measure proper neutralization.

Monitoring also includes the following:

- Setting caged fish in lakes and streams to determine the lethality and/or neutrality of treated waters, and when to restock.
- Gill netting lakes to determine fish population status.
- Visual observation of spawning redds, in part, to determine natural reproduction.
- Electrofishing surveys in streams to determine fish abundance.
- Sampling lakes with a Wisconsin net to determine plankton species and abundance.
- Angler surveys and reports to determine satisfaction.
- Sweep netting and kick netting to determine insect species and abundance.
- Visual surveys, kick netting, and electrofishing to determine amphibian presence and abundance.

Post treatment evaluations will involve replicating pre-treatment evaluations. This provides the most consistent methodology. Pre-treatment plankton evaluations are made by replicate vertical tows using a 5 inch Wisconsin net at 50 feet depth, or maximum lake depth, which ever is greatest. These samples are analyzed to a reasonable degree of taxonomic resolution for average number per species per liter, and by total number per species, when feasible. These evaluations have been conducted on monthly intervals, during ice off, in some lakes to capture variation in species richness and abundance in the SF drainage.

Amphibian surveys involve walking and dip netting along shorelines, and kick netting and visual observations in streams. Time has been the unit of effort. Monthly amphibian surveys have been conducted on some lakes to capture variation in richness, life stage, abundance and, most importantly, detectability.

Insect evaluations are being designed by MFWP and will begin in 2005. This survey will sample stream and lake insect communities throughout the SF drainage and will determine a baseline by which to compare future insect community status. Kick netting will be used in streams, sweep netting will be used in lakes, where possible, and a sample of lake benthos will be taken from sediments up to 50 feet depth.

There is inherent natural variation in insect, plankton and amphibian communities. Evaluations conducted before any treatment would hopefully capture this variation, and would be useful in making post treatment conclusions.

Add to Section 2.4.6:

Page 2-27 and Appendix C of the DEIS states that fish would be stocked in some of the streams to restore a viable fish population. We acknowledge that more information should have been provided in the DEIS. In 1973, the Fish and Game Commission changed the fish stocking policy by ruling that MFWP would no longer stock catchable-sized trout in streams with healthy wild trout populations. For the most part, this policy has been followed, and has been successful. In the case of this project, restocking of streams would not be for the purpose of sustaining angling, rather it would be conducted as a conservation measure to restore a viable population that could pioneer the treated segments of stream in a manner faster than would naturally occur by drift from the lakes. The intent of this stocking is to expedite the repopulation of the streams with pure westslope cutthroat trout. Stocking density would be relatively small and likely consist of a few hundred WCT yearlings.

Chapter 3 Affected Environment and Environmental Consequences

On page 3-22, Appendix A should be Appendix **D** (grizzly bear)

On page 3-30, the last sentence – change researched to research.

The water quality information on page 3-31 under soil and vegetation should be moved to Section 3.4, Water Resources.

Add to Section 3.1.2.1:

There will be some jet exhaust and exhaust from outboard motors, but these emissions are expected to be minimal resulting in short term and minor impacts to air quality.

Add to Section 3.3:

We agree that little information was provided in the DEIS about the Harlequin duck. Harlequin ducks are known to occur within the project area. These ducks are relatively uncommon sea ducks.

In spring, the birds begin their migration to inland nesting sites that are usually along smaller river tributaries. Like many other waterfowl, male Harlequin Ducks leave the breeding areas once incubation begins (usually by mid-June to early July). After leaving their mates, males migrate to specific moulting sites to undergo their postnuptial moult. Females normally join males at these sites and moult one to two months later. Migration to the traditional wintering areas, which may encompass the moulting sites, takes place in September to October. Harlequin Ducks have different feeding habits depending on the season. During spring and summer, when Harlequins occupy freshwater habitats, the birds dive to the bottom and walk against the current, prying in the bottom substrate in search of larvae of flying insects such as blackflies, caddis flies, stone flies, and midges. The absence of sufficient food is thought to limit distribution in more northerly areas. Wintering habitat consists of turbulent seas and the rocky parts of coastal areas. The birds locate their food by diving in shallow waters over wave-pounded rocks and ledges to find and pry prey from crevices. The most common food items include small crabs, amphipods, gastropods, limpets, chitons, blue mussels, and fish eggs. The Harlequin Duck has high food energy requirements, probably because of its relatively small body mass and high metabolic demands, especially in colder parts of its range. Because a small bird can store fewer reserves than a large bird, Harlequins are less suited to survive extremely cold and stormy weather. They must feed continually to maintain their metabolism.

Any impacts to this duck would be short term and minor in the form of lower food availability if aquatic insects are reduced during a treatment. The likelihood of direct exposure to a treatment will be lessened because the treatments would be applied in the fall when ducks are returning to their winter habitats on the coast. If direct exposure or oral ingestions of antimycin or rotenone-killed organisms by birds were to occur, the ducks would not be affected because in general they are not affected by fish-killing concentrations (Schnick 1974a and 1974b).

Add to Section 3.3.2.2:

Table 3-5 of the DEIS was updated to correct some errors. First, the data were collected from 29 lakes in the South Fork and not 23 as reported in the DEIS. This error was made when lakes in a chain complex were tallied together rather than tallying them separately. Next, the data were collected between 2000 and 2003 and not 2002 and 2003 as reported in the DEIS. Finally, the figures presented in the DEIS were overestimated by 11% as a result of a calculation error in converting tow depths from Imperial to metric measurements. In 2004, MFWP instituted a more comprehensive analysis of 35 lakes in the project area. That study was designed to measure seasonal variation in abundance and diversity of plankton, and also to attempt to measure spatial variation. Lakes with and without fish have been sampled.

Table 3-5. Zooplankton and planktonic insect species sampled from 29 lakes (34 samples total) in the South Fork Flathead drainage, 2000 to 2003.

Zooplankton Species	**Number of lakes present**	**Maximum per liter**	**Minimum per liter**	Mean per liter
Daphnia thorata	17	4.58	0.005	1.143
Daphnia pulex	12	3.44	0.004	1.116
Bosmina spp.	6	16.33	0.004	2.949
Holopedium gibberum	4	6.06	0.04	3.053
Cyclops spp.	13	5.22	0.003	0.777
Calanoid Diaptomus spp.	26	19.09	0.02	2.833
Calanoid Epischura spp.	2	0.71	0.02	0.365
Nauplii	13	2.69	0.006	0.434
Chaoboridae spp. (insect)	2	0.067	0.043	0.055

Add to Section 3.3.4.2:

We do not expect that retreatment would be necessary, but if after monitoring the effectiveness of the first treatment we find that retreatment is necessary, we may treat a second time. We do not expect a third treatment to be necessary, but if it were we would look at other options considered in this analysis. Caged fish in the lake and streams during the treatment would be the first method of evaluation, thereafter, we would use gill netting, visual surveys and electrofishing to detect the presence of live fish after a treatment.

If subsequent treatments are necessary, we believe the cumulative impacts would be the similar as the first treatment, just a year later in time, so it would affect different individuals and the non-target populations (plankton and aquatic insects) might be depressed from the first treatment if they have not fully recovered. We do not expect cumulative impacts to be long term, but we recognize that this action would delay the repopulation of non-target organisms by one more year. The fishery would also be impaired for one year longer. Our estimation of predicted impacts comes from the historical record of treatment of lakes and streams in Montana. Past treatments had different objectives and were carried out over a long span of time. However, we do not expect a second treatment to cause long-term impacts. See Appendix D (page D-4). The examples of lakes in the Flathead area that received second treatments that are listed in Appendix D were not implemented in the next year after the first treatment, but were done in later years (average time between treatments 19 years and range was 8-36).

We would use our post-treatment and pre-treatment data to assess what impacts might occur from the second treatment. We do not expect the impacts to be absolute or long-term based on the case histories from similar treatments.

To fully predict the outcome of second treatment would require expensive, time-consuming studies that are not part of our proposal. However, should a second treatment of a lake be needed, we would collect data through our proposed monitoring plan that could be used in future decision-making.

Add to Section 3.4:

It may be reasonable to base the chronic exposure scenario on the drinking water route of exposure only, since, as the DEIS explains, the fish targeted for removal will be killed quickly and the dead fish will be collected and disposed of (i.e., if the fish are quickly killed and disposed of, there would not appear to be much likelihood of bioconcentration and a fish consumption route of exposure). As a result, the chronic risk assessment calculation for the water column values might be based solely on the drinking water route of exposure. The reasonableness of this assumption, of course, would depend on a 100% (or close to) fish kill, dead fish collection and a short half-life for the chemicals used. Since the objective of a project such as this is generally 100% kill, limited potential for bioconcentration would seem to be a reasonable assumption.

Correction to Section 3.4.1

Replace the third and fourth paragraphs with these paragraphs:

Typical stream types found in the project area generally have gradients from 4 to 10 percent, and are characterized by straight (nonsinuous) cascading reaches with closely spaced pools. Many of the outlet streams associated with the lakes in this project have large waterfalls immediately downstream of the lakes, some reaching 200 feet tall.

Streams with gradients from 2 to 4 percent usually occupy narrow valleys with gently sloping sides…

There are no federal or Montana numeric water quality standards for rotenone or antimycin. However, the Montana Water Quality Act has narrative standards for water quality that prohibit the introduction of substances into waters that are injurious to aquatic life or that affect exiting uses. Under this project, MFWP would apply piscicide for the expressed purpose of killing unwanted fish. The Montana WQA in §75-5-308 MCA and the EPA through FIFRA acknowledge the use of pesticides under special circumstances is beneficial. FIFRA registration and label instructions reduce the potential for impacts to non-target organisms or long-term impacts and protects human health. Conditions imposed by DEQ when it issues a "308 authorization" will add an additional level of protection to non-target organisms and designated beneficial uses. The conditions may include limitations to the time of year the piscicides are applied, monitoring treated waters to ensure detoxification of the piscicides is complete, biological monitoring and ensuring that the duration of toxic conditions is as short as possible, among others.

Add to Section 3.4.3.1:

Grisak (2003c) reported that antimycin would readily bind to and be detoxified by activated charcoal and natural substances like leafy vegetation and water plants. It does not enter ground water supplies because it binds rapidly with organic compounds in soil and in water (Romeo, 2002).

Section 3.9.1 of the DEIS provides information on the proper management of rotenone.

Impacts to drinking water used by humans and livestock would be minimized by temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary. A number of other precautions will aid in the reduction or elimination of exposure to these compounds by wildlife and other aquatic life proper containment of piscicide treatments (low concentrations used for fish killing do not have harmful effects on mammals); rapid detoxification of both compounds in flowing streams and the treated lakes;

Impacts to agriculture in the project areas are expected to be slight to no effect. Recreation (swimming) use impact would also be slight because of the time of year and cold-water conditions when the treatments would be applied. Recreational fishing would be impacted until the restocking occurs.

Add to Sections 3.6.4 and 3.6.9:

We acknowledge that terms like "wilderness solitude," and "wilderness values" are difficult to define, and the meanings will vary among people. We believe it is important to recognize these differences and make some attempt to qualify the way in which they are interpreted (see addition to Section 3.7).

Add to Section 3.6.5:

The Draft Minimum Tools Analysis analysis was used in part to narrow the scope of the analysis of the DEIS. Non-motorized application of toxicant was determined to be impractical at achieving the objectives. Section 2.6 of the DEIS also provides some information on the impracticality of using non-motorized boats to implement.

Roselund and Stevens (1992) have described in detail the procedures for implementing a successful antimycin project. They reported that an outboard motor is absolutely necessary to obtain an effective mix of antimycin during a lake application. Because it is applied in such low concentrations, the compound requires thorough mixing. If an outboard motor cannot be used, they recommended not conducting the treatment.

In 1996, MFWP used a raft to apply rotenone on Devine Lake in the Bob Marshall Wilderness to remove brook trout. Devine Lake is one acre in size and has a maximum depth of 14 feet. Based on the small size and shallow depth, it was possible to apply rotenone to the lake with a small rowed craft. None of the lakes in this proposal are as small, except for some of the Necklace Lakes. Nevertheless, the several lakes that comprise the Necklace complex are proposed for treatment at the same time, using antimycin. Based on this, the complexity of this treatment warrants using the appropriate measures to ensure the toxin is thoroughly mixed within one day.

Add to Section 3.7:

We acknowledge that terms like "wilderness solitude," and "wilderness values" are difficult to define, and the meanings will vary among people. We believe it is important to recognize these differences and make some attempt to qualify the way in which they are interpreted.

Numerous commenters recommended removing fish from lakes and not restocking them. While we recognize that some commenters wish to restore the BMWC to pre-European influence, and that others wish to observe and restore natural processes. We recognize the importance of these intangible wilderness values. This project was designed to increase naturalness by removing nonnative fish and hybrids that were introduced by man.

We also recognize that using motorized equipment in a wilderness would have a short-term impact on these intangible wilderness values. Though a wilderness user may not be at a site to see or hear motorized equipment, the mere thought of this action may have short-term impacts on the untrammeled quality of the wilderness. While we recognize this value system exists for some, it is also important to recognize the tangible values of others, which are firmly rooted in activities like angling, recreation, and outfitting, as well as the protection of native species like the westslope cutthroat trout. Depriving or impacting the latter values would have real and quantifiable impacts on established social, recreational, and economic practices. Quantifying the impacts on the intangible values and undefined wilderness quality is impossible, and we recognize that intangible values are no less important than tangible values. Upon completion of the project, protection of westslope cutthroat trout would require less human intervention and the trend toward wildness would increase.

MFWP has a history of using aircraft in the South Fork drainage since 1953. After the passing of the Wilderness Act in 1964, MFWP aircraft use in the BMWC continued, but tapered off slowly. The last known landing for fisheries work was in Big Salmon drainage in 1965. Since that time aircraft have been used to stock fish in lakes in the SF drainage. Starting in 1985 and continuing for the next 20 years, MFWP helicopter flights over the BMWC steadily increased to correct the problem of hybrid trout. Implementing genetic swamping required more frequent helicopter flights to stock pure westslope cutthroat trout. The motorized equipment component associated with this project, although controversial, was designed to eliminate the threat of hybrid trout, and ultimately reduce the number and frequency of flights necessary to conserve native fish species.

Add to Section 3.9

The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows:

For antimycin, the 0.5 mg/kg-day is a No Observed Effect Level (NOEL), not a Rfd. To arrive at a RD. this value will have to be adjusted downward based on appropriate uncertainty factors. EPA's Regional toxicologist (Dr. Robert Benson) recommends an overall uncertainty factor of 3,000 rather than 300 based on the following:

1) a factor of 10 based on uncertainty in the animal to human translation;

2) a factor of 10 based on intra-human variability;

3) a factor of 10 based on the subchronic/chronic uncertainty; and

4) a factor of 3 based on data limitation (i.e., one study) = 3000 as the overall uncertainty.

The RfD for antimycin, then, would be 0.0002 mg/kg-day.

For antimycin, the document notes that antimycin does not bioconcentrate, and therefore no bio-concentration factor (BCF) is used in the calculation of the human health value. The EPA suggested that there be a reference supporting this conclusion (EPA noted: There are a number of toxicants, some metals for example, that do not bioconcentrate appreciably and are said not to concentrate, but even for these, the BCF is often greater than 1).

Based on the adjustments discussed above (using the 17.5 grs consumption assumption for the rotenone "water+fish"), the EPA suggested the appropriate toxicant target concentrations and human health values would be as shown in Table 3-8:

Table 3-8. Toxicant Target Concentrations and Human Health Values

Toxicant	Water Column Value	Human Health Value	
		Water plus fish	Water only
Rotenone	50 ug/L	18 ug/L	140 ug/L
Antimycin	7.5-8.0 up/L or 4 ug/L	---	7.0 ug/L
Potassium permanganate	4.5 mg/L	---	0.8 mg/L

Based on these figures, the target concentrations for rotenone (50 ug/l) would be lower by greater magnitude than the estimated chronic "water only" human health value for rotenone (140 ug/L), more so than target concentrations and "water only" human health values for antimycin and potassium permanganate. This suggests that there may be a greater margin of safety in regard to human health risk for use of rotenone (at the proposed target concentrations) than for the other chemicals. Admittedly, this is an observation based on a limited amount of information and application of uncertainty factors, and it should also be noted that proposed target concentrations of these chemicals may be higher than shown to account for water chemistry and fresh water inputs. In any case, it is important that potential human health risks be considered along with other factors (e.g., rate of detoxification, quantity needed to kill fish, ease of bulk transport, toxicity to non-target organisms, piscicide availability, etc.,) in weighing the advantages and disadvantages of use of the chemicals.

Suggested Guidance for Application of Manganese RfD to Specific Scenarios

EPA suggested the following guidance:

In applying the reference dose (RfD) for manganese to a risk assessment, it is important that the assessor consider the ubiquitous nature of manganese, specifically that most individuals will be consuming about 2-5 mg Mn/day in their diet. This is particularly important when one is using the reference dose to determine acceptable concentrations of manganese in water and soils. Following RfD/RfC Work Group deliberations, it was decided that having a single reference dose for total oral intake of manganese is most appropriate, but that guidance should also be provided as to how this reference dose might be applied in specific situations. It is recommended that the upper end of the range recommended by the NRC (5 mg/day, described below) be considered to represent a typical human intake from total dietary sources. For determination of acceptable concentrations of manganese in water and soil, then, the risk assessor would subtract this amount from the level specified by the RfD [i.e., 10 mg/day (RID) - 5 mg/day (typical dietary intake) =5 mg/day (remaining)]. For applying this number to a non-dietary scenario, it is also recommended that a modifying factor of 3 be applied. The rationale for this modifying factor is three-fold. First, while the data described in section I.A.4 of the IRIS file suggest that there is no significant difference between absorption of manganese as a function of the form in which it is ingested (i.e., food versus water), there was some degree of increased uptake from water in fasted individuals. Second, the study by Kondakis et al. (1989) has raised concerns for possible adverse health effects associated with a lifetime ingestion of drinking water containing about 2 mg/L manganese. While no data are available to quantify total intake of manganese, one would not expect this concentration of manganese in water to be a problem based on dietary information revealing intakes ranging from 2 to 10 mg/day that are not associated with adverse health effects. Third, although toxicity has not been demonstrated, there are remaining concerns for infants fed formula which typically has a much higher concentration of manganese than does human milk (see section I.A.4 of the IRIS file for further discussion). If powdered formula is made with drinking water, the manganese in the water would represent an additional source of intake.

Using the recommended appropriation of 5 mg Mn/day for dietary contributions and a modifying factor of 3 for exposures from soil and drinking water and a body weight of 70 kg, yields a value of 0.0238 mg/kg-day.

Exposure from water + Exposure from soil = (10-5)/(3x70) = 0.0238 mg/kg-day.

Assuming no exposure from soil and a '70 kg person drinking 2 L/day, the suggested advisory level is:

0.0238 mg/kg-day x 70 kg x 1 day/2 L = 0.8 mg/L

The following correction should be made:

The new fish consumption value for the Clean Water Act 304(a) criteria is 17.5 grs/day instead of 6.5 grs/day (this may be limited to 6.5 grs because that is the value in the current version of the State's WQB-7 criteria document).

Chapter 7 References

Add the following references:

Adams, Susan B., Christopher A. Frissell, and Bruce E. Rieman. 2001. Geography of invasion in mountain streams; consequences of headwater lake fish introductions. Ecosystems 4[4] 296-307.

Fraley, J. 2001. Personal communication on the post rotenone treatment evaluation of Devine Lake. Montana Fish, Wildlife & Parks, Kalispell.

Fredenberg, W. 1993. Collection of juvenile bull trout in the Flathead River drainage, Montana. U.S. Fish and Wildlife Service, Creston Nation Fish Hatchery, Kalispell.

Hinson, D. 2000. Rotenone characterization and toxicity in aquatic systems. Unpublished paper. University of Idaho, principles of environmental toxicology, Moscow.

Knapp, Roland A., Paul Stephen Corn, and Daniel Schindler. 2001. The introduction of nonnative fish into wilderness lakes: good intentions, conflicting mandates, and unlimited consequences. Ecosystems 4[4]275-278.

Kondakis, X.G., N. Makris, M. Leotsinidis, M. Prinou and T. Papapetropoulos. 1989. Possible health effects of high manganese concentration in drinking water. Arch. Environ. Health. 44(3): 175-178.

Landers, Peter, Shannon Meyer, and Sue Matthews. 2001. The wilderness act and fish stocking: an overview of legislation, judicial interpretation, and agency implementation. Ecosystems 4[4] 287-295.

Lee, T.H., P.H. Derse, and S.D. Morton. 1971. Effects of physical and chemical conditions on the detoxification of antimycin. Transactions of the American Fisheries Society 1:13-17.

Lesser, B.R. 1970. The acute toxicities of antimycin A and juglone to selected aquatic organisms. Masters thesis. Department of Biology, University of Wisconsin, La Crosse.

Marking, L.L. 1973. Critical factors influencing the inactivation of antimycin in water. Masters thesis. University of Wisconsin, La Crosse.

Marking, L.L. 1975. Effects of pH on toxicity of antimycin to fish. Journal of Fisheries Research Board of Canada. Vol 32(6) 769-773.

Marking, L.L., and V.K. Dawson. 1972. The half-life of biological activity of antimycin determined by fish bioassay. Transactions of the American fisheries Society. 1;100-105.

Pilliod, David S. and Charles R. Peterson. 2001. Local landscape effects of introduced trout on amphibians in historically fishless watersheds. Ecosystems 4[4] 322-333.

Pister, Edwin P. 2001. Wilderness fish stocking; history and perspective. Ecosystems 4[4] 279-286.

Romeo, Nick. 2002. Aquabiotics, personal communication.

Schindler, Daniel E., Roland A. Knapp, and Peter R. Leavitt. 2001. Alteration of nutrient cycles and algal production resulting from fish introductions into mountain lakes. Ecosystems 4[4] 308-321.

Stefferud, J.A. and D.L. Propst. 1996. A lightweight constant flow device for dispensing liquid piscicides into streams in remote areas. North American Journal of Fisheries Management 16:228-230.

Appendix B Legal Chronology of Westslope Cutthroat Trout Listing Milestones

Add the following text to page B-3:

On October 25, 2004, the plaintiffs filed a notice of intent to appeal the USFWS decision to not list the WCT as a threatened species under ESA claiming that once again the USFWS failed to undertake a rational assessment of the WCT's current status in light of the best available scientific data and prevalent hybridization with introduced rainbow trout and Yellowstone cutthroat trout.

Appendix D Technical Appendix on the Use of Piscicides

Add the following tables and text:

Although the performance benefits are listed in the DEIS for antimycin, we acknowledge that the DEIS is not clear on the performance advantages that were used to help determine where rotenone would be used (see Table D-1).

First, rotenone has performance characteristics in stream environments that can be used to the advantage of an applicator to cover longer reaches of streams in rugged remote terrain. As a result, this does not require as many drip stations to maintain lethality of stream water. In areas where downstream bull trout populations are not at risk of exposure to the fish toxin, rotenone is preferred to make advantage of this. When bull trout are at risk of exposure, antimycin would be used to reduce the impacts to them.

Second, MFWP has a long history, success with, and is experienced at using rotenone, specifically within the project area.

Marking and Dawson (1972) reported that the half-life of antimycin in water of pH 8.0 and temperature of 53°F was 100 hours. Schnick (1974a) reported that half-life of antimycin was between 68 and 120 hours, depending on temperature and pH. These figures were reduced when antimycin was exposed to direct sunlight. Lee et al. (1971) studied the effects of pH, hardness, temperature and light intensity, and determined that pH was the most significant physical attribute that influences its persistence. Based on these studies, and the chemistry of water in the project lakes, we would expect the half-life of antimycin in lakes to be approximately 100 hours. In regard to antimycin performance in stream environments, Tiffan and Bergersen (1996) reported that antimycin is detoxified by natural processes including absorption by organic materials, oxidation, and exposure to UV light, generally within about 200 meters of stream elevation drop.

According to Gilderhus et al. (1986), the half-life of rotenone in cold water (41°F) at pH 8.6 was between 3 and 7 days. Based on this information we would expect the half-life performance of rotenone in this project to be similar, but likely toward the 3-day figure.

Table D-1. Comparison of advantages and disadvantages of using rotenone and antimycin for the South Fork Flathead westslope cutthroat trout conservation program.

Method	Advantages	Disadvantages
Rotenone	-proven technique -can be contained with potassium permanganate, activated charcoal -naturally detoxifies with UV light, oxidation, dilution -maintains toxicity in streams longer than antimycin -used extensively in this area since 1948 -molecular weight is heavier than water, sinks through deep water. -fish die within 1-3 hours of exposure -minimal affects to amphibians	-liquid formulation is bulky, requires more resources to transport to remote areas -liquid form has petroleum emulsifier -fish may smell/taste it and try to avoid - fish may avoid or recover from rotenone toxicity by breathing fresh water -maintains toxicity in streams longer than antimycin -has distinctive odor -powder form generally requires mixing slurry on site
Antimycin	-proven technique -can be contained with potassium permanganate, activated charcoal -rapidly degrades with UV light, binds to organic compounds -naturally detoxifies with every 200 feet of drop in stream elevation -non-toxic until mixed, less risk of damage resulting from accidental spill -requires less volume than other piscicides -two components, inert until mixed -fish can't smell it, can't avoid it -toxic to fish in very low concentrations -does not affect amphibians at fish killing concentrations -easily packed to remote areas by mule -easily transported by livestock -nearly odorless	-limited history of use in this area -naturally detoxifies with every 200 feet of drop in stream elevation -administered in such small quantity that proper mixing is paramount. -fish die within 4-8 hours of exposure

Thermal analyses of three lakes located in project area over the past two years indicate that the lakes experience limnetic turn over at 47°F, which typically occurs near October 7th. Applying these compounds slightly before this time would provide a reasonable time buffer for natural detoxification to occur in the lakes. Furthermore, the lake waters would be 13-18 degrees greater than freezing which should provide a reasonable amount of time for natural processes to reduce the toxicity of the lake water before ice formation. It is important to note that detoxification measures will be implemented on outlet streams at the designated containment zones, until caged fish survive.

Lee et al. (1971) reported that antimycin is light sensitive and its performance can be reduced by increased light intensity. MFWP evaluated the photo penetration at one lake in order to explain the best application scenario (Table D-2). A Protomatic brand photometer was used to measure light intensity at varying depths on the hour. This analysis showed that in October, sunlight first hits Wildcat Lake at 10:00. The light intensity at this point was 1100 foot candles (fc), which represented the minimum direct light intensity throughout the day. The maximum surface light intensity occurred at 13:00 hours and was 2900 fc. During this time, measurements at various water depths determined that light intensity was reduced by 50% of the surface value at 13 feet depth, and 30% at 27 feet. Linear regression was used to predict the depth at which the light intensity was similar to the minimum surface intensity, which occurred at 10:00. The equation $y=-0.02857x+53$ revealed that 24 feet of water was necessary to attenuate the intensity to 1100 fc.

Table D-2. Photometer analysis (foot candles) of Wildcat Lake, South Fork Flathead River drainage, October 5, 2004.

	Hour						
Depth (ft)	10:00	11:00	12:00	13:00	14:00	15:00	16:00
0	1100	1900	2100	2900	2500	2100	1800
13	650	900	1200	1400	1300	1300	1300
27	370	400	670	910	1100	980	810
40	190	200	260	520	480	420	340
54	100	140	130	260	240	180	210
67	41	140	130	130	100	54	90
80	29	130	130	130	110	54	44

Based on this information, it may be beneficial to apply antimycin below 24 feet, during the period of greatest light intensity, then apply to the surface region after the sun is lower in the sky and light intensity is reduced.

The ARM rule that we cited on page D-5 of the DEIS was outdated. The correct citation is obtained from the October 2003 printing of the Montana Water Quality Act and the August 2003 printing of the Montana Surface Water Quality Standards and Procedures. The correct citation refers to ARM 17.30.6.

Appendix D (page D-12) of the DEIS should be corrected to read ...Hydrogen sulfide ***is a*** deadly gas that can be formed in the collection and treatment of municipal wastewater...

The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. EPA believes this is appropriate, but has the following corrections to be made:

In regard to acute toxicity and exposure, it appears that the DIMS uses LD5O values from the literature to estimate exposure scenarios that are highly unlikely to occur, such as drinking 12,000 liters of contaminated water in one day, as the basis for dismissing concerns about acute exposures. EPA believes it is inappropriate to use a lethal dose as the basis for reaching conclusions about public health protection. Also, the extreme exposure scenario approach to presenting the LD5O information may be misleading in a public disclosure document such as an EIS. There appears to a low amount of data with which to derive safe acute exposure levels for these chemicals.

The Montana Department of Environmental Quality (DEQ) has reviewed comments submitted by the Montana Office of the EPA dated July 29, 2004, and fully concurs with those comments. The only minor exception pertains to Human Health comment 27. Montana has not adopted the new EPA fish consumption value of 17.5 g/day. The adopted fish consumption value for calculating Human Health criteria is 6.5 g/day.

For potassium permanganate, the document does not present a proposed human health water column value. Dr. Benson has calculated a value. Based on his calculation (see Section 3.9 of this document) the water column value should not exceed 0.8 mg/L.

Add this MSDS Sheet for Potassium Permanganate

MSDS Number: **P6008** * * * * * *Effective Date: **07/29/03*** * * * * * *Supercedes: **11/22/00***

MSDS *Material Safety Data Sheet*

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERMANGANATE, VOLUMETRIC SOLUTIONS

1. Product Identification

Synonyms: Permanganic acid, potassium salt solution; Potassium Permanganate 0.1 Normal (N/10) Volumetric solution; Potassium Permanganate 1.0 Normal Volumetric solution; Potassium Permanganate, DILUT-IT® Analytical Concentrate
CAS No.: 7722-64-7
Molecular Weight: 158.03
Chemical Formula: $KMnO4$ (solution)
Product Codes:
J.T. Baker: 4677, 5651
Mallinckrodt: 5387, 6139

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Permanganate	7722-64-7	0.3 - 8%	Yes
Water	7732-18-5	92 - 99.7%	No

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:
No adverse effects expected. May cause mild irritation to the respiratory tract.
Ingestion:
Ingestion of solid or high concentrations causes severe distress of gastro-intestinal system with possible burns and edema; slow pulse; shock with fall of blood pressure. May be fatal. Ingestion of concentrations up to 1% causes burning of the throat, nausea, vomiting, and abdominal pain; 2-3% causes anemia and swelling of the throat with possible suffocation; 4-5% may cause kidney damage.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Prolonged exposure can cause dermatitis and defatting. Chronic manganese poisoning can occur after ingestion of large amounts. Affects the nervous system.
Aggravation of Pre-existing Conditions:
Persons with preexisting skin disorders may be more susceptible to these substances.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. This oxidizing material can increase the flammability of adjacent combustible materials. Contact with oxidizable substances may cause extremely violent combustion.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
5 mg/m3 Ceiling for manganese compounds as Mn

- ACGIH Threshold Limit Value (TLV):
0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn

Ventilation System:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.
Personal Respirators (NIOSH Approved):
Not expected to require personal respirator usage.
Skin Protection:
Gloves and lab coat, apron or coveralls.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Purple solutions.
Odor:
Odorless.
Solubility:
Miscible in water.
Density:
ca. 1.0-1.6
pH:
No information found.
% Volatiles by volume @ 21C (70F):
90 (as water)
Boiling Point:
ca. 102C (ca. 216F)
Melting Point:

-2C (28F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Reducing agents, flammables, reactive organic materials, metals, sulfuric acid.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Potassium Permanganate: oral rat LD50: 1090 mg/kg. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\--

---	NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Potassium Permanganate(7722-64-7)	No	No	None
Water(7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
For potassium permanganate: This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: POTASSIUM PERMANGANATE SOLUTION
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERMANGANATE SOLUTION
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 4L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Potassium Permanganate (7722-64-7	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	Canada-- DSL	NDSL	Phil.
Potassium Permanganate (7722-64-7)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Potassium Permanganate (7722-64-7)	No	No	No	Manganese co
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	- RCRA- 261.33	-TSCA- 8(d)
Potassium Permanganate (7722-64-7)	100 No	No	
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **1** Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.
Label Precautions:
Store in a tightly closed container.
Do not store near combustible materials.
Keep from contact with clothing and other combustible materials.
Do not get in eyes, on skin, or on clothing.
Remove and wash contaminated clothing promptly.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash

clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Appendix G Additional Information on Non-Target Organisms

Surveys in 2004 were conducted on 86 streams in the South Fork drainage. Tailed frogs represented 91.6% of all amphibians found in stream environments. Tailed frogs were found between altitudes of 3,560 and 7,103 feet above sea level. Tailed frogs were found in 77% of the streams (n=86) that were surveyed.

Some commenters are concerned that tailed frogs may become extinct. The 2004 surveys confirm that the species is quite ubiquitous throughout the SF drainage. These findings hold true for spotted frogs and long toed salamanders surveyed in the 75 lakes in 2004 as well (see Table G-1).

Table G-1. Summary statistics of amphibian and reptile surveys at 75 lakes in the South Fork Flathead River drainage, 2002-2004.

Species	# lakes found	Rel % of all lakes surveyed	Min elev (ft)	Max elev (ft)	Total # found	Min # found	Max # found	Mean # found
Columbia spotted frog	40	53	3,464	7,208	8,700	1	1,856	217
Pacific chorus frog	2	3	3,464	3,960	2	---	---	---
Tailed frog	7	13	5,455	7,103	19	1	11	3
Western toad	5	7	5,548	7,208	10	1	4	2
Long toed salamander	26	35	3,720	7,150	850	1	328	33
Common garter snake	1	1	---	5,951	1	---	---	---
Painted turtle	1	1	---	3,464	4	---	---	---

MFWP has initiated a comprehensive survey to describe the status and distribution of amphibians in the project area. When considering these data, the MFWP laboratory investigations, the MFWP field trials using rotenone, the exhaustive literature listing the impacts of fish toxin to non-target organisms, the impacts to non-target organisms appear to be minimal and short term.

Concerning rotenone, numerous studies indicate that rotenone has temporary or minimal affects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little affect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the non-target insect community of a stream. Kiser et al. (1963) reported that 20 of

22 zooplankton species re-established themselves to pre-treatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that 3 Missouri ponds treated with rotenone showed little short term and no long term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pre-treatment levels within 8 months.

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

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1997). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment then became stable. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time.

Seven high altitude mountain lakes in the Flathead basin have been treated with liquid formulated rotenone. Devine Lake is a 1-acre lake located in the Bob Marshall Wilderness that was treated with Prenfish rotenone in 1994 to remove an illegally introduced population of brook trout. The pre-treatment surveys were weighted heavily toward aquatic insects and although amphibians were observed, they were not quantified (J. Fraley, MFWP, personal communication, 2001). Post treatment surveys using the same protocol sampled two unidentified tadpoles in 1995, three unidentified tadpoles in 1996, eight adult spotted frogs in 2001, and in 2002 a single adult spotted frog and over 50 spotted frog tadpoles were observed. Studies continued into 2003 and 2004 with similar results. The lake was planted once with 1,140 westslope cutthroat trout fry in 1997.

The four Jewel lakes were treated with liquid formulated rotenone in 1986 to remove rainbow trout. There were no pretreatment data on file to determine the status of amphibians. East Jewel Lake was planted with 1,324 cutthroat trout between 1986 and 1988; North Jewel was planted with 6,056 cutthroat trout between 1986 and 1992; South Jewel was planted with 4,610 cutthroat trout between 1986 and 1989. West Jewel was not directly planted as fish from South and North Jewel lakes could swim into it. In 2001, a survey was conducted along the shore of each of the 4 lakes and found 26 frogs of both the spotted and tailed variety with both adults and juveniles present. A survey of the four lakes in 2002 revealed 76 spotted frog adults, 103 juveniles, over 110 tadpoles, and a single tailed frog adult. Amphibians were present at each of the four lakes.

Whale Lake was treated with Prenfish in October 2000 to remove hybrid cutthroat trout. It was planted in 2001 with 1,246 westslope cutthroat trout, 240 of which were between 4 and 11 inches in length. A survey in July 2002, approximately 21 months after the treatment, yielded 21 salamander tadpoles, many of which had not yet emerged from their gelatinous matrix. This survey was conducted on only ½ of the lake. Numerous fish were observed feeding at the surface of the lake. In September 2002, another survey found 16 salamander juveniles and a single tailed frog adult. In addition, small trout fry approximately 1-1/4 inches long were observed in the outlet stream, indicating natural reproduction had occurred. The outlet stream was dry approximately 100 yards downstream of the lake.

Tom-Tom Lake was treated with Prenfish in October 2000 to remove a population of hybrid trout. The lake was planted in 2001 with 2,000 genetically pure westslope cutthroat trout, 500 of which were 4 to 11 inches in length. The lake was surveyed in September 2001, approximately 1 year after the treatment, and surveyors netted over 25 long-toed salamanders in both larval and adult stage, over 100 juvenile spotted frogs, and 2 tailed frogs. A survey in 2002 revealed 115 spotted frog juveniles, a single adult, 2 long toed salamander juveniles, approximately 40 eggs. Five tailed frog tadpoles were found in the outlet stream.

Wheeler Creek is the outflow stream for Tom-Tom Lake. The stream was detoxified with potassium permanganate at the mouth of the lake during treatment. In July 2001, approximately 9 months after the treatment on Tom-Tom Lake, Wheeler Creek was electrofished at four different sites for 3.18 hours of total electrofishing, and 6 adult tailed frogs, 32 tailed frog tadpoles with specimens displaying developmental stages that included no legs, 2 legs, and 4 legs were collected. Many other tailed frog tadpoles were not netted due to swift flows and their ability to make a quick escape. Although not quantified, numerous stoneflies, caddis flies and dragonflies were also observed. A replicate survey in 2002 found 58 tailed frog tadpoles at the four sites during 3.37 hours of electrofishing.

These findings suggest that amphibians, specifically tailed frog tadpoles, are able to withstand a rotenone treatment in high altitude lakes in the Flathead basin (Grisak 2003c).

Concerning antimycin, it has been extensively tested to measure its effect on non-target organisms. A compendium of study results on non-target organisms was prepared by Schnick (1974a) who concluded that laboratory studies, field trials and reclamation projects revealed that vertebrates, phytoplankton or aquatic plants exposed to antimycin at fish killing concentrations demonstrated no adverse effects either short term or long term. It has been found to be non-toxic to plankton, bottom insects, water plants and amphibians and reptiles (Walker et al. 1964). Lesser (1970) reported it was not toxic to crayfish or clams, but was to freshwater shrimp. Callaham and Huish (1969) reported that zooplankton were severely depleted but began to reappear within 6-9 days and bottom insects were not affected by antimycin. Hughey (1975) concluded that 4 Missouri ponds treated with antimycin showed little short term and no long term effect on population levels of zooplankton. The effects of antimycin on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pre-treatment levels within 8 months.

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Chapter 1 Draft EIS Comments and Responses

Bonneville Power Administration sent the DEIS to the public for comments on the Proposed Action and alternatives. The DEIS was distributed to agencies, groups, individuals, and libraries in June 2004. A public review period ended on August 20, 2004.

A public meeting was held in Kalispell, Montana on July 12, 2004 to review and receive comments on the Draft EIS. These comments were all captured and catalogued. This chapter contains the written comments from letters, e-mails, and comment sheets received during the comment period for the DEIS and BPA's responses to those comments. It also contains the oral comments from the public meeting in July 2004 and telephone calls received during the comment period. Letters and comment sheets were given numbers in the order they were received. Separate comments in each letter were given separate codes. For example, letter 39 might have comments 39.1, 39.2, and 39.3 identified within its text. Comments from the public meeting were also logged. BPA prepared responses to each of these individual comments.

The chapter is organized by the sequence of letters as they were received. Because we have organized comments this way and often reference responses to other comments, please use the numerical list on the back of this page for page references. BPA's responses to the comments are in a table following the copies of the comment letters.

Table 1-1. Comment Log for Draft EIS

Comment Log No.	First Name	Last Name	Affiliation	Comment Letter Page No.	Response to Comment Page No.
SFFW-001	Barbara	Burns	Bob Marshall Wilderness Ranch	1-5	1-177
SFFW-002	Paul	Stantus		1-8	1-180
SFFW-003	Doug	Glenn		1-9	1-180
SFFW-004	Kurt	Gentry	Spotted Bear Ranch	1-10	1-181
SFFW-005	Steve	Little		1-11	1-181
SFFW-006	Joe	Kuzmic		1-12	1-182
SFFW-007		N/A	Spotted Bear Ranch	1-13	1-183
SFFW-008	Earl	Applekamp		1-14	1-183
SFFW-009	Raymond	Mehring		1-15	1-184
SFFW-010	Mark	Moser		1-16	1-186
SFFW-011	John F.	Wardell	U.S. Environmental Protection Agency - Region 8	1-17	1-186
SFFW-012	R. Mark	Wilson	U.S. Dept of the Interior, Fish and Wildlife Service	1-41	1-225
SFFW-013	Doug	Bell		1-43	1-227
SFFW-014	Chuck	Roady	F. H. Stoltze Land & Lumber Co.	1-44	1-227
SFFW-015	Christian J.	Levine	Montana Dept. of Environmental Quality	1-46	1-229
SFFW-016	Warren	Illi	Public Meeting 7/12/04, Kalispell, MT	1-50	1-233
SFFW-017	Arlen	Roll	Public Meeting 7/12/04, Kalispell, MT.	1-51	1-234
SFFW-018	Tim	Taylor		1-52	1-235
SFFW-019	Shelly	Toavs		1-53	1-236
SFFW-020	Bob	Cole		1-54	1-237
SFFW-021	Joe	Fagan		1-55	1-237
SFFW-022	Joe	Moody		1-56	1-238
SFFW-023	Richard	Tagg		1-57	1-239
SFFW-024	Dennis E.	Hoffmann		1-58	1-239
SFFW-025	Lindsay M.	Arthur		1-59	1-240
SFFW-026	Keith J.	Hammer	Swan View Coalition	1-60	1-241
SFFW-027	Joe	Moody		1-61	1-243

Comment Log No.	First Name	Last Name	Affiliation	Comment Letter Page No.	Response to Comment Page No.
SFFW-028	Fred	Wallner		1-62	1-244
SFFW-029	Dave	Williams		1-63	1-245
SFFW-030	Gordon	Johnson		1-64	1-245
SFFW-031	Amy	Stix	American Wildlands	1-65	1-246
SFFW-032	Eric	Rozell		1-67	1-250
SFFW-033	Richard	Smith		1-68	1-251
SFFW-034	Arlene	Montgomery	Friends of the Wild Swam	1-69	1-251
SFFW-035	George	Nickas	Wilderness Watch	1-76	1-269
SFFW-036	George K.	Sage		1-81	1-278
SFFW-037	Dale	Luhman		1-83	1-282
SFFW-038	Ernie	Barker	Professional Wilderness Outfitters Assn.	1-165	1-354
SFFW-039	Kirk	Gentry	Spotted Bear Ranch	1-166	1-357
SFFW-040	Clint	Muhlfeld	Montana Chapter of the American Fisheries Society	1-167	1-358

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Page 1 of 1

SFFW-001
JUN 30 2004

Spiering, Colleen A - KEC-4

From: Barbara Burns [sti4466@blackfoot.net]
Sent: Wednesday, June 23, 2004 1:42 PM
To: Spiering, Colleen A - KEC-4
Subject: fish kill

Please consider this as our comment to the proposed project.

Thank you,

Barb

www.wildernessranch.com

6/24/2004

January 20, 2003

To Whom It May Concern

We have been made aware of a devastating situation that is planned to be implemented in the Bob Marshall Wilderness This plan calls for the poisoning of certain lakes totally killing all of the fish in these lakes in the Bob Marshall Wilderness. The lakes in question are in our main camp area We have operated in this area for thirty years and probably know more about the fish in these lakes than anyone associated with this ridiculous plan. These lakes have provided unequalled fishing to our guests and all others that have fished them.

We feel that this plan goes against all that is held sacred in a wilderness area Wilderness areas were established in order to hold those areas in a pristine state without interference from human beings. We believe the "Wilderness Act" should be respected and these areas should not be tampered with.

The logic behind this plan is to obtain a genetically pure strain westslope cutthroat trout. The present fish in these lakes are thriving, healthy fish. Fishing for these "exotic" fish is excellent. Why should anyone be allowed to tamper with these healthy fish in order to obtain a genetically pure strain of fish? Isn't this what Hitler had in mind?

The plan also flirts with the use of helicopters to carry out the fish kill and poison the lakes. Helicopters are only to be used in the "wilderness" for emergency reasons. Is this an emergency?

If anything at all were proposed to eliminate the thriving, healthy fish in these lakes, saturation of the lakes with westslope cutthroats would be the most viable answer. But again, why kill healthy, viable fish for only genetic reasons. We believe this to be true in any location, but especially true in the wilderness which established areas to remain as they are If fish are allowed to be tampered with in the wilderness, what next?

Virgil and Barbara Burns, Owners
Bob Marshall Wilderness Ranch

Date: May 3, 2003

To: Bonneville Power Administration

From: Virgil and Barbara Burns, Owners – Bob Marshall Wilderness Ranch

Re: Proposed Fish Kill in the Bob Marshall Wilderness

This devastating proposal should not be implemented in the Bob Marshall Wilderness. The alpine lakes under fire are in the same area I have outfitted in for the last thirty years. These lakes are very productive and have provided unequalled fishing to us, our guests and all others that have fished them. These thriving, healthy, big, fat fish should not be killed for purely genetic reasons. These fish pose no threat whatsoever to pure westslope cutthroat.

We feel this plan goes against all that is held sacred in a wilderness area. Wilderness areas were established in order to hold those areas in a pristine state without interference from human beings. We believe the "Wilderness Act" should be respected and these areas should not be tampered with.

The logic behind this plan is to obtain a genetically pure strain of westslope cutthroat trout. The present fish in these lakes are thriving, healthy fish. Fishing for these "exotic" fish in excellent. Why should anyone be allowed to tamper with these healthy fish in order to obtain a genetically pure strain of fish? Isn't this what Hitler had in mind?

The plan also flirts with the use of airplanes and powerboats to carry out the fish kill and poison the lakes. Airplanes are only to be used in the "Wilderness" for emergency reasons. Is this an emergency?

If anything at all were proposed to eliminate the thriving, healthy fish in these lakes, saturation of the lakes with westslope cutthroats would be the most viable answer. But, again, why kill healthy, viable fish for only genetic reasons? We believe this to be true in any location, but especially true in the wilderness, which established areas to remain as they are. If fish are allowed to be tampered with in the wilderness, what next?

Notes – wilderness landlocked
What effect on bears etc, eating poisoned fish
Another arm of the government obtaining $ for ridiculous purposes
If fish were sparse, unhealthy, etc do it to improve – but not the case here – lots of healthy, big, fat fish – (if it not broke don't fix it, especially tampering with nature in the wilderness!

Page 1 of 1

Kuehn, Ginny - DM-7

SFFW-002
JUN 2 9 2004

From: Paul & Connie Stantus [stantus@frontiernet.net]
Sent: Tuesday, June 29, 2004 5:38 PM
To: BPA Public Involvement
Subject: South Fork of Flathead Cutthroat Plan

Dear Sirs:

I am a resident of Montana that has fished some these lakes for many years. I cannot believe you are proposing such a plan. The fish that inhabit these lakes are as native as you and I are. To kill off what you call non-native trout and grayling is the same as killing people because they are not the correct race. I think this was tried in Germany once.
They are beautiful lakes with very large trout. To poison these lakes would be a crime.

My family and many of my friends and their families have fished Handkerchief Lake for more than 10 years for the grayling. We make several trips a year to camp and fish for the usually large grayling in the lake. We fly fish in float tubes and release all the fish we catch so we can to continue to experience great grayling fishing. This lake up to last year held the state record for grayling. It is a beautiful fish that epitomizes the wild country it lives in. I cannot imagine Handkerchief Lake without grayling.
We camp and hike to other lakes in the area to experience their beauty and fish them, but Handkerchief is the gem.

I have worked for the U.S. Forest Service for 25 years and have always been a supporter of the Montana Fish, Wildlife, and Parks. I am a reasonable person, but I cannot and will not support what you are trying to do here.

I want to be put on the mailing list for any information regarding the plan to kill fish in these lakes. You may email me at my address or send hard copies to:

Paul Stantus
739 Greers Ferry
Libby, MT 59923
stantus@frontiernet.net

6/30/2004

SFFW-002

South Fork Flathead Watershed

JUN 30 2004

Telephone comment by Ginny Kuehn
6/30/2004

Doug Glenn

406-387-5787

I just called to comment on the poisoning of Sunburst Lake, Gray Creeks, and the other lakes up there. It is a good fishery already. I think if we get involved in it, we will screw up more of the river than just the lakes. If you have any questions call me back please.

South Fork Flathead Watershed

SFFW-004
JUN 30 2004

Telephone comment by Ginny Kuehn
6/30/2004

Kurt Gentry
Spotted Bear Ranch

406-755-7337

I would like to comment on Bonneville Power funding process for poisoning the lakes in the wilderness and around the wilderness. I just would like to go on record that we don't think that it is a good idea. We have a healthy fishery right now. We like it that the Westslope Cutthroat is a very strong strain and that is pure in the lava areas. It seems like when the fish and game get involved in one of these processes it always takes longer than they think it is going to and usually there is more messes up there than improvements. So we don't want you to fund that process. However, we would like to see you contribute to grade the roads so people can come out to access the national forests. A lot of times these people tear up their vehicles driving up these roads that don't have any funding to go fishing. If they poison those lakes we won't have fish to fish for and roads worth driving on to get to. So a little common sense of letting the fishery that is already there and these lakes remain the same, would save a lot of money maybe a little money to grade roads would allow people to come up in the forest areas to enjoy these lakes. It would be far better use of your money than to allow some government project to be funded that probably won't work in the long run anyway. So if you would like to call me back I would be glad to talk to you about this.

Poisoning

From: Steve Little [little2@llnl.gov]
Sent: Wednesday, June 30, 2004 11:20 AM
To: BPA Public Involvement
Cc: mtapples@cyberport.net; pstantus@fs.fed.us
Subject: Poisoning

SFFW-005

BPA,

I'm writing concerning the poisoning of some wonderful fisheries. I live in California and travel to Montana to visit friends and relatives as often as possible. During my visits I enjoy fishing some of the wonderful lakes and streams Montana has to offer. 5-1 The idea of poisoning some of these wonderful places is frightening. California has tried it with Lake Davis and failed miserably. In my opinion a better plan of attack is letting the anglers handle it by restricting creel limits on native cutthroat and increasing the limits on the unwanted species. 5-2

Thank you for your time, and please don't make the same mistake as California.

Steve Little
27937 S. Sharon Ct
Tracy Ca. 95304

file:///Y|/EF3043%20-%20BPA/Flathead%20&%20South%20Fork%20EIS/DEIS%20Comments/Poisoning.htm(9/16/2004 5:36:46 AM file://Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork%20EIS/DEIS%20Comments/south%20fork%20fish.htm

From: joe kuzmic [summitz@centurytel.net] SFFW-006
Sent: Wednesday, June 30, 2004 11:28 AM
To: BPA Public Involvement
Cc: Hollie Fish
Subject: south fork fish

I oppose your plan. It will never work in those lakes. 1 There is 10 pound cutthroat in those lakes. If you kill the fish in the lakes, how many years will it take to get fish that size back? The lakes you want to kill out are the best fishing lakes we have. Leave them alone. 2
Even if you think it will work, all it takes is one person that does not agree with your plan to ruin it. It is a good idea on paper, but how often do these plans work? There is going to be a large grassroots force against you.

It is a nice gesture on your part, but I think it will be a waste of time and money. 3
thank you
Joe kuzmic

file://Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork%20EIS/DEIS%20Comments/south%20fork%20fish.htm9/16/2004 5:49:19 AM file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork%20EIS/...Fk%20Flathead%20Watershed%20Trout%20Conservation%20Program.htm

From: Spotted Bear Ranch [info@spottedbear.com] SFFW-007
Sent: Friday, July 02, 2004 9:24 AM
To: BPA Public Involvement
Subject: S Fk Flathead Watershed Trout Conservation Program

I'm in favor of the concept of preserving the genetic purity of Westslope cutthroat trout in the South Fork drainage. 7.1 However, **I have low confidence in the ability of the USFS and MFWP to achieve the stated goals.** 7.2

Government agencies, such as the USFS and MFWP, are typically run very inefficiently with a lower than normal degree of success compared to private sector counterparts. They love these programs as they create more work for themselves. The program goals could be more successfully achieved using private enterprise.

Removing the administration of this program from the hands of federal and state funded agencies would very likely increase the probability of success and reduce costs. Government agencies are much less effective simply because they're not required to be financially responsible. They're not financially responsible because they don't need to show a profit; they're able to spend freely without consequences. And, they tend to make decisions based upon job and benefit preservation. 7.3

This program is destined burn through a bunch of money with a low probability of success. And, this comment and public meeting-open house forum is a boondoggle – you're going ahead with the program anyway.

file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20For...thead%20Watershed%20Trout%20Conservation%20Program.htm9/16/2004 3:42:50 AM file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork%20EIS/DEIS%20Comments/Native%20Cutthroat%20project.htm

From: Earl & Sheila Applekamp [mtapples@cyberport.net]
Sent: Friday, July 02, 2004 9:04 PM
To: BPA Public Involvement
Subject: Native Cutthroat project

SFFW-008

Dear BPA.

I'm writing regarding the proposed poisoning of the 20 lakes in the South Fork of the Flathead River drainage. Although I don't agree with this proposal at all, I can understand the concern regarding brook trout and rainbow trout threatening native bull and cutthroat. Where this is a problem I can understand wanting to prevent widespread population of these species. 8.1

What I cannot understand is the proposal of poisoning the grayling population in Handkerchief Lake! I strongly oppose poisoning this lake. Grayling are a rare fish in Montana, in the lower 48 states for that matter, and require special habitat to survive. There has been consideration to giving them T&E species protection because of their scarcity. However, because of the rare habitat, they are doing exceptionally well in Handkerchief lake. Other than consuming some food, they do not pose a threat to other fish. Genetically they are no threat to either the Bull Trout or the Cutthroat trout like brooks and rainbows. 8.2

8.3 I am an avid fly fisherman, and have fished handkerchief lake for 8 years, multiple times every year. I have caught and released hundreds of fish in this lake and have only caught grayling and cutthroat, never another species. The proximity of the lake with falls upstream and downstream somewhat confine the grayling. Although some do go downstream to the reservoir, the habitat in the deep water is not conducive to grayling and they cannot compete with the cutthroat and bull trout in this environment. (They probably provide a food source for the large Bull Trout!) 8.4

Please do not proceed with this poisoning proposal, and if you must, please exclude Handkerchief Lake!!!!!! 8.5

Earl Applekamp
120 Pleasant View Drive
Kalispell, MT 59901

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SFFW-0091

NATIVE FISH 2004

JUL 07 2004

I'm writing this letter in response to the article in the Hungry Horse News of the BBA.s plan to rid the South Fork drainage of non-native game fish with the use of rotenone and antimycin. I think that the less expensive method called (SWAMP OUT) would give the same end results with stocking of native cutthroats until they reproduce into genetically pure populations. The (swamp out) method would leave the lakes fishable while the regeneration takes place. The use of rotenone will attract every bear in the surrounding area and would be a threat to hikers and campers for quite some time. I have seen this happen when the Fish and Wildlife used this method on Lake Five,Halfmoon and Mud Lake in the 60,s . The dead fish ATTRACTED both Grizzly and Black bears from Glacier and the surrounding area .

The rehabilitation of the lakes in the South Fork of the Flathead should not be the responsibility of the BPA.

The Montana Fish Wildlife and Parks are the responsible party for the decline of the native Cutthroat and Bull Trout in the Flathead River Drainage system. There were a number of things that led up to the decline of the native trout. After the devastating flood of 1964 which reduced the number of all fish in the North and Middle Forks of the Flathead the MFWP left the 10 fish limit on Cutthroat rather than do a lesser limit or even better a catch and release method until the fish increased in population. In 1965 I discussed this issue with Montana fish and game officials in Kalispell office and their reply was that no one would buy a license if they put a catch and release or a restricted limit on Cutthroat and Bull Trout.

It took quite a few years before the FWP put a lesser limit on Cutthroat and a catch and release on Bull Trout. The MFWP would have been better off with the loss of revenue in license sales ,if any than the loss of the Native fish in the Flathead drainage.

The MFWP CAN ONLY HOLD THEMSELVES RESPONSIBLE for the loss of the Kokanne Salmon in the Flathead river system by the introduction of mythiss shrimp in Flathead Lake which had already been tried in Idaho without success.

The increase of Non -Native Lake Trout in Flathead Lake also took its toll on cutthroat.

The ILLEAGLE introduction of Northern Pike into the Flathead drainage is taking its toll on native fish. the MFWP now have a limit on the NORTHERN PIKE." WHY "?

The Montana Fish Wildlife & Parks have to be held accountable for their actions , not the BPA.

Yours Truly

Raymond F Mehring

Raymond Mehring
PO Box 260349
630 Spotted Bear Rd
Martin City, MT 59926-0349

Page 1

South Fork Flathead Watershed – MT

SFFW-010
JUL 30 2004

Telephone comment by Ginny Kuehn
7/30/2004

Mark Moser
3217 Helena Drive
Missoula, MT 59803

406-251-3646

My comments concern George Lake. George Lake is a self-contained lake with no possible way for the trout to leave that lake. There is a 1,000 ft. waterfall at the end of the lake. My family, friends and I have been hiking into George Lake for the last two decades and thoroughly enjoyed the fishery in there. It contains eastslope cutthroat and westslope cutthroat. We do not mind at all about the hybrid fish. The reintroduction would eliminate the fishery for five to ten years. We do not want that to happen. The survey I have taken, 100% of my friends and family would like to see this particular lake left as is. So I hope that lake could be an exception to the rule.

I appreciate being able to comment on the situation.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING, 10 West 15th St., Suite 3200
HELENA, MONTANA 59626

SFFW-011
AUG 04 2004

Ref: 8MO

July 29, 2004

Communications,
Bonneville Power Administration - DM-7,
P.O. Box 14428
Portland, OR 97293-4428

Re: CEQ #040274, Draft Environmental Impact Statement for the South Fork Flathead Westslope Cutthroat Trout Conservation Program

Dear BPA:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Environmental Protection Agency, Region VIII, Montana Office (EPA) has reviewed the South Fork Flathead Westslope Cutthroat Trout Conservation Program Draft Environmental Impact Statement (DEIS). The EPA reviews EISs in accordance with its responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309 of the Clean Air Act directs EPA to review and comment in writing on the environmental impacts of any major federal agency action. The EPA's comments include a rating of both the environmental impact of the proposed action and the adequacy of the NEPA document.

The EPA appreciates the efforts of the Bonneville Power Administration (BPA) and Montana Dept. of Fish, Wildlife, & Parks (MDFWP) in preparing this DEIS to analyze alternatives and environmental impacts associated with implementation of the South Fork Flathead Westslope Cutthroat Trout Conservation Program. The EPA supports the stated goals and objectives of the proposed project to preserve native genetically pure fluvial and adfluvial westslope cutthroat trout populations in the South Fork Flathead drainage, and to avoid and minimize adverse environmental impacts. We also recommend that maintenance of naturally functioning aquatic ecosystems and compliance with State Water Quality Standards be included among the project goals.

One of our primary concerns with the proposed project involves the need for additional details and information regarding project monitoring and evaluation and adaptive management. Monitoring and evaluation and adaptive management should be critical elements of this conservation program, particularly since there is uncertainty associated with the effects of the proposed activities. There should be a continuing process of planning, implementing, monitoring, and evaluating effects of project implementation, and adjusting implementation and/or mitigation when and where necessary.

We are pleased that the DEIS indicates that post-treatment monitoring would be conducted, but we are concerned that only general descriptions of monitoring activities are provided. The monitoring program to assess post-treatment effects and natural recovery or repopulation of the lakes by indigenous species should be more fully described, particularly monitoring for non-target species present in or around the lakes (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc.). Additional details of the monitoring efforts and adaptive management strategy should be presented to assure that consistent and meaningful information/data and is generated to evaluate effects of project implementation.

We also believe it is important to have contingency plans in the event that treatments do not eradicate the entire hybrid trout population, and in the event that continuing illegal reintroduction of non-native trout occurs after the proposed treatments. It is important to project success to both eradicate hybrid trout, and prevent the reintroduction of non-native trout into these lakes. We are concerned that the DEIS contains little information about the actions that would be taken or the strategy that would be employed to reduce these risks, particularly the risk of continuing illegal reintroduction of non-native trout. Contingency planning should also cover the unintended spill or release of toxic or hazardous chemicals during project implementation.

We recommend that a clear and complete list of advantages and disadvantages of the two proposed fish toxins, rotenone and antimycin, be provided, along with further discussion regarding use of one toxicant vs. the other. Such information will assist the decision maker and the public in understanding and evaluating the proposed use of the fish toxins. We note that it will be important to use appropriate mitigation measures and management practices during project implementation to minimize the potential for human exposure to the piscicides and potassium permanganate.

The DEIS identifies genetic diversity issues associated with restocking the treated lakes with M012 brood stock. These issues include: 1) potential reduction of westslope cutthroat trout genetic diversity by restocking with a single M012 genetic stock, which may result in a monoculture exhibiting little genetic diversity; and 2) potential dilution of natural genetic uniqueness exhibited in adaptations and phenotypic variations of local westslope cutthroat trout. We recommend that the FEIS explain more fully how these concerns will be addressed.

Also, few specifics are provided regarding potential restocking of the lakes with other native non-target species that may be affected by treatments (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc.). We are concerned about potential loss of native non-target species, since proposed fish toxicants and potassium permanganate, used to neutralize the toxins, can be lethal to many aquatic organisms. The loss of non-target species and impacts on overall aquatic ecosystem integrity is an important issue. If some of indigenous species depend on isolated headwater habitat in the lakes or have evolved within the isolated headwater habitat they may not easily repopulate the lakes and may need assistance in repopulation.

Restocking and other proposed efforts to restore or compensate for unavoidable impacts that may occur to all affected species should be more fully addressed.

We also believe the potential effects of continuing to restock fish in originally fishless lakes should be more fully evaluated and disclosed in the FEIS. The introduction of trout to support recreational fisheries in lakes that were formally fishless has potential to affect lake ecology. Predation by introduced trout consumes native amphibians and benthic invertebrates and can reduce the population of larger zooplankton, which are effective grazers of the phytoplankton. With the restocking of fish to lakes that were originally fishlesss, additional biomass is added to the lakes that can influence nutrient cycling, and can have unintended effects to water quality and the biological integrity of the lake.

We recommend that restocking of fish to originally fishless lakes be based on monitoring and evaluation and full understanding of how lake ecology is affected by fish restocking. We recommend that a cautious approach to the trout restocking program be taken and that the stocking program be accompanied by a sufficiently robust monitoring and evaluation program to evaluate ecological effects of stocking fish in lakes that were originally fishless. Maybe some of the lakes should be left fishless for long-term monitoring and ecological comparison with lakes that are restocked? We note that decisions were made in the past to introduce non-native trout to these lakes without careful, thoughtful evaluation, and full consideration of potential ecological effects. This led to the ecological problems creating the need for this proposed project. We think it would be appropriate to proceed cautiously in restocking of fishless lakes, and to base restocking decisions on careful evaluation of monitoring data and information and full understanding of ecological effects.

We are enclosing our more detailed comments, questions, and concerns regarding this DEIS for your review and consideration. Based on the procedures EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action and alternatives in an EIS, the South Fork Flathead Westslope Cutthroat Trout Conservation Program DEIS has been rated as Category EC-2 (Environmental Concerns - Insufficient Information). A copy of EPA's rating criteria is attached.

Our environmental concerns regard the need for additional details and information regarding: project monitoring and evaluation and the adaptive management program; contingency plans if treatments do not eradicate the entire hybrid trout population, and in the event of continuing illegal reintroduction of non-native trout after the proposed treatments, and in the event of spills or releases of hazardous chemicals; more complete identification of the advantages and disadvantages of proposed fish toxins, rotenone and antimycin; and additional information and evaluation regarding the restocking program.

If we may provide further explanation of our concerns please contact Mr. Steve Potts of my staff in Helena at (406) 457-5022 or in Missoula at (406) 329-3313. Thank you for your consideration.

Sincerely,

John F. Wardell
Director
Montana Office

Enclosures

cc: Larry Svoboda/Julia Johnson, EPA, 8EPA-N, Denver
Chris Levine, MDEQ, Helena
Grant Grisak, MDFWP, Kalispell
Dan Brewer, USFWS, Helena

EPA Comments on South Fork Flathead Westslope Cutthroat Trout Conservation Program DEIS

Brief Project Overview:

The Bonneville Power Administration (BPA) is proposing as part of the Hungry Horse Dam Mitigation Program to fund implementation of a Montana Dept. of Fish, Wildlife, & Parks (MDFWP) conservation program intended to preserve the genetic purity of the westslope cutthroat trout populations in the South Fork of the Flathead River drainage. The South Fork Flathead drainage contains one of the largest genetically pure populations of genetically pure native westslope cutthroat trout in the nation. This population is protected from invasion by non-native fish because of the barriers created by Hungry Horse Dam. Historic stocking introduced non-native trout species into the drainage years ago. The Fisheries Management Plan for the South Fork Flathead drainage developed by MDFWP, Forest Service and a Citizen's Committee lists management goals of 1) maintaining a self-sustaining fishery; 2) maintaining and improving genetic integrity of westslope cutthroat trout; 3) emphasizing quality fishery over quantity of harvest; and 4) manage fishery consistent with wilderness management guidelines. The MDFWP is also mandated by state law to manage in a manner that avoids listing fish and wildlife under the Endangered Species Act.

The proposal involves removal of hybrid trout from 21 lakes and their outflow streams in the South Fork Flathead drainage on the Flathead National Forest, and replacing them with genetically pure native westslope cutthroat trout over the next 10-12 years. Some of the lakes are in the Bob Marshall Wilderness area and Flathead National Forest Jewel Basin Hiking Area. Other lakes may also be included as additional information is discovered. Four alternatives have been evaluated. Alternative A is no action to remove hybrid trout in the drainage, which provides a baseline for comparison with other alternatives.

Alternative B is the proposed action and preferred alternative, that involves application of the piscicides rotenone and antimycin to remove hybrid fish. Antimycin would be used to remove hybrid trout from the lakes in the Bob Marshal Wilderness area and both rotenone and antimycin would be used in the other National Forest lakes. Piscicides would be applied in the Fall when water levels are generally low, and recreational use of the lakes is reduced, and the lakes summer thermal stratification has ended to allow more even dispersion of piscicides in the lakes. Piscicides and application equipment would be transported by livestock or flown by helicopters or fixed wing aircraft. Livestock transport would be used for wilderness lakes accessed by system trails. Helicopter transport would be used for wilderness lakes without system trails. Single engine aircraft tanker (SEAT) airplanes or helicopters would be used in non-wilderness lakes. Piscicide applications using drip stations would generally take a day or two, with motor boats used for application and mixing within the lakes, and detoxification would take several days, after which personnel would evaluate the lakes and collect and measure fish. Target rotenone concentrations would be 1 ppm, and target antimycin concentrations would be 7.5-8 ppb, but may vary depending upon water chemistry. Potassium permanganate would be

1

used for detoxification. Fish restocking would occur after sentinel fish cages demonstrated that piscicides were no longer present. Treatments would be staggered spatially over ten years or more to reduce angling effects.

Alternative C is similar to Alternative B, but involves differing methods of transport of materials and equipment to the lakes and application of fish toxins to the lakes. All transport would occur via helicopter and fixed wing aircraft. Livestock would not be used for transport. Motor boats would be used for application and mixing of piscicides.

Alternative D would not involve use of piscicides, but instead would use gill netting, trapping, and other mechanical means to remove hybrid fish in designated lakes, and where possible, in designated streams. An intensive "genetic swamping" program would then be implemented with intensive and frequent restocking in an attempt to dominate the remaining hybrid trout.

Comments:

Goals

1\. The EPA supports the stated goals and objectives (page 1-9) of the proposed project involving preservation of native genetically pure fluvial and adfluvial westslope cutthroat trout populations in the South Fork Flathead drainage, and avoiding and minimizing adverse environmental impacts. We also recommend that maintenance of naturally functioning aquatic ecosystems and compliance with State Water Quality Standards be included among the project goals.

Project Proposal and Alternatives

2\. Thank you for including Table 2-1 (page 2-5) showing the lakes proposed for treatment, treatment method, method of equipment transport, outlet streams and detoxification measures, Table 2-4 (page 2-28) summarizing the proposed action, and for including the lake descriptions in Appendix C, and additional information on lake treatments in Table C-2 (page C-59). This greatly increases public ability to understand the proposed project.

3\. It is stated that likely rotenone dosage would be 1 mg/l, and antimycin dosage 7.5-8 ug/l (page 2-14), and that these target concentrations are based on assays conducted by MDFWP, although it is also suggested that higher levels may be needed based on water chemistry and fresh water inputs. It is our understanding that the 1 mg/l concentration of rotenone is based on using a five percent rotenone solution, so that the actual target concentration of the rotenone active ingredient would be 50 ug/l of rotenone (1 mg/l x 0.05 = 50 ug/l, page 3-54).

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It is stated that antimycin is shipped by the manufacturer in two parts: the active ingredient of antimycin with some residual fats or lipids, and an acetone - detergent surfactant (page 2-10). We understand that the antimycin formulation used would be a 50:50 mixture by volume of the two parts. It should be clarified if the projected reference dose of 7.5-8 ug/l of antimycin is the concentration of the active antimycin ingredient or of the 50% formulation (which would appear to make the target dose concentration of antimycin approximately ~4 ug/l). Is our understanding regarding the target dosage of the antimycin active ingredient correct?

14-18

We are interested in seeing the lowest concentration of rotenone and antimycin used that will be effective at removing hybrid trout, in order to minimize adverse effects to other non-target species. We recommend that the lowest dosages of rotenone and antimycin that will achieve effective removal of target species be used in order to minimize adverse effects to non-target species. We believe it would be appropriate to identify the maximum expected concentration of these piscicides that would be used in order to better understand the potential impacts of proposed piscicides upon non-target species.

Some websites with useful information on the proposed piscicides include:
http://www.epa.gov/pesticides/
http://www.epa.gov/oppsrrd1/REDs/factsheets/rotenone_fs.pdf
http://msds.pdc.cornell.edu/msds/msdsdod/a192/m95857.htm
http://msds.pdc.cornell.edu/msds/msdsdod/a481/m240264.htm

14-19

We understand that Antimycin A currently has 1 active registration, Fintrol Concentrate (registration # 39096-2). The latest label is dated November 29, 1999. This "piscicide" is slated for reregistration sometime after 2006. The current chemical review manager is Mr. Dirk Helder, (phone, 703-305-4610).

Rotenone appears to have several active registrations (e.g., registration #'s 299-227, 655-421, 655-422, 655-804, 655-805, 655-806, 769-414, 1439-157, 1439-260, 5481-313, 6458-6) which can be researched at the EPA pesticides website shown above.

14-20

4. Reasoning is presented (page 3-12) to explain why antimycin is a preferred fish toxin rather than rotenone in the 13 lakes in which bull trout occur downstream of the treated lakes (i.e., rapid detoxification in flowing streams, requires much lower quantity to kill fish, less bulky and easier to transport-fewer aircraft and packtrips and associated transport impacts). Antimycin is also less toxic to amphibians and other non-target species. However, it appears that there is greater experience with using rotenone than with use of antimycin, and that rotenone may be less expensive and more available, and that the chronic exposure public health risk for use of rotenone may be less than for antimycin (see our public health comment # 27 below).

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We believe it would improve public and decision maker understanding to provide a clear and complete list of advantages and disadvantages regarding use of rotenone and antimycin, and further discussion regarding use of one toxicant vs. the other to allow the decision maker and the public to better understand and evaluate advantages and disadvantages of use of either toxicant.

5. It may be difficult to apply or precisely maintain consistent piscicide concentrations throughout the lakes due to practical considerations associated with difficulties of maintaining consistent piscicide concentrations horizontally and vertically in the lakes with applications by aircraft, boats, and drip stations and using boats for lake mixing and hoses and pressurized equipment to distribute toxins to deeper depths (page 2-22). It would be of interest to include additional discussion regarding piscicide monitoring and piscicide concentration gradients that may occur during treatments, and how piscicide application and mixing considerations would be managed to maintain the desired range of target dosages. Our interest is understanding how large variations in piscicide concentrations within the lakes and significant exceedances of toxic concentrations, and thus, additional impacts to non-targeted species would be avoided. It is important that efforts to avoid impacts to non-targeted species are described, and that unavoidable impacts to non-targeted species and overall ecosystem integrity are fully disclosed and mitigated.

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6. It is suggested that a dosage of potassium permanganate for detoxification would be 4.5 ppm (page 2-10) which includes 1.5 ppm to neutralize the fish toxin, and 3 ppm to account for the organic demand in the stream, although the amount may vary depending upon stream demand (page 2-14). The DEIS also states that bioassays show potassium permanganate toxicity to westslope cutthroat trout at 1.5 ppm (page 2-10). It would appear likely, therefore, that there is significant potential for potassium permanganate used for piscicide detoxification to kill aquatic biota itself, including biota of non-target species (e.g., amphibians, invertebrates). What precautions or mitigation measures are proposed to assure minimal effects on non-target species from use of potassium permanganate? Can locations of detoxification stations be identified? How far downstream from detoxification stations on streams will potassium permanganate or piscicide toxicity be evident to aquatic life?

11-22

7. It is stated that bull trout are not found in any of the lakes to be treated, but they do occur in associated drainages downstream of some lakes (page 3-9). It is important that the bull trout, a threatened species, is not unduly impacted by the proposed project. We understand that the U.S. Fish & Wildlife Service (USFWS) has concurred that the proposed project does not have potential to cause an adverse effect on bull trout, impair suitable habitat necessary for the survival for the local population of bull trout (i.e., biological determination of, "may effect, but not likely to adversely affect," page 3-14). We note that it is important that toxicity in streams draining the lakes be neutralized before the bull trout sections of the streams are reached.

11-23

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8. It is stated that sentinel fish cages would be used in concert with potassium permanganate detoxification stations to evaluate effectiveness of treatment and to monitor effectiveness of detoxification (page 2-11). It is also stated that several days are anticipated to carry out detoxification and post-treatment cleanup (page 2-4), and that piscicide treatments are proposed to occur just before lake ice-up occurs (late September to early November). 11-24 Cold water temperatures, reduced water oxygenation and reduced sunlight after lakes ice-up are likely to reduce the rate of toxin decomposition. It appears, therefore, that unless the fish toxins are fully detoxified before lake ice-up there may be potential for residual toxicity to remain for long periods after the lakes ice over. Will full detoxification be required before lakes ice-up? We would expect additional potential for impacts to non-target species if long periods of toxicity are allowed, particularly with rotenone use. We believe that detoxification should occur before lakes ice up.

9. 11-25 It is suggested that a second piscicide treatment may be implemented if fish are detected following the first treatment (page 2-8), and that resultant action stemming from each treatment and post-treatment evaluation would be considered on a case-by-case basis. The DEIS also states that unauthorized, illegal stocking with non-native species may occur as it has in the past (page 2-27). 11-26 If unauthorized illegal stocking occurs after proposed treatments it would significantly reduce the effectiveness of this program to eradicate hybrid trout and preserve genetic purity of native westslope cutthroat trout. It appears important to project success to both eradicate hybrid trout and prevent the reintroduction of non-native trout into these lakes.

We believe it is important to have contingency plans in the event that treatments do not eradicate the entire hybrid trout population, and in the event that continuing illegal 11-27 reintroduction of non-native trout occurs after the proposed treatments. Given the importance of these elements of the project, we are concerned that the DEIS contains little information about the actions that would be taken or the strategy that would be employed to reduce these risks, particularly risks of continuing illegal reintroduction of non-native trout. Also, efforts should be made to educate the public on the effects of 11-28 such illegal introductions, and to improve enforcement programs and deterrents (fines, creel inspections, etc.) to reduce potential for continuing illegal stocking or introductions of non-native species.

10. It is stated that liquid rotenone would be the preferred formulation for this project (page 2-9). We recognize the hazards to applicators in using powdered rotenone (page D-6), 11-29 but have some concerns regarding the aromatic solvents that are used as a dispersant in liquid rotenone formulations (page E-6). These aromatic solvents can include trichloroethylene, napthalene, 2-methylnapthalene, and xylene (page D-2), which can be detrimental to public health, and are generally persistent in the environment (i.e., they do not quickly biodegrade). We understand that 5,800 of gallons of liquid rotenone formulations will be used on the eight lakes in which rotenone is the proposed piscicide

5

(Table C-2). Has MDFWP monitored for the presence of these aromatic solvents in rotenone treated waters following treatments in their prior uses of liquid formulations of rotenone? Does BPA or MDFWP propose to monitor the presence and degradation of these compounds in the eight rotenone treated lakes with this proposed project? Are sentinel fish cages the only means of monitoring for toxicity? Is it just assumed that these compounds will dissipate, be diluted, and/or otherwise not result in any adverse effects?

11.30 Also, is it known if less persistent or more biodegradable solvents are available for use in liquid rotenone formulations?

11. 11.31 Thank you for providing Appendix D discussing use of rotenone, safety measures, and precautions and measures to be used during storage and transport of rotenone to reduce risk of accidental spills. Is similar information available regarding the history and use of antimycin?

11.32 Thank you also for providing the MSDS sheets on treatment chemicals in Appendix E. A spill contingency plan is mentioned on page 2-13, but we did not see the details of the spill contingency plan included in Appendix D. We believe information on the contingencies in the event of spill or release of toxic or hazardous chemicals should be included in the EIS appendices.

12. 11.33 We are pleased that it is stated that at least one applicator licensed by the Montana Dept. of Agriculture well versed in the state regulatory requirements regarding safe and legal use of the piscicides must be on-site to supervise or administer the project (page D-7). We are also pleased that the staff involved in implementing the project will receive safety training in regard to the proposed use of the toxic and hazardous chemicals.

13. 11.34 The method of transport of equipment, people and material to the lake sites and degree of disturbance associated with such access and transport provides an important distinguishing difference between Alternatives B and D and Alternative C. It is stated (presumably with Alternatives B and D) that crew sizes in wilderness lakes would not exceed 15 persons and pack strings would be broken into strings of 10 to 12 animals (page 2-16). No pack trains into wilderness areas would occur in Alternative C, since aircraft would be the mode of transport with Alternative C. It is not clear how many strings of 10 to 12 animals would be required in Alternatives B and D. The extent of potential ground disturbance, disturbance to trails and other resources, and other environmental impacts from use of pack train transport of equipment, people and material to the lake sites should be more fully described to provide an improved basis upon which to evaluate and choose among alternatives.

11.35 Wilderness experience and solitude and wildlife may be affected during transport of equipment, people and material to the lake sites in all action alternatives. It is stated that an estimated nine helicopter flights would be needed to execute the treatment procedure

6

in Blackfoot Lake (page 2-18). Are nine flights estimated to be the average number of flights to each lake?

41.36 It appears that environmental impacts and ground disturbance during transport may be least with Alternative C involving use of aircraft for transport of equipment, people, and material to all lakes and use of motor boats for application, although wilderness sites and wildlife would experience additional impacts to solitude from aircraft impacts within wilderness areas with Alternative C. While we realize that wilderness values and wildlife may be impacted in the short-term using Alternative C, it appears that there may be some benefits to Alternative C in reduced ground disturbance from long pack train transport to the wilderness lakes, and shorter disturbance periods. The extent of additional ground disturbance and impacts and intrusion from pack animals and longer durations of intrusion with Alternative B modes of transport should be more clearly and quantitatively compared with the aircraft mode of transport proposed with Alternative C. Improved comparative alternatives evaluation may better define the issues and provide a clearer basis of choice among options for the decision maker and the public in accordance with the NEPA implementing rules (40 CFR 1502.14).

14. 41.37 Table 2-6 (page 2-44) indicates that Alternative D that avoids use of fish toxins would not eliminate non-native trout from headwater lakes; involves unproven techniques; would be less effective; and would result in longer-term angling loss and fisheries impairment in the headwater lakes. Alternative D, however, would avoid many of the uncertain and difficult to quantify aquatic ecosystem impacts associated with use of fish toxins and potassium permanganate (no risk to plankton, insects, amphibians). We believe additional discussion and comparative evaluation of these benefits of Alternative D vs. the reduced effectiveness and risks to angling and fisheries should be provided to better define the issues and provide a clearer basis of choice among options for the decision maker and the public.

15. 41.38 The method of transport proposed to restock lakes with genetically pure westslope cutthroat trout is not clear to us. Will pack trains or aerial transport be used to transport fish for restocking wilderness lakes? Will aerial transport be used to transport fish for restocking non-wilderness lakes?

16. 41.39 Any effects on water quality (e.g., nutrient enrichment) from dead fish decaying in the lake should be addressed in the Water Resources Section 3.4 (page 3-26). Will nutrients released from decaying fish have any potential effects on trophic levels in Hungry Horse Reservoir or Flathead Lake downstream? Special attention should be made regarding the State's identification of Flathead Lake as a water body with impaired beneficial uses in its Clean Water Act Section 303(d) report. It is important that the proposed project does not further degrade Flathead Lake water quality, and that the conservation program be consistent with long term water quality recovery as proposed in the Flathead Lake Nutrient Management Plan and Total Maximum Daily Load (TMDL) (see

7

http://www.deq.state.mt.us/wqinfo/TMDL/pdf/FlatheadDoc.pdf). Phase 1 of the Flathead Lake TMDL calls for a 25% reduction in nitrogen and phosphorus loads to the lake. The water quality goals for Flathead Lake are: 80 g carbon/m²/yr; no declining trend in hypolimnionic dissolved oxygen; no measurable blooms of Anabaena or other pollution algae; 1.0 ug/l chlorophyll a maintaining or decreasing near-shore algal growth on rocks; 5.0 ug/l total phosphorus; <0.5 ug/l soluble reactive phosphorus; 95 ug/l total nitrogen; 30 ug/l nitrate+nitrate; <1.0 ug/l ammonia.

Monitoring and Adaptive Management

17. 11 40 It is stated that MDFWP has administered 74 rotenone applications on 63 lakes in the Flathead Basin, including seven lakes requiring multiple treatments (page 2-8), and that previous monitoring shows that short-term impacts to the fisheries resource caused by chemical treatment (using rotenone or antimycin) are undetectable within the first three years (page 3-13). References should be provided for these monitoring results to better support this statement (similar to the references provided on pages 3-22 and 3-23 regarding previous studies of effects on amphibians, plankton and aquatic insects).

18. 11 41 It is our understanding from the information in Chapter 3 that hybrid trout and westslope cutthrout trout are the only fish species present in the lakes to be treated, but that bull trout and whitefish are present in downstream drainages. Is this correct?

19. 11 42 It is stated that monitoring of restocked fish would continue for several years to determine population viability and associated characteristics and program success (page 2-5), and that a survey would occur the spring or summer following treatment with setting of gill nets, monitoring of caged fish, and, if possible, the evaluation of the status of non-target organisms like plankton, amphibians, and aquatic insects (page 2-25). Why is it stated that non-target organisms will be evaluated, if possible?

11 43 We believe it is important that before-and-after surveys and evaluation of proposed treatments be conducted for all aquatic and terrestrial biota that could potentially be affected by the proposed use of fish toxins to remove fish from the lakes, not just westslope cutthroat trout. Baseline monitoring should identify all indigenous aquatic species present in the lakes to be treated. The monitoring program to assess post-treatment effects and natural recovery or repopulation of the lakes by indigenous species should be more fully described, particularly monitoring for non-target species present in or around the lakes (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc.).

20. 11 44 The DEIS states that amphibian surveys have been conducted at each lake and are ongoing (page 2-12), and that four amphibian species and two reptile species were detected in the project area: long-toed salamanders, Rocky Mountain tailed frogs, western toads, and Columbia spotted frogs, and Western terrestrial garter snake and common

8

garter snake (page 3-18). Four other species were believed to be in the project area, but were undetected (pacific tree frogs, northern leopard frogs, western painted turtles and rubber boa). The DEIS also states that these species are widely distributed throughout the project area.

It would be helpful to have a table that listed all aquatic species present in or that use each of the lakes to be treated and their abundance and life history stages at time of treatment (i.e., target and non-target species that occupy or use each lake). If species are present in some lakes that are not present in other lakes that should be identified as much as possible. If such baseline information is not available or unknown that should be clearly stated, although we believe such information should be obtained as much as is possible.

11-45 Are there any wetlands, springs, seeps and any other special or unique habitats on the edge of the lakes and treated streams that may be affected by the proposed project? If so, efforts to avoid adverse impacts to specialized aquatic habitats such as wetlands, springs, and seeps should be identified.

21. The DEIS states that substantial evidence collected from past rotenone treatments in the Flathead Basin indicates that rotenone would have no long-term impacts on amphibians in the project area, and that laboratory tests conducted by MDFWP indicate that antimycin would not have a negative effect on amphibians at the levels prescribed to kill fish (pages 2-25, page 2-26). The DEIS states that effects on amphibians from use of both compounds is "expected to be minimal or short-term" (page 3-23).

11-46 It does appear that impacts on amphibians from the application of antimycin are likely to be reduced, since antimycin is less toxic to amphibians than rotenone (pages 3-22 and 3-23). The proposed Fall application of piscicides should also reduce potential impacts on amphibians, since adult amphibians are affected less (page D-2), although Rocky Mountain tailed frogs are quite aquatic and even adult species could be significantly impacted by rotenone. We also note that potassium permanganate used for neutralizing the piscicides may also have toxic effects on amphibians and other aquatic species. We are concerned, therefore, that there may be potential for impacts to occur to amphibians and other aquatic species from the proposed project.

11-47 The DEIS states that if application of either compound show any anomalous effects on local amphibian populations, MDFWP would mitigate those impacts by replacing amphibians that may be impacted (page 2-26). It is stated that a follow-up survey for two years after treatment would be used to confirm whether amphibians are present within treated areas, and whether they need to be replaced. We are concerned, however, that few details are provided regarding follow-up surveys and amphibian monitoring before and after treatments. Lack of information on follow-up surveys and amphibian monitoring does not provide much assurance that any impacts on amphibians that may occur will be detected. More details regarding amphibian monitoring programs and

9

protocols should be provided to assure that any effects to amphibian species are detected, and then mitigated.

22. [11-48] Information is presented in Appendix D that suggests that the temporary overabundance of dead fish immediately following treatment, and the subsequent temporary loss of fish supplies to predators that rely upon such food supplies will have little impact on bird or mammal populations because most animals can utilize other water bodies and sources for food. We understand that piscicide treatments will occur in the Fall (late September to early November) and that restocking will not begin until the following July, and then would occur annually until a population of westslope cutthroat trout is established (page 2-26). This would appear to leave a period of at least 8 or 9 months for each treated lake to be without fish and other aquatic species that are affected by the fish toxins and potassium permanganate, and perhaps it would take years to establish a healthy population of trout and other affected species. While treatments would be staggered spatially over ten years or more to reduce effects on other species as well as angling, it is surprising that lengthy periods of loss of aquatic life in the lakes will not impact the bird or mammal life near the lakes that may have developed a reliance upon fish and other aquatic species for food.

[11-49] It is also not clear if the statement of predicted lack of impact on bird or mammals is based on actual monitoring of bird and mammal populations after actual piscicide treatments or on supposition. We are concerned that the MDFWP prioritizes monitoring on game fish, and monitoring for effects on other non-game species may be less attentive, so that effects on non-game species may occur without detection. There is a need to monitor for impacts to all species that may potentially be affected by the proposed use of toxic chemicals in these lakes and streams. We believe the BPA and MDFWP project monitoring and evaluation programs should include evaluation of impacts upon all potentially affected species, including bird and mammal populations that use aquatic species for food. Also, if impacts to bird or mammals from treatment are detected, efforts to mitigate or compensate for such impacts should be made.

23. [11-50] Monitoring and evaluation and an adaptive management strategy is critical to the success of project implementation, particularly since there is some uncertainty associated with the effects of the proposed activities. There should be a continuing process of planning, implementing, monitoring, and evaluating effects of project implementation, and adjusting implementation or mitigation where effects are not as predicted. It is only through monitoring of actual effects that occur that the BPA and MDFWP will be able to determine whether:

1) goals and objectives are being met;
2) assumptions/indicators used in developing and implementing the conservation program are valid;
3) effects are as predicted (i.e., addressing uncertainties); and

10

4) if mitigation is effective or should be increased or decreased or otherwise adjusted to be meet project goals and objectives.

11-51 A properly designed monitoring plan will also quantify how well the preferred alternative resolves the issues and concerns identified during scoping and DEIS review, and provides the flexible program for monitoring and feedback of monitoring results to improve predictive methodology and modify mitigation.

11-52 We are pleased that the DEIS indicates that post-treatment monitoring would be conducted (page 2-4), but we are concerned that the DEIS provides only general descriptions of monitoring activities that would be undertaken. Additional details of the monitoring efforts should be presented to assure that consistent and meaningful information/data and is generated to evaluate effects of project implementation. A well designed monitoring plan and adaptive management strategy is needed to assure that adequate monitoring is carried out and that results are evaluated and fed back to management for adjustments in project implementation and mitigation when and where necessary.

11-53 Specifically, we believe that information defining the follow-up actions to the rotenone and antimycin treatments (monitoring and evaluation of effects upon all potentially affected aquatic and terrestrial species, restocking plan for non-target indigenous species, contingency plans, plan for preventing reintroduction of non-native species) should be more completely developed and presented in the EIS. We believe monitoring and evaluation are equally as important as removing hybrid trout from the lakes and restocking with pure strain westslope cutthroat trout, since it is only through monitoring and evaluation that naturally functioning aquatic ecosystems will be restored and protected for the long-term.

11-54 We recommend that a monitoring and evaluation plan be completed and included as an appendix to the final EIS (and summarized in the Record of Decision) for the project. We believe that appending the monitoring and evaluation plan to the EIS provides the public with an opportunity to assist in developing and refining the elements of the plan which can potentially result in a better plan. We recommend that the following general components be included in the monitoring plan.

11-55 *Identification of Parameters or Resources to be Monitored* – The monitoring plan should specifically identify what is to be measured. For example, if amphibians are to be measured, the amphibian monitoring protocol should be identified. If water quality parameters (e.g., piscicide concentrations, potassium permanganate concentrations, aromatic solvent concentrations, pH, redox, dissolved oxygen, nutrients, temperature, alkalinity, other water chemistry parameters, physical and biological parameters, sentinel fish toxicity, etc.) are to be monitored, the monitoring methods and probable monitoring locations should be identified.

11

11-56 *Monitoring Methods to be Used* – The monitoring methods we are most familiar with are implemented using Standard Operating Procedures (SOPs) which outline how monitoring is done in a consistent, repeatable manner. Without SOPs, monitoring approaches could be applied haphazardly with the concomitant inconsistent reporting of the findings from that monitoring. We recommend that SOPs be contained in the monitoring plan or identified as being available by reference.

11-57 *Monitoring Frequency, Duration and Reporting of Results* – The monitoring plan should specify the frequency of the monitoring efforts and identify the time-frames within which results would be reported. We suggest that the monitoring plan identify the intended recipients of any monitoring reports and how the reports would relate to evaluating the relative successes and failures of project implementation. We also suggest that the plan identify the duration of the monitoring effort. We recommend that the duration of monitoring efforts be tied to the specific resources or parameters being measured and the reason for measuring them.

11-58 *Definition of Roles and Responsibilities of Involved Parties* – The monitoring plan should identify the parties that would be involved in the monitoring efforts and establish their respective roles (i.e., who will do what). This is particularly important in efforts that involve more than one agency and ensures that roles and expectations are established at the onset of the monitoring program.

Restocking

24. 11-59 The discussion at the top of page 1-11 regarding genetic diversity issues associated with restocking the treated lakes with M012 brood stock raises important concerns. These concerns include: a) potential reduction of westslope cutthroat trout genetic diversity by restocking with a single M012 genetic stock, which may result in a monoculture exhibiting little genetic diversity; and b) potential dilution of natural genetic uniqueness exhibited in adaptations and phenotypic variations of local westslope cutthroat trout. It is not clear to us how these important concerns are addressed with the restocking plan. We recommend that the FEIS explain more fully how these concerns will be addressed.

25. 11-60 Restocking of lakes with pure strain westslope cutthroat trout is discussed in Section 2.4.6 (page 2-26), and there is some discussion of restocking of amphibians. However, few specifics are provided regarding potential restocking of the lakes with other native non-target species that may be affected by treatments (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc.). We are concerned about potential loss of native non-target species, since proposed fish toxicants and potassium permanganate, used to neutralize the fish toxins, can be lethal to many aquatic organisms. The loss of non-target species and impacts on overall aquatic ecosystem integrity is an important

12

issue. We believe attention needs to be directed to potential impacts to non-target species.

11.61 If some indigenous species depend on isolated headwater habitat in the lakes or have evolved within the isolated headwater habitat they may not easily repopulate the lakes and may need assistance in repopulation. Restocking and other proposed efforts to restore or compensate for unavoidable impacts that may occur to all affected species should be more fully addressed. We have heard of potential longer term effects to invertebrates as a result of piscicide applications, most notably at Strawberry Reservoir in Utah where invertebrate populations have not been fully restored following rotenone applications there.

11.62 We are pleased that amphibians would be collected for release after treatment (page 2-21), and that MDFWP would replace amphibians that may be impacted (page 2-26). We also note that the DEIS states that tailed frogs could be collected from some streams prior to treatment and replaced following treatment (page 2-26), but does not definitively commit to such collection and restocking of tailed frogs and other amphibian species (i.e., the DEIS should say that all amphibian species will be collected from some streams prior to treatment and replaced following treatment). On page 3-23 it is also stated that efforts to mitigate impacts could include transplanting amphibians from neighboring populations, if necessary, and/or capturing specimens from within each project area before treatment then releasing them after it is complete. We believe such amphibian mitigation efforts should be committed to more definitively (i.e., "...would include transplanting amphibians...").

11.63 We also recommend that an accredited herpetologist be involved in supervising amphibian monitoring and evaluation and mitigation efforts. Amphibians have experienced significant decline in many habitats, and we feel particular precautions need to be taken to assure that populations of native amphibian species will be preserved and restored as much as possible in the treated waters.

26. 11.64 The potential effects of continuing to restock fish in lakes that were originally fishless should be more fully evaluated and disclosed in the EIS. It is our understanding that most or all of the proposed 21 lakes that are proposed for treatment were originally fishless. Is that correct? The DEIS says that MDFWP proposes to continue historical stocking of fish in these lakes order to maintain the current recreational and socioeconomic standards and to increase "biological integrity" by providing genetically pure westslope cutthroat trout to seed downstream areas (page 1-13). It is also stated (page 2-27) that unauthorized, illegal stocking may occur as it has in the past, and that such illegal stocking is likely to occur if MDFWP dose not restock the lakes that were originally fishless.

The introduction of fish to fishless lakes to create a recreational fishery can have adverse effects on the aquatic ecosystem. Predation by introduced trout consumes native

13

amphibians and benthic invertebrates and can reduce the population of larger zooplankton, which are effective grazers of the phytoplankton. With the restocking of fish to lakes that were originally fishless, additional biomass is added to the lakes that can influence nutrient cycling, and can have unintended negative effects to water quality and the biological integrity of the lake. It is not clear to us, therefore, if "biological integrity" is increased by introducing fish to lakes that did not originally have fish as part of their naturally functioning ecosystem. A case can be made that biological integrity or ecological integrity is compromised by introduction of fish to fishless lakes. 11-65

11-66 We recommend that restocking of fish to originally fishless lakes be based on monitoring and evaluation and full understanding of how lake ecology is affected by fish restocking. We recommend that a cautious approach to the trout restocking program be taken and that the stocking program be accompanied by a sufficiently robust monitoring and evaluation program to evaluate ecological effects of stocking fish in lakes that were originally fishless. Maybe some of the lakes should be left fishless for long-term monitoring and ecological comparison with lakes that are restocked?

11-67 We note that decisions were made in the past to introduce non-native trout to these lakes without careful, thoughtful evaluation, and full consideration of potential ecological effects. This led to the ecological problems creating the need for this proposed project. We think it would be appropriate to proceed cautiously in restocking of fishless lakes, and to base restocking decisions on careful evaluation of monitoring data and information and full understanding of potential ecological effects.

Public Health

27 11-68 Thank you for including a discussion of public or human health effects associated with using rotenone and antimycin (beginning on page 3-54). The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows:.

11-69 - The new fish consumption value for the Clean Water Act 304(a) criteria is 17.5 grs/day instead of 6.5 grs/day (although you may be limited to 6.5 grs because that is the value in the current version of the State's WQB-7 criteria document).

11-70 - For rotenone, the document lists the appropriate Reference Dose (RfD), but we suggest you provide a citation for the value (i.e., EPA's IRIS document).

11-71 - For antimycin, the 0.5 mg/kg-day is a No Observed Effect Level (NOEL), not a Rfd. To arrive at a RfD, this value will have to be adjusted downward based on appropriate uncertainty factors. EPA's Regional toxicologist (Dr. Robert Benson) recommends an overall uncertainty factor of 3,000 rather than 300 based on the following:

14

1) a factor of 10 based on uncertainty in the animal to human translation;
2) a factor of 10 based on intra-human variability;
3) a factor of 10 based on the subchronic/chronic uncertainty; and
4) a factor of 3 based on data limitation (i.e., one study) = 3000 as the overall uncertainty.

The RfD for antimycin, then, would be 0.0002 mg/kg-day.

- For antimycin, the document notes that antimycin does not bioconcentrate, and therefore no bio-concentration factor (BCF) is used in the calculation of the human health value. We suggest that there be a reference supporting this conclusion (note: There are a number of toxicants, some metals for example, that do not bioconcentrate appreciably and are said not to concentrate, but even for these, the BCF is often greater than 1).

- For potassium permanganate, the document does not present a proposed human health water column value. Dr. Benson has calculated a value. Based on his calculation (see attached) the water column value should not exceed 0.8 mg/L.

It may be reasonable to base the chronic exposure scenario on the drinking water route of exposure only, since, as the DEIS explains, the fish targeted for removal will be killed quickly and the dead fish will be collected and disposed of (i.e., if the fish are quickly killed and disposed of, there would not appear to be much likelihood of bioconcentration and a fish consumption route of exposure). As a result, the chronic risk assessment calculation for the water column values might be based solely on the drinking water route of exposure. The reasonableness of this assumption, of course, would depend on a 100% (or close to) fish kill, dead fish collection and a short half-life for the chemicals used. Since the objective of a project such as this is generally 100% kill, limited potential for bioconcentration would seem to be a reasonable assumption.

Based on the adjustments discussed above (using the 17.5 grs consumption assumption for the rotenone "water+fish"), we suggest that appropriate toxicant target concentrations and human health values would be:

Toxicant	Water Column Target	Human Health Value	
		water+fish	water only
Rotenone	50 ug/L	18 ug/L	140 ug/L
Antimycin	7.5-8.0 ug/L or 4 ug/l*	-	7.0 ug/L
Potassium Permanganate	4.5 mg/L	-	0.8 mg/L

15

* See our comment #3 above regarding uncertainty over the proposed target concentration of the antimycin active ingredient.

Based on the figures in this table, the target concentrations for rotenone (50 ug/l) would be lower by greater magnitude than the estimated chronic "water only" human health value for rotenone (140 ug/l), more so than target concentrations and "water only" human health values for antimycin and potassium permanganate. This suggests that there may be a greater margin of safety in regard to human health risk for use of rotenone (at the proposed target concentrations) than for the other chemicals. Admittedly, this is an observation based on a limited amount of information and application of uncertainty factors, and it should also be noted that proposed target concentrations of these chemicals may be higher than shown to account for water chemistry and fresh water inputs. In any case, it is important that potential human health risks be considered along with other factors (e.g., rate of detoxification, quantity needed to kill fish, ease of bulk transport, toxicity to non-target organisms, piscicide availability, etc.,) in weighing the advantages and disadvantages of use of the chemicals.

In regard to acute toxicity and exposure, it appears that the DEIS uses LD50 values from the literature to estimate exposure scenarios that are highly unlikely to occur, such as drinking 12,000 liters of contaminated water in one day, as the basis for dismissing concerns about acute exposures. We believe it is inappropriate to use a lethal dose as the basis for reaching conclusions about public health protection. Also, the extreme exposure scenario approach to presenting the LD50 information may be misleading in a public disclosure document such as an EIS. There appears to a low amount of data with which to derive safe acute exposure levels for these chemicals. The EIS should disclose the uncertainty in human health exposure effects, and identify the mitigation measures and management practices that will be used to avoid and minimize human exposure.

Other Comments

28. Thank you for identifying the permits and authorizations that would be needed to implement the proposed project (pages 2-14, 2-15), including the water quality exemption permitted under MCA 75-5-308 for short-term exemptions fro the purpose of elimination of undesirable and nonnative aquatic species (pages 3-26, 4-2, D-5). Generally the Montana DEQ establishes conditions that minimize risks to public health and the extent of exceedances of Water Quality Standards and the length of time during which an exceedance may occur. We believe the FEIS should also disclose the Montana DEQ's conditions for use of the MCA 75-5-308 water quality exemption.

Also, we did not see Clean Water Act Section 401 water quality certification included among the permits and authorizations discussed. It would be appropriate to discuss Clean Water Act Section 401 water quality certification that may be required from the Montana DEQ.

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29. The EPA issued an Interim Statement and Guidance on Application of Pesticides to Waters of the U.S. in Compliance with FIFRA (Federal Insecticides, Fungicides, and Rodenticides Act) on July 11, 2003 that indicates that application of a pesticide to waters of the U.S., consistent with all relevant requirements of the FIFRA, does not constitute the discharge of a pollutant under the Clean Water Act. It is our understanding that this policy would cover use of piscicides for managing non-native fish species. Thus, EPA's current position is that the use of fish toxicants in waters of the U.S. for management of non-native fish would not require an NPDES permit (or in Montana- MPDES permit) under Section 402 of the Clean Water Act. You should understand, however, that EPA is still accepting public comments on this position, and that there may be case law with alternative views on such matters.

11-79

30. It is stated (page 3-61) that none of the alternatives would affect air quality, although a small possibility of odors from piscicides is noted. We note that there appears to be potential for emissions of air pollutants from aircraft and mechanical equipment used during transport, application and mixing of toxicants. These potential effects, while likely minor, should be assessed and disclosed, especially since emissions may occur in or near the Class 1 air quality areas of the Bob Marshall Wilderness and adjacent Glacier National Park.

11-80

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11.80

Suggested Guidance for Application of Manganese RfD to Specific Scenarios

In applying the reference dose (RfD) for manganese to a risk assessment, it is important that the assessor consider the ubiquitous nature of manganese, specifically that most individuals will be consuming about 2-5 mg Mn/day in their diet. This is particularly important when one is using the reference dose to determine acceptable concentrations of manganese in water and soils. Following RfD/RfC Work Group deliberations, it was decided that having a single reference dose for total oral intake of manganese is most appropriate, but that guidance should also be provided as to how this reference dose might be applied in specific situations. It is recommended that the upper end of the range recommended by the NRC (5 mg/day, described below) be considered to represent a typical human intake from total dietary sources. For determination of acceptable concentrations of manganese in water and soil, then, the risk assessor would subtract this amount from the level specified by the RfD [i.e., 10 mg/day (RfD) - 5 mg/day (typical dietary intake) = 5 mg/day (remaining)]. For applying this number to a non-dietary scenario, it is also recommended that a modifying factor of 3 be applied. The rationale for this modifying factor is three-fold. First, while the data described in section I.A.4 of the IRIS file suggest that there is no significant difference between absorption of manganese as a function of the form in which it is ingested (i.e., food versus water), there was some degree of increased uptake from water in fasted individuals. Second, the study by Kondakis et al. (1989) has raised concerns for possible adverse health effects associated with a lifetime ingestion of drinking water containing about 2 mg/l manganese. While no data are available to quantify total intake of manganese, one would not expect this concentration of manganese in water to be a problem based on dietary information revealing intakes ranging from 2 to 10 mg/day that are not associated with adverse health effects. Third, although toxicity has not been demonstrated, there are remaining concerns for infants fed formula which typically has a much higher concentration of manganese than does human milk (see section I.A.4 of the IRIS file for further discussion). If powdered formula is made with drinking water, the manganese in the water would represent an additional source of intake.

Using the recommended appropriation of 5 mg Mn/day for dietary contributions and a modifying factor of 3 for exposures from soil and drinking water and a body weight of 70 kg, yields a value of 0.0238 mg/kg-day.

Exposure from water + Exposure from soil = (10-5)/(3x70) = 0.0238 mg/kg-day

Assuming no exposure from soil and a 70 kg person drinking 2 L/day, the suggested advisory level is:

0.0238 mg/kg-day x 70 kg x 1 day/2 L = 0.8 mg/L

19

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
MONTANA FIELD OFFICE
100 N. PARK, SUITE 320
HELENA, MONTANA 59601
PHONE (406) 449-5225, FAX (406) 449-5339

SFFU-012
AUG 04 2004

File: M 03(I)

July 29, 2004

Bonneville Power Administration
DM-7, P.O. Box 14428
Portland, Organ 97293-4428

This letter responds to your June 18, 2004, request for comments from the U.S. Fish and Wildlife Service (Service) on the proposed Bonneville Power Administration (BPA) Draft Environmental Impact Statement (DEIS) for the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program located in Montana. We appreciate the opportunity to review this project proposal and provide early comments. These comments have been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and the Endangered Species Act (16 U.S.C. 1531 et. seq.).

12-1 The Service reviewed an April 2002 biological assessment prepared by BPA and Montana Fish, Wildlife, and Parks (MFWP) for this project and concurred with the determination that the proposed project is not likely to adversely affect the threatened bull trout (*Salvelinus confluentus*), threatened grizzly bear (*Ursus arctos horribilis*), threatened bald eagle (*Haliaeetus leucocephalus*), threatened Canada lynx (*Lynx canadensis*) and the threatened gray wolf (*Canis lupus*) (UFWS, May15, 2002, letter of concurrence). Therefore, pursuant to 50 CFR 402.13 (a), formal consultation on the bull trout, or other federally listed species, was not required and incidental take of any threatened and endangered species within the project area is not anticipated. However, although incidental take is not anticipated, should unforeseen circumstances accidentally result in incidental take of a listed species, the Service must be notified. Further, if the final design of the project is changed so that it changes the effects on federally listed species, a revised biological assessment may be required.

12-2 The Service has reviewed the DEIS for the proposed project and supports the activities outlined in the DEIS that would reduce the threats to a native species that has been degraded due to anthropogenic factors, specifically westslope cutthroat trout. 12-3 The anticipated net effect of the proposed project will likely return portions of the Bob Marshall and Great Bear Wilderness areas to a condition that is consistent with the spirit and purpose of the Wilderness Act, and may help prevent westslope cutthroat trout being driven toward federal listing in the future.

12-4 The Service considers alternatives B and C as having the greatest potential of achieving westslope cutthroat trout conservation. We believe that MFWP is cognizant of the public's high regard for the qualities and values in designated wilderness areas, and that MFWP has provided the assurances that the Proposed Action represents a carefully considered attempt to balance objectives that sometimes appear to conflict (i.e., protection of wilderness values opposed to conservation of rare species) with the reality of conducting business in a financially conscientious manner.

125 We wish to convey our appreciation of the agencies involved for actions that promote the conservation of westslope cutthroat trout. Projects such as what is proposed in the DEIS will be helpful in protecting the existing range and in increasing the number of populations of the westslope cutthroat trout. Such actions will be extremely beneficial for this rare species and we hope, will factor prominently into preventing the need to add this fish to the Secretary of Interior's list of federally threatened and endangered species.

The Service appreciates your efforts to incorporate fish and wildlife resource concerns into your project planning. If you have questions or comments related to this issue, please contact Dan Brewer at 406-449-5225, extension 216.

Sincerely,

R. Mark Wilson

R. Mark Wilson
Field Supervisor

Copy to:
MTFWP, Fisheries Division, Helena, MT (Attn: Chris Hunter)
AFR,-R6, MS 60140 (Attn: Mike Stempel)
FWS, Columbia River Native Fish Coordinator, Kalispell, MT (Attn: Tim Bodurtha)
FWS, Fish & Wildlife Management Assistance, Native Fish Branch, Bozeman, MT (Attn: Lynn Kaeding)

South Fork Flathead Watershed/Westslope Cutthroat
Trout Conservation Project

SFFW-013
AUG 1 2 2004

Telephone comment by Ginny Kuehn
8/11/2004

Doug Bell
76 Crestwood
Whitefish, MT 59937

406-862-0071

13.1 You need a sample of fish from Martin Lake tested before you poison them. I was asked to go with group of people to catch 25 fish as a sample (I was unable to go). The group didn't catch any fish to test.

13.2 The fish they have been catching from the lake look pure.

SFFW-014
AUG 1 2 2004

F. H. STOLTZE LAND & LUMBER CO

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August 12, 2004

S. F. Flathead Watershed Westslope Cutthroat Trout
Bonneville Power Administration-DM-7
P.O. Box 14428
Portland, Oregon 97293-4428

RE: South Fork Flathead Watershed Westslope Cutthroat Trout Program

Communications Committee:

In response to the recently published Draft EIS "South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program", F.H. Stoltze Land and Lumber Company offers the following comments.

14-1 1.) We understand the rationale behind this project and we think it is admirable for the BPA, USFS, and Montana Fish, Wildlife, and Parks to try to restore our native fisheries and eliminate introduced trout competition. Unfortunately, we introduced non-natives into these mountain lakes and watershed in the first place during past years and we may now be playing "God" again when we try to reverse those previous mistakes.

14-2 We believe it is highly unlikely that all hybridization and non-natives would be eliminated in this tremendously expensive project. It is unrealistic to think we can totally correct or "undo" our past.

14-3 If this project does continue as planned, we suggest that initial attempts be limited to one drainage or basin for a test case to be certain that it has the positive outcome you intend.

14-4 2.) The effect upon existing recreation opportunities is substantial ! This region has a rapidly expanding human population and the public is continuously demanding improved and increased recreational use days. The South Fork Westslope Cutthroat Trout Program would be harmful to the local public fishing opportunities

14-5 as well as local outfitters' livelihoods

14-6 for nearly half a decade following the application of fish toxins. This effect upon the loss of public recreation must be an important consideration during the EIS process.

Page 1 of 2

AUG-12-04 THU 10:16 AM STOLTZE LUMBER CO. FAX NO. 406 892 1612 P. 2

Thank you for the opportunity to comment on your conservation program DEIS. Please keep us informed when a final analysis is presented and feel free to contact us for clarification of our comments.

Sincerely,

Chuck Roady

Chuck Roady
Lands & Resource Manager

Page 2 of 2

Montana Department of
ENVIRONMENTAL QUALITY

SFFW-015
AUG 1 2 2004

Judy H. Martz, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.state.mt.us

10 August 2004

Communications
Bonneville Power Administration – DM -7
P.O. Box 14428
Portland, OR 97293-4428

RE: Comments pertaining to Draft Environmental Impact Statement DOE/EIS-0353, South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program

Dear BPA:

The following are Montana Department of Environmental Quality (DEQ) comments pertaining to the Draft Environmental Impact Statement DOE/EIS-0353, South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program. DEQ is responsible for the maintenance, protection and improvement of water quality and designated uses and authorizes or permits discharges to waters of the state that may affect water quality and designated uses.

General Comments

The Department has reviewed comments submitted by the Montana Office of the EPA dated July 29, 2004, and fully concurs with those comments. The only minor exception pertains to Human Health comment 27. Montana has not adopted the new EPA fish consumption value of 17.5 g/day. The adopted fish consumption value for calculating Human Health criteria is 6.5g/day. See the extensive comments previously submitted by the Department to the Department of Fish, Wildlife and Parks during the internal draft review pertaining to the calculation of Human Health criteria.

Since water quality sampling for rotenone may be difficult and a laboratory method for antimycin does not exist, instead of chemical monitoring, DEQ requests that biological monitoring for lakes and streams be performed at least during the first two years of the project. According to Sections 2.4.2.2 and 2.4.5 pre- and post- biological surveys are already planned and some of the information has been collected from lakes within the project area (Sections 3.3.2.2 and 3.3.3.1).

DEQ requests that information from pre- and post- biological sampling be organized into a report and submitted to Department after each year of treatment to document that no adverse short-term or long-term impacts to non-target species will occur. This

Centralized Services Division • Enforcement Division • Permitting & Compliance Division • Planning, Prevention & Assistance Division • Remediation Division

information will also justify allowing the project to continue if the information demonstrates water quality and beneficial uses will be protected.

Specific Comments

Chapter 1

18.4 1.5.4 In addition to the "308 Authorization" DEQ has §401 Certification authority for federal permits (i.e., Forest Service special use permits) that may cause a discharge to state waters. The §318 "Turbidity Authorization" should also be mentioned because construction of dams, weirs or other structures (that cause sediment or turbidity increases) may be installed during the life of the project.

Chapter 2

18.5 2.4.24 Add provisions for the §401 Certification and possible §318 Authorization. The 308 Authorization conditions listed are an example; additional conditions, such as biological monitoring, may be required by DEQ.

Chapter 3

3.4.1 Typical stream types found in the project area generally have gradients from 4 to 10percent, and are characterized by straight (nonsinuous) cascading reaches with ~~frequently~~ closely spaced pools. Many of the outlet streams associated with the lakes in this project have large waterfalls immediately downstream of the lakes, some reaching 200 feet tall. ~~Also common are~~ Streams with gradients from 2 to 4 percent; ~~these streams~~ usually occupy narrow valleys with gently sloping sides.

There are no federal or Montana numeric water quality standards for rotenone or antimycin. However, the Montana Water Quality Act has narrative standards for water quality that prohibit the introduction of substances into waters that are injurious to aquatic life or that affect exiting uses. Under this project, MFWP would apply piscicide
18.6 for the expressed purpose of killing unwanted fish. ~~There may be some minimal and short-term impacts to other aquatic organisms, but the MDEQ will permit an exemption for this activity under section 75-5-308 of the MCA.~~ The Montana WQA in §75-5-308 MCA and the EPA through FIFRA acknowledge the use of pesticides under special circumstances is beneficial. FIFRA registration and label instructions reduce the potential for impacts to non-target organisms or long-term impacts and protects human health. Conditions imposed by DEQ when it issues a "308 authorization" will add an additional level of protection to non-target organisms and designated beneficial uses. The conditions may include limitations to the time of year the piscicides are applied, monitoring treated waters to ensure detoxification of the piscicides is complete, biological monitoring, and ensuring that the duration of toxic conditions is as short as possible, among others.

3.4.3.1

Add a section describing the movement and detoxification of Antimycin by organic sediment.

Add a section about the proper management of Rotenone.

15-7 ~~The only downstream users of water would be outfitter and private hunter camps.~~ Impact to drinking water use (human health) and livestock uses will be minimized by temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary.
~~Some livestock watering would be expected at some of these downstream locations.~~ A number
of other precautions ~~factors would~~ will aid in the reduction or elimination of ~~project areas users'~~ exposure to these compounds by wildlife and other aquatic life : proper containment of piscicide treatments (low concentrations used for fish killing do not have harmful effects on mammals); rapid detoxification of both compounds in flowing streams and the treated lakes; ~~temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary.~~

Impacts to agricultural uses in the project areas is expected to be slight to no effect. Recreation (swimming) use impact will also be slight because of the time of year and cold water conditions when the treatments will be applied. Recreational fishing will be impacted until the restocking efforts are complete.

Chapter 4

15-8 4.1.5

Add sections discussing the §401 Certification and possible 318 Authorization.

Appendix D

Rotenone Effects

15-9 Describe in detail the environmental factors affecting the decomposition of Rotenone and Antimycin. Discussions with FW&P staff have described toxic conditions in a Rotenone treated lake well in the winter following treatment. Toxic conditions to aquatic life for months after treatment probably will not be considered short term as required in the 308 authorization. Outlet streams will have to be monitored and detoxified until a no effect level is reached.

15-10 Regulatory Status

Use the correct citations. The citation for 17.30.637(3)(b) does not exist. This was brought to your attention during the internal draft review comments.

Municipal Wastewater Applications

15.11 …Hydrogen sulfide is ~~one the~~ a deadly ~~gases~~ gas that can be formed in the collection and
treatment of municipal wastewater…

Cleanup

15.12 … sub-sample of the dead fish is collected…

Aesthetics is an important reason to clean up the dead fish, but odor control, bacteria and fungus control and removing the potential food source for bears, eagles and other wildlife to consume rotenone killed fish is even more important.

For more information please contact Mr. Christian J Levine, ph 406-444-0371, email clevine@state.mt.us.

Sincerely,

Christian J. Levine

Christian J Levine
Environmental Science Spec
Water Quality Standards Section

SFFW-016
AUG 12 2004

Comment received at Public Meeting 7/12/04, Kalispell, MT

WARREN ILLI: Basically just two comments at this point. First is that we think that any lake that is poisoned needs to be restocked with -- to preserve that fishery. We would not support poisoning out the existing fish and keeping the lake fishless.

SHERI J. HAZLETT REPORTING, INC.
P.O. Box 8853 ~ Kalispell, Montana 59904-1853
406-752-4645 ~ 1-888-292-7822

The second comment is the use of mechanized equipment in the wilderness or Jewel Basin hiking area. We think it ought to be done in a way that's relatively cost effective as well as maintaining the wilderness qualities and the hiking qualities of the area.

So in summary, we support using some mechanized equipment. It seems to be a reasonable balance between maintaining the wilderness qualities as well as being cost effective in dealing with the fishery issue.

SFFW-017
AUG 12 2004

Comment received 7/12/04 at Public Meeting Kalispell 2

P R O C E E D I N G S

ARLEN ROLL: I fully support the project that's been presented, with one exception. The exception is Handkerchief Lake. It's my view that the resource; that is, the grayling, are of two high of value to be poisoned out. I appreciate the fact that they're going to trap and hold and restock, but it's my opinion that far too many grayling will escape the traps and be killed. And I just don't think that's the approach we should take based on the value of the grayling in our current societal situation.

I guess I would support poisoning the Graves Creek from the outlet down to the reservoir, which is where, in my view, the majority of the trout are.

I first began to fish Handkerchief in 1958 and have caught very, very, very few trout in the lake itself and lots and lots and lots of grayling. And I just think it's an inappropriate decision, and I'd like to speak for the fish and say, let's just bypass Handkerchief Lake on this one and go ahead with the remainder of the project and just leave that alone.

SFFW-018
AUG 12 2004

Spiering, Colleen A - KEC-4

Tim Taylor

From: ~~alan brown~~ [tim8hr@hotmail.com]
Sent: Thursday, August 12, 2004 7:05 AM
To: Spiering, Colleen A - KEC-4
Subject: High mountain lake poisoning

Dear,Colleen Spiering:

18-1 I would like to voice that there be no fish removal or fish toxins used in the high mountain lakes.

18-2 I would like to see Montana Fish Wildlife & Parks plant pure strain westslope Cutthroat Trout on existing populations and bring the ninety to ninety-five percent (90 / 95%) genetically pure fish population up genetically by using a swamp out method instead of killing all the wild Cutthroat. This would be a lot more beneficial than using a fish toxin, and keep the water quality untouched by a foreign chemical in the water / drainage.

18-3 Not to mention the incidental killing of other aquatic life and small animals using the water to drink.

18-4 There is an artical in the Hungry Horse News from a former Biologist Joe Huston discussing this matter and was very concerned with the notion of MTFWP position on the removal of all these fish.

18-5 Montana Fish Wildlife & Parks has lost a lot of credibility in recent years and sportsman like myself would like to see them quit messing with the fish populations in region 1.

Thank you for your time.

Tim Taylor

1

Page 1 of 1

Spiering, Colleen A - KEC-4

SFFW-019
AUG 12 2004

From: shelfie [shelfie@cyberport.net]
Sent: Tuesday, August 10, 2004 2:11 PM
To: Spiering, Colleen A - KEC-4
Subject: Re: EIS

Dear,Colleen Spiering
I would like to see Montana Fish Wildlife & Parks plant more pure strain westslope Cutthroat Trout on existing populations and bring the ninety to ninety-five percent (90 / 95%) pure fish population up genetically instead of killing all the wild Cutthroat. This would be a lot more beneficial than using a fish toxin, and keep the water quality untouched by a foreign chemical in the water / drainage.
Not to mention the incidental killing of other aquatic mammals and small animals. Montana Fish Wildlife & Parks has lost a lot of credibility in recent years and sportsman like myself would like to see them quit messing with the fish populations in region 1.

I voice that there be no fish removal in the high mountain lakes.
Thank you for your time.
Shelly

----- Original Message -----
From: Spiering, Colleen A - KEC-4
To: shelfie
Sent: Friday, June 25, 2004 1:17 AM
Subject: RE: EIS

Items were mailed on 6/18. If you have not received them yet, please let me know.

Colleen Spiering
Environmental Specialist
Bonneville Power Administration KEC-4
PO Box 3621
Portland, OR 97208-3621
503-230-5756
503-230-5699 (FAX)
503-628-0295 (Home Office)

-----Original Message-----
From: shelfie [mailto:shelfie@cyberport.net]
Sent: Sunday, June 20, 2004 10:15 PM
To: Spiering, Colleen A - KEC-4
Subject: EIS

Just courios if the packet were sent out regarding the poisoning of south fork watershed in Kalispell Mt.
Sent my card in for printed pages and the cd of the rest of eis.
Shelly Toavs
182 Valley View Dr.
Kalispell Mt. 59901
thank you

8/12/2004

SFFW-020
AUG 1 2 2004

Spiering, Colleen A - KEC-4

From: kari and bob cole [karbo@montanasky.us]
Sent: Wednesday, August 11, 2004 4:01 PM
To: Spiering, Colleen A - KEC-4
Subject: South Fork Flathead Watershed Westslope Cutthroat TroutConservatiin Program

Have attended a meeting at FWP and read the DEIS. Please use alternative B.

Not sure I agree with all of your comments in the "question and answer" addendum to the summary of the DEIS but is OK in general.

Think the idea of moving some of the grayling from Hankerchief Lake during the poisoning is good, perhaps could move a few more than planned? I worry you might interrupt the spawning, perhaps simillar to Rogers Lake where no one seems to know what is altering the spawning there.

Bob Cole
1417 Hwy 2 W,
Kalispell, Mt,
59901

1

SFFW-021
Aug 12 2004

South Fork Drainage Fish Comments

21.1 I don't think we should destroy anymore fisheries by poisoning lakes in the drainage. Most of us fishermen like to catch cutthroat or any trout. I would guess 99.9% of us don't care if the fish we catch has papers or is possibly a pure strain.

21.2 Seems to me another way to create jobs and destroy more fishing. There is no way there is ever any reason for catch and release if the fisheries program is working. A perfect example of a failed program is keeping fish under 10" along with the salmon that disappeared.

Joe Fagan
862-3936
Whitefish

21.3 Walleye Comments:
Don't poison any more of Montana's waters with pike/walleye-Fort Peck and Yellowtail reservoirs are places for people to already fish for them.

SFFW-022
Aug 12 2004

Joe Moody
PO Box 337
Col. Falls, MT 59912

Dear Mr. Vashro,

Just finished reading the impact statement on the Westslope Cutthroat Conservation program.
22-1 Your plan seems well thought out, although given the depth of some lakes I'm not sure fish kill will be as thorough as you would like.

In principle I'm still opposed to the project.
22-2 I've spent a lot of time in my 64 years in the Flathead hiking and fishing in these areas and I can tell you that you are going to kill a lot of beautiful fish in some of these lakes. I also have a hard time with wiping out a healthy grayling population in Handkerchief Lake.

22-3 Given that there are already several lakes in the area which hold pure Westslope Trout, I question if they really are in danger of being listed as endangered and I wonder why <u>every</u> lake has to contain nothing but pure Westslope Cutthroat.

I've never been one to be critical of your department. I've always found your folks to be friendly, courteous, and helpful in my dealings with them and I think you are trying your best to do a very difficult job.
22-4 In this case, however, I wish you would scale back and downsize the scope of the project. I really think it is being overdone and the money could be better spent.

Sincerely,

Joe Moody

South Fork Flathead Watershed/Westslope Cutthroat
Trout Conservation Project

SFFW-023
AUG 1 3 2004

Telephone comment by Ginny Kuehn
8/12/04

Richard Tagg
9290 Butler Creek Road
Missoula, MT 59808

406-549-4333

Commenting on the draft EIS. About the poisoning of hybrid fish in the South Fork of the Flathead drainage. I have read the DEIS that you sent. I don't entirely disagree with the scope of the project. But I have a specific concern that is George Lake which I have enjoyed going into and fishing several times with friends and family. My point would be, why destroy such a huge resource of beautiful fish when I seriously question how many of any fish survived the journey out of George Lake, down George Creek and into the South Fork. There are a couple of falls and in the DEIS you made a comment that of course fish can not get up into George Lake from this tributary and I seriously doubt how many if any would survive that journey out of it. I am 60 years old and I would like to be able to continue to go in with my friends and family to fish George Lake.

Thank you very much.

file://Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork%20EIS/D...be%20Westslope%20Cutthroat%20Trout%20Conservation%20Program.htm

From: Dennis Hoffman [dkhoff@montanadsl.net] SFFW-024
Sent: Tuesday, August 17, 2004 1:53 PM
To: BPA Public Involvement
Subject: Comments regarding the Westslope Cutthroat Trout Conservation Program

I have reviewed the above program and I have the following comments:

I am alarmed by the subject and scope of the proposed project. The need to establish a pure cutthroat species does not strike me as necessary since your on information states that the subject lakes originally had no fish in them. If you are trying to go "Pre-European", restocking with any species is unnecessary. 24.1

The vast majority of tax payers and voters could not differentiate between a cutthroat and a sore throat. This project appears to have all the markings of appeasing a tiny group of elitist conservationists while providing work for some misled wild life professionals. 24.2

I am not aware of any such project having any long term success as the interbreeding will undoubtedly re-occur naturally or through the acts of detractors. 24.3

The slaughter of thousands of fish to appease the whims of a few is not in the best interest of conservation or society. 24.4

What next? Slaughter all the ring necked pheasants and Hungarian partridge?

Please stop this nonsense. Cherry Creek and Bad Canyon are enough of a tragedy.

Dennis E Hoffmann
246 Wintergreen Lane
Bozeman MT 59715

file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork...tslope%20Cutthroat%20Trout%20Conservation%20Program.htm9/16/2004 5:32:59 AM

SFFW-025
AUG 17 2004

Communications
Bonneville Power Administration- DM- 7
PO BOX 12999
Portland, OR 97212

Project: South fork flathead watershed westslope cutthroat trout conservation program

Dear Bonneville Power Administration:

I am responding to your request for comments for the deis of the above project. I am currently a graduate student attending the University of Montana researching fisheries health. I am very interested in this project due to its location and purpose. 25.1 It appears that this project will preserve the integrity of the current westslope population while creating a location to restore a swindling statewide population.

25.2 I support the proposed action of removing non-native trout from the lakes in the south fork river drainage. My approved action would be action B, or the proposed action. 25.3 My only concerns would be with the introduced populations not establishing a healthy population in the lakes within the 10 year period and planting fish in historically fishless lakes. 25.4 I am not concerned with angling pressures and would be interested in the process the ecosystem takes when fish are removed and restocked.

Please keep me informed on the progress of this project.

Sincerely,

Lindsay M. Arthur
2310 Wylie Ave.
Missoula, MT 59801
PLEASE USE ABOVE ADDRESS FOR CORRESPONDENCE

SFFW-016
AUG 20 2004

Swan View Coalition

"People Helping People Help the Earth"
3165 Foothill Road, Kalispell, MT 59901
406-755-1379 www.swanview.org

August 16, 2004

Communications
Bonneville Power Administration-DM-7
PO Box 14428
Portland, OR 97293-4428

Re: South Fork Flathead Westslope Cutthroat Trout Conservation Program

Dear Folks at Bonneville;

Please accept the following comments on the above DEIS on behalf of Swan View Coalition.

We have taken a look at the DEIS and ask that you revisit our scoping letter of June 20, 2003. We still have the same concerns and find that the DEIS fails to put them at rest.

In a nutshell, we remain supportive of the restoration of native fish but doubt this project/program will be of much value in this regard. The program would appear to be largely ineffective in totally eliminating non-native and hybrid species of fish so it is likely they will return to these waters over time. Moreover, the program is intended largely to attempt to establish pure strain westslope cutthroat in lakes that were historically fishless anyway - so how is this to truly be viewed as restoration? The lack of a sound monitoring program integrated in a step-by-step manner that moves forward from one lake or stream to the next only after success has been firmly established makes us all the more doubtful that this is a wise expenditure of time and money.

With these doubts in mind, we simply cannot lend our full support to a program that would, according to some alternatives at least, require the use of motorized vehicles and equipment in Wilderness areas, Jewel Basin Hiking Area, and other areas where motorized use is otherwise prohibited or a non-motorized backcountry setting is expected.

Thank you for this opportunity to comment,

Keith

Keith J. Hammer - Chair

SFFW-027
Aug 20 2004

Joe Moody
PO Box 337
Col. Falls, MT 59912

Dear Sir,

Finished reading your impact statement on the Westslope Cutthroat Conservation Program. I
27-1 seems your plan is well thought out, however given the depth of some lakes I'm not sure fish kill will be as thorough as you like.

27-2 In principal I'm still opposed to the project. I know from personal experience that you are going to kill a lot of beautiful fish in some of those lakes—4 to 5 pounders. I also don't know how you justify wiping out a healthy grayling population in Handkerchief Lake.

27-3 Given that there are already some lakes in the area that hold pure Westslope Cutthroat I question why every lake has to be for pure Westslope Cutthroat.

27-4 I urge you to downsize the scope of the project. I think the money could be better spent.

Sincerely,

Joe Moody

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

SFFW-028

From: wallner@centrytel.net
Sent: Thursday, August 19, 2004 9:12 PM
To: BPA Public Involvement
Subject: Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

Montana
Mime-Version: 1.0
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit
X-Mailer: ColdFusion MX Application Server

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project
Montana
View open comment periods on http://www.bpa.gov/corporate/kc/home/comment.cfm

Fred Wallner

wallner@centrytel.net
406-752-3699
40 Scovel Lane
Kalispell MT 59901
 28.1

I have mixed feelings about this project. Your intentions are good... your odds of success are not so good. Lakes the size of George, Woodward, or Sunburst are extremely hard to poison out successfully. You will have no way of knowing for years whether or not it was a success. In the meantime you spoil some first class fisheries in these lakes. You also have to wonder what the risks to the genetic pool in the South Fork really are. Those fish have 28.2 been in the lakes for a lot of years. A lot of money has been thrown at the problem with the various studies, the overstock program, etc. Maybe that money could be spent by the BPA better somewhere else. 28.3

28.4

Last, but not least, you have the distinct possibility of some "bucket biogist" dumping a bucket full of fish into the system at some time in the future. I suspect that you're going to upset some people when you poison out their favorite lake. Thanks for listening... RETHINK this isssue. 28.5

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SFFW-029

From: AnonymousComment@somewhere.com
Sent: Friday, August 20, 2004 7:41 AM
To: BPA Public Involvement
Subject: Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

Montana
Mime-Version: 1.0
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit
X-Mailer: ColdFusion MX Application Server

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project
Montana
View open comment periods on http://webit2/corporate/kc/home/comment.cfm

DAVE WILLIAMS

No E-mail Address Submitted
406 7561493
350 SUMMIT RIDGE
KALISPELL MT 59901
 29.1
I am opposed to the poisoning of the roughly 20 lakes in the South Fork of the Flathead River system, to remove the hybrid trout. I believe the impacts to the total river system is not fully evaluated. Some of those lakes have fantasic fishing opportunities that will be changed for many years. This proposal will add more mistrust between anglers and MT. FWP. 29.2

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Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

SFFW-030

From: coopdog7@earthlink.net
Sent: Friday, August 20, 2004 8:07 AM
To: BPA Public Involvement
Subject: Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

Montana
Mime-Version: 1.0
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit
X-Mailer: ColdFusion MX Application Server

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project
Montana
View open comment periods on http://www.bpa.gov/corporate/kc/home/comment.cfm

Gordon Johnson
flathead native
coopdog7@earthlink.net
4067512407
57 Morning Glory Lane
Kalispell MT 59901
 30.1

I have tramped these hills and fished these waters for almost 50 years and I see no reason try to alter what has been fine for 50 years. The likelyhood that these lakes will stay genetically pure is remote. Just look at what has 30.2 happened to all the other lakes around here with the introduction of other species both by illeagal of legal means. How do you suppose they became slightly impure today? My choice is to keep these lakes as they are now with intermittent stocking of pure westslope cutthroat and this will gradually improve the purity. 30.3

file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork...tslope%20Cutthroat%20Trout%20Conservation%20Project.htm9/16/2004 5:48:29 AM

SFFW-031

American Wildlands

40 East Main Street, Suite 2, Bozeman, Montana 59715
P.O. Box 6669, Bozeman Montana 59771
email: info@wildlands.org
(406) 586-8175; fax 586-8842

Communication
Bonneville Power Administration
P.O. 14428
Portland, OR 97293-4428

August 20, 2004

RE: Comments on the DEIS for South Fork Flathead Watershed Westslope Cutthroat Trout Restoration Plan

Dear Communication Staff:

Thank you for the opportunity to comment on the DEIS for the Westslope Cutthroat Trout (WCT) restoration plan in the South Fork Flathead Watershed. These comments are submitted on behalf of American Wildlands (AWL), a non-profit conservation organization dedicated to protecting the wildlands, wildlife, and aquatic integrity of the U.S. Northern Rockies. Our organization has been working on federal land management and native aquatic species issues for over 25 years.

American Wildlands was one of the organizations that first petitioned to list the WCT as a threatened species under the Endangered Species Act (ESA) in 1997. Our decision to file for ESA listing stemmed from the fact that populations of WCT have been in steady decline throughout their historic range due to a variety of pressures including, habitat destruction from logging, grazing and mining, urban development, agricultural practices, the operation of dams and past and ongoing stocking of nonnative fish species.

31.1 American Wildlands continues to strongly support the protection and restoration of both pure populations of WCT and their native habitat. However, we do have several concerns regarding the current BPA proposal for the South Fork Flathead Watershed:

Restocking of Fishless Lakes

31.2 Several of the twenty-one proposed project lakes were historically fishless before Montana Fish, Wildlife and Parks began an aggressive non-native stocking strategy in the 1950's. We would like to see that upon removal of all non-native fish species, each of the historically fishless lakes remain that way. We support the reintroduction of WCT only to those project lakes and streams where WCT historically inhabited. AWL does not believe it is appropriate to "restore" westslope cutthroat trout to lakes and streams where the fish never naturally occupied. 31.3 We also would like to see the project focus first on closed basin lakes, as past projects have shown the difficulty of eradicating hybrids in open basins.

Use of Mechanized Equipment in Wilderness Areas

31.4 The federal Wilderness Act defines a wilderness as "an area where the earth and its community of life are untrammeled by man…which is protected and managed so as to preserve its natural conditions…with the imprint of man's work substantially unnoticeable." The utilization of helicopters, planes and motorboats in a wilderness area violates the directive of the Wilderness Act, as the law specifically prohibits the use of motorized equipment unless use demonstrates the minimum necessary for protecting the wilderness resource. American Wildlands therefore does not support the proposed alternative to use motorized mechanization to transport materials, chemicals and staff to the restoration sites. In all project areas within designated wilderness, we would like to see utilizations of solely non-motorized transport. In non-wilderness areas, we support the use of helicopters to transport materials, as this method would avoid conflicting with current Forest Service management prohibiting pack stock in the Jewel Basin.

Neighbor Stock

The Montana Department of Fish, Wildlife and Parks (FWP) should develop a local "near neighbor" stock of westslope cutthroat trout for restoration purposes. Although it does take time
31.5 to develop the near neighbor stock, we prefer to see WCT reintroduction take place in its historical habitat with near neighbor stocks and not MO12 hatchery fish that lack the 100 percent locally developed genotype.
31.6 None of the lakes within designated wilderness should be stocked with MO12 fish.

Project Monitoring

31.7 The Final EIS must disclose specifically how the applications and affects of toxins and piscicide will be monitored.
31.8 The document should detail how undesirable genetic drift will be slowed in the South Fork watershed and eliminated in specific drainages.
31.9 The FEIS should disclose the specific impacts of the project on each wilderness lake and the impacts to recreational/angling usage.
31.10 In addition, the project must be carefully monitored to ensure that bull trout populations associated in downstream drainages from the treated lakes are not adversely impacted by the treatment. The FEIS must clearly define how the downstream detoxification stations will function and ensure that bull trout and other native downstream species of concern are protected.

Application of Toxins

31.11 We prefer the application of antimycin to remove the hybrid fish species from all the proposed project areas. As antimycin requires less volume per area treated than other piscicides such as rotenone, fewer trips and pack animals are required which would limit associated impacts. In addition, antimycin detoxifies more rapidly in streams after oxidation and photolosis, thus we prefer the use of this toxin to ameliorate any possible impacts on downstream bull trout and other native aquatic species.

Thank you again for considering our comments on this proposal. We look forward to reviewing the final decision that reflects the above suggestions.

Sincerely,

Amy Stix
Water Program Coordinator

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

From: AnonymousComment@somewhere.com SFFW-032
Sent: Friday, August 20, 2004 10:26 AM
To: BPA Public Involvement
Subject: Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

Montana
Mime-Version: 1.0
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit
X-Mailer: ColdFusion MX Application Server

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project
Montana
View open comment periods on http://webit2/corporate/kc/home/comment.cfm

Eric Rozell

No E-mail Address Submitted
752-4862
170 Arbour Drive
Kalispell Mt 59901
I am apposed to poisoning the listed lakes in your proposal. 32.1 Due to the size and water volume in many of these lakes the cost would be huge. There 32.2

is also no guarantee of 100% success. 32.1 I feel available dollars could be used more wisely on productive projects.

file://Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork...tslope%20Cutthroat%20Trout%20Conservation%20Project.htm9/16/2004 3:49:54 AM

SFFW-033

From: AnonymousComment@somewhere.com
Sent: Friday, August 20, 2004 10:53 AM
To: BPA Public Involvement
Subject: Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project

Montana
Mime-Version: 1.0
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit
X-Mailer: ColdFusion MX Application Server

Comment on South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Project
Montana
View open comment periods on http://webit2/corporate/kc/home/comment.cfm

Richard Smith

No E-mail Address Submitted
675-8977
5333 Doubletree Lane
Polson MT 59860
I have never, in 50 years of fishing in Montana, heard of a more stupid, ill-conceived idea than the present one of poisoning the lakes in the headwaters of the South Fork drainage. You are going to be destroying a precious resource that sportsmen have paid for with their yearly fees. Please do not go forward with this plan.

33.1

SFFW-034

AUG 2 0 2004

Kuehn, Ginny - DM-7

From: Arlene Montgomery [arlene@wildswan.org]
Sent: Friday, August 20, 2004 10:59 AM
To: Kuehn, Ginny - DM-7
Subject: South fork cutthroat comments

Following and attached as a Word document are Friends of the Wild Swan's comments on the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program. I also sent a hard copy of them to you in today's mail. Please acknowledge receipt of this e-mail. Thank you.

August 20, 2004

Communications
Bonneville Power Administration - DM-7
P.O. Box 11428
Portland, OR 97293-4428

VIA E-MAIL TO: comment@bpa.gov

Please accept the following comments on the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program on behalf of Friends of the Wild Swan. 34-1 Friends of the Wild Swan supports native restoration however, this proposed project violates the Wilderness Act, is risky and does not restore native cutthroat trout.

NATIVE FISH RESTORATION

34-2 o The money being spent on this project would better serve native fish restoration if it was used to implement the road reclamation authorized under the Forest Service's Paint Emery and Bent Flat Records of the Decision. Road reclamation has proven benefits to native fish and their habitat. The Paint Emery project is located in westslope cutthroat trout streams in the South Fork Flathead drainage and the environmental analysis is completed. However, funding is lacking to reclaim the remaining 72 miles of road that fall under this decision.

The Bent Flat project is also located in the South Fork Flathead drainage and the environmental analysis is completed but funding is not available to reclaim the remaining 8 miles of road that fall under this decision. It would be consistent with Hungry Horse mitigation and restoration of cutthroat trout habitat to fund and implement these projects.

CUMULATIVE EFFECTS

34-3 o The DEIS fails to disclose that most suppression projects are not successful and could require repeated applications of the toxins into these lakes and streams. The Montana Bull Trout Scientific Group's paper Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery concluded that toxicant use in lakes is more difficult in lakes with springs and inlet and outlet streams. And typically the suppression effort must be repeated every few years because the adversely interacting species usually return to pre-suppression levels. Repeated use of toxicants on these lakes was not analyzed in the DEIS nor disclosed as a possibility. The DEIS does not disclose whether these lakes are spring-fed and the increased difficulty of attempting to eradicate fish from these lakes.

34-4 Regarding the use of toxicants in streams the Scientific Group stated that typically toxicants needed to

34-5 be used for two years in a row on a reach of stream. The DEIS does not analyze the cumulative effects of the repeated use of toxicants in these streams, the success rate of using toxicants in streams and the impacts of repeated use on amphibians, invertebrates and other wildlife.

34-6 o The DEIS fails to disclose that rotenone can persist for up to five months. Higher water temperatures will degrade the rotenone faster. These high mountain lakes do not get warm even in the summer so it should be assumed that it takes longer for the rotenone to break down in these lakes. (Hinson 2000)

34-7 o The DEIS fails to disclose that potassium permanganate can leave fish vulnerable to bacterial and fungal infections. This is a serious effect to downstream native fish populations. (Hinson 2000)

WILDERNESS

34-8 o Deploying poison in a wilderness area is inconsistent with the Act's legal mandate to preserve wilderness areas in a condition that is "untrammeled" by man. Although National Forest Service regional foresters are given the authority to approve the application of pesticides in wilderness areas, this should be reserved for emergencies that threaten human health or the environment. Other, non-toxic methods have not been tried. Given the health and environmental effects of using these toxicants, they certainly should not be used in a wilderness area.

34-9 o Use of helicopters, planes and motor boats in the wilderness area violates the Wilderness Act. The Wilderness Act specifically prohibits the use of motor vehicles unless their use is the minimum necessary for protecting the wilderness resource. Wilderness is "...an area where the earth and its community of life are untrammeled by man...retaining its primeval character and influence...protected and managed so as to preserve its natural conditions." This proposal is not consistent with those values nor are we aware of exceptions to the Wilderness Act to conduct this type of project.

34-10 o Restocking lakes that were naturally fishless in the wilderness violates the Wilderness Act. This project does not restore the wilderness character of the lakes or westslope cutthroat trout. The wilderness character of these lakes is that they did not contain fish. If the fish are removed from these wilderness lakes they should not be restocked with any fish, that would be restoration. Restoration is the act of putting something back into a prior position, place or condition, the prior condition of these lakes is that they were fishless. Restocking these naturally fishless lakes with westslope cutthroat trout is not restoration of this species because they never naturally occupied this habitat.

MONITORING

34-11 o The DEIS must have a comprehensive monitoring plan to determine success or failure of the project prior to implementing treatment to all lakes so success or failure could be determined and the project halted or modified. It appears that this project will proceed on many lakes in one season with no provision for evaluating environmental effects or success or failure.

MACROINVERTEBRATES

34-12 o While the petition acknowledges that antimycin will have an initial adverse impact on stream macroinvertebrates, it assumes that the macroinvertebrate community will eventually return to its pretreatment status. But several studies have found that while macroinvertebrate communities frequently return, they may be altered from their original composition. And many unanswered questions remain regarding the long-term effect of antimycin on macroinvertebrates.

34-13 According to a NM Department of Game and Fish study in 2001 by fisheries biologist Steven Sanders, "the use of antimycin for fish eradication is extensive in the USA, but its affects on benthic populations are not well known".

8/20/2004

South fork cutthroat comments

34.14 In an Aquatic Macroinvertebrate Survey of Animas, Seco and South Palomas Creeks [in New Mexico], the author states that "a few macroinvertebrate taxa that are particularly sensitive to antimycin and have poor recuperative powers may suffer long-term impacts from the (antimycin) treatment". This would be especially true for organisms with longer reproductive cycles. And there may uniquely adapted macroinvertebrate species that do not return at all. The author also notes that based on the sparse macroinvertebrate community in these streams they are only "marginal trout streams". (McCampbell, 2002)

AMPHIBIANS

34.15 o It is well recognized that there has been a disturbing global decline in amphibian populations in recent years and many scientists suspect that exposures to toxic chemicals are a significant cause. Several studies have linked pesticide exposure to adverse effects in frogs. As mentioned above, one study found that frogs exposed to as little as .1ppb of the herbicide atrazine developed male and female sex organs. Another study found that frogs exposed to either atrazine or a pyrethroid insecticide, esfenvalerate, were more susceptible to infection by a parasitic worm that caused limb deformities. The pesticides appeared to depress the frogs' immune systems even at the low concentrations used, which were within EPA drinking water standards for humans. The authors concluded that "these negative impacts may help explain pathogen-mediated amphibian declines in many regions."

34.16 In another study, frogs given trace amounts of DDT experienced a near total collapse in their immune systems, which was identical to their exposure to cyclophosphamide. The latter is a drug given to humans to suppress their immune systems so they do not reject organ transplants. The researchers found that as little as 75 ppb DDT caused frogs' immune systems to malfunction.

34.17 To avoid causing harm the environment must be kept as free of pollutants as possible since, as noted above, amphibian immune and endocrine systems are very fragile and can be adversely impacted by even extremely low levels of toxic chemicals. Thus, even if poisons such as antimycin/Fintrol do not kill amphibians immediately, they may still harm them by making them more vulnerable to serious diseases, due to immune suppression, or cause them to have developmental abnormalities or reduced fertility via endocrine disruption. (McCampbell, 2002)

TOXICANT EFFECTS

34.18 o Impacts to wildlife, bull trout, amphibians, macroinvertebrates and humans from deploying these chemicals were glossed over or ignored in the EIS. Following are concerns we have with the chemicals that are being proposed for use:

34.19 FINTROL/ANTIMYCIN: The registration of Fintrol by the U.S. Environmental Protection Agency does not mean it is safe to use. The U.S. EPA admits that all registered pesticides pose some risk. The range of potential adverse effects of deploying Fintrol is unknown. It was registered in the 1970's when the EPA required little data prior to registering a pesticide product. Fintrol is now undergoing the re-registration process and there is still an extensive lack of data regarding this product. The potential wildlife and environmental impacts of deploying Fintrol are also unknown because no one has ever done comprehensive post-deployment assessments. California will not register Fintrol in that state because data is missing in at least 22 standard toxicology tests. The New Mexico Department of Health has not approved the use of Fintrol in fish restoration projects. Also, the New Mexico Game and Fish Commission on August 18, 2004 cancelled all use of fish poisons in the state without prior approval.

34.20 Fintrol concentrate carries the highest acute toxicity rating given by the U.S. Environmental Protection Agency (EPA), Toxicity Category I. The label contains the warning "DANGER POISON" next to a skull and crossbones. Under "hazards to humans and domestic animals" it says this product is "FATAL IF SWALLOWED" and "MAY BE FATAL IF ABSORBED THROUGH THE SKIN". (McCampbell,

8/20/2004

South fork cutthroat comments

Page 4 of 7

2002)

34.21 The Hazards Information section of the Material Safety Data Sheet states that routes of entry for antimycin A include the skin, inhalation, and ingestion. The ingestion hazard rating is "highly toxic". Antimycin A is also noted to be an eye, skin and respiratory irritant. Target organs include eyes, skin, respiratory tract, cardiovascular system, nervous system, kidneys, and possibly fetus. Inhalation of vapors or aerosol can irritate the eyes, nose, and respiratory tract. Direct contact with skin or eyes can produce severe irritation. And systemic intake can produce a decrease in blood pressure, nausea, light headedness, dizziness, excitement, incoordination, weakness, loss of coordinated speech and drowsiness. Medical conditions said to be aggravated by antimycin A exposure are pre-existing eye, skin, respiratory, kidney, nervous system or cardiovascular ailments.

34.22 A University of California at Santa Cruz Laboratory Standard Operating Procedure guide on antimycin A states that this material is considered a Particularly Hazardous Substance by the CAL OSHA Lab Standard. It also says that antimycin A is "highly toxic" and "may be fatal if swallowed, absorbed through skin, or inhaled". It notes that "respiratory distress, impaired reflexes, incoordination, and terminal symptoms consistent with CNS (central nervous system) depression have been reported in experimental animals poisoned by the oral or parenteral route."

34.23 ToxNet Hazardous Substance Databank Information on antimycin A, which includes data from PoisonDex, states that respiratory distress, incoordination, impaired reflexes, and CNS (central nervous system) depression have occurred in animals. It further notes that *the minimum lethal human exposure level is unknown.*

34.24 Besides its extreme acute toxicity, ToxNet also states that antimycin A is an experimental MUTAGEN. The NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) also includes "mutation data" on antimycin A. And there are 36 references regarding antimycin on the ToxNet Environmental Mutagen Information Center (EMIC) web page. At least one study describes antimycin-induced DNA fragmentation and strand breaks. (McCampbell, 2002)

34.25 DIETHYL PHTHALATE: The EPA considers diethyl phthalate to be an endocrine disruptor. Endocrine disruptors mimic natural hormones and have an adverse effect on the structure or functioning of the endocrine system, which includes the pituitary, hypothalamus, thyroid, adrenals, pancreas, thymus, ovaries, and testes. Compounds which are toxic to the endocrine system can cause health effects ranging from hypothyroidism and diabetes to infertility, low sperm count, birth defects, and testicular, breast, and prostate cancer.

34.26 There is growing scientific concern about the health impacts of human exposure to endocrine disrupting chemicals, in large part because of their widespread presence in the environment and because their adverse effects can often be caused by extremely minute quantities, at levels not previously considered to be in the toxic range.

For example, a recent study found that frogs exposed during larval development to as little as .1 part per billion (ppb) of the herbicide atrazine developed male and female sex organs. The authors concluded that "this widespread compound and other environmental endocrine disruptors may be a factor in global amphibian declines".

34.27 Diethyl phthalate is a priority pollutant under the Clean Water Act. It is also listed as a hazardous constituent under the Resource Conservation and Recovery Act and as a hazardous substance under Superfund. The EPA may be considering the removal of diethyl phthalate from all pesticide products.

8/20/2004

South fork cutthroat comments

Page 5 of 7

34 28 According to a National Toxicology Program fact sheet, diethyl phthalate is toxic by ingestion and inhalation and poisonous by the intravenous route. It is an irritant of the skin, eyes, mucous membranes and upper respiratory tract. It is a narcotic in high concentrations. It is also listed as an experimental teratogen, which means it can cause birth defects in developing fetuses, and it can cause other experimental reproductive effects. Studies have shown, for example, abnormal development of male fetuses in rats exposed to this chemical.

34 29 The New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet notes numerous toxic effects of diethyl phthalate. Exposure to vapors can irritate the nose and throat. Contact can irritate the eyes and skin, and repeated exposure may damage the nervous system. It also notes that chronic (long-term) health effects can occur at some time after exposure to diethyl phthalate even if the exposure levels were not high enough to make someone immediately sick. It also warns that there is evidence that diethyl phthalate is a teratogen in animals and that until further testing is done, this chemical should be treated as a possible teratogen in humans. And while those working directly with diethyl phthalate are at higher risk than the general public, the fact sheet states that people in the community may be exposed to diethyl phthalate in contaminated water and air and that children and people who are already ill would be at the most risk of developing health problems from it.

34 30 Diethyl phthalate is moderately persistent in the environment and has moderate acute and chronic toxicity to aquatic life. According to one source, the concentration of diethyl phthalate found in fish tissues is expected to be somewhat higher than the average concentration found in the water from which the fish was taken.

34 31 Finally, one can not be sure that the diethyl phthalate in the Fintrol product is not contaminated with other phthalates, such as diethyl-hexyl phthalate (DEHP), which is listed as a chemical known to the state of California to cause cancer (California's Proposition 65 list, June 22, 2001). (McCampbell, 2002)

34 32 NONOXYL-9: According to Philip Dickey in his publication "Troubling bubbles", nonoxyl 9 is an alkylphenol ethoxylate that can disrupt the endocrine systems of fish, birds, and mammals. For example, nonylphenol, a breakdown product of nonylphenol ethoxylate, can cause a reduction in testicular size in rainbow trout and cause male trout to produce an egg-yolk protein that is normally only produced by females. Rats administered nonoxynol-9 in one study produced a statistically significant, dose-related number of fetuses with both extra ribs and slightly dilated pelvic components.

34 33 Nonylphenol ethoxylate is also noted for its slow incomplete biodegradation. It tends to persist in the environment and bioconcentrate. Many times the breakdown products are more toxic to aquatic life than the original chemical. There is evidence for synergism between nonylphenolic metabolites, indicating that the adverse effects from a mixture of compounds may be greater than the sum of the effects from the individual compounds. Nonylphenolic compounds have been detected in groundwater. Alkylphenol ethoxylates have been banned in many countries in Europe. And it is the recommendation of the author that the use of alkylphenol ethoxylates as inert ingredients in pesticide formulations applied to aquatic environments be discontinued. (McCampbell, 2002)

34 34 ACETONE: Acetone is a volatile neurotoxic solvent, which can cause central nervous system depression. It constitutes more than 50% of the Fintrol product. (McCampbell, 2002)

34 35 Clearly, the safety of Fintrol and antimycin has not been established. At the very least, the possible effects of Fintrol on the human environment are highly uncertain and involve unique and unknown risks.

34 36 POTASSIUM PERMANGANATE: Potassium permanganate is a hazardous caustic alkali. Targets organs include the respiratory and central nervous system, blood, and kidneys. If swallowed, it can

8/20/2004

South fork cutthroat comments

Page 6 of 7

cause nausea, vomiting, gastrointestinal irritation and burns to the mouth and throat. It may also cause severe irritation or burns to the eye and skin. Prolonged inhalation of potassium permanganate can cause manganism from a toxic build up of manganese in one's body. According to one Material Safety Data Sheet, potassium permanganate has also been reported to cause reproductive toxicity in laboratory animals and states that the ecological effects of this product have not been evaluated.

34 37 Potassium permanganate can be directly toxic to fish, even at deployment concentrations of 1 part per million. It can also kill phytoplankton and macrophytes that fish use for food.

34 38 Although potassium permanganate will help neutralize the antimycin A it comes in contact with, it does have its limitations. According to the authors of "Limitations on Potassium Permanganate Detoxification of Antimycin" , potassium permanganate rapidly detoxifies antimycin to a toxicity level equivalent to about 4% of the original concentration. From there on, the detoxification is quite slow. They conclude that the use of antimycin-potassium permanganate systems in fish control would probably entail undue risk in most situations involving antimycin-sensitive fish, soft water and a need for rapid detoxification. There will also inevitably be some uneven mixing of potassium permanganate with antimycin A as well as other factors that retard their chemically reacting with each other.

34 39 It is overly optimistic to think that potassium permanganate will totally neutralize antimycin A or that deploying another toxic chemical will return the stream to its former non-polluted condition. It also ignores the fact that potassium permanganate will have little or no effect on the levels of acetone and nonoxyl-9 present. (McCampbell, 2002)

34 40 ROTENONE: Rotenone is a broad spectrum mitochondrial poison similar to antimycin. It is used to induce Parkinson-like illnesses in lab animals and is more persistent in the environment than antimycin.

34 41 Rotenone products are often formulated with toxic solvents such as trichloroethylene, xylene, trimethylbenzene, naphthalene, 1-m-naphthalene, 2-m-naphthalene, toluene and the liver poison piperonyl butoxide (PBO). Piperonyl butoxide is a possible human carcinogen according to the EPA and naphthalene and trichloroethylene are known to the state of California to cause cancer. (Dr. Ann McCampbell pers. comm.)

We expect these comments and the ones we submitted for scoping on this project be thoroughly considered prior to making a decision.

LITERATURE CITED

34 42 Montana Bull Trout Scientific Group, Assessment of methods for removal or suppression of introduced fish to aid in bull trout recovery, March, 1996.

34 43 Dustin Hinson, Rotenone Characterization and Toxicity in Aquatic Systems, University of Idaho, Principles of Environmental Toxicity, November, 2000.

34 44 Ann McCampbell, MD, Technical Testimony at the Hearing on New Mexico Game and Fish Department's Petition to Deploy A Piscicide in Animas Creek Watershed before the Water Quality Control Commission, August 14, 2002.

Sincerely,

Arlene Montgomery

8/20/2004

South fork cutthroat comments Page 7 of 7

Program Director

Arlene Montgomery
Friends of the Wild Swan
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8/20/2004

Comments on Bob Marshall Wilderness lakes poisoning project

SFFW-035

From: George Nickas [gnickas@wildernesswatch.org]
Sent: Friday, August 20, 2004 5:51 PM
To: BPA Public Involvement
Cc: gnickas@wildernesswatch.org
Subject: Comments on Bob Marshall Wilderness lakes poisoning project

To whom it may concern:

Attached are Wilderness Watch's comments on the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program Draft EIS. They are also being sent today on letterhead by US mail.

--

George Nickas
Executive Director
Wilderness Watch
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Missoula, Montana 59807
(406) 542-2048
(406) 542-7714 - fax
http://www.wildernesswatch.org

file:///Y|/EP3043%20-%20BPA/Flathead%20EIS/South%20Fork...Marshall%20Wilderness%20lakes%20poisoning%20project.htm9/16/2004 3:51:23 AM

August 20, 2004

Communications
Bonneville Power Administration – DM-7
P.O. Box 11428
Portland, OR 97293-4428

VIA E-MAIL TO: comment@bpa.gov

Please accept the following comments from Wilderness Watch on the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program Draft EIS. Our comments are generally limited to those actions that will occur in the Bob Marshall Wilderness.

35.1 Wilderness Watch supports the restoration of native westslope cutthroat trout populations in the Flathead River drainage where that species originally existed. At the same time we believe that fishery programs must be administered in a manner that gives equal consideration to the entire aquatic ecosystem and that respects the resource of Wilderness. For those reasons we have a number of concerns with the proposed project and can not support it in its current form.

Our primary concerns with the project center on its damage to the wilderness character of the Bob Marshall Wilderness. Specifically, we are concerned with the proposal to restock with fish what are naturally fishless lakes, the use of motorized equipment and vehicles, and the use of poisons (fish toxicants).

35.2 At the outset we would point out that every alternative in the DEIS proposes to stock these naturally fishless lakes. This violates NEPA's requirements to provide a reasonable range of alternatives. Whether to stock these lakes with fish in the future has been a major public and agency issue since the outset of this project. Failing to provide alternative ways to address this issue is a major failure of the process to date.

35.3 Further, the DEIS is wrong to conclude that the decision to stock these lakes lies solely with the Montana Dept. of Fish, Wildlife and Parks (MDFWP). In fact, Congress has charged the USDA Forest Service with administering the Flathead National Forest and the Bob Marshall Wilderness. It has also been well established by the US Supreme Court that federal agencies retain the authority for administering federal lands and the wildlife that reside thereon. The federal government generally allows the states to regulate hunting, fishing and trapping on public lands; the Wilderness Act did not change that. But the Wilderness Act did mandate that the Forest Service ensure that the area be administered so as to preserve its wilderness character. This mandate applies to both public uses and the actions of the agency(s). Whether or not to restock these lakes must take into account the fact that several of the lakes are within a federally designated Wilderness. The DEIS should have taken into account the federal government's role in determining whether or not stocking is appropriate.

35.4 Restocking these lakes violates a principle tenet of the Wilderness Act: that these areas will be untrammeled by humans, retain their primeval character and influence, and be administered so as to preserve their natural conditions. Nothing could be more trammeling or unnatural than to fill naturally fishless lakes with fish. If the fish are removed from these lakes then the lakes should remain fishless and allowed to follow their natural evolutionary path.

35.5 The DEIS fails to consider the damage to the aquatic ecosystem from restocking these lakes with fish. The scientific literature is filled with studies that show fish stocking reduces the abundance of amphibians in stocked lakes. Recent studies in the Northern Rockies have shown that fish stocking also influences the distribution and abundance of amphibians in entire mountain basins including those lakes which are not stocked and remain fishless (see Pillion and Peterson, Ecosystems (2001) 4:322-333). These studies show that the impacts do not end with stocking, but instead continue to effect the area (and in all likelihood get worse) as long as fish remain. The DEIS is silent on these impacts which will occur under every alternative that restocks the lakes with fish.

35.6 Likewise, the DEIS failed to consider the damage to the rest of the aquatic biota from stocking these lakes. While "lip-service" is given to the effects of poisons on these species, there is no analysis of the effects of stocking fish on these biota. Again, the literature is replete with evidence of the negative effects of fish stocking in these systems, but that information doesn't make it into the DEIS. The DEIS does acknowledge that restocking is a "connected" action (p. 2-26), however it fails to disclose the environmental effects of those actions. 35.7 Further, the DEIS fails to evaluate the cumulative effects of fish stocking by MDFWP throughout the S. Fork Flathead drainage.

35.8 The Wilderness Act prohibits the use of motorized equipment and mechanical transport "except as necessary to meet minimum requirements for the administration of the area for the *purpose of this Act*." (emphasis added). The purpose of the Act is to preserve the Wilderness. This project which is designed to establish a westslope cutthroat trout fishery in naturally fishless lakes fails to meet that test. 35.9 Further, the MDFWP does not administer the Bob Marshall Wilderness and thus MDFWP's activities, unless authorized by the Forest Service as part of the federal agency's mandate to protect the Wilderness, do not fall within the administrative exception in the law.

35.10 The only justification given for using helicopters to access George and Lick lakes is that these lakes aren't accessed by system trails. That doesn't mean they are inaccessible by foot or with packstock (horses, donkeys or llamas). Both are within one mile of system trails that could be used to bring materials to within a mile of lakes. There's nothing in the DEIS that suggests materials couldn't be hauled the last mile with horses, mules or donkeys, or by backpacks or llamas to lessen the impact on vegetation and soils. The DEIS should be revised to address the possible use of other non-motorized means for delivering materials, supplies and personnel to George and Lick lakes.

35.11 Similarly, every scenario assumes that a motorboat must be used, whether its for gill netting, trap netting, spreading poisons or other uses. It appears to more a matter of convenience than need. The DEIS should be revised to address using non-motorized watercraft on lakes in the Wilderness.

The use of poisons also runs counter to the idea of Wilderness. All Wildernesses have
been modified to some degree by human impacts prior to designation, and some of those
changes are ubiquitous and ongoing (i.e. human-caused global warming). Yet the choice
society makes when designating an area as *Wilderness* is that from that point forth we
35.12 will no longer try to "play God." The Wilderness must be allowed to operate freely in the
future with intentional human manipulation. MDFWP should stop doing harm by
continuing to stock these lakes with alien predators. There may be rare occasions where
toxicants are appropriate in Wilderness to save a species that might otherwise be lost
forever. But this project is geared toward expanding the range of cutthroat trout into
lakes where it did not naturally exist. The use of poisons are not justified in this context.

We are also concerned with the limited information on the impact of poisons on non-
35.13 target aquatic species. The diversity, abundance and population trends for these species
in the Bob Marshall Wilderness are not well known, nor is the effects from retenone or
other poisons. Before embarking on a project of this magnitude in a designated
35.14 Wilderness, BPA the Forest Service and MDFWP should implement a long-term
inventory and monitoring study so that irreparable harm is avoided.

The DEIS fails to explain why, after nearly a century of stocking non-indigenous trout in
the Flathead drainage the remaining hybrids pose a substantial risk to the remaining
westslope cutthroats. Obviously there is something acting to keep the populations
35.15 isolated from one another, or to inhibit hybridization. How have these populations
managed to remain "pure" and why won't that continue if MDFWP no longer stocks the
drainage with non-native species.

We want to note that it is doubtful the project will meet the DEIS purpose of preserving
"genetically pure" cutthroat trout in the South Fork Flathead drainage. Genetically pure
trout are defined as those that are 100 percent pure through the testing of species-specific
proteins. Many of the westslope cutthroat in areas of the South Fork drainage that won't
35.16 be treated are not 100 percent pure. Many of the areas where the range of introgressed
trout and bull trout overlap can not be treated. Moreover, because the poisons are not
expected to be 100 percent effective, any remaining hybrids will impart their genes into
the genetically pure stock that is supposed to be planted in the lakes. Genes go both
ways, and the plan to restock these lakes is as likely to result in less than 100 percent pure
fish downstream as is not restocking the lakes.

If a decision is made that it is necessary to remove the exotic species (fish) from these
lakes in order to preserve the wilderness character of the Bob Marshall Wilderness, then
we would suggest that the Wilderness lakes remain fishless after the removal. The
35.17 35.18 concern that the lakes will be illegally stocked could be largely ameliorated by closing
the lakes to fishing. Leaving the lakes in their natural condition would not only respect
the wilderness values of the area, it would also provide an outstanding opportunity to
study the effects of fish removal on the natural aquatic ecosystem and to compare those

35 17 effects to lakes outside Wilderness where stocking is likely to occur. This kind of scientific inquiry is one of the public purposes of Wilderness and one of the greatest benefits that it can provide to people of present and future generations.

Sincerely,

George Nickas
Executive Director

SFFW-036

RE: South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program

To Whom It May Concern:

I have again reviewed the proposed action listed above and feel that chemical treatment of these
36.1 waters should not occur until Montana Department of Fish Wildlife and Parks (MDFWP)
thoroughly reviews and considers all the available data regarding current levels of hybridization
within these systems. As I stated in my previous letter many of the lakes they are proposing to
chemically treat do not require such a drastic and unnecessary action. For example, upper Three
Eagles Lake is over 99% pure westslope, and it cannot be said with certainty that it is not pure
westslope. Based on this information how can the chemical treatment of this lake be justified?
The answer is that it cannot be justified. There is also lack of justification for the chemical
36.2 treatment of Black Lake and Pilgrim Lake. Recent genetic data obtained from a 1999 collection
of fish from Black Lake and a 2001 collection from Pilgrim Lake indicated that both of these
lakes now harbor populations of trout that are also at least 99% pure westslope cutthroat trout.
Why is there a need to chemically treat these populations? What is to be gained? Without an
absolute guarantee of a100% kill of the current populations within these lakes there is nothing to
be gained and even with a 100% kill the overall cost of the treatment, both environmentally and
economically, far outweigh any gains that might be realized from such an action.

In addition to the examples above where there is absolutely no need for chemical removal, there
also appears to have been large decreases in the level of non-native genes present in many of the
other lakes proposed for chemical treatment. For example, in the initial genetic surveys
conducted on Lena, Necklace, Pyramid and Sunburst Lake no westslope cutthroat trout genes
were present. However, in the most recent genetic surveys conducted on these waters for
36.3 MDFWP's, Lena and the Necklace Lakes contained over 60% westslope cutthroat trout genes,
Sunburst Lake contained 82% westslope cutthroat trout genes, and Pyramid Lake contained 97%
westslope genes. How can MDFWP pretend that the genetic swamping of these lakes is not
effective when the only mechanism for change in these lakes has been the introduction of pure
westslope cutthroat trout from their broodstock? In fact, based on this data, there is also little
justification for the proposed chemical removal of fish from Pyramid Lake.

Similar changes in the genetic composition of other lakes on the chopping block have also been
observed, i.e. Lower Big Hawk and Blackfoot Lakes. The level of non-native genes in these
systems has been reduced by 40% and 50% respectively through the introduction of westslope
36.4 from MDFWP's broodstock. In fact in almost every case where the swamp out technique has
been implemented there has been a decrease in the overall percentage of non-native genes
present. This technique has proven to be highly effective and it should be restarted, not
discarded, as is currently being done.

MDFWP's also indicates that they will chemically remove fish downstream of many of the lakes
that are proposed for chemical treatment. In most cases, however, they lack sufficient genetic
data to determine the necessity and extent of this action, and in some cases they are proposing
36.5 chemical treatment when their own data indicates that it is not warranted. For example,
MDWFP's is proposing to chemically treat 3.7 miles of Lick Creek even though no hybridization
was detected in a sample of westslope cutthroat trout collected for genetic analysis in 2000. As

the stewards of our resources it is irresponsible for MWFP's to disregard available information or to proceed with the chemical treatment of these streams without sufficient data to justify their actions.

36.6 As I stated in my initial June 23rd letter, these examples indicate the need for MDFWP's to carefully evaluate and justify the need for chemical treatment of each of the 21 lakes and downstream reaches they are proposing to poison. They must not be allowed to continue to ignore or disregard their own genetic data indicating that the chemical removal of fish from many of these waters is unwarranted.

36.7 As I previously commented, the very first action to be taken prior to any chemical removal of fish from any these systems is to genetically retest the populations, using both allozyme and nuclear DNA techniques to determine the current genetic composition of each lake and downstream reach. Most of these lakes were repeatedly stocked with hatchery fish from the states westslope cutthroat trout broodstock after they were first genetically characterized in the mid 1980's and early 1990's, and before any chemical treatment of these waters is conducted the effectiveness of the genetic swamping needs to be thoroughly evaluated. Based on the genetic information presented above, the assertion that this method of removal of non-native genes doesn't work is not supported. In fact, in the lakes discussed above this method has significantly reduced the percentage of non-native trout genes present.

The benefits to genetically retesting each lake and downstream reach proposed for chemical treatment should also not be overlooked. First, it will determine which lakes and streams may still require chemical removal of hybrid trout, and also assist in the prioritization of lakes and streams to be treated based on their current genetic composition. Second, it will save money by reducing the number of lakes and streams that need to be treated. Third, it will lower disturbance, leave a smaller footprint, and maintain fishing opportunities that would otherwise be temporarily lost from some lakes. Fourth, it would provide hard scientific data on the effectiveness of genetic swamping for many different systems allowing MDFWP's to fully evaluate its potential as a management tool. Finally, and perhaps most importantly, it will provide baseline data on the current genetic composition of the lakes and streams that are ultimately poisoned so MDFWP's can evaluate the effectiveness of chemical removal on each population poisoned.

While the opinions I have stated above are solely my own, the scientific data I used to reach them is available to both MDFWP's and Bonneville Power Administration personnel. I request of you both that you do not ignore this information, to do so would be both irresponsible and unethical.

Sincerely,

George K. Sage
Geneticist
1606 Sanya Circle
Anchorage, Alaska 99508

SFFW-037
AUG 2 3 2004

Kuehn, Ginny - DM-7

From: dale luhman [dtck@digisys.net]
Sent: Monday, August 23, 2004 1:11 AM
To: BPA Public Involvement
Subject: south fork flathead watershed westslope cutthroat trout conservation program comments

attached are my comments on this project. also my 6/23/03 letter with attachments a and b that did not seem to be well incorporated into the draft eis.i figured no one was going to read these comments on saturday and sunday so if i got them to you by monday 8/23 morning to read that would work. i assume you are striving to receive public input at any time in this process so that better decisions can be made by the various decision makers. i would appreciate acknowledgment that you received and will consider these comments. thanks,

dale luhman

SFFW-037

August 20, 2004

AUG 23 2004

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208-3621

Attention: Environment, Fish and Wildlife
Email - comment@bpa.gov

This is in response to the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program proposal Draft EIS, DOE/EIS-0353.

While I think the objective to protect Westslope cutthroat trout from becoming listed as an endangered species is a very good one, I do not believe it should be at the expense of the wilderness resource. Wilderness is set aside as a place humans to not dominate or manipulate, where natural processes are allowed to operate freely. Wilderness is a very small percentage of the United States that are best suited to represent flora, fauna, and the natural processes before human changes are done to manipulate most of the landscape to try to better suit his needs. Most higher elevations lakes in the western United States were originally fishless. Over the last 100-150 years, most lakes of any size with any reasonable access had fish planted in them. Many lakes ended up with self-sustaining populations, some were repeatedly stocked, and some were not stocked again because they froze out, were too remote, etc. Most lakes were stocked with fish that were not native to the local drainages. Some eventually were stocked with fish that had the same basic genetics for a drainage. In any event, any fish that were stocked were exotic, not part of the natural system, and disrupted natural processes and non-fish species that existed for thousands of years before these fish were artificially introduced.

The draft EIS says that 50 of 355 lakes in the South Fork have fish in them, all except Doctor and Big Salmon Lakes were very likely originally fishless. The draft EIS proposes to only remove fish from 20 of these 50 lakes that do not have genetically pure WCT in them. Fish are now located mainly in the larger, deeper lakes in the South Fork. Apparently, research has not been done on these South Fork Lakes except in the last couple of years on the proposed lakes to be treated to determine what assemblages of non-fish species inhabited these lakes, marshes, and downstream areas before the introduction of exotic fish predators. Glacier National Park, North Cascades National Park have done research and are doing an EIS to determine what species existed there in lakes before fish. Studies in the Sierras show a dramatic decline in yellow-legged frog due to the introduction of fish. There is so much that we do not know about these natural systems. We tend to focus on species that have immediate, direct benefit to humans- elk, deer, fish, and maybe grizzly bears and wolves because they are large and people can relate to them better. However, it seems that many of human management actions can have dramatic impacts on the associated flora and fauna as humans attempt to manage species so they can more directly benefit human needs. Humans pave, build, and farm on

1

99% of the United States. It seems only reasonable that at least wilderness should be left
as unaltered as possible. In wilderness lately we even try or propose to manipulate
habitat and systems to try to undo past human influences - consider lighting fires to make
up for the lightning strikes that have been put out over the years. Consider planting
whitebark pine to replace trees that have been killed by an exotic blister rust. Consider
37-3 building new trails or reopening long unused trails to facilitate more human use and
access into the wilderness. If the Bob Marshall Wilderness Complex at 1.5 million acres,
the second largest wilderness in the lower 48 states can't have natural processes left
basically unaltered in the large size with limited potential effects on areas outside of the
wilderness, where can we have places that are not manipulated, turned into gardens to try
to undo past human impacts or shape the wilderness landscape into something that is
more desirable from a human perspective? Not a natural process perspective, but from
current human needs?

37-4 This draft EIS displays several methods of accessing the area for fish removal, by stock
or aircraft. This seems to have a reasonable discussion. For the actual fish removal, the
poisons to be considered, rotenone and antimycin, are well discussed, but the gill netting
gets minimal consideration. The EIS quotes gill netting might be effective on lakes 7.4
acres in size and 32 feet deep. This would include Necklace Lakes #2, 3, 4, 6,7,9,10,11.
With much thought and consideration of minimum tool and the potential effects on non-
fish species with the use of poison, it seems like Pyramid Lake at 9.6 acres and 37 feet
deep could also be reasonably be considered for gill netting. The EIS then discounts this
37-5 method because the Montana Bull Trout Scientific Group concluded that gill netting
would not result in a complete removal of fish. (p.2-32) in the discussion in Alternative
B, the Proposed Actions, one of the excuses for immediate restocking of lakes the next
summer after the fall poisoning of each lake, was to ensure genetically pure cutthroat
populations in sufficient quantities to ensure domination over any hybrid fish that might
remain, and to re-establish the fishery. (P.2-5) this seems to display that rotenone and
antimycin are not 100% sure to kill all fish by treatments. If this is the case, then gill
netting, trap nets, using explosives might certainly be reasonable to consider. The DEIS
does not say that for each lake and downstream area following fall poisoning, that the
following summer, in what manner the lake would be monitored to see if any fish remain
37-6 for the next year or two. This would serve two purposes, the first to ensure that all fish
had been removed and if not, a second treatment would be in order to actually remove
those non-wct genes and not just swamp them, and second, it would open the possibility
to leave the lake fishless.

To leave some lakes fishless, to be more in their original condition, especially for non-
fish species, would certainly be appropriate for the natural processes to occur in
wilderness instead of the initial stocking and continued stocking in the case of some
37-7 lakes. Of the over 220 wilderness lakes in the South Fork Flathead, the 20 lakes with fish
average over 90 acres in size, while the 200 lakes without fish average less than 1 acre.
Certainly leaving representative larger lakes in larger basins with other fishless lakes to
represent the original natural systems and to allow possible seriously depleted non-fish
species to reestablish themselves would be prudent. Pillod's paper, "Evaluating Effects
of Fish Stocking on Amphibian Populations in Wilderness Lakes," describes such a

2

strategy method. In Jason Dunham's paper "Assessing the Consequences of Nonnative Trout in Headwater Ecosystems n Western North America"; they list 7 key issues for assessing the consequences of nonnative tour in headwaters ecosystems. The North Cascades National Park in the beginning of their EIS to determine strategy on long-term fish management strategy will look at this alternative to restore natural processes in some historically fishless lakes.

27-8 With the seemingly good intentions Montana Fish Wildlife and Parks has now decided that genetically pure Westslope cutthroat trout would be good for the long term for the restocking of these originally fishless lakes and the downstream areas with the fish they want to remove. One thinks of the good intentions of miscis shrimp in Flathead Lake and the disruption on native fisheries. Lead poisoning of hatchery raised fish this summer and how that might affect fish that are stocked in the wilderness. The Hungry Horse dam has cut off the rest of the South Fork Flathead River to protect the upstream section from the various problems of introduced fish down stream. This originally genetically pure Westslope cutthroat trout population has evolved with the stocking of fish (except in these lakes). They have adapted to their places on the 1,898 miles of habitat. A WCT trout likely has different characteristics if it is found in Abbot Bay then if it is found in Youngs Creek. The basic genetic material may be the same, but the behavior and local adaptations cannot be duplicated. if these hatchery fish that were taken from various streams on the South Fork Flathead and an entirely different Clark Fork drainage and are all mixed together, then are continually stocked into lakes and dribble down into the main originally "pure" WCT area, aren't we potentially polluting these original native genes with our new combo mix genes and saying it is close enough as far as we know now?

27-9 Again, 50 years ago as outfitter, angler, and fish and game folks all dumped fish into these barren, useless lakes to try to make productive fisheries out of them, no one gave a second thought to the non-fish species and natural processes that were being disrupted. They just did it. Now it seems, with a broader awareness of ecosystems and how intricately connected everything is, to continue to just dump more exotic fish, even if the basic genetics match, and how humans can so easily mess up things they really do not understand, it is appalling to think that is what is proposed. Most of these lakes have had fish since before the 1964 Wilderness Act, it is a state's right to manage the fishery, so the state will just continue to keep stocking fish as it always has. The Forest Service

27-10 manages the habitat, and for broader landscape systems. Since the state does not really show much more than required cursory concern about non-fish species, it is incumbent on the forest service to look out for non-fish species and natural processes. There is a link and precedent for the forest service to have a say in short and long term impacts of stocking of fish and impacts on habitat. See Peter Landres paper, "The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation."

27-11 My proposal for the wilderness lakes would be to consider all lakes with fish, since all but Big Salmon and Doctor were originally fishless. This must be done to correlate the cumulative effects on the wilderness of fish introduction into these fishless lakes. Since almost all lakes with fish have exceeded Limits of Acceptable Change standards, most in one to four of the measured standards, most for all years since the standards were adopted

3

in 1987, over 17 years it should be a major consideration on whether to continue to stock or not stock fish. Opportunity Class should be the main player in trying to balance which of the larger, deep fishless lakes should remain fishless after fish removal. Opportunity Classes I and II are to be managed as an unmodified and and essentially unmodified natural environment. Ecological and natural process are not measurably affected by the actions of users. Management strongly emphasized sustaining and enhancing the natural ecosystem. These are the most primitive, natural areas within the wilderness. To meet this Forest Plan management requirement, I would remove all fish from Opportunity Class I and II areas and not replant them. Woodward, Lena, Lick, Koessler, George, Devine, Upper and Lower Marshall, and Diamond. I would remove all fish in Opportunity Class 3 and 4 areas and replant them with WCT as a compromise with more recent recreation values, and realizing that continued stocking will likely continue to have LAC standards exceeded well into the future. These two areas are the more impacted end of the wilderness use spectrum. Necklace Lakes, Pyramid, and Sunburst. I would leave Big Salmon and Doctor Lakes alone, since apparently they originally naturally had fish, they have exceeded LAC standards, even though they are in Opportunity Classes 4 and 2 respectively.

Westslope cutthroat trout are important, and we want to protect this species. However, WCT is part of the river system, not a part of these alpine wilderness lakes. To artificially continue this fish stocking gives a unique recreation experience for visitors, but at the expense of natural processes. We do not achieve naturalness or wildness. as Landres describes in "Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness."

The lakes of the Cascade Mountains in Washington and Oregon, the Sierras of California, the Rocky Mountain Lakes of Idaho and Montana all have had exotic species put into originally fishless lakes. This proposal to remove fish from originally fishless lakes, and then to leave lakes fishless as outlined in the previous paragraph would meet the purpose of action of the project - to preserve genetically pure Westslope cutthroat populations in the South Fork drainage, and to eliminate from headwater lakes and their outflow streams, the non-native trout that threaten genetically pure stocks of Westslope cutthroat trout.

My proposal above would even better meet these two goals, and provide additional wilderness resource benefits. by treating these lakes, once, possibly twice to make sure all non-WCT trout were removed, you would know for sure those non-WCT genes were out of the system, never to trickle down to pollute those original pure WCT genes. The opportunity class 1 and 2 lakes remaining fishless would not have any fish to trickle down to pollute river genes. The OC 1 and 2 areas are more remote and would cause less impact on recreational users. Having no fish would reduce for at least some people the draw of going to a lake to fish. This should contribute to LAC standards improving. Also, the non-fish species would have a chance to have a comeback. If remote, nearby ponds, and marshes that did not ever get planted with fish, might allow amphibians, and insects to recolonize and possibly restore at least some of these originally fishless lakes to a more natural system. The state would not continue stocking and further disrupting these lakes. They could eventually be more representative of natural processes in the

4

37-11 wilderness. The lakes that would be restocked in OC 3 and 4 areas, would also be tested and monitored after the initial poisoning to ensure all non-WCT genes were gone. Once this was assured, then as a compromise between natural processes and recreation use, WCT would be planted into these lakes. If these WCT trickled down to the river, at least every lake would not dribble down these hatchery genes. LAC standards would likely still be exceeded, but this is no worse off then the last 17 years. The original non-fish species of these stocked lakes would be severely suppressed or become extinct, but at least it is in only part of the deep fishless lakes. The state would hopefully just stock these lakes until they became a sustainable fishery and then cease stocking. This would at least leave the human manipulation finished at each lake, and the lake could evolve with these fish. Visitors would not have planes flying over with fish being dumped into them every few years, and a new normal could evolve.

Additional background that shows the impact of fish on non-fish species-

1. 37-12 Ptarmigan Lake Project, Glacier National Park, Jack Stanford- Ptarmigan Lake and two nearby control lakes were studied 2001-2002 and the biotic assemblages that exist in the three study lakes differ noticeably form one another during the 2001-2002 sampling seasons.
2. 37-13 Amphibians of Glacier National Park, Leo Marnell- the introduction of sport fish into a large number of formerly fishless lakes may have contributed to the loss or decline of several amphibians in portions of Glacier National Park. The presence of fish has been implicated in the decline of some amphibian species. Long-toed salamanders were particularly vulnerable to predation by introduced fished in portions of the Cascade Mountains in western Washington and Oregon. Long-toed salamander larvae were not observed in any Glacier National Park water harboring fish, and this species existed close to fish at only 2 of 25 sites. The extent of damage to native amphibians in Glacier National Park as a consequence of fish introductions may never be fully understood.
3. 37-14 The Fish-stocking Controversy, North Cascades National Park Service Complex, 1968-2003, David Louter- the consent decree required that the agency review the fish stocking program through an EIS. The research program, carried out by Oregon State University, lasted for 12 years instead of 3, and only recently concluded in July 2002. The research concluded that zooplankton, insects and amphibian in lakes with high densities of reproducing fish have undergone statistically significant changes in abundance and species composition.
4. 37-15 An evaluation of Restoration Efforts in Fishless Lakes Stocked with Exotic Trout, Deanne Drake- Diatom assemblages in two restored lakes have not returned, with several potential explanations- First, recovery may take longer than the 20-30 years since fishes were removed from the lakes. Second, ecological conditions in stocked lakes may have been driven past a threshold of change- exceeding the bounds or resiliency- from which they will not return spontaneously. Third, other disturbances, such as loss of lakeshore vegetation, may also have affected diatom communities in lakes over the last 30 years. Because few ecosystems are well understood in terms of history, function, or structure, the results of our study imply that ecological restoration of other systems also may be more difficult than managers expect.

5

Repeat 3x If the project is to proceed on any lakes, I feel the following items should be included:

37 16 1. Trails that do not have a well maintained system trail should not have stock used to transport people, gear and chemicals into them - this includes Woodward, Lena, Lick, George, and Koessler.

37 17 2. Any stock carrying in people, gear, supplies should be round tripped out back to the trailhead if this mileage is 20-22 miles. It sounds like each lake will take 3-7 or more days to complete. At these sensitive alpine lakes, have many head of riding and pack stock staying for 3-7 nights would largely contribute to the continued exceeded LAC standards. Round tripping stock out to the trailhead should include - Sunburst, Necklace, Pyramid, and possibly Woodward.

37 18 3. If boats with motors have to be used to effectively mix in poisons, it seems like electric motors or at least 4 stroke cleaner motors should be used. They are quieter, would not spill fuel, and would not give off fumes. It would only seem like the state would have to buy an electric motor.

Specific draft EIS comments include:

37 19 S-3- the EIS implies that more lakes and streams than the 21 listed might be treated if hybridization was determined. I assume a new EIS would be prepared if this came to pass.

37 20 S-4- in Alternative B, the EIS says that all lakes that have fish removed would have WCT stocked in the lake without sampling to see if all of the fish in each lake were killed. Why wouldn't another poisoning occur to make sure all non-WCT genes were removed from each lake instead of just swamping over the top? For each lake and stream below each lake to be treated, what is the expected success rate for the proposed action, 80%, 90%, 99%, 100%?

37 21 S-4- in Alternative D, the EIS says that when fish numbers are reduced, intensive fish stocking would be used to swamp the remaining fish. How does this compare to Alternative B in the number of fish that would be swamped, percentage of success, etc.? It sounds like they are they same alternative except that in some cases some lakes in alternative B would have fewer fish remaining to be swamped.

37 22 S-5- gathering and sinking dead fish in the treated lake would stimulate plankton growth as a food source for restocked WCT. The poisoned fish as well as the restocked fish are exotic species to the wilderness. The poisoned fish should be removed. The wilderness should not be considered a garden when the original natural processes are manipulated for human perceived better conditions.

37 23 S-6- Alternative D- gill netting would require long term camping and storage of equipment to accomplish and this lead to trampling and site degradation. This is what currently exists at almost all lakes with fish. Limits of Acceptable Change standards are exceeded, largely because of the human impacts of people being attracted to lakes with artificially placed fish. Many stock users, outfitters, and hikers come to fish at lakes and cause LAC standards to be exceeded because of these fish. By saying that gill netting might cause standards to be exceeded might be a short term price to pay if the fish were removed and not replanted, so fewer people would come to each lake without the unnatural fish attractant.

37 24 I-8- the 1999 MOU and Conservation Agreement for WCT, says WCT is to be managed

6

37 25 within its historic range in Montana. These fishless lakes are not within its historic range. Protect all genetically pure WCT. The South Fork Flathead River is the only genetically pure WCT. Get rid of all fish in its headwater lakes and the river WCT will take care of itself. The more we try to garden fish management, the more disruptive this is to fish and non-fish species, especially in wilderness where natural processes are to dominate.

37 26 1-9- purpose- eliminate from headwater lakes the non-native trout. Removing all WCT and non-WCT from these lakes and not restocking them meets this purpose very well. This is not displayed as an alternative to be considered.

37 27 1-13- MFWP is proposing to continue historical practices of stocking fish for recreation and to increase biological integrity. Again, not having any fish, WCT or non-WCT in lakes or streams from these lakes, does the best job of protecting the genetics of the native WCT in the South Fork Flathead River.

37 28 2-4- management goals for the fisheries in the South Fork focus on- managing fisheries consistent with wilderness management guidelines - the fact that it is proposed to do at least some of this project with primitive tools, stock versus aircraft, is a plus. However, in the bigger picture, removing fish and then putting more fish back into originally fishless lakes has the bigger impact to the overall natural processes that are supposed to be occurring in wilderness. Your proposal does certainly not meet wilderness values.

37 29 2-5- alt b. again, it is not displayed what the expected outcome is by lake for poison treatment. is Lick Lake expected to have 100 of the original 1,000 fish remain alive after poisoning, then it is restocked with 10,000 WCT so the genetic swamping dominates more quickly than waiting for 40 years? If the objective really is to remove all non-WCT genes from the South Fork Flathead River drainage, would it not be prudent to sample each lake after poisoning to confirm if all fish are dead and then re-treat the lake if fish still live? And if indeed fish are finally all gone, does that not meet the objective of not having any polluting non-native WCT genes dribbling down to the main South Fork Flathead River?

37 30 2-8- speaks to a post treatment survey, but does not commit to anything besides just restocking with more fish.

37 31 2-12 amphibian surveys have been conducted at each lake. Surveys have not been done at all large, deep lakes in the South Fork to see what non-fish species do or did exist at these lakes. Fish certainly had an impact on non-fish species, and by only looking and comparing what exists at lakes with fish, you are not looking at what species have been lost and how stocking and restocking effects them in the short and long term.

37 32 2-25- post treatment gill nets. If live fish remain, a determination would be made to impellent another treatment. Are you supposed to remove all non-WCT genes or not? What is the threshold that will be used to remove the last fish or just dump 10,000 more fish on top of them? What are the professionals anticipating the success is? See S-4 above.

37 33 2-25- rotenone would have on long-term adverse impacts on amphibians in the project area. it is not displayed what the range of amphibians currently are at the proposed treatment lakes, much less what amphibians were there before fish.

37 34 2-26- isolated fish have survived piscicide treatment. So you are saying that no treatment at these lakes is 100% effective. All treatments at removing fish are really to reduce as many fish as possible and continue long term swamping. If this is the case, poison, gill netting, and explosives all seem reasonable methods to use and may have less impact on

7

non-fish species.

37 35 2-27 - there is not a "no restocking" option. This is a reasonable alternative to be displayed to show what the effects on possible non-WCT genes dribbling out of lakes might be, what types of non-fish species could recolonize deep, fishless lakes, etc.

37 36 2-27- restocking decisions - the flat out statement that all lakes would be subject to illegal restocking is not accurate. with some credible education of the public about natural processes in the wilderness, the only places that they have any chance to possibly work with little human manipulation, and FWP puts fish into basically every lake outside of wilderness. putting fish back into opportunity class 3 and 4 areas, and not restocking in opportunity class 1 and 2 areas, would keep the more pristine, remote areas that way and more likely to return to Limits of Acceptable Change standards.

37 37 Just restocking all lakes shows little appreciation or understanding of the wilderness resource, or natural processes. Wilderness is just another recreation place to hunt and fish, it does not have any roads, but fish and wildlife can be manipulated like they can in any non-wilderness area.

37 38 2-35- genetic swamping may not be able to completely remove the genetic introgression. Genetic swamping seems to be part of all alternatives, it just varies by how many fish are being swamped. In this event, none of the alternatives completely remove all non-WCT genes. If that is the case, then the project is to just take out as many potential non-WCT genes as we can.

37 39 2-39- explosives estimate 85-95% fish kill. This is from one persons estimate. It seems like maybe 5 people should be asked their opinion, or maybe do a test lake. If poisons and gill nets do an estimated 95-98%, is that that much better?

37 40 2-45- not discuss wilderness in terms of naturalness and wildness in terms of short and long term impacts as per Landres paper.

37 41 3-2- bob marshall wilderness complex is 1.5 million acres, about 110 miles north to south from hwy 2 to lincoln.

37 42 3-7- protect and restore WCT in their historic range. Outside wilderness, maybe the FWP is empowered to do more manipulation, but it still should consider natural processes. Inside wilderness, natural processes should be dominant, and putting exotic fish into originally fishless lakes does not promote natural processes today or into the future. Growing WCT in the wilderness lakes where they were not historically located does no service to natural processes in the one area where natural processes are to prevail.

37 43 3-10- there is internal and external debate as to when a fish should be considered indigenous. If 1964 is the date, then hybrids should count as indigenous. Continuing to stock fish in fishless lakes regardless of semantics does not serve the natural processes of wilderness.

37 44 3-12 - protect bull trout by removing as many hybrid WCT as possible. Again, it sounds like some, it's not quantified, WCT will remain after poisoning to protect bull trout, and because poisons might not be effective in every nook and cranny of every lake and stream. If this is so, say so and what the anticipated success is for each lake and stream segment. This display might help determine which treatment is best for each area.

37 45 3-13 if piscides combined with swamping any remaining non-WCT should reduce but not eliminate non-WCT genes. Again, what are the chances of success by lake and stream segment? If some are very assured of success, this would rate that segment much higher in remaining fishless.

8

37.46 3-13- using the same M012 stock for all lakes again seems economical, but likely will lead to future genetic contamination of the really, original genetically pure WCT in the main South Fork Flathead. If the proposal persists in wanting to stock WCT into lakes, the least that should be done is to get WCT fish that live in the main stem and use these fish to stock lakes that drain into them. For example, for Lick, Koessler and George Lakes, use WCT that naturally live where Gordon Creek empties into the South Fork for brood stock. Plant these fish into Lick, Koessler and George Lakes. If over the years, fish happen to dribble down from the lakes to the main river, at least these fish will carry the genetics of the original fish from the drainage.

37.47 3-18 - amphibian baseline data has been collected from the project area that indicates that these species are widely distributed throughout the project area. Apparently, the amphibian survey did not consider other large, possibly deep fishless lakes to compare what the lakes currently stocked with fish might have had for non-fish life forms before fish. Lakes without fish, such as Palisades, Olor lakes, Crimson, Pendant, Christopher, Hart, Recluse, Rubble, Marshall Mt., Cooney, Lion Creek, Terrace, are some examples of the many larger and possibly deep lakes that could be surveyed to see what amphibian, reptile, plankton, aquatic insect, etc. may have existed in these lake prior to fish introduction. Until the surveys are done on all large lakes with and without fish, it seems that saying none of the alternatives would have any effects is premature.

37.48 3-20- basing a Glacier National Park FONSI that said noise would not effect wildlife, without displaying what the FONSI said, the project background, etc. seems pretty presumptuous in saying the same effects apply for this project.

37.49 3-22- what food storage method would be used at lakes? Camp occupancy or bear resistant containers? Will piscide be stored in bear resistant containers? Although they are not a food consumed by humans, it could be odorous and intriguing to a grizzly bear to just check it out and tear it open or bite it to see what it is, like has been know to happen with oil and gasoline containers.

37.50 3-23- impacts on amphibians would be minimal. If piscide use kills all fish, it seems likely that it will kill all amphibians in the water. It might be true that some amphibians would still be around after treatment, it does not go into the various life cycles that different amphibians have, where over several years they go from pond, to marsh to lake, and depending on time of year, treatments can be deadly to different species.

37.51 3-28 - spills from pumps and outboard motors. It seems like electric motors instead of those run from gasoline would prevent this possible problem.

37.52 3-26- "Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces." This project is supposed to help correct imbalances cause by past actions. People put fish in lakes in the past. We do not like those fish, so we want to kill off the old fish and everything else that lives in these lakes and streams, then put in new fish into these originally fishless lakes, and continue to stock them with fish so people can fish for them. What about this description sounds like wilderness responding to natural forces?

37.53 3-37- "where a choice must be made between wilderness values and visitor and other activity, preserving the wilderness resource is the overriding value." Maybe taking the fish out of lakes might help preserve the wilderness resource, but putting them back into every lake to continue an unnatural process certainly does little to preserve the wilderness resource.

9

37.54 3-37 maintaining naturalness and wildness should dominate what is done in this proposal. Natural and Wildness: The Dilemma and Irony of Managing Wilderness, Peter Landres-paper says that wildness is free from human control or manipulation. Naturalness is native, indigenous. Both are essential elements of wilderness. The present and future of these originally fishless lakes meets neither. In the past fish were planted in fishless lakes- human control of stocking, manipulating the setting, and making less native. Every time the lakes are stocked it is more human manipulation of a non-native organism put into a lake at the expense of those species that were there before fish. This proposal would have deadly human manipulation to remove most life from lakes and affected streams, and then put non-native fish in the short and long term back into these lakes. Neither naturalness nor wildness is met by any measure.

37.55 3-38 a final minimum tool analysis it not normally completed prior to having an approved decision. At a minimum the analysis and decision go side by side. If a decision is made without knowing what the minimal tool choices are, it is not a very informed decision. The EIS should display what minimum tool is for each lake and stream segment. To say that it will be discussed in the details after a broader decision is made does not reasonably display to the public and decision maker what the various consequences are to each decision.

37.56 3-39 - cumulative effects on wilderness resources. There are 50 lakes in the South Fork stocked with fish; all but two were originally fishless. Almost all are in designated or proposed wilderness. The cumulative effects of having 50 of 355 large, deep lakes stocked with exotic fish, on the non-fish species needs to be displayed as an effect on wilderness resources.

37.57 3-40- it is not clear how gill netting and other suppression techniques would disrupt natural wilderness processes and adding poisons and swamping would not.

37.58 3-42-it seems to misrepresent the fishing impacts of listing 21 lakes for this project, and adding them up to represent the 157th out of 1,529 fisheries in the state. Each is a widely separated lake and the highest any lake rates is 320. To then say all of these together represent the 157th biggest fishery does not seem to make sense. One lake ranks at 1,175 out of 1,529.

37.59 3-43- Limits of Acceptable Change- most lakes with fish have exceeded standards. Most have one and up to four measured standards, most have been exceeded for all 17 years since these standards were established. Lakes stocked with fish play a major role in attracting people to lakes. The fact that the forest plan states that wilderness is to be managed within standards should prevail. the fact that some lakes might be getting closer to being within standard, but are still are outside standard after 17 years should be part of the display of information and have a bearing on which, if any lakes should be considered for restocking with fish.

37.60 3-48 - the EIS notes that the LAC standards are not expected to change in alternative B. The connected action of restocking lakes will continue to have lakes not being managed within LAC standards. An alternative that would not restock some or all lakes based on Opportunity Class would likely have at least the lakes that were not stocked come back within LAC standards.

37.61 In general, even though we will never know all we need to know before making a decision on these lakes, I still believe there is a basic level we need to know on the larger,

10

deep fishless lakes. Do we have representative basins that can reflect what non-fish species were present before the introduction of fish? Can we keep the most pristine areas
37.62 fishless as they originally were in Opportunity Class 1 and 2 areas whether they have any fish at all? If we must remove fish from all lakes and restock them into some lakes for
37.63 compromise or political or social reasons, can we stock the fish for one or two years, and then let them become self-maintaining or not, and try to restore as much naturalness and wildness as we can to wilderness without continued human manipulation? In the
37.64 proposed wilderness for Jewel Basin, can you keep the more remote lakes fishless to represent natural processes in other areas as well, especially those areas likely to become wilderness?

Attached is my 6/23/03 letter to you with Attachments A and B. Your EIS addressed
37.65 many of the issues I outlined in attachment A, and did not seem to embrace and include much of the wilderness and amphibian research outlined in attachment B. This EIS is still not a very balanced document. Poison non - WCT in some lakes, put WCT back in, and keep providing a recreational fishery. This does not contribute to natural processes,
37.66 naturalness or wildness, as part of wilderness; it is totally subservient to fish. A dangerous precedent to manage for a wildlife species at the expense of the overall wilderness resource.

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11

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Attachment A

ISSUES FOR WESTSLOPE CUTTHROAT TROUT IN MOUNTAIN LAKES IN THE SOUTH FORK FLATHEAD RIVER – REMOVAL AND RESTOCKING –6/23/03

Alternative methods to remove fish

37.67 Alternatives include ending all fish stocking, liberal angling rules, netting, electrofishing, targeting spawning areas, stocking with predatory sterile hybrids, etc. All alternatives should be fully considered and displayed, not just for convenience and economics.

37.68 Non-toxic alternatives such as trapping, and screening off of spawning beds. These alternatives could be combined with gill netting and other non-toxic methods in treating some lakes.

37.69 Antimycin, advantages should be listed. You need 1/5 the volume of rotenone so for wilderness situations it has merit. Its effect on nontarget organisms is less than rotenone. Antimycin is used in the Wilderness lakes but rotenone is proposed in the non-wilderness. Both sets of lakes have non-fish species that are sensitive to chemicals and areas of streams below lakes that have hybrids. Explain why there is the difference in the types of chemicals being used.

37.70 Gill netting has been shown to be effective in lakes up to 33 feet deep and 8 acres in size. (Knapp and Matthews June 1998) this method should be seriously evaluated and considered for the Necklace Lakes and Pyramid Lake.

37.71 Lakes with chemicals flown in – have people walk in, stay there, walk out. To minimize flights, serious consideration should be given to having people walk in instead of riding stock and then having stock not stay at the lake but taken out to the trailhead to minimize impacts to trails and to lakeshore areas.

Bull trout

37.72 Bull trout spawning and rearing tributaries. It will be critical that a failsafe method be adopted to preclude the accidental discharge of toxified water downstream from these removal efforts. How many miles of stream have both bull trout and hybrid fish? In those areas with both types of fish, is the hope that potential dribble down of planted wct from the lakes will swamp out any hybrids in these sections? If wct were not planted in the lakes, couldn't any hybrids be swamped out with pure native wct from the South Fork Flathead River?

What is uppermost bull trout distribution in each of these drainages? Also, assuming that most of the uppermost reaches end at some kind of barriers or falls. Again, why

Page 1 of 14

can't hybrid wct above the barriers be removed, and not replant wct in the lakes and in the streams above the barriers? If these toxins are supposed to be so effective, there should not be a problem with not having to plant wct in lakes to dribble down to do more swamping.

Directions and agreements

FSM 2320.22: Objectives – "Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces". This is not being proposed based on past actions of planting by FWP, by fish removal, then proposed continued restocking of lakes forever.

FSM 2320.3: Directs FS Line Officers to select an action alternative which gives precedent to maintenance of wilderness values where there are alternatives among management decisions…except where limited by the Wilderness Act, subsequent legislation or regulations. Maintaining naturalness and wildness should dominate what the Forest Service does and what the Forest Service does in partnership with Fish, Wildlife and Parks. Both agencies need to consider wilderness values, not just specific wants and needs for one project like this fish removal and restocking proposal.

FSM 2320.6: "where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value.." Wilderness values should dominate all agencies decisions, not just Forest Service decisions based on one species of fish.

Inconsistency between FSM direction and MOU guidelines/criteria -

Define statutory authorities given court rulings. (Landres and Meyers 2000). This paper notes that "backed by the Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values." By having the Forest Service say that the state can stock and continue to stock fish in any and all wilderness lakes that it so chooses, is an abdication of federal responsibility of protecting long term wilderness values, natural processes, and minimizing continued human manipulation of the wilderness.

"Territorial imperative" is a barrier to wilderness management - *There is some comfort level with the current perception that State has jurisdiction over fish stocking in wilderness as long as there is recognition of* ***shared responsibility*** *for meeting intent of the Act, as well as, other laws that regulate Forest Service actions.* There does not appear to be any shared responsibility for meeting the intent of the Wilderness Act. This project is purposely divided into decisions that each agency is supposed to make independently, without cooperation or adherence to the much touted Bob Marshall Wilderness Complex framework of cooperation between the Forest Service and FWP. There should be shared responsibility for meeting needs of wct as well as wilderness values.

Page 2 of 14

Believe that the Forest Service does not have the authority to allow the State to perform this procedure. It does not seem to meet the Forest Service mission of maintaining wilderness values and natural processes by just letting the state perform exotic fish removal from lakes, and then just let them put in different exotic fish back into these lakes.

Fishless lakes

37-78 We have a very unique and rare opportunity to recreate many large fishless lakes.

37-79 Stocking fish in naturally fishless waters has had a devastating effect on native aquatic biological diversity and biological integrity. I don't believe non-fish species in these originally fishless lakes has been fully considered. What did all fishless lakes look like prior to fish? What is left in these and the remaining lakes as far as non-fish species diversity and makeup?

37-80 Use such lakes for the study of recolonization by amphibians and affected aquatic insect populations? For any of the lakes that don't end up being restocked, they should be studied to see what the recolonization by non-fish species looks like.

37-81 How many of these 355 lakes are capable of sustaining fish. A rough guess is that 95-100% of lakes that can sustain fish in the South Fork have fish in them. Bottom line is that there are few to no large deep fishless lakes due to stocking practices. Large, deep fishless lakes likely have different, if not unique, assemblages of non-fish species. Even though most lakes in the Wilderness lakes have not had fish planted in them, most of the lakes with fish planted, are the largest and deepest. Some of the largest and deepest lakes need to be left fishless.

37-82 There were some lakes, Marshall and Crimson that were stocked by FWP after Wilderness designation. Of all of the lakes in the wilderness, when was each lake likely stocked and by whom, and when was each lake first officially stocked? If any lakes were first stocked after 1964 they stock have all fish removed and not replanted.

37-83 Which lakes are most likely to have 100% fish kill? This should be a strong consideration for lakes to be left fishless.

Genetics

37-84 From a genetic standpoint, it is important that we provide for local adaptations and phenotypic variation. We thought that it would not make any difference to plant lake trout, Kokanee, and shrimp in Flathead Lake, and now a lot of the native fish populations are declining. How do know that using MO12 brood stock from 2 Clark Fork and 10 South Fork drainage streams will not seriously impact the pure native wct that is in the South Fork Flathead River? Is it possible that the unique adaptations that the wct have in the main river and the side streams may allow unique opportunities to survive and thrive?

Page 3 of 14

37 85 The South Fork is the best wct river system that we have left. We have kind of messed up the lakes and some streams from them with hybrid fish. What makes us think by the continued gardening of adding fish with genes not of the exact local streams may lead to genetic pollution and the eventual losing of this native species?

37 86 What is the best WCT source for rebuilding the lake fishery? Can a downstream pure WCT population or other nearby wild WCT populations serve as the donor? This might take more time and expense for the short term, but for the long term would this be a better consideration?

37 87 MOU for Wct in Montana, "Protect all genetically pure populations," "Thus, each tributary that supports WCT, regardless of its length, constitutes a population." If this is the case, MO12 should not be used to stock lakes or other streams.

37 88 We have been told that the genetic diversity among WCT populations may be the result of founder effects or genetic drift. How likely is this?

37 89 What is the Committee's best informed estimate on the issue of whether or not the diversity of these local populations reflects a significant amount of local adaptations rather that founder effects or genetic drift?

37 90 Suppose the appropriate genetics data formed into, say four or five clusters of local populations. And suppose a lake cluster brood stocks were formed by taking stock over the tributaries in each cluster. Would the use of such stocks (compared to M012's serve to: a) decrease the chances of losing alleles, b) decrees the extent of loss of local adaptations, and c) decrease that loss of genetic diversity among the local populations? Extensive discussion on the genetic implications of this project is needed.

37 91 We have been told that, since M012's have been in these lakes for some time now as part of the "swamp-out" program, the downstream WCT populations are probably already inter bred with the M012's. Is this simply a guess, or is there evidence for this claim? Is there any reason to think that there are pure local populations in sections of the tributaries that are not interbred with the M012's? Are there any genetic markers that can be used to distinguish (with a fairly high degree of confidence) pure WCT's that have M012 genes from those that have not?

37 92 It has been suggested that the leaking of M012's into the downstream local populations could provide a remedy (or prevent) inbreeding depression. Is there any evidence that these populations are suffering from (or on the verge of) inbreeding depression? If so, is interbreeding with M012's the best way to deal with the problem from the conservation genetics standpoint?

37 93 If there is currently insufficient genetics (or other) data to answer many of the above questions, does the Committee believe that – strictly from the standpoint of the conservation biology of the project – acquiring the relevant data before restocking these lakes with M012's would be the appropriate course of action?

Page 4 of 14

37 94 We are deeply concerned about the ongoing hybridization in thee tributaries, and agree that the immediate remedy is to eliminate the non-native (and hatchery cutthroat) lake populations using techniques most compatible with wilderness. 37 95 We believe that in a project of this magnitude and potential impact on wild native WCT populations, it is extremely important that it not be launched until the scientific issues most relevant to its success as a conservation project are considered and resolved in accord with the best available science. 37 96 Our preliminary review of the genetics data available indicates that it is focused on the hybridization issue and is insufficient in scope to provide a basis for assessing the overall genetic makeup of the tributaries affected by the project.

37 97 Before restocking, we would like to see a thorough review of alternatives to restocking with a single generic brood stock. (Raise local brood stocks instream, or at a local hatchery, or plant lakes directly from their associated tributaries?

37 98 Restocking with M012 WCT appears to be in conflict with the Upper Missouri Westslope Cutthroat Trout Committee. We do not now recommend that WCT be introduced into waters containing or connected to waters that contain pure WCT populations unless the existing pure population is the source of the introduced fish. This recommendation will prevent the possibility of breaking down local adaptations due to interbreeding of extant fish with introduced fish.

37 99 At a minimum FWP should address the consequences from stocking M012 on phenotypic variation versus the consequences of a few remaining hybrids (if a complete fish kill is not achieved) on the downstream native fish population.

37 100 It is highly possible that once hybrid genes are removed from lakes that seeding and swamping of remaining hybrids in the stream is achieved by pure wild fish moving upstream. This possibility without restocking the lakes should be displayed.

37 101 Given that hybrids have been present for 70 years, it is important to remove hybrids, but not sure of the urgency. Whatever we do, let's do it right with the best information that we have, or with more information to collect if needed.

37 102 If we are stocking with M012 is viability an issue since there is always a hatchery source?

37 103 We know that there are WCT downstream. We don't have enough genetic info yet but in all likelihood there is a gradient of hybridization with the highest near the lake to little or no downstream at confluence. If hybrids are removed from lake and trickle down effect is removed or reduced doesn't seeding also happen from downstream pure wild fish upstream? In other words, wild pure fish swamp out hybrid stream fish since hybrid source is gone from lake.

Page 5 of 14

Grizzly bears

37 104 Indicate how the thousands of poisoned fish will be disposed. If they are not removed from the wilderness, what will be the effects on wildlife, including threatened and endangered species like grizzly bears, that feed on the poisoned carcasses and to whom fish will be food attractants?

37 105 Fish are not a natural part of this ecosystem- all dead fish should be removed from site by packing or flying out to minimize unnatural food sources for grizzly bears and to minimize artificial nutrient additions to this area. To sink dead fish to add to the unnatural nutrient loading of the lake further disrupts natural processes.

Illegal fish stocking

37 106 In response to the concern that outfitters or other will illegally stock these waters with exotic fish, we would suggest that if the existing fish are removed, the State of Montana should permanently close these lakes to angling. This should be included as mitigation in alternatives.

Monitoring

37 107 The success of chemical rehabilitation should be assessed through pre and post treatment inventory using gill nets, electrofishing, and/or underwater visual inspection. If this isn't done, FWP will never know how successful their treatments were.

37 108 The full extent of the impact of introduced fish on amphibians (specifically Columbian spotted frogs) will probably only be able to be determined through experimental removal or introduction of fish with post, pre and post treatment estimates of relative abundance.

37 109 We have been told that one reason for immediately restocking the lakes is to swamp out any remaining Yellowstone cutthroat trout or rainbow that remain after rotenone or antimycin treatment. This project has as its goal the total removal of all exotics in the lakes involved. It is technically reasonable to suppose that (at least in some cases) the rotenone or antimycin treatment will be totally successful? Could a program of subsequent monitoring (say, by netting) give reasonable assurance of the completeness of the treatment program?

37 110 Some amphibian surveys have been done over the last year or two, but I don't believe they have been done on all 350 lakes to determine what biota is out there or what used to be out there. What is the likelihood that a species like the mountain yellow-legged frog exists near extinction or is extinct from past fish introduction? What type and amount of surveys should reasonably be done to be satisfied what species are or have been out there?

37 111 This project should not proceed without substantial information on the biota of the lakes being treated. It is critical to know what species of zooplankton, invertebrates and

Page 6 of 14

37 112 amphibians live in these lakes prior to treating them. This project has focused on the fish and barely addressed the other organisms in the lakes. The best way for this project to proceed it to use 2-3 lakes as a pilot to document the impacts, or lack of impacts, on these aquatic communities to justify proceeding with the full scale watershed restoration project. I highly recommend doing a BACI (Before, After, Control, Impact) type pilot study to document the potential effects of this project before proceeding. This could be completed in 2004 and 2005, and would not hold the project up because (1) 3 lakes could be treated in 2004 as part of the pilot study and (2) the pilot study could provide useful information by the end of 2005. By conducting biotic inventories prior to treatment, this project could be used as a model for future restoration work throughout the west and provide important and timely scientific information.

37 113 We specifically request discussion of impacts to non-target organisms such as amphibians and invertebrates from local and national research.

37 114 There is an assumption by FWP that we may not get a complete fish kill. The effectiveness of the treatment will vary by lake, the most compounding factors being depth and volume. We should be ranking lakes from low to high on what our expectations are for a complete kill and then monitor to determine if we get a complete fish kill. We could defer stocking for 1-2 years at a minimum in high probability lakes (of getting complete fish kill) to determine if we met our objective to remove hybrids. If we get a complete kill, this should eliminate the need to stock a lake to "swamp" the remaining hybrids. We can couple this information with angler days, remoteness, chances of bait bucket reintroduction, needs of non-fish species, etc. to identify lakes which provide the best opportunity to return to fishless characteristics. To date FWP has had a 100% success rate on the 7 treated lakes to remove trout. Observations from the lakes that have been treated in the Flathead over the last 7 years was that a complete kill was achieved in all cases. Professional fisheries biologists concur that complete kills for trout are common in lakes.

37 115 Several times over two seasons survey all 44 lakes with fish and their surroundings to determine existing biota to determine, which, if any lakes should remain fishless. This should capture most of the life cycles of non-fish species.

Motorized Project

37 116 Agencies should set a good example by conforming to the regulations that make Wilderness Areas special places.

37 117 I think the only way this project can justify the use of helicopters and motorboats in federally designated wilderness is if doing so will result in higher success of exotic fish eradication. And then, how much higher success?

37 118 Outboard motor use should be specified to consider 4 stroke motors or other low pollution models such as electric motors. We request further substantiation that rowing is infeasible.

Page 7 of 14

37 119 Helicopters are noisy and obtrusive. The noise assessment should include the numerous overhead trips affecting residents living in adjacent wilderness and users of wilderness expecting freedom from such motorized obtrusion.

I urge you to avoid setting an undesirable precedent by using motorized equipment for this purpose.

37 120 This is definitely not an emergency. If this is not a cost effective project, by using conventional methods such as horseback or on foot, then it should not be done.

37 121 I hope that at some point there is some strong consideration given to using an efficient helicopter. Cost can't be the only factor considered. There needs to be some discussion of the value of reducing the number of flights.

The number of flights and cost could be reduced by leaving the crew on site over night in non-wilderness lakes. People should walk in, or ride in if they must, but stock should not overnight at the lakes.

37 122 Would it be better to disturb 2 lakes in the same area in a year rather than 2 lakes in 2 very different areas?

37 123 Motorized use precedent from the past. For ALL lakes with fish, identify when fish were first officially or unofficially planted by foot or stock, and then each was first planted by aircraft.

37 124 When were Sunburst, Pyramid and Woodward Lakes planted?

37 125 It should be clearly displayed when and how fish were originally stocked in the lakes. If they were stocked before the Wilderness Act in 1964, there might be an argument for a preexisting condition, but any lakes originally officially stocked after 1964 for the first time really should have done so with analysis and public review in context with the Wilderness Act and I do not believe this has been done. This current proposed project should take into account the cumulative effect of the Wilderness and non-wilderness lakes of the South, Middle, and North Forks, and put it in context with the rest of the Bob Marshall Wilderness Complex and how many lakes remain in their original fishless state. Put this in context with the western United States as to how many lakes of any size and depth really remain fishless to fully represent the non-fish flora and faun of these unique ecosystems.

Non-motorized project

37 126 The wear and tear of the trails can be done by lighter loads and traveling when the trails are dry. Consider packing in any chemicals in bear resistant containers in August when the trails are more apt to be dry.

Page 8 of 14

37 127 No size and number limit Yellowstone Cutthroat, Rainbow, cutthroat, for a three-year period.

But this may ultimately be a social issue where some compromises become necessary to gain public acceptance. A more limited use of motorized equipment may be feasible for some of the lakes.

37 128 We realize that some of the lakes will be hard to access, but with a little work and some ingenuity we are sure a non-motorized solution can be found. One of the things that make wilderness areas stand out from the other 99% of the land in the United States is that motorized and mechanized equipment are not allowed.

The management of wilderness is not always cost efficient.

37 129 Where round trip travel is less than 20-22 miles consider taking stock out of the wilderness rather than camping with stock at the lakes.

37 130 So will non-motorized boats with oars be used to go around each lake for 2-3 days to make sure all fish are picked up and removed from wilderness?

Non-fish species

37 131 Once extirpated from a lake, the large-bodied species may not be able to recolonize, even if fish are removed, due to their limited ability to disperse.

37 132 Loss of amphibian species and populations are of global concerns. Declines for both endemic and widespread amphibians are believed to be the result of habitat degradation and alteration. Despite widespread declines of amphibians, we still to not have a definite answer with regards to our local species, spotted frog, long toed salamander, and boreal toad. Deferring stocking will enable us to search for answers.

37 133 Describe what other species exist in these lakes, and how they might be affected by rotenone or antimycin. What will happen to the native amphibians, zooplankton, macroinvertebrates, and the wealth of native biota that may still exist?

37 134 Trout reproduction was occurring in inlet/outlet streams (presence of juveniles) which indicate that rotenone or antimycin would have to be applied to the streams also, not just the lakes. Result of applying rotenone to feeder streams would be the probable loss of 4 years of tailed frog cohorts.

37 135 Leave the lakes fishless, so the native biota can regenerate. Regeneration of the native biota will be in the long-term interest, support, and preservation of the Concept of Wilderness and the wild character of this area.

Page 9 of 14

37 136 While it is possible that fish stocking has extirpated species from local sites and portions of watersheds they clearly have not extirpated either of these species from the entire landscape.

37 137 We concluded that various life stages of 4 species could be negatively affected by the use of chemicals.

37 138 The effects from inbreeding depression and changes in local adaptations should be discussed. What are the effects of restocking on amphibians, WCT, invertebrates. What is the effect on impacts around the lakes, etc?

37 139 For all 44-50 lakes with fish in the South Fork, a strategy will be determined to insure that native amphibians and other biota are represented in natural processes to restore or maintain these populations.

Non-lake origin streams with non-native genes

37 140 Are there any thoughts of how to treat non-lake origin streams that contain non-native genes?

It would also be useful to complete more genetic surveys of the tributaries in question to get some measure of the genetic diversity of these populations.

Planning

37 141 Start developing "subbasin management plans" which should cover how we manage all aquatic (including fishless lakes, amphibians, etc.)

37 142 I propose that there are several lakes in the South Fork that can be considered isolated and thus should have fish removed and not replanted.

37 143 Identify the lakes which pose the greatest threat to WCT genetic integrity.

37 144 The main purpose for this proposed action seems to maintain the integrity of westslope cutthroat trout. I believe at least an equally compelling reason for this project is to restore and maintain naturally occurring processes in the Wilderness as required by the 1964 Wilderness Act.

37 145 How can we ensure the persistence of native amphibians at the level of a local watershed for the long term given that fish may not be the only management issue of concern while maintaining enough sport fishing opportunities to maintain public support?

37 146 From a cumulative effect and looking at the short and term effects of allowing natural processes to operate at least in the wilderness, should the different environments that the 350 lakes represent - size, depth, elevation, wetlands, amphibian habitat, etc. be sorted into some kind of representative groups for the 350 lakes, and then see how many of the

Page 10 of 14

total 46 lakes with fish should be kept fishless to represent natural processes in these groups? If only the 27 of 46 lakes with fish are looked at for removing fish, the 19 lakes with wct that aren't being considered to have fish removed might have better representative habitat for being fishless for the long term.

37 147 I think this project is somewhat misguided. Wilderness lakes should not be used as genetic refuges or a source of genetic swamping for westslope cutthroat trout at the expense of native biota. This approach may be appropriate management for non-wilderness lakes, but wilderness lakes should be managed to maximize both naturalness and wildness. Removing an exotic fish using invasive procedures (helicopters, boats, poison) only to restock with a different non-native fish (to those ecosystems) is inappropriate for wilderness. From the wilderness perspective, leaving the lakes as they are is far better than what this project proposes to do. However, given the status of westslope cutthroat trout and the perpetual (and real) problems with downstream movement of exotic fish out of these mountain lakes, I recommend leaving the lakes fishless after treating with rotenone or antimycin. The argument against this approach is that any fish that were not killed by the treatment would repopulate the lake. If this is true, then maybe an alternative or combination of fish eradication procedures should be implemented to insure success. Leaving the lakes fishless would serve several purposes: (1) protect downstream pure strain populations of westslope cutthroat trout, (2) allow amphibian populations to recover (there are many well documented studies that demonstrate that introduced salmonids suppress native amphibian populations), (3) allow other native flora and fauna to recover, restoring the natural ecosystem processes of the lakes, (4) gain support from wilderness advocates.

37 148 A recent federal court ruling now requires, under the Clean Water Act, a National Pollution Discharge Elimination System permit?

Public involvement

37 149 Our original intent with forming the Limits of Acceptable Change approach to planning and dealing with Wilderness issues was to involve as many diverse citizen interests as possible. In doing so, we hoped a better understanding of state and federal responsibilities could be achieved (i.e. "consensus building"). It appeared to be a better way of doing business.

Research

37 150 High mountain lakes have had little research conducted on them. There is so much that we do not understand. Are there unique assemblages of zooplankton or aquatic invertebrates in large, deep, fishless lakes that do not occur in shallower lakes because of potential winter kill?

37 151 One of the objectives would also be to conduct research in cooperation with the State and the Aldo Leopold Wilderness Research Institute.

Page 11 of 14

Rotenone and Antimycin

37 152 Discuss the effectiveness of the rotenone and antimycin treatment for killing all the existing fish in the lakes. Without that information there is no way to determine how MDFWP's preferred method stacks up against other potential methods of fish removal.

37 153 The effects of the rotenone or antimycin downstream as water flows from lakes.

37 154 There should be analysis of impacts to other species such as amphibians, plants, insects, invertebrates and other sensitive taxa from using rotenone or antimycin.

37 155 Poison making their way down creeks via the extensive faulting of sedimentary rock in this area? How long will the poison persist in the lake? The creek and other streams?

37 156 What about the thousands of dead and decaying fish after treatment and affect on water quality? The nutrients from the dead fish are not part of the natural system.

37 157 Does rotenone or antimycin pose any threat to other species – birds, mammals, aquatic micro-organisms?

37 158 Concerns with the use of potassium permanganate (KmnO4).

37 159 What would be the tradeoffs of powdered vs. liquid in terms of weight? If pack animals are to be used it might be worth pursuing an analysis?

37 160 To date FWP has had a 100% complete kill on mountain lakes. Options also exist to do a 2nd treatment rather than stocking to remove remaining fish if a complete kill is not achieved. What are the economics of a 2nd treatment vs. restocking to remove remaining hybrids if any?

37 161 Fish would be removed from the shoreline. How would they be disposed of?

37 162 $KMnO_4$ can be applied using detox stations far downstream of the lakes, but still above bull trout range. This implies that streams may be treated so the effects should be analyzed and sites disclosed.

37 163 If rotenone and antimycin are supposed to be so effective, why is there a need to restock? It doesn't seem reasonable to not consider gill netting or other methods than chemicals because they aren't 100% effective, and then propose chemical use as very effective. But if chemicals too are not 100% effective, and then say you must swamp just in case, then all methods of treatment should be reasonably considered.

Stocking

37 164 An alternative would be to request a one time stocking that will minimize long term mechanized impacts from aerial stocking.

Page 12 of 14

37 165 Likelihood to be restocked by public – size, access, ease in getting to lake, amount of use, wilderness opportunity class, LAC standards, average angler use, outfitted use, year originally stocked- if so, by who? Should help determine which lakes remain fishless.

"Accessibility" by the public would seem to be criteria for stocking.

37 166 I do not believe this project can be fully accomplished as planned due to your statements that the Big Salmon Lake would not be treated because of its size would be impossible to do so. Therefore, there would always be the exotic fish in the wilderness.

37 167 If stocking after rotenone or antimycin is proposed because there may not be a complete kill, is it possible to pursue these other alternatives and achieve similar objectives and outcomes? It appears that they may have been dismissed too quickly.

Swamping

37 168 Has swamping out worked in many cases and has failed in other cases?

37 169 You also state that populations have not responded to swamp-out over a 16 year period. Has swamping out been working on other lakes and their outlet streams and can this be proven with genetic data?

37 170 If we attempt to remove exotic fish, and not all are successfully removed, do we need to deep adding more fish to these lakes indefinitely to try to swamp out the exotics? What is the probability of success with swamping lakes, and when do we know when we have succeeded?

37 171 "Swamping" could occur from wild pure fish downstream rather than from M012 from the lake.

37 172 Swamping has been attempted and cannot assure complete eradication of exotic species – why then is swamping all lakes still part of the proposed action?

Wilderness

37 173 Limits of Acceptable change standards from the 1988-1992 period and changes to the 1993-1997 period and on to the 1998-2002 period should be reviewed to determine which lakes might benefit by not restocking to reduce the human impacts on these Wilderness lakes.

37 174 Once designated as Wilderness, nature must be allowed to operate unrestrained or untrammeled. Thus, unless there is a management requirement (such as protecting an endangered species) or a specific exception in the law (such as fire control), the existing condition should evolve on nature's terms. This should be discussed related to wildness and naturalness.

37 175 While FWP may view economic considerations as the overriding factor for the alternative it chooses, the Forest Service is required to put Wilderness first. "Where there are alternatives among management decisions, wilderness values shall dominate over all other considerations…" FSM 2320.3 "Where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness." FSM 2320.6 FWP cannot undertake this project without Forest Service approval, and is should strive to meet the standards of the federal agency and the Wilderness Act before requesting it.

37 176 A minimum requirement decision guide evaluation including a minimum tool analysis should be completed for each lake that is determined to be restocked with western cutthroat trout.

37 177 How accessible are the lakes to stocking/ consideration should be given to how many miles in by maintained stock trail? How many miles by user made trail? How many angler days occur at each lake now? Are one or more Limits of Acceptable Change standards at a lake exceeded? The lakes in the most pristine opportunity classes 1 and 2 should have as natural occurring processes and be as fishless as possible.

37 178 The sight and sound of helicopters and motor boats in these areas is offensive to those who enjoy and recreate in these areas.

37 179 Highlight wilderness solitude versus outside wilderness.

Page 14 of 14

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Regarding - The Proposal to remove non – westslope cutthroat trout and then plant westslope cutthroat trout back into Wilderness Lakes –

The Montana Department of Fish, Wildlife and Parks (FWP), with funding from the Bonneville Power Administration (BPA) is proposing to remove and then replant fish in lakes that were historically fishless in the South Fork Flathead River in the Bob Marshall Wilderness and other lands proposed as wilderness to protect westslope cutthroat trout (wct) values.

My understanding of this FWP proposal is that the State is trying to protect the westslope trout and attempt to prevent it from being listed as a threatened species. Over the years private parties and the state have stocked many lakes that were originally fishless for recreation fishing opportunities. Some westslope trout and other species not native to the drainage were planted. In those lakes that have species that are not native to the drainage, i.e., non-westslope trout, the state wants to remove these fish so they don't "dribble down" from the lakes into the creeks and then down to the South Fork Flathead River where they might interbreed with the native westslope cutthroat trout and taint the gene pool. 37 180 The State wants to remove fish from just those lakes containing non-wct, and then put wct back into those lakes to maintain recreation fishing opportunities. They want to do this as economically and efficiently as possible and do not want to consider any other variables or options.

37 181 Most of this proposed project is located in Wilderness, whose legal mandate is to retain its primeval character and influence, and is protected and managed so as to preserve its natural condition. Wilderness should promote both wildness- an area free from human control or manipulation, and naturalness- native and indigenous systems in Wilderness. Wilderness is intended to be managed with minimal human intrusion and to let natural systems operate freely. 37 182 37 183 Past and continued fish stocking provides recreational fishing opportunities, but does not promote or provide for natural processes within Wilderness. Fish stocking impacts many non-fish species, such as amphibians, zooplankton, and invertebrates and the unique food webs that each lake represents. 37 184 Almost all of the other lakes proposed for fish removal and restocking are located in areas that are proposed as wilderness in the Flathead National Forest Plan, and management direction states that no action can occur which will reduce these area's wilderness attributes.

Page 1 of 3

37 185 Initial issues that should be considered in developing the purpose and need and creating a proposed action – (see attachment A) I believe that all of these issues should be considered in the assessment of this project.

37 186 From the research I have read (See attachment B) related to this project, I believe a broader study should evaluate all 224 Wilderness lakes and also the 134 non-wilderness lakes in the South Fork Flathead River drainage. In Wilderness determining how many lakes have ever been stocked, how many still have fish (17?), how many may have fish (10?), and what the non-fish flora and fauna currently looks like at each lake. What deep lakes need to remain or which lakes need to become fishless so that at least representative natural systems can remain in place and endure for the long term? Right now in the wilderness, the average size of all lakes is 8 acres, while the size of the lakes with fish is 83 acres. For the non-wilderness lakes the average size of all lakes is 5 acres and the size of lakes with fish is 17 acres. The point is, that even though there are many lakes without fish, most of them are very small, and probably freeze out every winter and have very different characteristics than the larger, deep lakes with fish that probably don't freeze out and support different types of non-fish life.

37 187 All of this referenced research indicates that there is so much more to consider in these wilderness lakes than just the westslope cutthroat trout and hybrid trout that people have put into these lakes. I think All of these referenced research papers should be considered to develop a better proposal. Two articles seem to be especially relevant, "Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds" and "Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes", both by David S. Pilliod and Charles R. Peterson.

37 188 To restore natural processes it would be important to consider and evaluate removing all fish from all lakes that were originally fishless. (Except Big Salmon and Doctor Lakes that apparently originally had fish) 37 189 For Wilderness character and values, the effects on wildness and naturalness should be fully considered. The use of motorized equipment, chemicals, gill nets and other tools should be fully evaluated with the minimum tool analysis to determine, which lakes, if any, might warrant some kind of manipulation.

37 190 The action of restocking lakes with westslope cutthroat trout that have had fish removed should be evaluated separately and fully consider whether stocked lakes are necessary to provide a recreational fishing as a wilderness-dependent activity. A balance between recreation fishing opportunities and natural processes needs to be assessed, with the effects of exotic fish on non-fish native species, and the short and long term impacts of stocking considered, evaluated, with effects displayed.

37 191 While westslope trout conservation and protection is a very important objective, I don't believe it should be the primary or the only objective for this proposal. I think the purpose and need should protect westslope cutthroat trout, but also maintain and restore natural processes, to increase wildness and naturalness, to manage wilderness within limits of acceptable change standards, and to manage the wilderness for the use and enjoyment by visitors, but keep the lands unimpaired for future use and enjoyment as

Page 2 of 3

wilderness. Limiting the purpose and need to just fisheries values and not including wilderness with its natural processes and native non-fish species seems to be an abdication of Forest Service management responsibilities to use this opportunity of this fisheries driven proposal to help in restoration of wilderness natural systems. All lakes in the South Fork should be assessed for the cumulative impacts of past actions from the historical base of not having fish in any of the lakes but two. The proposed restocking of new exotic fish by the state into these lakes is a foreseeable connected action, and needs to be considered for the short and long term effects.

I would offer these types of alternatives to be considered to meet your proposed purpose and need, while also meeting other wilderness values. (See Attachment C) I believe that this is a reasonable range of alternatives to consider for this EIS that would still meet your proposed primary objective of protecting wct.

With what I know about the entire project, I would offer my Attachment D as my preferred alternative to be evaluated. This would provide some recreational fishing opportunities in the more accessible opportunity classes of the wilderness, while maintaining fishless status and more pristine conditions in the more remote areas. Note that I would consider ALL lakes for their potential for fish removal, whether wct or hybrid. This would meet your proposed primary objective of protecting wct, but would also protect the wilderness values of naturalness, wildness, and natural processes.

Thank you for the consideration of my comments. Please keep me on the mailing list.

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Page 3 of 3

SFFW-037

AUG 23 2004

Attachment B

Research

Repeat Introduction

37.b1

These are quotes from the research paper summaries that follow. It is perfectly clear to me that there is so much more to the issue recreational fishing of westslope cutthroat trout in Wilderness Lakes. Wilderness values, effects on the original non-fish species, and disruption of natural processes have as much weight, if not more, then a potentially threatened fish species being considered to be stocked in originally barren, fishless lakes in the Wilderness. I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness.

Because they have the potential to provide the best remaining standards of relatively unmodified landscapes, protected areas in North America (such as wilderness areas and national parks) have tremendous ecological and scientific value (Cole and Landres 1996). Although the montane ecosystems of western North America are particularly well represented in this complex of protected lands, aquatic habitats within these protected areas are often subject to management practices that are inconsistent with the goal of maintaining natural processes. The most prevalent of these practices is the introduction of salmonid fishes (such as trout) into historically fishless ecosystems to create recreational fisheries.

See 37.b21

These stocking programs have dramatically transformed the formerly fishless aquatic ecosystems within protected areas of western North America. For example, of the estimated 16,000 naturally fishless mountain lakes in the western US, the majority of which are located within national parks and wilderness areas, 60% of all lakes and 95% of larger, deeper lakes now contain nonnative trout (*Oncorhynchus* spp., *Salmo* spp., *Salvelinus* spp.) (Bahls 1992).

The management of nonnative trout populations in protected areas is highly controversial due in large part to increased awareness of the ecological effects of introduced fishes on naturally fishless ecosystems (Duff 1995; Fraley 1996). Although the state agencies charged with managing aquatic ecosystems within protected areas have historically focused on providing recreational fishing while placing little emphasis on ensuring the maintenance of natural processes, fisheries managers are increasingly being asked to justify their stocking programs in light of a growing body of literature that documents the effects of fish introductions into naturally fishless lakes. These studies have repeatedly demonstrated that fish introductions dramatically alter native vertebrate and invertebrate communities, often resulting in the extirpation of native fishes, amphibians, zooplankton, and benthic macroinvertebrates (Anderson 1972; Stoddard 1987; Bradford and others 1998; Carlisle and Hawkins 1998; Tyler and others 1998; Knapp and Matthews 2000). However, these studies have typically focused narrowly on the direct impact of fish introductions on the native fauna and ignored the possible disruption of ecosystem processes (but see Leavitt and others 1994) as well as indirect landscape-scale impacts transmitted beyond the boundaries of those habitats subject to fish introductions.

37.b2

He concludes that in the face of increasing public support for protecting natural processes, the continued stocking of fish into wilderness ecosystems is no longer justified.

37.b3

They conclude that although US federal policy currently grants the authority for fish stocking to the states, case law allows the federal agencies to be directly involved in decisions regarding fish stocking in wilderness areas.

37.b4

This work shows that the introduction of salmonid fishes into headwater lakes can result in disproportionately larger effects on native fishes than introductions lower in drainages

However, introductions of nonnative fishes into headwater lakes provide point sources capable of invading all downstream habitats, as the fish surmount barriers that normally hinder upstream-directed invasions.

Page 1 of 5344

These results suggest that widespread fish stocking has caused substantial changes to nutrient cycles in hundreds of lakes throughout montaneprotected areas of western North America, with impacts being greatest in lakes stocked with high densities of trout.

37 b5 They report that at a local scale, after accounting for habitat differences between fishcontaining and fishless water bodies, the abundance of all life stages of long-toed salamanders and spotted frogs was lower in water bodies containing nonnative trout than in water bodies remaining in a fishless condition. At the landscape scale, the presence of fish in some water bodies had important influences on the abundance of amphibians in the remaining fishless water bodies.

37 b6 Of the two large zooplankton species believed to have been present in the lake prior to fish introductions, one reappeared while another failed to do so, apparently because the egg bank of this latter species had been depleted during the 30 years of fish presence.

37 b7 Collectively, these papers indicate that the effects of widespread trout introductions into wilderness landscapes are not limited simply to direct effects on prey taxa, but instead can be transmitted throughout lake food webs and even beyond the shorelines of fish-containing lakes to fishless lakes. In addition, following fish removal, full recovery of ecosystem structure and function may not occur

37 b8 If managers are to truly balance these often opposing goals, it is imperative that current fisheries management practices be evaluated in the context of their effects on ecosystem and landscape processes.

37 b9 The highly utilitarian ethic that drove resource management until well into the 1960s was gradually replaced by one that acknowledges the value of all life forms and their ecological complexity, a view currently supported even by many anglers. The necessity for wilderness fish stocking is now the subject of widespread debate, especially in view of changing social values and priorities. Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems.

Future management of waters that already contain introduced trout must be directed toward overall ecosystem health and stability, with biodiversity and ecosystem integrity as a paramount objective.

Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems. This should be our greatest concern.

Further, although current federal regulations recognize state authority for fish stocking, judicial interpretation gives federal agencies the authority for direct involvement in decisions regarding fish stocking in wilderness.

37 b10 Fish stocking does compromise certain wilderness values, and wilderness designation does impose restrictions on the types of wildlife management actions that are appropriate in wilderness areas. In some cases, these compromises and restrictions have led to an "either/or" dichotomous view that pits state fish stocking programs against federal responsibility for protecting wilderness values. Differences in agency missions, traditions, and cultures also tend to exacerbate "us vs them" attitudes.

Backed by Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values.

headwater lake stocking provides source populations that may be capable of invading most downstream habitats, including headwater refugia of native fishes.

37 b11 Trout introductions to high-elevation headwater lakes thus pose disproportionately large risks to native fishes— even when the place of introduction may appear to be spatially dissociated from populations of the native species.

It is important to consider, however, that stocking of a mere handful of lakes could allow nonnative fishes access to nearly an entire stream network.

Page 2 of 5344

37 b12

Similarly, the stream area negatively affected by nonnatives could be minimized by stocking multiple lakes in one tributary basin instead of one lake each in multiple basins. Systems where nonnative fishes have emigrated from headwater lakes and occupy, but have not successfully colonized, the outlet streams should be considered good candidates for eradication projects.

Introduced fish may alter lake nutrient cycles and primary production, but the magnitude and variation of these effects have not been fully explored.

The results of our modeling and paleolimnological analyses indicate that introduced trout fundamentally alter nutrient cycles and stimulate primary production by accessing benthic P sources that are not normally available to pelagic communities in oligotrophic mountain lakes. These effects pose a difficult challenge for managers charged with balancing the demand for recreational fisheries with the need to maintain natural ecosystem processes.

Implications for Current Stocking Practices in Mountain Wilderness Areas

Although the largest perturbations to lake communities and ecosystem processes probably occur soon after fishless lakes are stocked for the first time, our analyses show that continued stocking only serves to exacerbate the original effects.

In addition, our analyses of fish nutrient regeneration rates suggest that the contributions of introduced trout to nutrient cycles are approximately double the level estimated for lakes that have not been stocked for several decades (Figure 7).

See 37 a25

Therefore, to truly minimize effects of introduced fish on mountain lake ecosystems, all stocking should be halted. This would allow the lakes that lack sufficient spawning habitat to revert to a fishless condition, while reducing the density of fish in lakes with self-sustaining trout populations. Because many currently stocked lakes are likely to harbor self-sustaining trout populations (Bahls 1992; R. A. Knapp unpublished), a moratorium on trout stocking in all lakes would provide fisheries managers a simple means by which to reduce the effects of introduced fish on native invertebrate communities and ecosystem processes while still providing ample recreational fishing opportunities. It remains to be seen whether native faunal assemblages and ecosystem processes in mountain lakes can be restored simply by eliminating fish populations (Funk and Dunlap 1999; McNaught and others 1999).

At the scale of individual water bodies, after accounting for differences in habitat characteristics between fish-containing and fishless sites, the abundance of amphibians at all life stages was significantly lower in lakes with fish. At the basin scale, densities of overwintering life stages of amphibians were lower in the fishless sites of basins where more habitat was occupied by trout. Our results suggest that many of the remaining fishless habitats are too shallow to provide suitable breeding or overwintering sites for these amphibians and that current trout distributions may eventually result in the extirpation of amphibian populations from entire landscapes, including sites that remain in a fishless condition.

Restoration

37 b13

Conserving natural biodiversity and maintaining functioning ecosystems is a goal of protected area management. The results of this study suggest that wildlife managers need to consider restoring a few deep lakes in each basin to create fishless breeding and overwintering habitat for amphibians (Knapp 1996; Knapp and Matthews 1998; Pilliod and Peterson 2000).

37 b14

Gill netting is a viable fish eradication technique for smaller (less than 10 ha. (25 acres)), shallow (less than 10 m (33 feet) deep)) lakes that lack habitable inflows and outflows or other sensitive species. Further work is required to define appropriate removal methods for larger lakes and watersheds.

Page 3 of 5344

37.b15 We believe that shallower lakes (less than 10 m deep) of up to 10 ha should be amenable to gill net eradication of nonnative fishes over reasonably short periods, without resorting to rotenone or other poisons.

If the restoration of substantially larger or deeper lakes is proposed, alternate methods of fish removal including, but not limited to, electrofishing, trap netting on spawning grounds, disturbing spawning habitat, creating under-ice anoxia by the addition of nutrients (see Brunskill and others 1980 for a possible method), lake drawdown, and/or the application of piscicides should be given consideration in addition to, or as a replacement for gill nets. These alternate methods will be controversial, but they may be more practical for removing fish from certain lakes. Canadian national parks managers have previously used chemical agents in their attempt to eradicate fish from dozens of lakes.

37.b16 Further, nontarget species such as Harlequin Ducks (*Histrionicus histrionicus*) and even bears might be adversely affected by restoration activities on some water bodies.

37.b17 Last, because organisms such as *Gammarus* may be extirpated but leave no trace of their prior existence, it will be difficult to ascertain that full food web restoration has been achieved for the many lakes that lack prestocking records of their original invertebrate communities.

37.b18 Further experimental restoration work is needed to better define the practical limits of gill netting as a management tool and to provide alternate solutions for larger or otherwise "difficult" stocked lakes. A better understanding of our few remaining pristine ecosystems is also needed if we wish to undo a century of past fisheries management practices and return a small suite of lakes to their natural state

Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness

The origin and value of these concepts are discussed, as well as the dilemma and irony that arises when wilderness managers contemplate manipulating the environment to restore naturalness at the risk of reducing wildness

It is concluded that large scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. One of the biggest hurdles facing wilderness policy-makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.

See 37.b28 Two independent but related concepts are intertwined in the idea of wilderness. In the 1964 Wilderness Act, wilderness is defined in Section 2.(c) as "...an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Later in this same section, wilderness is further defined as an area "retaining its primeval character and influence...which is protected and managed so as to preserve its natural conditions." The key words in these quotes are *untrammeled* and *natural*. When the Wilderness Act was passed, these key words undoubtedly were intended to be complementary because untrammeled areas were certainly natural. Today, however, we are witnessing regional ecological impacts to areas that are untrammeled in every other way, as well as new understanding of the long-term ecological consequences of natural resource management. As a result, we now have divergent philosophical views of what wilderness is and what it should be. These views are encapsulated by the words untrammeled and natural in a way that was likely unforeseen by wilderness proponents as they crafted legislative wording. This dialogue session explored the management dilemmas and social ironies resulting from these divergent views and presented a case study that brings these diverging views into sharp focus.

Synonyms for untrammeled include unimpeded, unhampered, uncontrolled, self-willed and free. We suggest that the word "wildness" strongly connotes this sense of an area free from human control or manipulation.

Synonyms for natural include native, aboriginal, indigenous and endemic, and we suggest that the term "naturalness" be used to capture this biological sense of wilderness.

While these concepts of wildness and naturalness differ from one another, both are essential elements of wilderness. wilderness is the idea and place where the concepts of wildness and naturalness reach their highest expression. These concepts strongly influence, either directly or indirectly, virtually all of the decisions and actions taken in wilderness management.

In each of these cases, the naturalness of the area has been compromised by broad-scale human actions, and some form of manipulation of the environment is proposed to restore this naturalness. The crucial issue this raises is whether large-scale manipulation, however undesirable, should be used to restore natural conditions, thereby sacrificing wildness for naturalness (Cole 1996). In these situations, where human-caused impacts have caused wholesale changes to the wilderness environment, should the wildness of present day wilderness be compromised to restore naturalness? In other

Page 4 of 1344

words, should an undesirable means, such as manipulation of wilderness, be used to achieve a desirable end, such as restoration of natural conditions in wilderness?

Different people hold strong views on this issue, which goes to the heart of whether wilderness is, or should at least remain from this point on, wild or natural. Some people think the provision in the 1964 Wilderness Act that "...these [areas] shall be administered...so as to provide for the protection of these areas, the preservation of their wilderness character..." is a clear mandate for restoring natural conditions in wilderness to overcome a myriad of human caused insults. Indeed, restoration of these areas is often expressed in terms of an obligation and responsibility to correct human-caused problems (Windhager 1998). Others, citing the Wilderness Act definition of wilderness as "...an area where the earth and its community of life are untrammeled by man," claim that the fundamental character of wilderness is to be free of human manipulation (Worf 1997). Here, wilderness is the one and only place on our ever more crowded planet that is left free from our conscious manipulation, and these areas yield important and vital benefits to people and society because they are untrammeled.

The Central Dilemma of Wilderness Management: When to Take Action?

Deciding when to take action in wilderness was described by Landres and others (1998) as the central dilemma in wilderness management. Proposals to manipulate ecological conditions in wilderness to restore naturalness bring this dilemma to new heights, as well as raise significant and difficult questions: Does manipulation compromise the very values that are protected and preserved in wilderness? Is there sufficient technical knowledge to use large-scale manipulation to restore wilderness landscapes? What are the consequences and risks of taking action versus not taking action? Does the public sufficiently trust the agency to allow such large-scale actions? Does the desire to restore the ecological value of naturalness outweigh the social value of wildness? How much trammeling is necessary and tolerable in wilderness? Is it appropriate to even define a target for desired future ecological conditions in wilderness? Must we accept, albeit reluctantly, the human "gardenification" of wilderness, as suggested by Janzen (1998)?

See 37 b28

Separating the concepts of wildness from naturalness helps clarify and partially resolve this management dilemma of when to take action. A two-way matrix of wildness and naturalness (figure 2) illustrates when a proposed action is not appropriate, when it is appropriate and when it entails weighing wildness against naturalness. Briefly, some proposed management actions, such as manipulating habitat to increase a wildlife species' density above natural levels, decrease both wildness and naturalness and should not be pursued. Conversely, proposed actions that support wildness or at least do not reduce it while increasing naturalness should be pursued. Closing and restoring a campsite, for example, doesn't manipulate the environment in a way that impedes wildness on a large scale, and restoring native plants increases naturalness.

Management dilemma and irony can be seen when either wildness or naturalness must be compromised to enhance the other (figure 2).

		WILDNESS	
		Decrease	Support
NATURAL-	Decrease	NO ACTION	DILEMMA AND IRONY
NESS	Increase	DILEMMA AND IRONY	ACTION

Figure 2—A two-way matrix showing suggested outcomes when proposed management actions support or decrease wildness and increase or decrease naturalness. Proposed actions that both decrease wilderness and naturalness should not be considered, while actions that both support wildness and increase naturalness should be considered. Proposed actions that compromise either wildness or naturalness create management dilemmas and social irony forcing wildness to be weighed against naturalness.

If the degraded area and restoration actions are localized, if the actions taken today will allow managers to reduce their interference with the "will of the land" in the future, and if there are good reference sites to know what the undisturbed condition is, manipulative actions are probably justified. In contrast, if restoration actions are being considered over a large area and there is uncertainty about the effects of these actions or about the target conditions, much more caution and scrutiny is warranted.

Large-scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. In one way, this dilemma is good because it forces us to carefully consider our actions and their consequences. "Doing the right thing" for wilderness used to be fairly straightforward. Today, with our increased knowledge of regional-scale human impacts, coupled with our desire to restore areas known to be degraded, "doing the right thing" is no longer a simple path because it is based on a philosophical choice between wildness and naturalness. Two people or groups may differ, sometimes strongly, about what they perceive is "right" for wilderness, and both views are valid. If there are significant doubts about a proposed action, one view would err on the side of protecting wildness, while the other view would err on the side of naturalness. One of the biggest hurdles facing wilderness policy-makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.

See 37.b28

To balance wilderness lake use between recreational fisheries and protected habitat for native species, managers need to understand how stocking non-native predaceous fish affects amphibian populations within a landscape. The goal of this paper is to help managers design and conduct studies that will provide such information. Desirable study characteristics include multiple- visit surveys of all wetlands within a watershed to provide information on amphibian distribution, abundance, breeding, recruitment and seasonal variation in habitat use. By identifying the distribution of critical amphibian habitat and source populations, this approach should enable managers to target specific lakes for protection or restoration as fishless amphibian habitat without overly compromising wilderness fishing opportunities.

Wild areas, large or small, are likely to have values as norms for land science. Recreation is not their only, or even principal utility.
—Aldo Leopold, Sand County Almanac

6. How Can This Information Be Used to Evaluate Potential Management Actions?

Like many ecological problems, the anthropogenic effects of trout stocking on amphibians can vary for different species and even different populations of the same species under a variety of conditions. This variability makes it difficult to make general management recommendations that will adequately protect all species and their habitats. However, research can greatly improve the evaluation and implementation of effective management actions that may balance the needs of the recreational public with conservation of native species. Ideally, any alterations in stocking practices should strive for the lowest cost-benefit ratio in terms of decreasing threats to amphibian persistence with the fewest changes to current recreational fishing opportunities.

Possible management actions include: (1) ceasing stocking in all lakes, (2) ceasing stocking and possibly removing fish from some lakes, (3) reducing stocking frequency and density, (4) reducing naturally reproducing populations of fish by restricting access to spawning areas and/or gill netting, (5) changing species stocked (cutthroat may be less predatory than rainbow or brook trout), (6) stocking sterile fish, or (7) making no changes in stocking practices if fisheries threats to amphibian persistence are negligible.

See 37.b29

Cessation of stocking in all wilderness lakes would most likely benefit amphibians and reduce threats to persistence (fig. 3). Undoubtedly, this action would be extremely unpopular for many anglers and could result in less support for wilderness. Economic impacts on outfitters and guides may also occur. Despite the potential socioeconomic costs of this management strategy, some wilderness proponents argue these costs will be minimal and will not overly jeopardize public support for wilderness (Murray and Boyd 1996). This view appears to be supported by resolutions from potentially opposing groups like the Society for Conservation Biology (SCB) and Trout Unlimited. The SCB recommends "phas[ing] out incongruent stocking practices and restor[ing], where appropriate and feasible, previously damaged ecosystems" (SCB 1995). Trout Unlimited states that it "oppose[s] salmonid stocking in historically documented non-salmonid waters where scientific evaluation indicates that such stocking would be likely to adversely affect native biodiversity" (Trout Unlimited 1998).

An example of the potential costs and benefits of restoring wilderness lakes through the cessation of fish stocking comes from the National Park Service, which recommended phasing out and eventually terminating all fish stocking (NPS 1975). In Sequoia, Kings Canyon and Yosemite National Parks, fish stocking was curtailed in the 1970's and completely halted in 1991. This management decision resulted in the loss of recreational fisheries from 29% to 44% of previously stocked lakes (Knapp 1996). Due to a reduction in the proportion of lakes containing fish, as well as historic differences in stocking intensity, the mountain yellow-legged frog currently has a greater distribution in Kings Canyon National Park, compared with the neighboring John Muir Wilderness, where lakes have continued to be stocked and frog persistence is at risk (Matthews and Knapp 1999).

A similar pattern was observed in the Bitterroot Mountains, Montana where six of 18 stocked lakes (33%) no longer supported trout populations in 1996, following cessation of stocking in 1984 (Funk and Dunlap, in press). Funk and Dunlap (in press) found that long-toed salamanders recolonized five of these currently fishless, but previously stocked lakes within two decades, even in lakes over 5 km from the nearest salamander populations. These studies indicate that widespread cessation of stocking does not result in the loss all trout populations and that amphibians will recolonize lakes after fish disappear.

Page 6 of 5344

Cessation of fish stocking, and even removal of fish, in some but not all lakes may be more amenable to recreational anglers. If conducted properly, this management strategy could provide the necessary amphibian habitat for species recovery. The success of this management action, however, is dependent on which lakes are selected for fish elimination. Choosing lakes to be restored to a fishless condition based solely on anthropogenic variables, such as difficulty of access and amount of angler use, may have little effect on reducing threats to amphibian persistence (fig. 3). However, restoring fishless lakes based on their potential for amphibian recolonization and their importance as amphibian habitat should improve the success of this action.

For fish elimination, we recommend targeting: (1) stocked lakes that already have some amphibian breeding occurring, (2) lakes that appear to provide deep-water overwintering habitat for amphibians in surrounding shallow, fishless lakes, (3) lakes that have the potential for fish elimination (low or no natural reproduction), and (4) lakes that are the least important for recreational anglers. Of these recommendations, the first three should take priority over the last. In our study, over 40% of the stocked lakes had at least some frog reproduction, yet few of these lakes had any frog recruitment. Eliminating fish from a lake where frogs are already breeding should result in faster frog recovery than eliminating fish in a lake that has no amphibian reproduction. Furthermore, restoring lakes that provide over-wintering habitat for amphibians can benefit amphibians both locally and potentially across a watershed. Finally, when selecting a lake for fish elimination, choosing a lake that will require the least amount of invasive management (fish removal) is important. Nonreproducing fish can be eliminated from a lake by simply removing that lake from the stocking schedule. However, if fish removal is required, techniques such as gill netting (Knapp and Matthews 1998), coupled with blocking spawning habitat, are preferable to piscicides, such as rotenone and antimycin A. Both of these chemicals may harm other aquatic vertebrates, including amphibians (Fontenot and others 1994; Schnick 1974), and their use in wilderness is controversial.

See 37.b29

Finally, managers should keep in mind that most systems are not isolated, and fish stocking practices in adjacent regions can significantly affect restoration efforts. For example, fish dispersal from upstream locations may colonize wetlands that are actively managed as fishless habitats. In addition, fish predation in streams may act as barriers to migration, dispersal and hence colonization of amphibians (Bradford and others 1993).

Despite the range of possible management actions, we believe the best management strategy is to use species and watershed-specific biological information to make management decisions. This information can be obtained only through carefully designed and conducted studies that provide adequate information about the distribution, abundance and life history characteristics of amphibian species across local landscapes. Hopefully, using appropriate information at the watershed scale will enable managers to restore critical amphibian habitat and the biological integrity of wilderness lakes. Creating a few fishless lakes to provide the necessary habitat requirements of amphibians in a watershed may disproportionately reduce the threats of fish stocking on amphibian persistence. For example, having two amphibian source populations in a watershed, instead of one, may increase the probability of amphibian persistence in that watershed by an order of magnitude. With proper management, we believe amphibian populations can be recovered and protected while maintaining recreational fishing opportunities in many wilderness lakes.

Abstract—Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness, generating conflicts between managing wilderness as natural ecosystems and providing opportunities for recreation. Managers faced with controversial and difficult decisions about how to manage wilderness lakes may not always have ready access to research relevant to these decisions

See 37.b30

The conflicts between managing wilderness as "natural" ecosystems and providing opportunities for recreation are especially acute in fisheries management. Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness (Bahls 1992), usually to the detriment of the native biota (Bradford and others 1993; Chess and others 1993; Tyler and others 1998). Alpine lakes are the primary target for recreation in wilderness (Hendee and Schoenfeld 1990), and fishing opportunities may further concentrate use in these areas, resulting in resource damage and compromising solitude in the wilderness experience.
Fish stocking, especially using aircraft, is also considered to conflict with wilderness values (Duff 1995).

However, fish stocking in mountain lakes long predates the Wilderness Act of 1964, and fishing is the objective of a sizable proportion of wilderness visitors (Fraley 1996; Hendee and Schoenfeld 1990). Language in the Wilderness Act, reserving the rights of the States with respect to management of fish and wildlife, is often cited as justification for continued active management of fisheries in wilderness (Duff 1995; Fraley 1996). Conversely, other language in the Wilderness Act promoting the preservation of natural systems, and increasing emphasis on wilderness as a reference point for the study and management of ecosystems (Hendee and others 1990; Kaufmann and others 1994) are difficult to reconcile with many of the current practices of fisheries management.

Consequently, managers are faced with controversial and difficult decisions about how to manage wilderness lakes, and they do not always have ready access to research relevant to these decisions. Considerable research has been conducted recently on the biological effects of fish stocking on resident biota. Many managers tend to minimize these effects, however, instead promoting untested alternative hypotheses

Page 7 of 5344

an overview of fish stocking in wilderness from federal, state, tribal and user perspectives, including summaries of key legislation, policy and description of current management practices. A session on community and ecosystem effects included effects of fish stocking on lake nutrient cycling, algal dynamics and invertebrates and interactions between predators, hydroperiod and amphibians. The third session focused on effects on vertebrate species and included discussions on effects of stocking on native fish and amphibians. The final session described restoration and management.

37.b30

Life history traits vary among amphibian species, however, and fish stocking may affect species differently. In addition, amphibian population structure may be affected at a broad scale when a portion of lakes and streams in a watershed are stocked. This habitat fragmentation may isolate amphibian populations and result in increased extinction rates.

Results: Historical records indicated that Idaho Fish and Game stocked over 60,000 cutthroat and rainbow trout into 12 to 30 previously fishless lakes in 1937 and 1938 in the Bighorn Crags area. Beginning in the 1960s, fish were restocked every three to six years. In total, 37 lakes were stocked with 300,000 fry or fingerlings.

Cutthroat, rainbow, and golden trout and their hybrids were found in all 11 basins searched. Overall, fish occupied 43% of sites. Large, deep lakes (greater than 1 ha in surface area and more than 4 m deep) were more likely occupied than small, shallow wetlands. As a result, fish occupied 90% of the available surface area of water in the basins. More importantly, only two basins had more than one deep, fishless lake.

See 37 b31

Densities of both long-toed salamanders and Columbia spotted frogs were lower in sites with fish than in those without fish. Indeed, when site characteristics of deep lakes were held constant, fewer amphibians of all stages were found in stocked lakes than in lakes without fish. Moreover, densities of salamander larvae at least two years old, and both adult and juvenile frogs in *fishless* sites decreased as the proportion of wetlands in the basin occupied by trout increased.

Management Implications:

Survival of salamander larvae and juvenile frogs may depend on deep lakes (>2 m), yet few of these habitats are not stocked with fish.

Negative effects of stocked lakes may extend across a landscape. Lakes with fish may have insufficient juvenile recruitment to compensate for adult mortality. Amphibians with extended larval periods may be forced to breed in shallower wetlands where the risk of extirpation due to desiccation, anoxia, and freezing are higher than in the deep, lentic environments. Likewise, amphibians that complete their life cycle in one summer may breed in shallow wetlands but may be forced to immigrate to deep lakes to overwinter. If those lakes are stocked with fish, the progeny may be completely eradicated.

Information necessary to evaluate the effects of fish stocking in high-elevation lakes should include knowledge of:

(1) **the amphibian and fish species in the area** – Because little information is available about distributions of many amphibian species, surveys should be based on what species are potentially in the wilderness area and the life histories of those species. Different types of surveys conducted at various times of the year may be needed to assess abundances and life stages.

Page 8 of 5344

(2) the extent of area impacted – Surveys of entire watersheds provide the most
unbiased information to determine production, habitat use, and potential interaction
between fish and amphibians and allow the most accurate assessment of management
actions. Because watershed sampling requires considerable time and effort, the number of
watersheds in a wilderness that can be sampled may be limited. Surveying a subset of
wetlands in different watersheds using stratified sampling may broaden the scope if all
wetland types can be adequately represented. Integrating fish and amphibian surveys may
also expand sampling ability. photo by Steve Corn

See 37 b31

(3) the effect of management actions – Because the basin-wide effects of fish stocking
have only recently been identified, information on the results of specific management
actions is unavailable. Potential management actions include: cessation of stocking
and/or removal of fish, which reduce the number of lakes supporting fish; reduction in
stocking frequency/density/fertility (stocking sterile fish or limiting access to spawning
habitat), which may result in fishless habitats for short periods; and alteration of the
species stocked (e.g. cutthroat trout may be less predatory than brook or rainbow trout).

The consensus of the participants of that meeting was that amphibian populations
declines were real but documentation was largely anecdotal, and much work was
needed on the causes of population declines

Knowledge about the status of amphibians is important, because amphibians occupy
important ecological niches and a high proportion of western amphibian species have
undergone recent declines, often in protected habitats.

Introduced trout are often implicated in the decline of high mountain amphibian
populations, but few studies have attempted to understand whether the effects of
trout in lakes where they have been introduced may also influence the distribution
and abundance of amphibians throughout entire mountain basins, including in
remaining fishless lakes.

Our results suggest that many of the remaining fishless habitats are too shallow to
provide suitable breeding or over-wintering habitat for these amphibians, and that
current trout distributions may eventually result in the extirpation of amphibian
populations from entire landscapes, including from sites that remain in a fishless
condition.

37 b30

Amphibian Research and Monitoring Initiative

Initiate long-term monitoring to determine trends in amphibian populations

Conduct research into causes of amphibian declines and malformations

Habitat alteration and destruction have long been major causes of amphibian declines. More
recently, significant declines have occurred in protected areas in the western United States that
have not shown obvious changes in habitat. These unexplained declines may be caused by conta
minants, non-native species, or disease.

Page 9 of 5344

37 b21

Research related to the effects of stocking fish in fishless lakes within Wilderness,

The paper "**The Introduction of Nonnative Fish into Wilderness Lakes: Good Intentions, Conflicting Mandates, and Unintended Consequences**" references 6 other papers which describe the effects of stocking fish in wilderness lakes. The abstracts and conclusions of these 6 papers follow. At the end of these papers are additional references that are relevant to the fish stocking issue.

37 b22 37 b23 37 b24 37 b25 37 b26 37 b27

- **"Wilderness Fish Stocking: History and Perspective"**, Edwin P. Pister
- **"The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation,"** Peter Landres, Shannon Meyer, and Sue Matthews
- **"Geography of Invasion in Mountain Streams: Consequences of Headwater Lake Fish Introductions"**, Susan B. Adams, Christopher A. Frissell, and Bruce E. Rieman
- **"Alteration of Nutrient Cycles and Algal Production Resulting from Fish Introductions into Mountain Lakes"**, Daniel E. Schindler, Roland A. Knapp, and Peter R. Leavitt
- **"Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds"**, David S. Pilliod and Charles R. Peterson
- **"The Effects of Stocking and Removal of a Nonnative Salmonid on the Plankton of an Alpine Lake"**, B. R. Parker, D. W. Schindler, D. B. Donald, and R. S. Anderson

Additional references -

37 b28 37 b29 37 b30 37 b31 37 b32 37 b33 37 b34 37 b35 37 b36 37 b37 37 b38 37 b39

- **"Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness"**, Peter B. Landres, Mark W. Brunson, Linda Merigliano, Charisse Sydoriak, Steve Morton
- **"Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes"**, David S. Pilliod, Charles R. Peterson
- **"Fish Stocking in Protected Areas: Summary of a Workshop"**, Paul Stephen Corn, Roland A. Knapp
- **"IMPACTS OF TROUT STOCKING ON AMPHIBIAN POPULATIONS"**, David S. Pilliod, Charles R. Peterson, Peter B. Landres
- **"Amphibian declines: review of some current hypotheses"**, Corn, Paul Stephen
- **"Perspectives from the Aldo Leopold Wilderness Research Institute: amphibians and wilderness"**, Corn, Paul Stephen
- **"Local and landscape effects of Introduced trout on amphibians in historically fishless watersheds"**, Pilliod, D.S.; Peterson, C.R.
- **Leopold Institute, Current Wildlife Research Projects, Amphibian Research and Monitoring Initiative**
- **Leopold Institute's Wildlife Publications (1991-2002)**
  1. **WILDLIFE MANAGEMENT ACTIVITIES IN WILDERNESS**
  2. **RECREATION IMPACTS - GENERAL**
  3. **EFFECTS OF HUMAN INTRUSIONS ON BIRDS**
  4. **AMPHIBIAN CONSERVATION AND FISH STOCKING**

FISH STOCKING IMPACTS TO MOUNTAIN LAKE ECOSYSTEMS

Page 10 of 5344

37.b21

The Introduction of Nonnative Fish into Wilderness Lakes: Good Intentions, Conflicting Mandates, and Unintended Consequences

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Because they have the potential to provide the best remaining standards of relatively unmodified landscapes, protected areas in North America (such as wilderness areas and national parks) have tremendous ecological and scientific value (Cole and Landres 1996). Although the montane ecosystems of western North America are particularly well represented in this complex of protected lands, aquatic habitats within these protected areas are often subject to management practices that are inconsistent with the goal of maintaining natural processes. The most prevalent of these practices is the introduction of salmonid fishes (such as trout) into historically fishless ecosystems to create recreational fisheries.

These stocking programs have dramatically transformed the formerly fishless aquatic ecosystems within protected areas of western North America. For example, of the estimated 16,000 naturally fishless mountain lakes in the western US, the majority of which are located within national parks and wilderness areas, 60% of all lakes and 95% of larger, deeper lakes now contain nonnative trout (*Oncorhynchus* spp., *Salmo* spp., *Salvelinus* spp.) (Bahls 1992).

The management of nonnative trout populations in protected areas is highly controversial due in large part to increased awareness of the ecological effects of introduced fishes on naturally fishless ecosystems (Duff 1995; Fraley 1996). Although the state agencies charged with managing aquatic ecosystems within protected areas have historically focused on providing recreational fishing while placing little emphasis on ensuring the maintenance of natural processes, fisheries managers are increasingly being asked to justify their stocking programs in light of a growing body of literature that documents the effects of fish introductions into naturally fishless lakes. These studies have repeatedly demonstrated that fish introductions dramatically alter native vertebrate and invertebrate communities, often resulting in the extirpation of native fishes, amphibians, zooplankton, and benthic macroinvertebrates (Anderson 1972; Stoddard 1987; Bradford and others 1998; Carlisle and Hawkins 1998; Tyler and others 1998; Knapp and Matthews 2000). However, these studies have typically focused narrowly on the direct impact of fish introductions on the native fauna and ignored the possible disruption of ecosystem processes (but see Leavitt and others 1994) as well as indirect landscape-scale impacts transmitted beyond the boundaries of those habitats subject to fish introductions. Perhaps as a result, the efforts by managers attempting to lessen the impact of introduced fishes have also been narrowly focused. For example, in California's Sierra Nevada, where these fish introductions have been shown to have severe deleterious impacts on amphibians (Bradford 1989; Bradford and others 1993, 1998; Knapp and Matthews 2000), some managers have recently agreed to stop stocking lakes that serve as habitats for particular amphibian species. Although this policy change is an important step in reducing the ecological impact of fish introductions, it still represents the continuance of a narrowly focused lake-specific and species-specific approach that does not take potential larger-scale impacts into account.

The papers in this issue were motivated by a 3-day workshop on fish stocking in wilderness areas held in October 1998 at the Flathead Lake Biological Station, Polson, Montana (Corn and Knapp 2000). The purpose of the workshop was to promote a dialogue between managers and scientists by exposing the managers to current research while also making the scientists aware of the concerns and constraints of managers. In this special feature, we highlight (a) the history and political framework for fisheries management in protected areas, and (b) recent advances in our understanding of the ecosystem and the landscape-scale effects caused by the introductions of fish into naturally fishless mountain lakes.

We begin with a historical overview by Pister that provides a perspective gained during his several decades experience of managing a wilderness fishstocking program for the California Department of Fish

Page 11 of 5344

and Game. He concludes that in the face of increasing public support for protecting natural processes, the continued stocking of fish into wilderness ecosystems is no longer justified.

Landres, Meyer, and Matthews examine the controversy over fish stocking from the perspective of the 1964 Wilderness Act, focusing on the judicial interpretation of the act, the policies of the US federal agencies charged with implementing the act, and formal agreements between federal and state agencies. They conclude that although US federal policy currently grants the authority for fish stocking to the states, case law allows the federal agencies to be directly involved in decisions regarding fish stocking in wilderness areas. This type of cooperation could improve the often adversarial relationship between state and federal agencies and create an environment in which both state and federal agencies share the responsibility for managing aquatic resources within wilderness.

Following these two overview/policy papers are 4 papers that describe the ecosystem and landscapescale effects of fish introductions into naturally fishless mountain lakes. Adams, Frissell, and Rieman present a landscape analysis of the spread of introduced trout through stream networks. This work shows that the introduction of salmonid fishes into headwater lakes can result in disproportionately larger effects on native fishes than introductions lower in drainages. In many river basins, remaining populations of native fishes are concentrated in headwater refugia where they are protected by natural barriers from introduced fishes that are already established at lower elevations. However, introductions of nonnative fishes into headwater lakes provide point sources capable of invading all downstream habitats, as the fish surmount barriers that normally hinder upstream-directed invasions. The extent of such a potential invasion from headwater lakes depends on the geography of the stream network, and particularly on the density and distribution of headwater lakes and their locations relative to barriers inhibiting upstream dispersal.

Schindler, Knapp, and Leavitt use a fish bioenergetics model to evaluate the effect of trout introductions on nutrient cycles in naturally fishless oligotrophic lakes. To support the importance of this increased nutrient subsidy to pelagic algae, they present paleolimnological evidence that algal production increased approximately 10-fold following trout introductions and show that this increased production was maintained for the duration of fish presence. These results suggest that widespread fish stocking has caused substantial changes to nutrient cycles in hundreds of lakes throughout montaneprotected areas of western North America, with impacts being greatest in lakes stocked with high densities of trout.

Pilliod and Peterson use data on the distributions of native amphibians and nonnative trout in several drainages in the northern Rocky Mountains to evaluate the local and landscape effects of trout introductions. They report that at a local scale, after accounting for habitat differences between fishcontaining and fishless water bodies, the abundance of all life stages of long-toed salamanders and spotted frogs was lower in water bodies containing nonnative trout than in water bodies remaining in a fishless condition. At the landscape scale, the presence of fish in some water bodies had important influences on the abundance of amphibians in the remaining fishless water bodies. These landscape- scale effects may be the result of a loss of source populations and overwintering sites when fish are introduced into the larger, deeper lakes and amphibians are therefore restricted to shallower, more ephemeral habitats.

Parker, Schindler, Donald, and Anderson describe changes in ecosystem structure in a lake in the Canadian Rocky Mountains following the removal of the entire trout population with gill nets. Of the two large zooplankton species believed to have been present in the lake prior to fish introductions, one reappeared while another failed to do so, apparently because the egg bank of this latter species had been depleted during the 30 years of fish presence. Overall zooplankton biomass remained unchanged following removal of the fish population. Contrary to predictions based on trophic cascade theory, no changes in phytoplankton biomass or chlorophyll-*a* concentration were observed. Nutrient concentrations also remained unchanged. These results add to the growing body of studies that evaluate the recovery of mountain lake ecosystems following the removal of nonnative trout (Parker and others 1996; McNaught and others 1999; Funk and Dunlap 1999; Drake and Naiman 2000; Knapp and others 2001).

Collectively, these papers indicate that the effects of widespread trout introductions into wilderness landscapes are not limited simply to direct effects on prey taxa, but instead can be transmitted throughout lake food webs and even beyond the shorelines of fish-containing lakes to fishless lakes. In addition, following fish removal, full recovery of ecosystem structure and function may not occur. These results pose a difficult challenge for fisheries and wilderness managers interested in better balancing the conflicting goals of maintaining nonnative fisheries in wilderness areas while also minimizing the effects of these fisheries on natural processes. If managers are to truly balance these often opposing goals, it is imperative that current fisheries management practices be evaluated in the context of their effects on ecosystem and landscape processes. It is our hope that this special feature will provide the impetus for such an evaluation and for the adoption of new management strategies to reduce the ecological impacts of nonnative fisheries in protected areas.

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Page 13 of 5344

37.b22

COMMENTARY

Wilderness Fish Stocking: History and Perspective

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ABSTRACT

The stocking of trout in wilderness lakes of the western United States began in the 1800s. This practice was followed for nearly a century with the singular goal of creating and enhancing sport fishing and without any consideration of its ecological ramifications. Following the advent of a new environmental awareness in the 1960s, and thanks to new research that revealed negative impacts on the biota attributable to introduced fishes, traditional fish-stocking practices came under question first at federal land management agencies and later at their counterparts within the states. The highly utilitarian ethic that drove resource management until well into the 1960s was gradually replaced by one that acknowledges the value of all life forms and their ecological complexity, a view currently supported even by many anglers. The necessity for wilderness fish stocking is now the subject of widespread debate, especially in view of changing social values and priorities. Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems.

CONCLUSION AND FUTURE DIRECTION

Based on the management practices and policies currently in use in the West, Bahls (1992) made 12 recommendations that constitute a desired future direction for state agencies. To his paramount observation concerning the need for greater funding support for lake surveys and biotic inventories, I would add another highly important item. Research into the value (in terms of contribution to the angler) of backcountry lake stocking badly needs to be conducted. The western states are collectively involved in a massive and expensive wilderness stocking program, the value of which has never been conclusively demonstrated, and which is known to be destructive to native fauna and not in accordance with generally accepted wilderness values. Such a program should never be conducted in perpetuity without a proven scientific basis. The status quo therefore remains indefensible.

I have found through the years that when such controversies as wilderness fish stocking come under discussion, application of a corollary to Aldo Leopold's famous land ethic provides a very good answer: "A thing is right when it tends to preserve the beauty, integrity, and stability of the biotic community. It is wrong when it tends otherwise" (Leopold 1949). The question at hand obviously becomes fully as much a matter of ethics as biology. Inevitably, good ethical practice translates into good biological practice.

The philosopher George Santayana observed with great accuracy that those who cannot remember the past are condemned to repeat it. This thought may then be combined with a reconstruction of John F. Kennedy's famous admonition: Ask not what your biota can do for you; ask what you can do for your biota. Future management of waters that already contain introduced trout must be directed toward overall ecosystem health and stability, with biodiversity and ecosystem integrity as a paramount objective. Waters that have heretofore been spared from the introduction of trout must be vigorously protected, along with endemic life forms that exist in a complexity that will continue to transcend our absolute comprehension. Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems. This should be our greatest concern.

Page 14 of 5344

37.b24
37.b23

The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation

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Abstract

Many high-elevation lakes in designated wilderness are stocked with native and nonnative fish by state fish and game agencies to provide recreational fishing opportunities. In several areas, this practice has become controversial with state wildlife managers who support historical recreational use of wilderness, federal wilderness managers who assert that stocking compromises some of the ecological and social values of wilderness, and different public groups that support one or the other position.

Herein we examine this controversy from the perspective of the 1964 Wilderness Act, its judicial interpretation, the policies of the federal agencies, and formal agreements between federal and state agencies. Although some state stocking programs restore native fish populations, other programs may compromise some of the ecological and social values of wilderness areas. Further, although current federal regulations recognize state authority for fish stocking, judicial interpretation gives federal agencies the authority for direct involvement in decisions regarding fish stocking in wilderness. Where there are differences of opinion between state and federal managers, this judicial interpretation strongly points to the need for improved cooperation, communication, and coordination between state wildlife managers and federal wilderness managers to balance recreational fishing opportunities and other wildlife management activities with wilderness values.

Conclusions

Untangling the problems caused by concurrent federal and state authority requires an understanding of the origin of traditional states rights views, historical and current judicial interpretation, and agency regulations and policies. Unfortunately, these all seem to point in different directions: federal legislation supports concurrent state and federal authority, judicial interpretation clearly supports federal involvement in wildlife management decisions in wilderness, federal agency regulations and policies largely support a traditional states rights view, and the IAFWA agreement strongly supports wilderness values and asserts the need for cooperation between state and federal agencies.

Fish stocking does compromise certain wilderness values, and wilderness designation does impose restrictions on the types of wildlife management actions that are appropriate in wilderness areas. In some cases, these compromises and restrictions have led to an "either/or" dichotomous view that pits state fish stocking programs against federal responsibility for protecting wilderness values. Differences in agency missions, traditions, and cultures also tend to exacerbate "us vs them" attitudes. Examining state and federal interactions over fish stocking in wilderness, Fraley (1996), for example, concluded that agency personnel need to "rise above the bureaucracy and egos, work together, and share responsibility for managing all wilderness resources." In these cases, managers need to be reminded that "it is not a question of what level of government shall have the basic authority but, rather, how a shared authority can be made most productive" (Gottschalk 1978).

Fortunately, divisive attitudes are giving way to better understanding, communication, and cooperation in the face of extraordinarily complex social and ecological problems. Cooperation among state and federal managers will be increasingly important as research continues to reveal subtle and complex ecological interactions between stocked fish and native aquatic biota (see the other papers in this special feature). Changing social values and ecological complexities guarantee that what works in one area may not work in other areas, and that well developed and persistent communication and cooperation between state and federal managers will be necessary in crafting effective management solutions on a case-by-case basis.

Backed by Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values. Continuing to improve communication and cooperation between state and federal managers will ensure that wilderness contributes to the protection and preservation of wildlife, just as wildlife contributes to the value of wilderness.

Page 15 of 5344

37.b24

Geography of Invasion in Mountain Streams: Consequences of Headwater Lake Fish Introductions

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Abstract

The introduction of fish into high-elevation lakes can provide a geographic and demographic boost to their invasion of stream networks, thereby further endangering the native stream fauna. Increasingly, remaining populations of native salmonids are concentrated in fragmented headwater refugia that are protected by physical or biological barriers from introduced fishes that originate in the pervasive source populations established at lower elevations. Although fish introduced near mainstem rivers frequently encounter obstacles to upstream dispersal, such as steep slopes or falls, we found that brook trout (*Salvelinus fontinalis*) dispersed downstream through channel slopes of 80% and 18-m-high falls. Thus, headwater lake stocking provides source populations that may be capable of invading most downstream habitats, including headwater refugia of native fishes. The extent of additional area invasible from lakes, beyond that invasible from downstream, depends on the geography of the stream network, particularly the density and distribution of headwater lakes and their location relative to barriers inhibiting upstream dispersal. In the thermal and trophic environments downstream of lakes, fish commonly grow faster and thus mature earlier and have higher fecundity-at-age than their counterparts in other high-elevation streams. The resulting higher rates of population growth facilitate invasion. Larger body sizes also potentially aid the fish in overcoming barriers to invasion. Trout introductions to high-elevation headwater lakes thus pose disproportionately large risks to native fishes— even when the place of introduction may appear to be spatially dissociated from populations of the native species. Mapping the potential invasible area can help to establish priorities in stocking and eradication efforts.

Management Implications

The demand for recreational fishing in high-mountain lakes is the primary motivation for stocking nonnative fishes such as brook trout. It is important to consider, however, that stocking of a mere handful of lakes could allow nonnative fishes access to nearly an entire stream network. Consideration of the invasion geography could be useful in prioritizing lakes to protect or rehabilitate. For example, when a nonnative species already occurs downstream of a migration barrier, stocking lakes that are a short distance upstream of the barrier (assuming that other barriers occur farther upstream) will risk less than stocking lakes far upstream of the barrier (Figure 1). Similarly, the stream area negatively affected by nonnatives could be minimized by stocking multiple lakes in one tributary basin instead of one lake each in multiple basins. Similar analyses could help in prioritizing lake-stream networks for the eradication of nonnative fishes (see Knapp and Matthews 1998). Systems where nonnative fishes have emigrated from headwater lakes and occupy, but have not successfully colonized, the outlet streams should be considered good candidates for eradication projects. For example, Ice Lake is the only lake known to contain brook trout within a large area of the North Fork Clearwater River, Idaho, and as of 1996, the species had colonized little of Elizabeth Creek, the outlet stream (Appendix A). Brook trout eradication from Ice Lake would remove the one extant population with potential for invading a large drainage area. We believe systematic landscape-level analyses will reveal opportunities for defusing invasion threats in the montane regions of western North America and for reducing conflict between fisheries management and native species conservation programs.

37.b25

Alteration of Nutrient Cycles and Algal Production Resulting from Fish Introductions into Mountain Lakes

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ABSTRACT

The introduction of salmonid fishes into naturally fishless lakes represents one of the most prevalent
environmental modifications of aquatic ecosystems in western North America. Introduced fish may alter
lake nutrient cycles and primary production, but the magnitude and variation of these effects have not been
fully explored. We used bioenergetics modeling to estimate the contributions of stocked trout to
phosphorus (P) cycles across a wide range of fish densities in lakes of the Sierra Nevada, California. We
also assessed the larger effects of fish-induced changes in phosphorus cycling on primary production using
paleolimnological analyses from lakes in the southern Canadian Rockies. Our analyses showed that total P
recycling by fish was independent of fish density but positively related to fish biomass in the Sierra
Nevada. In lakes with fish populations maintained by continued stocking, fish recycled P at over twice the
rate of those in lakes where introduced fish populations are maintained by natural reproduction and
stocking has been discontinued. We estimate that P regeneration by introduced fishes is approximately
equivalent to atmospheric P deposition to these lakes. Paleolimnological analyses indicated that algal
production increased substantially following trout introductions to Rocky Mountain lakes and was
maintained for the duration of fish presence. The results of our modeling and paleolimnological analyses
indicate that introduced trout fundamentally alter nutrient cycles and stimulate primary production by
accessing benthic P sources that are not normally available to pelagic communities in oligotrophic
mountain lakes. These effects pose a difficult challenge for managers charged with balancing the demand
for recreational fisheries with the need to maintain natural ecosystem processes.

Implications for Current Stocking Practices in Mountain Wilderness Areas

Although the largest perturbations to lake communities and ecosystem processes probably occur soon after
fishless lakes are stocked for the first time, our analyses show that continued stocking only serves to
exacerbate the original effects. For example, some large invertebrate species (for example,
Hesperodiaptomus spp.) may coexist with low densities of introduced trout, especially in large and deep
lakes (Donald and others 1994). However, many Sierra Nevada lakes with self-sustaining trout populations
are still being stocked (R. A. Knapp unpublished), thereby increasing populations above densities that
would normally result from natural reproduction. Such increased densities can increase predation intensity
and further reduce the number of lakes in which *Hesperodiaptomus* occur. In addition, our analyses of fish
nutrient regeneration rates suggest that the contributions of introduced trout to nutrient cycles are
approximately double the level estimated for lakes that have not been stocked for several decades (Figure
7).

Therefore, to truly minimize effects of introduced fish on mountain lake ecosystems, all stocking should
be halted. This would allow the lakes that lack sufficient spawning habitat to revert to a fishless condition,
while reducing the density of fish in lakes with self-sustaining trout populations. Because many currently
stocked lakes are likely to harbor self-sustaining trout populations (Bahls 1992; R. A. Knapp unpublished),
a moratorium on trout stocking in all lakes would provide fisheries managers a simple means by which to
reduce the effects of introduced fish on native invertebrate communities and ecosystem processes while
still providing ample recreational fishing opportunities. It remains to be seen whether native faunal
assemblages and ecosystem processes in mountain lakes can be restored simply by eliminating fish
populations (Funk and Dunlap 1999; McNaught and others 1999). This question is the focus of current
whole-lake fish removal experiments in the Sierra Nevada (R. A. Knapp and O. Sarnelle unpublished).

Page 17 of 5344

37.b26

Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds

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ABSTRACT
Introduced trout have often been implicated in the decline of high-mountain amphibian populations, but few studies have attempted to understand whether fish stocking also influences the distribution and abundance of amphibians throughout entire mountain basins, including the remaining fishless lakes. We examined this relationship using the relative abundance of long-toed salamanders (*Ambystoma macrodactylum*) and Columbia spotted frogs (*Rana luteiventris*) in fish-containing and fishless lentic sites in basins with varying levels of historic fish stocking. All lentic waters were surveyed for fish and amphibians in 11 high-elevation basins in the Frank Church–River of No Return Wilderness, Idaho, between 1994 and 1999. We found introduced trout (*Oncorhynchus clarki, O. mykiss, O. m. aguabonita*) in 43 of the 101 sites, representing 90% of the total surface area of lentic water bodies available. At the scale of individual water bodies, after accounting for differences in habitat characteristics between fish-containing and fishless sites, the abundance of amphibians at all life stages was significantly lower in lakes with fish. At the basin scale, densities of overwintering life stages of amphibians were lower in the fishless sites of basins where more habitat was occupied by trout. Our results suggest that many of the remaining fishless habitats are too shallow to provide suitable breeding or overwintering sites for these amphibians and that current trout distributions may eventually result in the extirpation of amphibian populations from entire landscapes, including sites that remain in a fishless condition.

Restoration

Conserving natural biodiversity and maintaining functioning ecosystems is a goal of protected area management. The results of this study suggest that wildlife managers need to consider restoring a few deep lakes in each basin to create fishless breeding and overwintering habitat for amphibians (Knapp 1996; Knapp and Matthews 1998; Pilliod and Peterson 2000). Given that some amphibian reproduction is occurring, even in heavily stocked basins (see Figures 5A and 6A), we suspect that amphibian populations could recover quickly if a few deep lakes were restored to a fishless state (Bro¨nmark and Edenhamn 1994; Knapp 1996; Funk and Dunlap 1999; Knapp and others 2001). However, because amphibian populations in mountain basins are widely isolated from each other (Howard and Wallace 1981; Call 1997; Tallmon and others 2000), recolonization following the extirpation of amphibians from entire basins could take decades.

37.b27

The Effects of Stocking and Removal of a Nonnative Salmonid on the Plankton of an Alpine Lake

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ABSTRACT
Bighorn Lake, a fishless alpine lake, was stocked with nonnative brook trout, *Salvelinus fontinalis*, in 1965 and 1966. The newly introduced trout rapidly eliminated the large crustaceans *Hesperodiaptomus arcticus* and *Daphnia middendorffiana* from the plankton. In July 1997, we began to remove the fish using gill nets.

The population comprised 261 fish that averaged 214 g in wet weight and 273 mm in fork length.
Thereafter, zooplankton abundance increased within weeks. Early increases were caused by the maturation
of *Diacyclops bicuspidatus*, few of which reached copepodid stages before the removal of the fish because
of fish predation. *Daphnia middendorffiana*, absent when fish were present, reappeared in 1998.
Hesperodiaptomus arcticus, which had been eliminated by the stocked fish, did not return. The proportion
of large zooplankton increased after fish removal, but their overall biomass did not change. Algal biomass
was low and variable throughout the 1990s and correlated with water temperature but not with nutrient
concentrations or grazer densities. Diatoms were the most abundant algal taxon in the lake, followed by
Dinophyceae. Chrysophyceans and cryptophyceans were eliminated after the fish were removed.
Chlorophyll *a* concentrations were unaffected. Gill netting is a viable fish eradication technique for smaller
(less than 10 ha, (25 acres)), shallow (less than 10 m (33 feet) deep)) lakes that lack habitable inflows and
outflows or other sensitive species. Further work is required to define appropriate removal methods for
larger lakes and watersheds.

Gill Netting as a Management Tool

Given the effort employed to eliminate trout from Bighorn Lake and other small lakes (Knapp and
Matthews 1998), we speculate that removal of nonnative trout with gill nets alone may be impractical for
large lakes. However, we believe that the 3.0-ha size limit suggested by Knapp and Matthews may be too
conservative, particularly if more and larger commercial-weight gill nets are used. Intensive commercial
fishing with gill nets eliminated lake trout from Lesser Slave (1160 km2) and Touchwood lakes (29 km2) in
Alberta earlier in the 20th century, although massive effort applied over several decades was required in
both cases (Mitchell and Prepas 1990). We believe that shallower lakes (less than 10 m deep) of up to 10 ha
should be amenable to gill net eradication of nonnative fishes over reasonably short periods, without
resorting to rotenone or other poisons.

We propose that where good access is available, the intermittent deployment of gill nets, as practiced by
Knapp and Matthews (1998), should be adopted to minimize gill net avoidance by salmonids in clear lakes.
We have directly observed that salmonids started to avoid gill nets within a few hours after nets were set in
clear alpine lakes. Thus, a series of net sets conducted days or weeks apart may remove fish more quickly
than our continuous netting program.

If the restoration of substantially larger or deeper lakes is proposed, alternate methods of fish removal
including, but not limited to, electrofishing, trap netting on spawning grounds, disturbing spawning habitat,
creating under-ice anoxia by the addition of nutrients (see Brunskill and others 1980 for a possible method),
lake drawdown, and/or the application of piscicides should be given consideration in addition to, or as a
replacement for gill nets. These alternate methods will be controversial, but they may be more practical for
removing fish from certain lakes. Canadian national parks managers have previously used chemical agents
in their attempt to eradicate fish from dozens of lakes.

The Bighorn Lake restoration work does not address several important issues associated with the removal
of nonnative fish from lakes. For example, for lakes with habitable inlets and outlets (Bighorn Lake has
neither), the removal of nonnative fish from inflowing waters and the installation of barriers to prevent their
reinvasion from outflow creeks will be required. Also, selective removal of introduced fish from lakes that
have one or more populations of native fish may be desirable. Further, nontarget species such as Harlequin
Ducks (*Histrionicus histrionicus*) and even bears might be adversely affected by restoration activities on
some water bodies. Diving birds may become entangled in gill nets and drown, and bears may lose a food
resource if spawning runs of fish into shallow creeks are eliminated. Last, because organisms such as
Gammarus may be extirpated but leave no trace of their prior existence, it will be difficult to ascertain that
full food web restoration has been achieved for the many lakes that lack prestocking records of their
original invertebrate communities.

Further experimental restoration work is needed to better define the practical limits of gill netting as a
management tool and to provide alternate solutions for larger or otherwise "difficult" stocked lakes. A
better understanding of our few remaining pristine ecosystems is also needed if we wish to undo a century
of past fisheries management practices and return a small suite of lakes to their natural state.

37.b28

Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness

Peter B. Landres, Mark W. Brunson, Linda Merigliano, Charisse Sydoriak, Steve Morton

Abstract—This paper summarizes a dialogue session that focused on two concepts that strongly influence nearly all wilderness management: wildness and naturalness. The origin and value of these concepts are discussed, as well as the dilemma and irony that arises when wilderness managers contemplate manipulating the environment to restore naturalness at the risk of reducing wildness. To illustrate this irony, a case study of a proposed large-scale manipulation to stop the loss of cultural resources in the Bandelier Wilderness is discussed. It is concluded that large scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. One of the biggest hurdles facing wilderness policy-makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.

Two independent but related concepts are intertwined in the idea of wilderness. In the 1964 Wilderness Act, wilderness is defined in Section 2.(c) as "...an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Later in this same section, wilderness is further defined as an area "retaining its primeval character and influence...which is protected and managed so as to preserve its natural conditions." The key words in these quotes are *untrammeled* and *natural*. When the Wilderness Act was passed, these key words undoubtedly were intended to be complementary because untrammeled areas were certainly natural. Today, however, we are witnessing regional ecological impacts to areas that are untrammeled in every other way, as well as new understanding of the long-term ecological consequences of natural resource management. As a result, we now have divergent philosophical views of what wilderness is and what it should be. These views are encapsulated by the words untrammeled and natural in a way that was likely unforeseen by wilderness proponents as they crafted legislative wording. This dialogue session explored the management dilemmas and social ironies resulting from these divergent views and presented a case study that brings these diverging views into sharp focus.

Terms and Concepts

In one of the first and clearest explanations of the word untrammeled, Zahniser (1956) wrote "...there is in our planning a need also to secure the preservation of some areas that are so managed as to be left unmanaged—areas that are undeveloped by man's mechanical tools and in every way unmodified by his civilization." Synonyms for untrammeled include unimpeded, unhampered, uncontrolled, self-willed and free. We suggest that the word "wildness" strongly connotes this sense of an area free from human control or manipulation. Use of this word is also supported by Zahniser's statement before a committee of the New York State legislature in 1953 that "We must remember always that the essential quality of the wilderness is its wildness" (Zahniser 1992). Synonyms for natural include native, aboriginal, indigenous and endemic, and we suggest that the term "naturalness" be used to capture this biological sense of wilderness.

While these concepts of wildness and naturalness differ from one another, both are essential elements of wilderness (Aplet 1999; Barry 1998; Worf 1997) and are highly valued in our society (Cordell and others 1998; Manning and Valliere 1996). As shown in figure 1, wilderness is the idea and place where the concepts of wildness and naturalness reach their highest expression. These concepts strongly influence, either directly or indirectly, virtually all of the decisions and actions taken in wilderness management.

An Emerging Dilemma

In each of these cases, the naturalness of the area has been compromised by broad-scale human actions, and some form of manipulation of the environment is proposed to restore this naturalness. The crucial issue this raises is whether large-scale manipulation, however undesirable, should be used to restore natural conditions, thereby sacrificing wildness for naturalness (Cole 1996). In these situations, where human-caused impacts have caused wholesale changes to the wilderness environment, should the wildness of present day wilderness be compromised to restore naturalness? In other words, should an undesirable means, such as manipulation of wilderness, be used to achieve a desirable end, such as restoration of natural conditions in wilderness?

Different people hold strong views on this issue, which goes to the heart of whether wilderness is, or should at least remain from this point on, wild or natural. Some people think the provision in the 1964 Wilderness Act that "...these [areas] shall be administered...so as to provide for the protection of these areas, the preservation of their wilderness character..." is a clear mandate for restoring natural conditions in wilderness to overcome a myriad of human caused insults. Indeed, restoration of these areas is ~~oftenexpressed~~often expressed in terms of an obligation and responsibility to correct human-caused problems (Windhager 1998). Others, citing the Wilderness Act definition of wilderness as "...an area where the earth and its community of life are untrammeled by man," claim that the fundamental character of

Page 20 of 5344

wilderness is to be free of human manipulation (Worf 1997). Here, wilderness is the one and only place on our ever
more crowded planet that is left free from our conscious manipulation, and these areas yield important and vital
benefits to people and society because they are untrammeled.

The Central Dilemma of Wilderness Management: When to Take Action?

Deciding when to take action in wilderness was described by Landres and others (1998) as the central dilemma in
wilderness management. Proposals to manipulate ecological conditions in wilderness to restore naturalness bring this
dilemma to new heights, as well as raise significant and difficult questions: Does manipulation compromise the very
values that are protected and preserved in wilderness? Is there sufficient technical knowledge to use large-scale
manipulation to restore wilderness landscapes? What are the consequences and risks of taking action versus not taking
action? Does the public sufficiently trust the agency to allow such large-scale actions? Does the desire to restore the
ecological value of naturalness outweigh the social value of wildness? How much trammeling is necessary and
tolerable in wilderness? Is it appropriate to even define a target for desired future ecological conditions in wilderness?
Must we accept, albeit reluctantly, the human "gardenification" of wilderness, as suggested by Janzen (1998)?

Separating the concepts of wildness from naturalness helps clarify and partially resolve this management dilemma of
when to take action. A two-way matrix of wildness and naturalness (figure 2) illustrates when a proposed action is not
appropriate, when it is appropriate and when it entails weighing wildness against naturalness. Briefly, some proposed
management actions, such as manipulating habitat to increase a wildlife species' density above natural levels, decrease
both wildness and naturalness and should not be pursued. Conversely, proposed actions that support wildness or at least
do not reduce it while increasing naturalness should be pursued. Closing and restoring a campsite, for example, doesn't
manipulate the environment in away that impedes wildness on a large scale, and restoring native plants increases
naturalness.

Management dilemma and irony can be seen when either wildness or naturalness must be compromised to enhance
the other (figure 2).

		WILDNESS	
		Decrease	Support
NATURAL-NESS	Decrease	NO ACTION	DILEMMA AND IRONY
	Increase	DILEMMA AND IRONY	ACTION

Figure 2—A two-way matrix showing suggested outcomes when proposed management actions support or decrease
wildness and increase or decrease naturalness. Proposed actions that both decrease wilderness and naturalness should
not be considered, while actions that both support wildness and increase naturalness should be considered. Proposed
actions that compromise either wildness or naturalness create management dilemmas and social irony forcing wildness to
be weighed against naturalness.

If the degraded area and restoration actions are localized, if the actions taken today will allow managers to reduce their
interference with the "will of the land" in the future, and if there are good reference sites to know what the undisturbed
condition is, manipulative actions are probably justified. In contrast, if restoration actions are being considered over a
large area and there is uncertainty about the effects of these actions or about the target conditions, much more caution
and scrutiny is warranted.

Understanding the differences between wildness and naturalness doesn't provide a definitive answer to solve this
central dilemma of wilderness management. These concepts do help clarify when proposed actions are clearly
inappropriate and when they are appropriate. Furthermore, they clarify what issues need to be discussed and weighed in
determining whether proposed manipulative actions should be taken.

Understanding and Reconciling the Social Irony

The dilemma we face—whether to err on the side of wildness by stressing the nature/culture dichotomy, or to err on
the side of naturalness by restoring nature whenever possible — is rooted in the ongoing ambiguity of a wilderness
policy and other environmental policies that are rooted both in the preservationist and organic views of nature and

Page 21 of 5344

culture. Where we fall on the spectrum from dichotomy to convergence is often rooted in our view of risk and uncertainty: Do we dare trust science? Do we dare not? If we trust scientists to make wise, informed judgments about what "nature" would be without human intervention, we are more likely to approve of manipulations intended to produce those conditions. Alternatively, if we're concerned about the possibility of restoration going awry, we may be too risk-averse to allow restoration in wilderness.

Seen another way, if we believe that wild nature is doomed, we may be more likely to want to restrict further manipulation in order to save whatever's left in the least "damaged" condition possible. Alternatively, we may believe that leaving things alone will only make matters worse, as may be the case in systems we've simplified through fire suppression, so that the only justifiable action is to try to reverse the trends.

Our trust is not only in science, however, but in the people who apply it: scientists and managers. When people oppose manipulative restoration, is it the science they distrust or is it us? These are questions that we need to confront if we are to make reasoned decisions about whether to allow restoration of naturalness or protect wildness at all costs.

~~Terms and Concepts~~

~~In one of the first and clearest explanations of the word untrammeled, Zahniser (1956) wrote "...there is in our planning a need also to secure the preservation of some areas that are so managed as to be left unmanaged—areas that are undeveloped by man's mechanical tools and in every way unmodified by his civilization." Synonyms for untrammeled include unimpeded, unhampered, uncontrolled, self-willed and free. We suggest that the word "wildness" strongly connotes this sense of an area free from human control or manipulation. Use of this word is also supported by Zahniser's statement before a committee of the New York State legislature in 1953 that "We must remember always that the essential quality of the wilderness is its wildness" (Zahniser 1992). Synonyms for natural include native, aboriginal, indigenous and endemic, and we suggest that the term "naturalness" be used to capture this biological sense of wilderness.~~

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Conclusions

Large-scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. In one way, this dilemma is good because it forces us to carefully consider our actions and their consequences. "Doing the right thing" for wilderness used to be fairly straightforward. Today, with our increased knowledge of regional-scale human impacts, coupled with our desire to restore areas known to be degraded, "doing the right thing" is no longer a simple path because it is based on a philosophical choice between wildness and naturalness. Two people or groups may differ, sometimes strongly, about what they perceive is "right" for wilderness, and both views are valid. If there are significant doubts about a proposed action, one view would err on the side of protecting wildness, while the other view would err on the side of naturalness. One of the biggest hurdles facing wilderness policy-makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.

Page 22 of 5344

37 b29

Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes

David S. Pilliod
Charles R. Peterson

Abstract—To balance wilderness lake use between recreational fisheries and protected habitat for native species, managers need to understand how stocking non-native predaceous fish affects amphibian populations within a landscape. The goal of this paper is to help managers design and conduct studies that will provide such information. Desirable study characteristics include multiple-visit surveys of all wetlands within a watershed to provide information on amphibian distribution, abundance, breeding, recruitment and seasonal variation in habitat use. By identifying the distribution of critical amphibian habitat and source populations, this approach should enable managers to target specific lakes for protection or restoration as fishless amphibian habitat without overly compromising wilderness fishing opportunities.

Wild areas, large or small, are likely to have values as norms for land science. Recreation is not their only, or even principal utility.
—Aldo Leopold, Sand County Almanac

6. How Can This Information Be Used to Evaluate Potential Management Actions?

Like many ecological problems, the anthropogenic effects of trout stocking on amphibians can vary for different species and even different populations of the same species under a variety of conditions. This variability makes it difficult to make general management recommendations that will adequately protect all species and their habitats. **However, research can greatly improve the evaluation and implementation of effective management actions that may balance the needs of the recreational public with conservation of native species. Ideally, any alterations in stocking practices should strive for the lowest cost-benefit ratio in terms of decreasing threats to amphibian persistence with the fewest changes to current recreational fishing opportunities.**

Possible management actions include: (1) ceasing stocking in all lakes, (2) ceasing stocking and possibly removing fish from some lakes, (3) reducing stocking frequency and density, (4) reducing naturally reproducing populations of fish by restricting access to spawning areas and/or gill netting, (5) changing species stocked (cutthroat may be less predatory than rainbow or brook trout), (6) stocking sterile fish, or (7) making no changes in stocking practices if fisheries threats to amphibian persistence are negligible.

Cessation of stocking in all wilderness lakes would most likely benefit amphibians and reduce threats to persistence (fig. 3). **Undoubtedly, this action would be extremely unpopular for many anglers and could result in less support for wilderness. Economic impacts on outfitters and guides may also occur. Despite the potential socioeconomic costs of this management strategy, some wilderness proponents argue these costs will be minimal and will not overly jeopardize public support for wilderness (Murray and Boyd 1996). This view appears to be supported by resolutions from potentially opposing groups like** the Society for Conservation Biology (SCB) **and Trout Unlimited. The SCB** recommends "phas[ing] out incongruent stocking practices and restor[ing], where appropriate and feasible, previously damaged ecosystems" **(SCB 1995).** Trout Unlimited states that it "oppose[s] salmonid stocking in historically documented non-salmonid waters where scientific evaluation indicates that such stocking would be likely to adversely affect native biodiversity" **(Trout Unlimited 1998).**

An example of the potential costs and benefits of restoring wilderness lakes through the cessation of fish stocking comes from the National Park Service, which recommended phasing out and eventually terminating all fish stocking (NPS 1975). In Sequoia, Kings Canyon and Yosemite National Parks, fish stocking was curtailed in the 1970's and completely halted in 1991. This management decision resulted in the loss of recreational fisheries from 29% to 44% of previously stocked lakes (Knapp 1996). Due to a reduction in the proportion of lakes containing fish, as well as historic differences in stocking intensity, the mountain yellow-legged frog currently has a greater distribution in Kings Canyon

National Park, compared with the neighboring John Muir Wilderness, where lakes have continued to be stocked and frog persistence is at risk (Matthews and Knapp 1999).

A similar pattern was observed in the Bitterroot Mountains, Montana where six of 18 stocked lakes (33%) no longer supported trout populations in 1996, following cessation of stocking in 1984 (Funk and Dunlap, in press). Funk and Dunlap (in press) found that long-toed salamanders recolonized five of these currently fishless, but previously stocked lakes within two decades, even in lakes over 5 km from the nearest salamander populations. These studies indicate that widespread cessation of stocking does not result in the loss all trout populations and that amphibians will recolonize lakes after fish disappear.

Cessation of fish stocking, and even removal of fish, in some but not all lakes may be more amenable to recreational anglers. If conducted properly, this management strategy could provide the necessary amphibian habitat for species recovery. The success of this management action, however, is dependent on which lakes are selected for fish elimination. Choosing lakes to be restored to a fishless condition based solely on anthropogenic variables, such as difficulty of access and amount of angler use, may have little effect on reducing threats to amphibian persistence (fig. 3). However, restoring fishless lakes based on their potential for amphibian recolonization and their importance as amphibian habitat should improve the success of this action.

For fish elimination, we recommend targeting: (1) stocked lakes that already have some amphibian breeding occurring, (2) lakes that appear to provide deep-water overwintering habitat for amphibians in surrounding shallow, fishless lakes, (3) lakes that have the potential for fish elimination (low or no natural reproduction), and (4) lakes that are the least important for recreational anglers. Of these recommendations, the first three should take priority over the last. In our study, over 40% of the stocked lakes had at least some frog reproduction, yet few of these lakes had any frog recruitment. Eliminating fish from a lake where frogs are already breeding should result in faster frog recovery than eliminating fish in a lake that has no amphibian reproduction. Furthermore, restoring lakes that provide over-wintering habitat for amphibians can benefit amphibians both locally and potentially across a watershed. Finally, when selecting a lake for fish elimination, choosing a lake that will require the least amount of invasive management (fish removal) is important. Nonreproducing fish can be eliminated from a lake by simply removing that lake from the stocking schedule. However, if fish removal is required, techniques such as gill netting (Knapp and Matthews 1998), coupled with blocking spawning habitat, are preferable to piscicides, such as rotenone and antimycin A. Both of these chemicals may harm other aquatic vertebrates, including amphibians (Fontenot and others 1994; Schnick 1974), and their use in wilderness is controversial.

The relatively easy, potentially risky, and yet untested management strategies include reducing the frequency, density, species, and/or fertility of fish stocked (fig. 3). This action has the potential to benefit both anglers and amphibians. In the best circumstance, densities of trout could be

Figure 3—Diagram illustrating the effects of different management actions on recreational fishing and amphibian conservation. 1. Cessation of stocking in wilderness lakes can only help amphibians, however this will be unpopular with anglers. 2a. Restoring some lakes to their fishless state may increase amphibian persistence if lakes provide critical amphibian habitat, but have little effect if not (2b). 3. Reducing fish densities may benefit both frogs and fish, but this remains to be tested.

reduced, even to the point of providing fishless or near fishless habitats for short intervals of time (several years). This strategy may be attractive to the angling public, if larger trout are caught during periods of low fish density (when lakes are designated as "trophy waters"). If amphibians could produce a successful cohort during these intervals, this action could help sustain populations of those amphibians that are long-lived. However, this strategy does not take into consideration the stochastic variables that can greatly influence amphibian recruitment, namely weather.
In addition, larger fish have a greater gape and may prey on adult amphibians that were invulnerable to smaller fish (Semlitsch and Gibbons 1988; Zaret 1980). In amphibian populations, threats to older, reproductively mature individuals may be the most damaging to a population's persistence (Green 1997). In yet other circumstances, natural fish reproduction may reduce the effectiveness of this strategy at changing the density or size structure of fish populations. Clearly, further investigation of this strategy is warranted.

Finally, managers should keep in mind that most systems are not isolated, and fish stocking practices in adjacent regions can significantly affect restoration efforts. For example, fish dispersal from upstream locations may colonize wetlands that are actively managed as fishless habitats. In addition, fish predation in streams may act as barriers to migration, dispersal and hence colonization of amphibians (Bradford and others 1993).

Despite the range of possible management actions, we believe the best management strategy is to use species and watershed-specific biological information to make management decisions. This information can be obtained only through carefully designed and conducted studies that provide adequate information about the distribution, abundance and life history characteristics of amphibian species across local landscapes. Hopefully, using appropriate information at the watershed scale will enable managers to restore critical amphibian habitat and the biological integrity of wilderness lakes. Creating a few fishless lakes to provide the necessary habitat requirements of amphibians in a watershed may disproportionately reduce the threats of fish stocking on amphibian persistence. For example, having two amphibian source populations in a watershed, instead of one, may increase the probability of amphibian persistence in that watershed by an order of magnitude. With proper management, we believe amphibian populations can be recovered and protected while maintaining recreational fishing opportunities in many wilderness lakes.

Page 24 of 5344

37.b30

Fish Stocking in Protected Areas: Summary of a Workshop

Paul Stephen Corn
Roland A. Knapp

Abstract—Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness, generating conflicts between managing wilderness as natural ecosystems and providing opportunities for recreation. Managers faced with controversial and difficult decisions about how to manage wilderness lakes may not always have ready access to research relevant to these decisions. To address this problem, and to expose scientists to the concerns and constraints of managers and wilderness users, a workshop was held in October 1998 at the Flathead Lake Biological Station in Polson, Montana. Participants included 43 scientists, state and federal managers, wilderness users and advocates and students. Four subject areas were addressed: federal, state, tribal and user perspectives, community and ecosystem effects, species effects and management recommendations. Papers from the workshop are being developed for an issue of the journal *Ecosystems*.

The conflicts between managing wilderness as "natural" ecosystems and providing opportunities for recreation are especially acute in fisheries management. Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness (Bahls 1992), usually to the detriment of the native biota (Bradford and others 1993; Chess and others 1993; Tyler and others 1998). Alpine lakes are the primary target for recreation in wilderness (Hendee and Schoenfeld 1990), and fishing opportunities may further concentrate use in these areas, resulting in resource damage and compromising solitude in the wilderness experience.

Fish stocking, especially using aircraft, is also considered to conflict with wilderness values (Duff 1995) However, fish stocking in mountain lakes long predates the Wilderness Act of 1964, and fishing is the objective of a sizable proportion of wilderness visitors (Fraley 1996; Hendee and Schoenfeld 1990). Language in the Wilderness Act, reserving the rights of the States with respect to management of fish and wildlife, is often cited as justification for continued active management of fisheries in wilderness (Duff 1995; Fraley 1996). Conversely, other language in the Wilderness Act promoting the preservation of natural systems, and increasing emphasis on wilderness as a reference point for the study and management of ecosystems (Hendee and others 1990; Kaufmann and others 1994) are difficult to reconcile with many of the current practices of fisheries management.

Consequently, managers are faced with controversial and difficult decisions about how to manage wilderness lakes, and they do not always have ready access to research relevant to these decisions. Considerable research has been conducted recently on the biological effects of fish stocking on resident biota. Many managers tend to minimize these effects, however, instead promoting untested alternative hypotheses (Fraley 1996). Thus, we organized a workshop, held for three days in October 1998 at The University of Montana Flathead Lake Biological Station.

The objectives were to present wilderness managers with the latest research results and management recommendations on the effects of fish introductions on wilderness lakes; to encourage discussion of issues, areas of agreement, conflicts and recommendations for future management and research among managers, scientists and wilderness and recreation users; and to publish a compilation of research results and management recommendations that will be useful for scientists and managers, alike.

The workshop was organized into four sessions, which included formal presentations and a block of time for group discussion. The workshop began with an overview of fish stocking in wilderness from federal, state, tribal and user perspectives, including summaries of key legislation, policy and description of current management practices. A session on community and ecosystem effects included effects of fish stocking on lake nutrient cycling, algal dynamics and invertebrates and interactions between predators, hydroperiod and amphibians. The third session focused on effects on vertebrate species and included discussions on effects of stocking on native fish and amphibians. The final session described restoration and management. This paper briefly describes the presentations and summarizes the findings and

Page 25 of 5344

comments from the discussions. The complete agenda and abstracts can be found at the Aldo Leopold Wilderness Research Institute's web site (www.wilderness.net/leopold/ bulletin.htm).

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IMPACTS OF TROUT STOCKING ON AMPHIBIAN POPULATIONS

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Keywords: fish stocking, long-toed salamanders, Columbia spotted frogs, western toads, cutthroat trout, rainbow trout, golden trout

Background & Management Issues: Trout and other non-native sport fishes have been introduced into high-elevation lakes in western North America to provide recreational opportunities in the backcountry. Many of these lakes were historically fishless, and consequently, fish stocking has been implicated in the decline of native amphibian populations. Previous research has either examined spatial distributions of amphibian populations within individual water bodies decades after stocking occurred or focused on the effects on single species. Life history traits vary among amphibian species, however, and fish stocking may affect species differently. In addition, amphibian population structure may be affected at a broad scale when a portion of lakes and streams in a watershed are stocked. This habitat fragmentation may isolate amphibian populations and result in increased extinction rates.

Project Objectives:

To evaluate the effects of introduced trout on two species of amphibians with different life-history characteristics: the long-toed salamander, a species in which larvae overwinter two years before metamorphosing; and the Columbia spotted frog, a species in which the larval stage is completed in one summer.

To examine the broad-scale effects of fish stocking on amphibian populations within drainage basins.

Project Description: **Fish and amphibian surveys were conducted in the Bighorn Crags region of the Frank Church River of No Return Wilderness. Historical and**

Page 26 of 5344

state records, hook-and-line angling, gill netting, and visual observations were used to determine the presence of fish. Visual encounter surveys were used to determine the distribution and abundance of amphibians. Observers searched the perimeters of lakes, ponds, and entire flooded meadows, and recorded life stages of individuals encountered. Snorkel surveys in 11 lakes were used to evaluate the accuracy of visual encounter surveys for salamanders, and mark-recapture population estimates from 39 lakes permitted evaluation of frog surveys. In addition, the physical, chemical, and biological characteristics of lakes and wetlands were recorded.

Results: Historical records indicated that Idaho Fish and Game stocked over 60,000 cutthroat and rainbow trout into 12 to 30 previously fishless lakes in 1937 and 1938 in the Bighorn Crags area. Beginning in the 1960s, fish were restocked every three to six years. In total, 37 lakes were stocked with 300,000 fry or fingerlings.

Cutthroat, rainbow, and golden trout and their hybrids were found in all 11 basins searched. Overall, fish occupied 43% of sites. Large, deep lakes (greater than 1 ha in surface area and more than 4 m deep) were more likely occupied than small, shallow wetlands. As a result, fish occupied 90% of the available surface area of water in the basins. More importantly, only two basins had more than one deep, fishless lake.

Densities of both long-toed salamanders and Columbia spotted frogs were lower in sites with fish than in those without fish. Indeed, when site characteristics of deep lakes were held constant, fewer amphibians of all stages were found in stocked lakes than in lakes without fish. Moreover, densities of salamander larvae at least two years old, and both adult and juvenile frogs in *fishless* sites decreased as the proportion of wetlands in the basin occupied by trout increased.

Management Implications:

Survival of salamander larvae and juvenile frogs may depend on deep lakes (>2 m), yet few of these habitats are not stocked with fish.

Negative effects of stocked lakes may extend across a landscape. Lakes with fish may have insufficient juvenile recruitment to compensate for adult mortality. Amphibians with extended larval periods may be forced to breed in shallower wetlands where the risk of extirpation due to desiccation, anoxia, and freezing are higher than in the deep, lentic environments. Likewise, amphibians that complete their life cycle in one summer may breed in shallow wetlands but may be forced to immigrate to deep lakes to overwinter. If those lakes are stocked with fish, the progeny may be completely eradicated.

Information necessary to evaluate the effects of fish stocking in high-elevation lakes should include knowledge of:

(1) **the amphibian and fish species in the area** – Because little information is available about distributions of many amphibian species, surveys should be based on what species are potentially in the wilderness area and the life histories of those species. Different types of surveys conducted at various times of the year may be needed to assess abundances and life stages.

Page 27 of 5344

(2) **the extent of area impacted** – Surveys of entire watersheds provide the most unbiased information to determine production, habitat use, and potential interaction between fish and amphibians and allow the most accurate assessment of management actions. Because watershed sampling requires considerable time and effort, the number of watersheds in a wilderness that can be sampled may be limited. Surveying a subset of wetlands in different watersheds using stratified sampling may broaden the scope if all wetland types can be adequately represented. Integrating fish and amphibian surveys may also expand sampling ability. photo by Steve Corn

(3) **the effect of management actions** – Because the basin-wide effects of fish stocking have only recently been identified, information on the results of specific management actions is unavailable. Potential management actions include: cessation of stocking and/or removal of fish, which reduce the number of lakes supporting fish; reduction in stocking frequency/density/fertility (stocking sterile fish or limiting access to spawning habitat), which may result in fishless habitats for short periods; and alteration of the species stocked (e.g. cutthroat trout may be less predatory than brook or rainbow trout).

Project dates: The project was initiated in August 1994 and completed in January 2000.

Publications / Products / Presentations:

Pilliod, David S.; Peterson, Charles R. 2000. Evaluating effects of fish stocking on amphibian populations in wilderness lakes. *In*: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. Wilderness Science in a Time of Change Conference–Volume 5: Wilderness Ecosystems, Threats, and Management; 1999 May 23-27; Missoula, MT. Proceedings RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 328-335. **Leopold Publication Number 406**. Read it here!

Pilliod, David S.; Peterson, Charles R. 2001. Local and landscape effects of introduced trout on amphibians in historically fishless watersheds. *Ecosystems* 4(4): 322-333. **Leopold Publication Number 446**. For ordering information...

For additional information...

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Page 28 of 5344

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This summary was prepared by
A. E. H. Perkins 7/01

Citation for publication number 424:

37.b32

Corn, Paul Stephen 2000. **Amphibian declines: review of some current hypotheses** In: Sparling, Donald W.; Linder, Greg; Bishop, Christine A., eds. Ecotoxicology of Amphibians and Reptiles. U.S. Geological Survey, Midwest Science Center. Columbia, MO: 663-696
Leopold Publication Number **424**
publication not available for download
order form (free)

Abstract:

Declines of varying severity in the size of amphibian populations have been observed for many years (Bragg 1960; Gibbs et al. 1971; Cooke 1972; Beebee 1973; Bury et al. 1980; Andren and Nilson 1981; Hammerson 1982; Corn and Fogleman 1984; Hayes and Jennings 1986; Heyer et al. 1988), but concern among conservation biologists increased dramatically after the First World Congress of Herpetology in 1989 at Canterbury, UK. Several papers and posters at the meeting presented evidence of recent declines, and discussions among the attendees heightened concern about the status of amphibians globally. Continuing dialogue led to a workshop in February 1990 at Irvine, California, sponsored by the National Research Council Board on Biology. The consensus of the participants of that meeting was that amphibian populations declines were real but documentation was largely anecdotal, and much work was needed on the causes of population declines (Barinaga 1990; Blaustein and Wake 1990). The Irvine meeting received considerable media attention, with reporters from print media and National Public Radio in attendance. The initial coverage of the problem (e.g., Booth 1989; Tugend 1990) even caught the attention of the supermarket tabloids (Stern 1990), and the problem of disappearing frogs occupied agents Scully and Mulder in one episode of the television show The X-Files (Newton 1996). Belying amphibians' usual status as uncharismatic microfauna, public interest in these animals and their status remains high, sustained by continuing, more serious coverage in the popular media (e.g., Yoffe 1992; Quammen 1993; Argo 1996; Luoma 1997).

37.b38

Citation for publication number 425:

Corn, Paul Stephen 2001. **Perspectives from the Aldo Leopold Wilderness Research Institute: amphibians and wilderness** International Journal of Wilderness 7(2): 25.
Leopold Publication Number **425**
publication not available for download
order form (free)

Abstract:

Diversity of amphibians varies among wildernesses, from high in the Southeast to low in high-elevation Wilderness Areas and backcountry areas of National Parks in the western United States. Knowledge about the status of amphibians is important, because amphibians occupy important ecological niches and a high proportion of western amphibian species have undergone recent declines, often in protected habitats.

Citation for publication number 446:

See 37.b26

Pilliod, D.S.; Peterson, C.R. 2001. **Local and landscape effects of introduced trout on amphibians in historically fishless watersheds** Ecosystems 4:322-333.
Leopold Publication Number **446**
publication not available for download
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Abstract:

Introduced trout are often implicated in the decline of high mountain amphibian populations, but few studies have attempted to understand whether the effects of trout in lakes where they have been introduced may also influence the distribution and abundance of amphibians throughout entire mountain basins, including in remaining fishless lakes. We examined this relationship using the relative abundance of long-toed salamanders (Ambystoma macrodactylum) and Columbia spotted frogs (Rana luteiventris) in fish-containing and fishless lentic sites in basins with varying levels of historic fish stocking. All lentic waters were surveyed for fish and amphibians in 11 high-elevation basins in the Frank Church - River of No Return Wilderness, Idaho between 1994 and 1999. We found introduced trout (Oncorhynchus clarki, O. mykiss, O. m. aguabonita) in 43 of the 101 sites, representing 90% of the total available lentic water surface area. At the scale of individual water bodies, after accounting for differences in habitat characteristics between fish-containing and fishless sites, the abundance of all life stages of amphibians was significantly lower in lakes with fish. At the basin scale, densities of over-wintering life stages of amphibians were lower in fishless sites in basins with more habitat occupied by trout. Our results suggest that many of the remaining fishless habitats are too shallow to provide suitable breeding or over-wintering habitat for these amphibians, and that current trout distributions may eventually result in the extirpation of amphibian populations from entire landscapes, including from sites that remain in a fishless condition.

Page 30 of 5344

37 b38

CURRENT WILDLIFE RESEARCH PROJECTS

Amphibian Research and Monitoring Initiative

WHO: Steve Corn, Blake Hossack, and David Pilliod - Leopold Institute; Chuck Peterson - Idaho State University; Chris Funk, Bryce Maxell, Andrew Sheldon, and Aimee Wyrick - University of Montana

WHAT: In Fiscal Year 2000, the Department of the Interior (DOI) initiated a major national initiative to detect trends in amphibian populations and conduct research into causes of declines, the Amphibian Research and Monitoring Initiative (ARMI). Objectives include:

- Initiate long-term monitoring to determine trends in amphibian populations
- Conduct research into causes of amphibian declines and malformations
- Make use of relevant expertise within USGS and DOI
- Make the information available to cooperators, land managers, the scientific community, and the general public

ARMI projects are being conducted nationally. In the Northern Rocky Mountains, long-term monitoring of amphibian populations is being initiated at several National Parks, and surveys are being conducted on National Forests in Montana in cooperation with Region 1 of the Forest Service. ARMI funding is being used to help fund research on amphibian population dynamics.

Page 31 of 5344

WHEN: 2000 to 2004

WHERE: Glacier National Park, Grand Teton National Park, Theodore Roosevelt National Park, Yellowstone National Park, National Forests in western Montana, National Wildlife Refuges in Montana and Idaho

WHY: Approximately 230 species of frogs, toads, and salamanders make up the amphibian fauna of the continental United States. Their aquatic and terrestrial life stages and sensitivity to environmental conditions make them ideal sentinels of environmental stress and a possible model for human health studies. Declines have been observed in many parts of the world, including the United States. Habitat alteration and destruction have long been major causes of amphibian declines. More recently, significant declines have occurred in protected areas in the western United States that have not shown obvious changes in habitat. These unexplained declines may be caused by contaminants, non-native species, or disease. Under ARMI, concern about amphibian populations isp laced within the larger context of measuring trends in amphibian populations and a variety of environmental parameters.

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LEOPOLD INSTITUTE'S WILDLIFE PUBLICATIONS (1991-2002)

- WILDLIFE MANAGEMENT ACTIVITIES IN WILDERNESS
- RECREATION IMPACTS - GENERAL
- EFFECTS OF HUMAN INTRUSIONS ON BIRDS
- AMPHIBIAN CONSERVATION AND FISH STOCKING

To view abstracts for all of the following publications, go to the Leopold Institute's searchable publication database and search the wildlife category and sub-categories, OR view a specific abstract by selecting the publication number.

Wildlife management activities in Wilderness:

37.b38

Landres, Peter; Meyer, Shannon; Matthews, Sue 2001. The Wilderness Act and fish stocking: an overview of legislation, judicial interpretation, and agency implementation. *Ecosystems* 4(4): 287-295.
Leopold Publication Number 426

Page 32 of 5344

Krausman, Paul R.; Czech, Brian. 2000. Wildlife management activities in wilderness areas in the Southwestern United States. *Wildlife Society Bulletin* 28(3): 550-557.
Leopold Publication Number 412

Amphibian conservation and fish stocking:

37.b38

Bury, R.B.; Major, D.J.; Pilliod, D.S. 2002. Responses of Amphibians to Fire Disturbance in Pacific Northwest Forests: a Review. The role of fire in nongame wildlife management and community restoration: traditional uses and new directions. Edited by W.M. Ford, K.R. Russell, and C.E. Moorman U.S. Department of Agriculture, Forest Service, Northeastern Research Station, Newtown Square, PA. Gen. Tech. Rep. NE-288: 34-42.
Leopold Publication Number 447

Pilliod, D.S.; Peterson, C.R. 2001. Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds. *Ecosystems* 4:322-333.
Leopold Publication Number 446

Corn, Paul Stephen 2001. Fish Stocking Impacts to Mountain Lake Ecosystems: The Introduction of Nonnative Fish into Wilderness Lakes: Good Intentions, Conflicting Mandates, and Unintended Consequences. *Ecosystems* 4(4): 275-278.
Leopold Publication Number 427

Landres, Peter; Meyer, Shannon; Matthews, Sue 2001. The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation. *Ecosystems* 4(4): 287-295.
Leopold Publication Number 426

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Leopold Publication Number 425

Corn, Paul Stephen 2001. Perspectives from the Aldo Leopold Wilderness Research Institute: Amphibians and Wilderness. *International Journal of*

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Corn, Paul Stephen 2000. Amphibian Declines: Review of Some Current Hypotheses. *In*: Sparling, Donald W.; Linder, Greg; Bishop, Christine A., eds. Ecotoxicology of Amphibians and Reptiles. U.S. Geological Survey, Midwest Science Center. Columbia, MO: 663-696.
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Pilliod, David S.; Peterson, Charles R. 2000. Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes. *In*: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. 2000. Wilderness science in a time of change conference - Volume 5: Wilderness ecosystems, threats, and management; 2000 May 23-27; Missoula, MT. Proceedings RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 328-335.
Leopold Publication Number 406

Corn, Paul Stephen; Knapp, Roland A. 2000. Fish Stocking in Protected Areas: Summary of a Workshop. *In*: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. 2000. Wilderness science in a time of change conference - Volume 5: Wilderness ecosystems, threats, and management; 2000 May 23-27; Missoula, MT. Proceedings RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 301-303.

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Leopold Publication Number 317

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Leopold Publication Number 311

Muths, Erin; Corn, Paul Stephen. 1997. Basking by adult boreal toads (Bufo boreas boreas) during the breeding season. *Journal of Herpetology* 31(3): 426-428.
Leopold Publication Number 310

37.b39

NON-NATIVE FISH STOCKING IN LAKES READING LIST

This reading list provides an introduction to the issue of fish stocking in lakes. Rather than a comprehensive list, it is a compilation of references that scientists currently working on the issue have suggested may be relevant to managers, policy makers, and other scientists. Here the issue is separated into the following categories:

- **General Overview**
- **Amphibian Impacts**
- **Native Fish Impacts**
- **Ecosystem and Community Impacts**
- **Management and Restoration**

Comments/updates to the list can be sent to the Leopold Institute.

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Back to List

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AMPHIBIANS

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Back to List

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Back to List

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Back to List

37.b35

MANAGEMENT AND RESTORATION

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Back to List

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3 November 1998

~~These are quotes from the research paper summaries that follow. It is perfectly clear that there is so much more to recreational fishing of westslope cutthroat trout in Wilderness Lakes. Wilderness values, effects on the original non-fish species, and disruption of natural processes have as much weight, if not more, then a potentially threatened fish species being considered to be stocked in originally barren, fishless lakes in the Wilderness.~~

~~Because they have the potential to provide the best remaining standards of relatively unmodified landscapes, protected areas in North America (such as wilderness areas and national parks) have tremendous ecological and scientific value (Cole and Landres 1996). Although the montane ecosystems of western North America are particularly well represented in this complex of protected lands, aquatic habitats within these protected areas are often subject to management practices that are inconsistent with the goal of maintaining natural processes. The most prevalent of these practices is the introduction of salmonid fishes (such as trout) into historically fishless ecosystems to create recreational fisheries.~~

~~These stocking programs have dramatically transformed the formerly fishless aquatic ecosystems within protected areas of western North America. For example, of the estimated 16,000 naturally fishless mountain lakes in the western US, the majority of which are located within national parks and wilderness areas, 60% of all lakes and 95% of larger, deeper lakes now contain nonnative trout (*Oncorhynchus* spp., *Salmo* spp., *Salvelinus* spp.) (Bahls 1992).~~

~~The management of nonnative trout populations in protected areas is highly controversial due in large part to increased awareness of the ecological effects of introduced fishes on naturally fishless ecosystems (Duff 1995; Fraley 1996). Although the state agencies charged with managing aquatic ecosystems within protected areas have historically focused on providing recreational fishing while placing little emphasis on ensuring the maintenance of natural processes, fisheries managers are increasingly being asked to justify their stocking programs in light of a growing body of literature that documents the effects of fish introductions into naturally fishless lakes. These studies have repeatedly demonstrated that fish introductions dramatically alter native vertebrate and invertebrate communities, often resulting in the extirpation of native fishes, amphibians, zooplankton, and benthic macroinvertebrates (Anderson 1972; Stoddard 1987; Bradford and others 1998; Carlisle and Hawkins 1998; Tyler and others 1998; Knapp and Matthews 2000). However, these studies have typically focused narrowly on the direct impact of fish introductions on the native fauna and ignored the possible disruption of ecosystem processes (but see~~

Page 45 of 5344

~~Leavitt and others 1994) as well as indirect landscape-scale impacts transmitted beyond the boundaries of those habitats subject to fish introductions.~~

~~He concludes that in the face of increasing public support for protecting natural processes, the continued stocking of fish into wilderness ecosystems is no longer justified.~~

~~They conclude that although US federal policy currently grants the authority for fish stocking to the states, case law allows the federal agencies to be directly involved in decisions regarding fish stocking in wilderness areas.~~

~~This work shows that the introduction of salmonid fishes into headwater lakes can result in disproportionately larger effects on native fishes than introductions lower in drainages~~

~~However, introductions of nonnative fishes into headwater lakes provide point sources capable of invading all downstream habitats, as the fish surmount barriers that normally hinder upstream-directed invasions.~~

~~These results suggest that widespread fish stocking has caused substantial changes to nutrient cycles in hundreds of lakes throughout montaneprotected areas of western North America, with impacts being greatest in lakes stocked with high densities of trout.~~

~~They report that at a local scale, after accounting for habitat differences between fishcontaining and fishless water bodies, the abundance of all life stages of long-toed salamanders and spotted frogs was lower in water bodies containing nonnative trout than in water bodies remaining in a fishless condition. At the landscape scale, the presence of fish in some water bodies had important influences on the abundance of amphibians in the remaining fishless water bodies.~~

~~Of the two large zooplankton species believed to have been present in the lake prior to fish introductions, one reappeared while another failed to do so, apparently because the egg bank of this latter species had been depleted during the 30 years of fish presence.~~

~~Collectively, these papers indicate that the effects of widespread trout introductions into wilderness landscapes are not limited simply to direct effects on prey taxa, but instead can be transmitted throughout lake food webs and even beyond the shorelines of fish-containing lakes to fishless lakes. In addition, following fish removal, full recovery of ecosystem structure and function may not occur~~

~~If managers are to truly balance these often opposing goals, it is imperative that current fisheries management practices be evaluated in the context of their effects on ecosystem and landscape processes.~~

~~The highly utilitarian ethic that drove resource management until well into the 1960s was gradually replaced by one that acknowledges the value of all life forms and their ecological complexity, a view currently supported even by many anglers. The necessity for wilderness fish stocking is now the subject of widespread debate, especially in view of changing social values and priorities. Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems.~~

~~Future management of waters that already contain introduced trout must be directed toward overall ecosystem health and stability, with biodiversity and ecosystem integrity as a paramount objective.~~

~~Options for future generations cannot be preserved if introductions continue to erode the biodiversity of mountain lake ecosystems. This should be our greatest concern.~~

~~Further, although current federal regulations recognize state authority for fish stocking, judicial interpretation gives federal agencies the authority for direct involvement in decisions regarding fish stocking in wilderness.~~

Page 46 of 5344

~~Fish stocking does compromise certain wilderness values, and wilderness designation does impose restrictions on the types of wildlife management actions that are appropriate in wilderness areas. In some cases, these compromises and restrictions have led to an "either/or" dichotomous view that pits state fish stocking programs against federal responsibility for protecting wilderness values. Differences in agency missions, traditions, and cultures also tend to exacerbate "us vs them" attitudes.~~

~~Backed by Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values.~~

~~headwater lake stocking provides source populations that may be capable of invading most downstream habitats, including headwater refugia of native fishes.~~

~~Trout introductions to high-elevation headwater lakes thus pose disproportionately large risks to native fishes—even when the place of introduction may appear to be spatially dissociated from populations of the native species.~~

~~It is important to consider, however, that stocking of a mere handful of lakes could allow nonnative fishes access to nearly an entire stream network.~~

~~Similarly, the stream area negatively affected by nonnatives could be minimized by stocking multiple lakes in one tributary basin instead of one lake each in multiple basins.~~

~~Systems where nonnative fishes have emigrated from headwater lakes and occupy, but have not successfully colonized, the outlet streams should be considered good candidates for eradication projects.~~

~~Introduced fish may alter lake nutrient cycles and primary production, but the magnitude and variation of these effects have not been fully explored.~~

~~The results of our modeling and paleolimnological analyses indicate that introduced trout fundamentally alter nutrient cycles and stimulate primary production by accessing benthic P sources that are not normally available to pelagic communities in oligotrophic mountain lakes. These effects pose a difficult challenge for managers charged with balancing the demand for recreational fisheries with the need to maintain natural ecosystem processes.~~

~~Implications for Current Stocking Practices in Mountain Wilderness Areas~~

~~Although the largest perturbations to lake communities and ecosystem processes probably occur soon after fishless lakes are stocked for the first time, our analyses show that continued stocking only serves to exacerbate the original effects.~~

~~In addition, our analyses of fish nutrient regeneration rates suggest that the contributions of introduced trout to nutrient cycles are approximately double the level estimated for lakes that have not been stocked for several decades (Figure 7).~~
~~Therefore, to truly minimize effects of introduced fish on mountain lake ecosystems, all stocking should be halted. This would allow the lakes that lack sufficient spawning habitat to revert to a fishless condition, while reducing the density of fish in lakes with self-sustaining trout populations. Because many currently stocked lakes are likely to harbor self-sustaining trout populations (Bahls 1992; R. A. Knapp unpublished), a moratorium on trout stocking in all lakes would provide fisheries managers a simple means by which to reduce the effects of introduced fish on native invertebrate communities and ecosystem processes while still providing ample recreational fishing opportunities. It remains to be seen whether native faunal assemblages and ecosystem processes in mountain lakes can be restored simply by eliminating fish populations (Funk and Dunlap 1999; McNaught and others 1999).~~

~~At the scale of individual water bodies, after accounting for differences in habitat characteristics between fish-containing and fishless sites, the abundance of amphibians at all life stages was significantly lower in~~

Page 47 of 5344

~~lakes with fish. At the basin scale, densities of overwintering life stages of amphibians were lower in the fishless sites of basins where more habitat was occupied by trout. Our results suggest that many of the remaining fishless habitats are too shallow to provide suitable breeding or overwintering sites for these amphibians and that current trout distributions may eventually result in the extirpation of amphibian populations from entire landscapes, including sites that remain in a fishless condition.~~

Restoration

~~Conserving natural biodiversity and maintaining functioning ecosystems is a goal of protected area management. The results of this study suggest that wildlife managers need to consider restoring a few deep lakes in each basin to create fishless breeding and overwintering habitat for amphibians (Knapp 1996; Knapp and Matthews 1998; Pilliod and Peterson 2000).~~

~~Gill netting is a viable fish eradication technique for smaller (less than 10 ha, (25 acres)), shallow (less than 10 m (33 feet) deep)) lakes that lack habitable inflows and outflows or other sensitive species. Further work is required to define appropriate removal methods for larger lakes and watersheds.~~

~~We believe that shallower lakes (less than 10 m deep) of up to 10 ha should be amenable to gill net eradication of nonnative fishes over reasonably short periods, without resorting to rotenone or other poisons.~~
~~If the restoration of substantially larger or deeper lakes is proposed, alternate methods of fish removal including, but not limited to, electrofishing, trap netting on spawning grounds, disturbing spawning habitat, creating under-ice anoxia by the addition of nutrients (see Brunskill and others 1980 for a possible method), lake drawdown, and/or the application of piscicides should be given consideration in addition to, or as a replacement for gill nets. These alternate methods will be controversial, but they may be more practical for removing fish from certain lakes. Canadian national parks managers have previously used chemical agents in their attempt to eradicate fish from dozens of lakes.~~

~~Further, nontarget species such as Harlequin Ducks (*Histrionicus histrionicus*) and even bears might be adversely affected by restoration activities on some water bodies.~~

~~Last, because organisms such as *Gammarus* may be extirpated but leave no trace of their prior existence, it will be difficult to ascertain that full food web restoration has been achieved for the many lakes that lack prestocking records of their original invertebrate communities.~~
~~Further experimental restoration work is needed to better define the practical limits of gill netting as a management tool and to provide alternate solutions for larger or otherwise "difficult" stocked lakes. A better understanding of our few remaining pristine ecosystems is also needed if we wish to undo a century of past fisheries management practices and return a small suite of lakes to their natural state~~

~~Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness~~
~~The origin and value of these concepts are discussed, as well as the dilemma and irony that arises when wilderness managers contemplate manipulating the environment to restore naturalness at the risk of reducing wildness~~

~~It is concluded that large scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. One of the biggest hurdles facing wilderness policy makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.~~

~~Two independent but related concepts are intertwined in the idea of wilderness. In the 1964 Wilderness Act, wilderness is defined in Section 2.(c) as "...an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Later in this same section, wilderness is further defined as an area "retaining its primeval character and influence...which is protected and managed so as to preserve its natural conditions." The key words in these quotes are untrammeled and natural. When the Wilderness Act was passed, these key words undoubtedly were intended to be complementary because untrammeled areas were certainly natural. Today, however, we are witnessing regional ecological impacts to areas that are untrammeled in every other way, as well as new understanding of the long-term ecological consequences of natural resource management. As a result, we now~~

~~have divergent philosophical views of what wilderness is and what it should be. These views are encapsulated by the words untrammeled and natural in a way that was likely unforeseen by wilderness proponents as they crafted legislative wording. This dialogue session explored the management dilemmas and social issues resulting from these divergent views and presented a case study that brings these diverging views into sharp focus.~~

~~Synonyms for untrammeled include unimpeded, unhampered, uncontrolled, self-willed and free. We suggest that the word "wildness" strongly connotes this sense of an area free from human control or manipulation.~~

~~Synonyms for natural include native, aboriginal, indigenous and endemic, and we suggest that the term "naturalness" be used to capture this biological sense of wilderness.~~
~~While these concepts of wildness and naturalness differ from one another, both are essential elements of wilderness; wilderness is the idea and place where the concepts of wildness and naturalness reach their highest expression. These concepts strongly influence, either directly or indirectly, virtually all of the decisions and actions taken in wilderness management.~~

~~Large-scale wilderness restoration based on manipulating the environment will always cause a dilemma and entail the irony of balancing wildness against naturalness. In one way, this dilemma is good because it forces us to carefully consider our actions and their consequences. "Doing the right thing" for wilderness used to be fairly straightforward. Today, with our increased knowledge of regional-scale human impacts, coupled with our desire to restore areas known to be degraded, "doing the right thing" is no longer a simple path because it is based on a philosophical choice between wildness and naturalness. Two people or groups may differ, sometimes strongly, about what they perceive is "right" for wilderness, and both views are valid. If there are significant doubts about a proposed action, one view would err on the side of protecting wildness, while the other view would err on the side of naturalness. One of the biggest hurdles facing wilderness policy-makers and managers today, as well as the concerned public, is how to reconcile these views and manage wilderness for both wildness and naturalness.~~

~~To balance wilderness lake use between recreational fisheries and protected habitat for native species, managers need to understand how stocking non-native predaceous fish affects amphibian populations within a landscape. The goal of this paper is to help managers design and conduct studies that will provide such information. Desirable study characteristics include multiple- visit surveys of all wetlands within a watershed to provide information on amphibian distribution, abundance, breeding, recruitment and seasonal variation in habitat use. By identifying the distribution of critical amphibian habitat and source populations, this approach should enable managers to target specific lakes for protection or restoration as fishless amphibian habitat without overly compromising wilderness fishing opportunities.~~

~~Wild areas, large or small, are likely to have values as norms for land science. Recreation is not their only, or even principal utility.~~
~~—Aldo Leopold, Sand County Almanac~~

~~6. How Can This Information Be Used to Evaluate Potential Management Actions?~~

~~Like many ecological problems, the anthropogenic effects of trout stocking on amphibians can vary for different species and even different populations of the same species under a variety of conditions. This variability makes it difficult to make general management recommendations that will adequately protect all species and their habitats. However, research can greatly improve the evaluation and implementation of effective management actions that may balance the needs of the recreational public with conservation of native species. Ideally, any alterations in stocking practices should strive for the lowest cost-benefit ratio in terms of decreasing threats to amphibian persistence with the fewest changes to current recreational fishing opportunities.~~
~~Possible management actions include: (1) ceasing stocking in all lakes, (2) ceasing stocking and possibly removing fish from some lakes, (3) reducing stocking frequency and density, (4) reducing naturally reproducing populations of fish by restricting access to spawning areas and/or gill netting, (5) changing species stocked (cutthroat may be less predatory than rainbow or brook trout), (6) stocking sterile fish, or (7) making no changes in stocking practices if fisheries threats to amphibian persistence are negligible.~~
~~Cessation of stocking in all wilderness lakes would most likely benefit amphibians and reduce threats to persistence (fig. 3). Undoubtedly, this action would be extremely unpopular for many anglers and could result in less support for wilderness. Economic impacts on outfitters and guides may also occur. Despite the potential socioeconomic costs of this management strategy, some wilderness proponents argue these costs will be minimal and will not overly jeopardize public support for wilderness (Murray and Boyd 1996). This view appears to be supported by resolutions from potentially opposing groups like the Society for Conservation Biology (SCB) and Trout Unlimited. The SCB recommends "phas[ing] out incongruent stocking practices and restor[ing], where appropriate and feasible, previously damaged ecosystems" (SCB 1995). Trout Unlimited states that it "oppose[s] salmonid stocking in historically documented non-salmonid waters where scientific evaluation indicates that such stocking would be likely to adversely affect native biodiversity" (Trout Unlimited 1998).~~

~~An example of the potential costs and benefits of restoring wilderness lakes through the cessation of fish stocking comes from the National Park Service, which recommended phasing out and eventually terminating all fish stocking (NPS 1975). In Sequoia, Kings Canyon and Yosemite National Parks, fish stocking was curtailed in the 1970's and completely halted in 1991. This management decision resulted in the loss of recreational fisheries from 20% to 44% of previously stocked lakes (Knapp 1996). Due to a reduction in the proportion of lakes containing fish, as well as historic differences in stocking intensity, the mountain yellow-legged frog currently has a greater distribution in Kings Canyon National Park, compared with the neighboring John Muir Wilderness, where lakes have continued to be stocked and frog persistence is at risk (Matthews and Knapp 1999).~~

~~A similar pattern was observed in the Bitterroot Mountains, Montana where six of 18 stocked lakes (33%) no longer supported trout populations in 1996, following cessation of stocking in 1984 (Funk and Dunlap, in press). Funk and Dunlap (in press) found that long-toed salamanders recolonized five of these currently fishless, but previously stocked lakes within two decades, even in lakes over 5 km from the nearest salamander populations. These studies indicate that widespread cessation of stocking does not result in the loss all trout populations and that amphibians will recolonize lakes after fish disappear.~~

~~Cessation of fish stocking, and even removal of fish, in some but not all lakes may be more amenable to recreational anglers. If conducted properly, this management strategy could provide the necessary amphibian habitat for species recovery. The success of this management action, however, is dependent on which lakes are selected for fish elimination. Choosing lakes to be restored to a fishless condition based solely on anthropogenic variables, such as difficulty of access and amount of angler use, may have little effect on reducing threats to amphibian persistence (fig. 3). However, restoring fishless lakes based on their potential for amphibian recolonization and their importance as amphibian habitat should improve the success of this action.~~

~~For fish elimination, we recommend targeting: (1) stocked lakes that already have some amphibian breeding occurring, (2) lakes that appear to provide deep-water overwintering habitat for amphibians in surrounding shallow, fishless lakes, (3) lakes that have the potential for fish elimination (low or no natural reproduction), and (4) lakes that are the least important for recreational anglers. Of these recommendations, the first three should take priority over the last. In our study, over 40% of the stocked lakes had at least some frog reproduction, yet few of these lakes had any frog recruitment. Eliminating fish from a lake where frogs are already breeding should result in faster frog recovery than eliminating fish in a lake that has no amphibian reproduction. Furthermore, restoring lakes that provide over-wintering habitat for amphibians can benefit amphibians both locally and potentially across a watershed. Finally, when selecting a lake for fish elimination, choosing a lake that will require the least amount of invasive management (fish removal) is important. Nonreproducing fish can be eliminated from a lake by simply removing that lake from the stocking schedule. However, if fish removal is required, techniques such as gill netting (Knapp and Matthews 1998), coupled with blocking spawning habitat, are preferable to piscicides, such as rotenone and antimycin A. Both of these chemicals may harm other aquatic vertebrates, including amphibians (Fontenot and others 1994; Schnick 1974), and their use in wilderness is controversial.~~

~~Finally, managers should keep in mind that most systems are not isolated, and fish stocking practices in adjacent regions can significantly affect restoration efforts. For example, fish dispersal from upstream locations may colonize wetlands that are actively managed as fishless habitats. In addition, fish predation in streams may act as barriers to migration, dispersal and hence colonization of amphibians (Bradford and others 1993).~~

~~Despite the range of possible management actions, we believe the best management strategy is to use species and watershed-specific biological information to make management decisions. This information can be obtained only through carefully designed and conducted studies that provide adequate information about the distribution, abundance and life history characteristics of amphibian species across local landscapes. Hopefully, using appropriate information at the watershed scale will enable managers to restore critical amphibian habitat and the biological integrity of wilderness lakes. Creating a few fishless lakes to provide the necessary habitat requirements of amphibians in a watershed may disproportionately reduce the threats of fish stocking on amphibian persistence. For example, having two amphibian source populations in a watershed, instead of one, may increase the probability of amphibian persistence in that watershed by an order of magnitude. With proper management, we believe amphibian populations can be recovered and protected while maintaining recreational fishing opportunities in many wilderness lakes.~~

~~**Abstract**—Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness, generating conflicts between managing wilderness as natural ecosystems and providing opportunities for recreation. Managers faced with controversial and difficult decisions about how to manage wilderness lakes may not always have ready access to research relevant to these decisions~~

~~The conflicts between managing wilderness as "natural" ecosystems and providing opportunities for recreation are especially acute in fisheries management. Native and nonnative sport fish have been introduced into the majority of historically fishless lakes in wilderness (Bahls 1992), usually to the detriment of the native biota (Bradford and others 1993; Chess and others 1993; Tyler and others 1998). Alpine lakes are the primary target for recreation in wilderness (Hendee and Schoenfeld 1990), and fishing opportunities may further concentrate use in these areas, resulting in resource damage and compromising solitude in the wilderness experience.~~

~~Fish stocking, especially using aircraft, is also considered to conflict with wilderness values (Duff 1995).~~
~~However, fish stocking in mountain lakes long predates the Wilderness Act of 1964, and fishing is the objective of a~~
~~sizable proportion of wilderness visitors (Fraley 1996, Hendee and Schoenfeld 1990). Language in the Wilderness Act,~~
~~reserving the rights of the States with respect to management of fish and wildlife, is often cited as justification for~~
~~continued active management of fisheries in wilderness (Duff 1995, Fraley 1996). Conversely, other language in the~~
~~Wilderness Act promoting the preservation of natural systems, and increasing emphasis on wilderness as a reference~~
~~point for the study and management of ecosystems (Hendee and others 1990, Kaufmann and others 1994) are difficult~~
~~to reconcile with many of the current practices of fisheries management.~~
~~Consequently, managers are faced with controversial and difficult decisions about how to manage wilderness lakes,~~
~~and they do not always have ready access to research relevant to these decisions. Considerable research has been~~
~~conducted recently on the biological effects of fish stocking on resident biota. Many managers tend to minimize these~~
~~effects, however, instead promoting untested alternative hypotheses.~~

~~an overview of fish stocking in wilderness from federal, state, tribal and user perspectives, including summaries of key~~
~~legislation, policy and description of current management practices. A session on community and ecosystem effects~~
~~included effects of fish stocking on lake nutrient cycling, algal dynamics and invertebrates and interactions between~~
~~predators, hydroperiod and amphibians. The third session focused on effects on vertebrate species and included~~
~~discussions on effects of stocking on native fish and amphibians. The final session described restoration and~~
~~management.~~

~~Life history traits vary among amphibian species, however, and fish stocking may affect~~
~~species differently. In addition, amphibian population structure may be affected at a~~
~~broad scale when a portion of lakes and streams in a watershed are stocked. This habitat~~
~~fragmentation may isolate amphibian populations and result in increased extinction rates.~~

Results: ~~Historical records indicated that Idaho Fish and Game stocked over 60,000~~
~~cutthroat and rainbow trout into 12 to 30 previously fishless lakes in 1937 and 1938 in the~~
~~Bighorn Crags area. Beginning in the 1960s, fish were restocked every three to six years.~~
~~In total, 37 lakes were stocked with 300,000 fry or fingerlings.~~

~~Cutthroat, rainbow, and golden trout and their hybrids were found in all 11 basins~~
~~searched. Overall, fish occupied 43% of sites. Large, deep lakes (greater than 1 ha in~~
~~surface area and more than 4 m deep) were more likely occupied than small, shallow~~
~~wetlands. As a result, fish occupied 90% of the available surface area of water in the~~
~~basins. More importantly, only two basins had more than one deep, fishless lake.~~

~~Densities of both long-toed salamanders and Columbia spotted frogs were lower in sites~~
~~with fish than in those without fish. Indeed, when site characteristics of deep lakes were~~
~~held constant, fewer amphibians of all stages were found in stocked lakes than in lakes~~
~~without fish. Moreover, densities of salamander larvae at least two years old, and both~~
~~adult and juvenile frogs in *fishless* sites decreased as the proportion of wetlands in the~~
~~basin occupied by trout increased.~~

~~Management Implications:~~
~~Survival of salamander larvae and juvenile frogs may depend on deep lakes (>2 m), yet~~
~~few of these habitats are not stocked with fish.~~
~~Negative effects of stocked lakes may extend across a landscape. Lakes with fish may~~
~~have insufficient juvenile recruitment to compensate for adult mortality. Amphibians~~
~~with extended larval periods may be forced to breed in shallower wetlands where the risk~~
~~of extirpation due to desiccation, anoxia, and freezing are higher than in the deep, lentic~~
~~environments. Likewise, amphibians that complete their life cycle in one summer may~~

~~breed in shallow wetlands but may be forced to immigrate to deep lakes to overwinter. If those lakes are stocked with fish, the progeny may be completely eradicated.~~
~~Information necessary to evaluate the effects of fish stocking in high-elevation lakes should include knowledge of:~~

~~(1) **the amphibian and fish species in the area**—Because little information is available about distributions of many amphibian species, surveys should be based on what species are potentially in the wilderness area and the life histories of those species. Different types of surveys conducted at various times of the year may be needed to assess abundances and life stages.~~

~~(2) **the extent of area impacted**—Surveys of entire watersheds provide the most unbiased information to determine production, habitat use, and potential interaction between fish and amphibians and allow the most accurate assessment of management actions. Because watershed sampling requires considerable time and effort, the number of watersheds in a wilderness that can be sampled may be limited. Surveying a subset of wetlands in different watersheds using stratified sampling may broaden the scope if all wetland types can be adequately represented. Integrating fish and amphibian surveys may also expand sampling ability. photo by Steve Corn~~

~~(3) **the effect of management actions**—Because the basin-wide effects of fish stocking have only recently been identified, information on the results of specific management actions is unavailable. Potential management actions include: cessation of stocking and/or removal of fish, which reduce the number of lakes supporting fish; reduction in stocking frequency/density/fertility (stocking sterile fish or limiting access to spawning habitat), which may result in fishless habitats for short periods; and alteration of the species stocked (e.g. cutthroat trout may be less predatory than brook or rainbow trout).~~

~~The consensus of the participants of that meeting was that amphibian populations declines were real but documentation was largely anecdotal, and much work was needed on the causes of population declines~~

~~Knowledge about the status of amphibians is important, because amphibians occupy important ecological niches and a high proportion of western amphibian species have undergone recent declines, often in protected habitats.~~

~~Introduced trout are often implicated in the decline of high mountain amphibian populations, but few studies have attempted to understand whether the effects of trout in lakes where they have been introduced may also influence the distribution and abundance of amphibians throughout entire mountain basins, including in remaining fishless lakes.~~

~~Our results suggest that many of the remaining fishless habitats are too shallow to provide suitable breeding or over-wintering habitat for these amphibians, and that current trout distributions may eventually result in the extirpation of amphibian populations from entire landscapes, including from sites that remain in a fishless condition.~~

~~Amphibian Research and Monitoring Initiative~~

~~Initiate long-term monitoring to determine trends in amphibian populations~~

~~Conduct research into causes of amphibian declines and malformations~~

~~Habitat alteration and destruction have long been major causes of amphibian declines. More recently, significant declines have occurred in protected areas in the western United States that have not shown obvious changes in habitat. These unexplained declines may be caused by contaminants, non-native species, or disease.~~

Page 53 of 5344

SFFD-038
SEP 03 2004

PROFESSIONAL WILDERNESS OUTFITTERS ASS'N.

March 15, 2004

MT FWP
Mr. Mac Long
3201 Spurgeon Rd.
Missoula, MT 59804

Professional Wilderness Outfitters Association have concerns on the proposed poisoning of fish in lakes in the upper South Fork of the Flathead River drainage.

38-1 Professional Wilderness Outfitters Association does support a healthy and viable native cutthroat trout population in the upper South Fork of the Flathead River drainage in the Bob Marshall Wilderness Complex.

Our concerns are:

38-2 1. We question the technique proposed for the poisoning. Such as motorized boats, helicopters and the poison its self. The Wilderness Act states "no motorized equipment" to be use unless in emergency.
38-3 Also how safe is the poison to human and wildlife?
38-4 2. The size and scope of this project and the lake sizes is untested in relation to getting a good kill on the existing fish populations.
38-5 3. There is little evidence that non-native species are infiltrating down the tributaries and into the main river.
38-6 4. Loss of recreational opportunities for non-outfitted and outfitter public.
38-7 5. At this time there is there seems to be no imminent threat to the native cutthroat trout in this area.
38-8 6. Chances of litigation to prevent the restocking of the lakes due to Bonneville Power Assn and Montana Fish, Wildlife and Parks doing separate portions of the project.

PWOA is real concerned about this project and want you to consider re-evaluating your position to go a head on it. Thank you for responding to these concerns.

Sincerely yours,

Ernie Barker

Mr. Ernie Barker, President
Professional Wilderness Outfitters Assn.
PO Box 310
Augusta, MT 59410
Email: triplej@3rivers.net

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SFFD-039
SEP 0 3 2004

August 20, 2004

Colleen Spiering,
Environmental Specialist
Bonneville Power
P.O. Box 3621

To Whom It May Concern:

39-1 Recently I had the good fortune of fishing Sunburst Lake in the Bob Marshall Wilderness. What wonderful fishery that is. Being able to catch Westslope and Yellowstone cutthroat in the same lake is quite a thrill. I hope you don't follow through on your poisoning process we have heard you are considering.

39-2 It just doesn't make any sense to me to poison all of these lakes that provide such successful angling right now. Besides, if there are already hybrid fish in these lakes and

39-3 streams that flow out of them, your not going to be able to reverse that unless you poison everything. And that would be the wrong thing to do.

Please leave this fishery alone.

Sincerely,

Kirk Gentry

Kirk Gentry - Owner/Outfitter
115 Lake Blaine Drive Kalispell, Montana 59901 406-755-7337
www.spottedbear.com email: info@spottedbear.com

SFFW-040

American Fisheries Society
Montana Chapter

389 Rick Oshay Road
Whitefish, Montana 59937
emuhlfeld@state.mt.us

13 August 2004

Communications
Bonneville Power Administration, DM-7
PO Box 12999
Portland, Oregon 97212

RE: Montana Trout Conservation Project

Dear Colleen Spiering:

This letter provides comments from the Montana Chapter of the American Fisheries Society (MCAFS) in regards to the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program Draft Environmental Impact Statement (DOE/EIS-0353), hereafter DEIS. The MCAFS is an organization of professional fisheries scientists and students from multiple agencies, universities and the private sector across Montana. One of our objectives is the conservation, development and wise utilization of Montana's fisheries. We are keenly interested in the conservation of the large, interconnected metapopulation of westslope cutthroat trout (WCT) in the South Fork Flathead River, as well as the reestablishment of natural and wilderness values in the aquatic ecosystems of the South Fork Flathead watershed.

40.1 As a signatory to the Westslope Cutthroat Trout Conservation Agreement, we fully support the goal to preserve the genetic purity of populations in the South Fork of the Flathead River drainage. We also agree with the immediate need to remove hybrid source populations from identified lakes and to replace them with genetically pure and appropriate stocks of WCT in most cases. The proposed activity to remove non-native species from 21 lakes, therefore, is an important conservation action for WCT on which we would like to comment.

40.2 First, we would like to make it clear that MCAFS strongly supports the concept of removing non-native species from the South Fork Flathead River basin. We concur that non-native fish (hybridized cutthroat trout) pose a serious threat to the long-term conservation and persistence of westslope cutthroat trout. We also believe that reestablishment of fishless conditions in some of the high mountain lakes is desirable. We are pleased that the Bonneville Power Administration, 40.3 Montana Fish, Wildlife & Parks (FWP), and the U.S. Forest Service are willing to take on such a bold conservation action. The South Fork Flathead is a rare ecosystem because it is one of the largest sub-basins in the West that supports a native, intact species assemblage, with the glaring exception of hybrid and non-native fish in some of it's high mountain lakes.

40.4 MCAFS also concurs that the only viable method to remove non-native species from these 21 lakes is the application of either antimycin or rotenone. While we appreciate that chemical reclamation can be controversial, we think that the risks to non-target species are acceptable and that FWP has sufficient experience to implement the project.

40.5 The proposed actions implement the chemical reclamation by a variety of means (fixed-wing airplane, helicopter and boats, livestock) based on social, economic, and logistical concerns for each lake. This is a commendable approach and it should help reduce the controversy around working in the Bob Marshall Wilderness or the Jewell Basin Hiking Area.

We think it is wise to gradually phase in the plan in order to learn as you go and not exhaust your resources. Addressing the most critical lakes first would be wise in case the funding or political situation changes in the future.

40.6 However, the DEIS does not contain a matrix upon which to base biological, logistical, political, recreational, and economical prioritization of this phased approach. This matrix should include a detailed analysis of risks and benefits associated with the treatment and subsequent stocking or non-stocking of each lake among others. The matrix should also contain biological information (fish genetics and relative abundance, invertebrate and amphibian communities etc.) for each lake to characterize physical and biological conditions upon which treatment decisions will be made.

40.7 We recommend that the most critical lakes be addressed first in case the funding or political situation changes in the future. Lakes that pose the greatest and most immediate threat to neighboring WCT populations should be given the highest priority, since that is the goal of the project. High priority should be given to lakes located in the Bob Marshal Wilderness and those that contain hybrid populations that have significant non-native contributions (e.g., degree of introgression) and large population sizes.

40.8 In the case of mixed stocks assemblages (i.e., M012s planted on hybrid swarms), we recommend that the degree of introgression should be calculated on those individual fish in the sample that contain non-native rainbow trout genes. This may require collecting additional genetics samples, as sample sizes will likely be reduced.

40.9 We commend your plan to develop an adaptive approach that carefully analyzes risks and benefits to prioritize treatment and non-treatment lakes. However, a sound adaptive management plan should also include a research plan to guide the ensuing treatment phases, and in turn guide a comprehensive long-term adaptive aquatic ecosystem monitoring program. We suggest that prioritization consider the degree of hybridization, the likelihood of maintaining the lake as a pure population (or fishless), the potential for recolonization by native amphibians and zooplankton assemblages, recreational and wilderness values, and the degree of purity of WCT downstream, among others. Each lake should be analyzed independently and then placed in geographic context with neighboring lakes and streams; only then can a wide range of uses and values be accommodated through the proposed actions.

40.10 We recommend that drainage or stream specific donor stocks be used for WCT reintroductions in lakes of the South Fork Flathead River in the Bob Marshal Wilderness. The best available scientific information has clearly shown that using a "nearest neighbor" approach for reintroduction of WCT in the South Fork is the best conservation strategy to ensure the long-term genetic integrity of remaining populations. We recognize that this may conflict with a prioritized schedule based upon degree of introgression, therefore some lakes may need to be deferred until after a "nearest neighbor" brood is developed. Recent genetics studies have shown Repeat 4x that genetic differentiation between populations is a key factor for WCT reintroductions in South Fork lakes:

- 40.11 Leary (2002) concluded: "*Since substantial genetic differences exist between the M012 fish and the westslope cutthroat trout populations in Big Salmon Lake, Gordon Creek, and Danaher Creek, and the supposed middle Wheeler Creek population, continued introduction of M012 fish into these drainages genetically does not represent the best conservation approach. This practice could potentially result in significant genetic changes in the downstream populations. Whether or not these changes will negatively affect the viability of the downstream populations is unknown, but the possibility they may negatively impact viability exists. Thus, from a genetics perspective a less risky conservation strategy would be to use westslope cutthroat trout either collected directly, or descended from those collected directly, from each of these drainages as the source of fish for introductions within each respective drainage.*
- 40.12 Similarly, Dunning and Knudsen (2004) determined the genetic relationships among WCT in the upper Flathead River system and found that samples from the South Fork were significantly differentiated from those of the North and Middle Forks, and that Youngs Creek was the only one that showed significant differentiation between sites in the entire basin.
- 40.13 The Montana Westlope Trout Technical Committee (1998) also recommended using using a "nearest neighbor" strategy for WCT reintroductions and concluded that "*we do not now recommend that WCT be introduced into waters containing or connected to waters that contain a pure WCT population unless the existing pure population is the source of the introduced fish.*" Furthermore the report states: "*The allelic diversity of westslope cutthroat trout also suggests that historically there has been very little gene flow among populations, except possibly at a very local level (Wright 1932). In this situation, even fairly weak natural selection can effectively establish local adaptations. Thus, there is a good possibility that some populations of westslope cutthroat trout may have some degree of local adaptation (e.g. Fox 1993, Phillipp and Clausen 1995) which could be broken down, compromising population viability, if the native fish interbreed with westslope cutthroat trout from other populations.*"

Thus, the combined information clearly demonstrates the need to implement a "nearest neighbor" approach for reintroduction of WCT in the South Fork. Our comments on this approach are best summarized by Dunning and Knudsen (2004):

40.14 *"In the case of managing populations using the "nearest neighbor" approach within the Upper Flathead drainage, it is advisable that genetic differentiation between populations be taken into consideration. Management actions that increase the amount of genetic exchange among locally adapted populations, such as transferring fish between streams, could be detrimental if these local adaptations are lost due to outbreeding depression (Allendorf et al. 2001, 2004). Also, given the complex life history of westslope cutthroat in this system, we cannot be certain that migratory forms from one area will thrive in another. However, if a population is actually part of a larger metapopulation, then the threats of transfer of fish to such a population may be overestimated. Management of populations should be done on a case by case basis, depending on the demographic and genetic makeup of the populations at risk."*

40.15 Sekokini Springs Natural Rearing Facility provides an ideal opportunity to develop stream-specific donor populations for WCT reintroduction in the South Fork. Donor populations should be selected based on the degree of genetic relatedness using microsatellite or allozyme genetic analyses (Dunning and Knudsen 2004). Again, the document should identify specific lakes that will be reintroduced with pure WCT using the "nearest neighbor" approach. This is a critical component of the rehabilitation process for each lake and needs to be addressed and disclosed in the DEIS.

40.16 Loss of amphibian species and populations are of global concern. In recent years, there has been an increased number of species declines in the United States, from 5 species in 1980 to 33 in 1998. Declines for both endemic and widespread amphibians are believed to be the result of habitat degradation and alteration. A complicating factor is the inexplicable loss of amphibians in "pristine" areas such as wilderness areas and National Parks that generally lack obvious loss or alteration of habitat. These declines in remote areas appear to be the result of pollutants or effects from introduced species, such as trout. Despite widespread declines of amphibians, however, we still do not have a definitive answer with regards to our local species, like the spotted frog, long toed salamander, and boreal toad.

40.17 Fish stocking in the 1.5 million-acre Bob Marshall Wilderness complex appears to be a controversial fisheries management issue due to the potential conflicts with wilderness values and impacts on native fish fauna, invertebrates, and amphibians. 40.18 The basic question is whether to stock all the 21 lakes, or leave some fishless due to potential impacts to invertebrates and amphibians. The DEIS addresses this as an important issue, so we believe that the proposing agencies should consider leaving some lake fishless as a viable alternative. If the fishless issue jeopardizes this project from moving forward, we urge you to consider leaving a couple lakes fishless to ensure that this important project proceeds and achieves our mutual goal.

40.19 Leaving a couple lakes fishless could also provide a scientific framework to evaluate the potential changes to the fish, invertebrate and amphibian communities; fishless lakes could serve as controls and the stocked lakes could serve as experimental treatment groups. This experimental approach would ensure that the best scientific information is used to evaluate the potential impacts of chemical treatments on lake and river systems using an adaptive management approach.

40 20 We suggest that the scientific design and interpretation of the existing data regarding the potential impacts of fish on invertebrates and amphibians in the Flathead are inconclusive. While these data suggest limited impacts, we recommend that more rigorous studies will be necessary to conclusively prove that impacts from fish on invertebrates and amphibians in mountain lakes of the South Fork are inconsequential. We strongly recommend that this uncertainty be disclosed in the DEIS. We believe studies to address these issues should be recommended as part of the adaptive management plan for the South Fork. Ideally, these studies should be designed and implemented so that their results could be published in peer-reviewed journals.

40 21 We encourage FWP to conduct additional research because little is known about high mountain lake ecosystems. Are there unique assemblages of zooplankton or aquatic invertebrates in large, deep, fishless lakes that do not occur in shallower lakes because of potential winterkill? For example, zooplankton communities in high elevation, fishless lakes are dominated by large-bodies species. Introduction of trout results in the rapid elimination of these species and replacement by smaller-bodies forms. Once extirpated from a lake, the large-bodied species may not be able to recolonize, even if fish are removed, due to their limited ability to disperse. How do recolonization rates of amphibians differ between lakes restocked with fish versus those that are not stocked? What happens to re-established amphibian populations when fish are re-stocked on top of that amphibian population? In the past, we have only been able to infer impacts because fish have been present in these lakes for so long. Now we have a chance to actually determine what impacts may or may not occur. The DEIS fails to mention these research opportunities and the proposal to stock all lakes will result in a tremendous loss of opportunity to further our knowledge in this area.

40 22 There is an assumption in the DEIS that a complete fish kill may not be achieved. The effectiveness of the treatment will vary by lake, with the most influential factors being depth and volume. Lakes should be ranked from low to high using these factors on what the expectations are for a complete kill and subsequently monitored to determine if a complete fish kill is achieved. Stocking could be deferred for 1-2 years (at a minimum) in high probability lakes for a complete kill to determine if objectives were met to remove hybrids. If a complete kill is achieved, this may reduce the need to stock a lake to "swamp" the remaining hybrids.

40 23 The potential for future illegal introductions should be elaborated on in the DEIS. Lakes should be rated according to risk of illegal introductions. All the proposed wilderness lakes are remote and the risk is low, whereas outside of the wilderness only one lake (Handkerchief) can be reached by road.

The following are detailed comments on the DEIS:

Section 1.2.

40 24 The DEIS fails to list which lakes were previously "swamped" and to describe the potential genetic effects from the years of "swamping". For example, has inbreeding depression or the potential for changing local adaptations associated with the large amounts of M012 occurred?

Section 1.4.

40 25 During the scoping process, BPA received 71 comments. A summary is presented in this section. It will be important in the FEIS to respond to these comments as to whether they were substantive and lead to alternative development or were beyond the scope of the project. A detailed analysis of the comments (grouped by theme) is desirable.

40 26 Page 1-13. MCAFS questions whether biological integrity will be increased by stocking. Conversely, the aquatic ecosystem and biological integrity of that system is being altered by restocking/perpetuating fish in a previously fishless ecosystem.

40 27 Section 2.3
The ESA and USFWS would look at a reduction of imminent threats range wide for the species. To prevent a listing there would have to be significant efforts range wide. A case could be made if the statement " The No Action alternative could also lead to a WCT ESA listing…" was true why not propose actions in the MF, NF or throughout the Flathead. This statement has little validity, although in concept it may be good. This project is a great conservation measure, however, implemented alone it is unlikely that it would prevent an ESA listing.

40 28 Section 2.4.
Pages 2-5 and 2-8. It is commendable that adaptive management will be applied by using lessons learned from previous treatments. It would be worthwhile to mention what was learned. For example, if previous treatments were 100% successful then restocking to swamp out remaining fish would not be necessary but it may be for recreational angling. It is our understanding that FWP has had a 100% success rate (a complete kill was achieved) on the 6 treated lakes to remove trout over the last 10 years. It is our Chapter's understanding that complete kills for trout are common in lakes when trout are the targeted species. Another option is to design the project for a second treatment as in the case of Cherry Lake. If a second treatment is truly needed then this should be presented up front and the environmental effects analyzed in the FEIS.

40 29 The post treatment plan will be critical to the success of this project as will a pre-treatment plan that would determine if a lake should be stocked and, if yes, with what brood (M012 or nearest neighbor) and at what frequency. Adaptive management learned over the last decade should allow for these decisions to be made in the FEIS rather than post treatment.

40 30 We appreciate the thorough discussion associated with the treatment. The use of antimycin and rotenone being applied by various methods will enhance our knowledge in this field. We appreciate your attention to downstream aquatic organisms such as tailed frogs and bull trout.

40 31 Pages 2-26 and 2-27. There should be some discussion about using nearest neighbor fish and the effects of inbreeding and changes in local adaptations associated with M012. The WCT Tech. Committee recommendations should be noted and followed. It is assumed that M012 will be

used in all lakes since stocking will be conducted the following year with a variety of age classes. Once again, here is an opportunity to put together a pre-treatment plan that would have a variety of restocking options. The statement "restocking streams would expedite the restoration of a viable fish population" is confusing. Does this infer that viable populations currently do not exist in streams below these lakes? If portions of stream segments are treated immediately below the lakes down to a barrier, leaving these stream segments unstocked should be harmless for several reasons. 1) they are rarely fished, 2) the hybrid source is removed from the lake, 3) pure M012 would trickle out to "swamp" remaining hybrid stream fish, 4)little spawning habitat seldom exists in these high gradient reaches and 5) pure endemic SF WCT can move up from downstream until that barrier is reached.

Section 2.7

40.33 The MCAFS supports the decision not to use tiger muskies to reduce trout populations and to refrain from creating barriers in wilderness areas. 40.34 We fully agree that rotenone and antimycin provide the best chance of removing non-native trout from these lakes. Impacts associated with the use of these compounds will be limited in duration.

Section 3.2

40.35 Page 3-9. Mention is made of bull trout fishing being re-opened in the South Fork, which we agree is a great opportunity for the angling public. However, the DEIS fails to analyze the socioeconomic affects to outfitters associated with this action. Would this not enhance if at least replace any lost angling opportunities these outfitters may have if a lake was left fishless in their area?

40.36 Page 3-12. We appreciate the efforts that are being made to safeguard bull trout populations. The section on direct and indirect effects fails to mention impacts on WCT, such as the purpose of the project to reduce the likelihood of introgression and direct mortality to hybrids. Furthermore, effects upon sculpins, whitefish, or suckers are not disclosed.

40.37 Page 3-13. The MCAFS agrees that illegal bait bucket biology is a risk in any given water body. Illegal introductions are often driven by the availability of fish and access. We request that a risk assessment is completed for each of the treated lakes that would look at the likelihood of illegal introductions and where the potential source would come from. For example, most wilderness lakes, especially those without trails would have a very low likelihood of illegal introductions due to their remoteness and the closest source would be a neighbor lake or fish downstream in the creek. Illegal introductions with these fish may have less genetic risks associated with them than use of M012. The risk assessment would break this issue down from a programmatic risk that "it could happen anywhere" to a site-specific risk that may be very low on a certain waterbody such as Lick Lake. Many of the issues cited are programmatic in nature and given the scale of the proposal don't necessarily apply to every lake that is proposed.

Section 3.3

40.38 Table 3-5. This table would be much more useful if divided between fish versus fishless lakes. Adding presence, densities, sizes, etc would allow for a better understanding of potential impacts associated with the proposal. 40.39 As you may be aware, many studies have documented the changes associated with zooplankton communities in the presence of fish (see Knapp et al. 2001).

40 40 Page 3-22. There is a good discussion associated with impacts associated with the chemical treatment but no discussion about the effects upon amphibians and zooplankton associated with restocking. We request that the effects of restocking should be analyzed and included in this section.

40 41 Section 3.6
Page 3-40. Cumulative effects on the wilderness resource would vary depending on the number of chemical treatments and if the lakes become self-sustaining versus a rotational stocking. A pre-treatment plan that determines how each lake will be treated, i.e., fishless, one time stocking, rotational stocking, would lead to a better cumulative effects analysis.

Thank you for your interest in conserving westslope cutthroat trout and wilderness aquatic ecosystems. 40 42 The South Fork Flathead Watershed WCT Conservation Project is a unique opportunity to protect existing pure populations and restore genetically pure and appropriate WCT to their former distribution and abundance. We urge your agencies to consider our recommendations to conserve WCT in the South Fork Flathead, as the decisions made now will influence these important conservation areas for many years. We look forward to working with the agencies in restoring genetic integrity to the South Fork Flathead ecosystem.

Sincerely,

Clint Muhlfeld, President
Montana Chapter of the American Fisheries Society

the stewards of our resources it is irresponsible for MWFP's to disregard available information or to proceed with the chemical treatment of these streams without sufficient data to justify their actions.

38-6

As I stated in my initial June 23rd letter, these examples indicate the need for MDFWP's to carefully evaluate and justify the need for chemical treatment of each of the 21 lakes and downstream reaches they are proposing to poison. They must not be allowed to continue to ignore or disregard their own genetic data indicating that the chemical removal of fish from many of these waters is unwarranted.

38-7

As I previously commented, the very first action to be taken prior to any chemical removal of fish from any these systems is to genetically retest the populations, using both allozyme and nuclear DNA techniques to determine the current genetic composition of each lake and downstream reach. Most of these lakes were repeatedly stocked with hatchery fish from the states westslope cutthroat trout broodstock after they were first genetically characterized in the mid 1980's and early 1990's, and before any chemical treatment of these waters is conducted the effectiveness of the genetic swamping needs to be thoroughly evaluated. Based on the genetic information presented above, the assertion that this method of removal of non-native genes doesn't work is not supported. In fact, in the lakes discussed above this method has significantly reduced the percentage of non-native trout genes present.

The benefits to genetically retesting each lake and downstream reach proposed for chemical treatment should also not be overlooked. First, it will determine which lakes and streams may still require chemical removal of hybrid trout, and also assist in the prioritization of lakes and streams to be treated based on their current genetic composition. Second, it will save money by reducing the number of lakes and streams that need to be treated. Third, it will lower disturbance, leave a smaller footprint, and maintain fishing opportunities that would otherwise be temporarily lost from some lakes. Fourth, it would provide hard scientific data on the effectiveness of genetic swamping for many different systems allowing MDFWP's to fully evaluate its potential as a management tool. Finally, and perhaps most importantly, it will provide baseline data on the current genetic composition of the lakes and streams that are ultimately poisoned so MDFWP's can evaluate the effectiveness of chemical removal on each population poisoned.

While the opinions I have stated above are solely my own, the scientific data I used to reach them is available to both MDFWP's and Bonneville Power Administration personnel. I request of you both that you do not ignore this information, to do so would be both irresponsible and unethical.

Sincerely,

George K. Sage
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Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
1.1		The lakes in question are in our main camp area. We have operated in this area for thirty years and probably know more about the fish in these lakes than anyone associated with this ridiculous plan. These lakes have provided unequalled fishing to our guests and all others that have fished them.
	1.1	This project is designed to preserve this stronghold for native westslope cutthroat trout. This project proposes to re-establish WCT populations in all treated lakes, which will maintain angling opportunities.
1.2		We feel that his plan goes against all that is held sacred in a wilderness area. … We believe the "Wilderness Act" should be respected and these areas should not be tampered with.
	1.2	Native westslope cutthroat trout are considered a wilderness value. This project is designed to maintain and conserve that value.
1.3		Why should anyone be allowed to tamper with these healthy fish in order to obtain a genetically pure strain of fish?
	1.3	It is the responsibility of MFWP to ensure that this species is conserved and maintained so the public of Montana can continue to use and enjoy it. The species has been at risk of hybridization for some time. MFWP has taken measures to reduce and eliminate the threats (see Section 1.2 of the DEIS). The species has been proposed for ESA listing (see Section 1.4.1 and Appendix B of the DEIS). MFWP is mandated to keep this from happening so the public does not lose the opportunity to use and enjoy WCT (see page 1-8 of the DEIS).
1.4		The plan also flirts with the use of helicopters to carry out the fish kill and poison the lakes. Helicopters are only to be used in the "wilderness" for emergency reasons. Is this an emergency?
	1.4	Both the Wilderness Act and the Fish and Wildlife Management Framework Document for the BMWC provide provisions for using motorized equipment. The Act states specifically states: *…(c) Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including*

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area…(Section 4(c) of the Wilderness Act). The *Forest Service Manual* allows approval of motorized equipment and mechanical transport in the wilderness. (FSM 2326.04). Additionally, the agencies that are involved in this project believe that under the Wilderness Act and the Forest Service's directives implementing it allow the Forest Service to authorize the use of motorized equipment and aircraft to implement this project. The DEIS further explains this in Sections 3.6.3.3 and 3.6.1. The DEIS notes that "[t]he Forest Supervisor may authorize use of motorized equipment or livestock as deemed necessary for the administration of the area and its resources." The agencies believe that the intensity of the wilderness disturbance from the use of motorized equipment and mechanical transport would be very low. There would be no more than 2 of the wilderness lakes or wilderness lake complexes treated in a given year. See Section 2.4.4 of the DEIS. The Fish, Wildlife and Habitat Framework for the Bob Marshall Wilderness Complex goes on: *The emphasis is on the management of the BMWC as opposed to the management of a particular resource. This language is viewed as discretion that all management activities within the wilderness be done without motor vehicles, motorized equipment, or mechanical transport, unless truly necessary to administer the area or specifically permitted by other provisions in the Act. It means than any such use should be rare and temporary; that no roads can be built; and that wilderness managers must determine such use is the minimum necessary to accomplish the task.* Additionally in Section 15 "Use of Motorized Equipment" it states *Guideline: (a) Any use of motorized equipment or mechanical transport requires advance approval through the USFS Forest Supervisor for any management proposal. It is important to include an alternative that does not use motorized equipment. Where there are choices among management options, wilderness values should dominate over other considerations. Managers*

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		should also consider safety and length of time of disturbance to visitors in preparing management options. As per this directive, the DEIS considered alternatives to using motorized and mechanized equipment in the wilderness potion of the project area. Section 3.6.5 of the DEIS provides the draft Minimum Tool Analysis that was developed to aid in making decisions about the preferred alternative.
1.5		If anything at all were proposed to eliminate the thriving, healthy fish in these lakes, saturation of the lakes with westslope cutthroats would be the most viable answer. But again, why kill healthy, viable fish only for genetic reasons. We believe this to be true in any location, but especially true in the wilderness which established areas to remain as they are. If fish are allowed to be tampered with in the wilderness, what next?
	1.5	Section 1.2 (pages 1-7, and 1-8) and Section 2.6.4 (page 2-35) of the DEIS addresses this issue.
1.6		These thriving, healthy, big, fat fish [currently in alpine lakes] should not be killed for purely genetic reasons. These fish pose no threat whatsoever to pure westslope cutthroat.
	1.6	It has been known for many years that hybrid trout pose a threat to the remaining pure WCT populations in the SF drainage. See Section 1.2 of the DEIS.
1.7		The plan also flirts with the use of airplanes and powerboats to carry out the fish kill and poison the lakes. Airplanes are only to be used in the "Wilderness" for emergency reasons. Is this an emergency?
	1.7	See response to Comment 1.4.
1.8		What effect on bears etc, eating poisoned fish

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	1.8	See page 3-22 of the DEIS. Appendix D of the DEIS also provide information on the effects of rotenone on mammals. Page 3-56 of the DEIS provides information on human health threats from exposure to antimycin. Much of the information used to derive the values for humans were determined from studies conducted on rats (Stillmeadow 2001). The Schnick (1974a) paper that is cited on page 3-57 of the DEIS reported that guinea pigs and mice have also been used to determine the effects on mammals. The Ritter and Strong (1966) paper that is cited on page 3-57 concluded that mammals suffered no ill effects from eating fish killed with antimycin. On this basis, we would expect the same results with other mammals, including bears, which might consume antimycin-killed fish.
1.9		Another arm of the government obtaining $ for ridiculous purposes.
	1.9	Comment noted.
2.1		To kill off what you call non-native trout and grayling is the same as killing people because they are not the correct race.
	2.1	Comment noted.
2.2		My family and many of my friends and their families have fished Handkerchief Lake for more than 10 years for the grayling. We make several trips a year to camp and fish for the usually large grayling in the lake. We fly fish in float tubes and release all the fish we catch so we can to continue to experience great grayling fishing. This lake up to last year held the state record for grayling.
	2.2	MFWP would remove as many grayling from Handkerchief Lake using Merwin and Fyke traps and maintain them in a floating net pen in Graves Creek Bay during the treatment of the lake. After the lake is detoxified, these fish would be replaced in Handkerchief Lake.
3.1		It is a good fishery already.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	3.1	Thank you for your comment and interest in the SF WCT Conservation Program.
3.2		I think if we get involved in it, we will screw up more of the river than just the lakes.
	3.2	Thank you for your comment and interest in the SF WCT Conservation Program.
4.1		We have a healthy fishery right now. We like that the Westslope Cutthroat is a very strong strain and that is pure in the lava areas.
	4.1	Thank you for your comment and interest in the SF WCT Conservation Program.
4.2		It seems like when the fish and game get involved in one of these processes it always takes longer than they think it is going to and usually there is more messes up there than improvements. So we don't want you to fund that process. However, we would like to see you contribute to grade the roads so people can come out to access the national forests. A lot of times these people tear up their vehicles driving up these roads that don't have any funding to go fishing. If they poison those lakes we won't have fish to fish for and roads worth driving on to get to. So a little common sense of letting the fishery that is already there and these lakes remain the same, would save a lot of money maybe a little money to grade roads would allow people to come up in the forest areas to enjoy these lakes. It would be far better use of your money than to allow some government project to be funded that probably won't work in the long run anyway
	4.2	Comment noted.
5.1		During my visits I enjoy fishing some of the wonderful lakes and streams Montana has to offer.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	5.1	Thank you for your comment and interest in the SF WCT Conservation Program.
5.2		The idea of poisoning some of these wonderful places is frightening. California has tried it with Lake Davis and failed miserably. In my opinion a better plan of attack is letting the anglers handle it by restricting creel limits on native cutthroat and increasing the limits on the unwanted species.
	5.2	This method was evaluated and ruled out due to the reasons listed on page 2-36 of the DEIS.
6.1		I oppose your plan. It will never work in those lakes.
	6.1	Thank you for your comment and interest in the SF WCT Conservation Program.
6.2		There is [sic] 10 pound cutthroat in those lakes. If you kill the fish in the lakes, how many years will it take to get fish that size back? The lakes you want to kill out are the best fishing lakes we have. Leave them alone.
	6.2	Westslope cutthroat trout typically live for 6-7 years in these lake environments. Many of the lakes would be restocked with a number of catcheable WCT to restore the fishery as quickly as possible. Assuming 2-3 year old fish are replaced, quality angling would be restored within 1-2 years, and trophy angling would be restored within 4-5 years. However, fish in the 5 to 10 pound range are relatively rare in these mountain lakes. Although anglers have reported fish in this size range, the largest fish confirmed recorded from these high altitude lakes has been about 6 pounds.
6.3		It is a nice gesture on your part, but I think it will be a waste of time and money.
	6.3	Thank you for your comment and interest in the SF WCT Conservation Program.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
7.1		I'm in favor of the concept of preserving the genetic purity of Westslope cutthroat trout in the South Fork drainage.
	7.1	Thank you for your comment and interest in the SF WCT Conservation Program.
7.2		I have low confidence in the ability of the USFS and MFWP to achieve the stated goals.
	7.2	Thank you for your comment and interest in the SF WCT Conservation Program.
7.3		Removing the administration of this program from the hands of federal and state funded agencies would very likely increase the probability of success and reduce costs. Government agencies are much less effective simply because they're not required to be financially responsible. They're not financially responsible because they don't need to show a profit; they're able to spend freely without consequences. And, they tend to make decisions based upon job and benefit preservation. This program is destined burn through a bunch of money with a low probability of success. And, this comment and public meeting-open house forum is a boondoggle – you're going ahead with the program anyway.
	7.3	Thank you for your comment and interest in the SF WCT Conservation Program.
8.1		Although I don't agree with this proposal at all, I can understand the concern regarding brook trout and rainbow trout threatening native bull and cutthroat. Where this is a problem I can understand wanting to prevent widespread population of these species.
	8.1	Thank you for your comment and interest in the SF WCT Conservation Program.
8.2		Grayling are a rare fish in Montana, in the lower 48 states for that matter, and require special habitat to survive. There has been consideration to giving them T&E species protection because of their scarcity. However, because of the rare habitat, they are doing exceptionally well in

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Handkerchief lake. Other than consuming some food, they do not pose a threat to other fish. Genetically they are no threat to either the Bull Trout or the Cutthroat trout like brooks and rainbows.
	8.2	See page C-8 of the DEIS, which draws a similar conclusion.
8.3		I am an avid fly fisherman, and have fished handkerchief lake for 8 years, multiple times every year. I have caught and released hundreds of fish in this lake and have only caught grayling and cutthroat, never another species.
	8.3	Handkerchief Lake harbors a population of hybrid trout consisting of Yellowstone cutthroat, westslope cutthroat, and rainbow trout. In addition there has been a large number of grayling stocked in the lake since 1954. See page C-8 of the DEIS. Although the fish you caught may look like a cutthroat trout, the genetic make-up of many trout in this lake consists of all three species.
8.4		The proximity of the lake with falls upstream and downstream somewhat confine the grayling. Although some do go downstream to the reservoir, the habitat in the deep water is not conducive to grayling and they cannot compete with the cutthroat and bull trout in this environment. (They probably provide a food source for the large Bull Trout!)
	8.4	Thank you for your comment and interest in the SF WCT Conservation Program.
8.5		Please do not proceed with this poisoning proposal, and if you must, please exclude Handkerchief Lake!!!!!!
	8.5	Handkerchief Lake harbors hybrid fish. This lake is a valuable fishery for both trout and grayling. Provisions are proposed to limit impacts to the grayling fishery by removing many large fish and releasing them back after the treatment. See response to Comment 2.2.
9.1		I think that the less expensive method called (SWAMP OUT) would give the same end results with stocking of native cutthroats until they reproduce into genetically pure populations. The (swamp out) method would leave the lakes fishable while the regeneration takes place.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	9.1	The swamp out concept has not proven to be completely successful in removing hybrid trout. See response to Comment 1.5.
9.2		The use of rotenone will attract every bear in the surrounding area and would be a threat to hikers and campers for quite some time. I have seen this happen when the Fish and Wildlife used this method on lake Five, Halfmoon and Mud Lake in the 60's. The dead fish ATTRACTED both Grizzly and Black bears from Glacier and the surrounding area.
	9.2	Many things have changed since the 1960s, including the protocol for implementing a rotenone treatment. Since the 1980s, the protocol has included collecting and sinking fish that surface after a rotenone treatment. The same protocol would be implemented in this project. Parker (1970) reported on the factors that influence dead fish surfacing after a rotenone treatment. The DEIS further addresses this issue on pages S-5, 3-20, 3-54, 3-56, 3-58, and in Appendices C and D.
9.3		The rehabilitation of the lakes in the South Fork of the Flathead should not be the responsibility of the BPA. The Montana Fish Wildlife and Parks are the responsible party for the decline of the native Cutthroat and Bull Trout in the Flathead River Drainage System. . . . The Montana Fish Wildlife & Parks have to be held accountable for their actions, not the BPA.
	9.3	Thank you for your comment. Please see Section 1.5 of the DEIS.
9.4		There were a number of things that led up to the decline of the native trout. After the devastating flood of 1964 which reduced the number of all fish in the North and Middle Forks of the Flathead the MFWP left the 10 fish limit on Cutthroat rather than do a lesser limit or even better a catch and release method until the fish increased in population. In 1965 I discussed this issue with Montana fish and game officials in Kalispell office and their reply was that no one would buy a license if they put a catch and release or a restricted limit on cutthroat and Bull Trout. It took quite a few years before the FWP put a lesser limit on Cutthroat and a catch and release on Bull Trout. The MFWP would have been better off with the loss of revenue in license sales ,if any than the loss of the Native fish in the Flathead drainage.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		The MFWP CAN ONLY HOLD THEMSELVES RESPONSIBLE for the loss of the Kokanne salmon in the Flathead river system by the introduction of mythiss [sic] shrimp in Flathead Lake which had already been tried in Idaho without success. The increase of Non -Native Lake Trout in Flathead Lake also took its toll on cutthroat.
	9.4	Comment noted.
9.5		The ILLEAGLE [sic] introduction of Northern Pike into the Flathead drainage is taking its toll on native fish. The [sic] MFWP now have a limit on the NORTHERN PIKE. "WHY"?
	9.5	Northern pike are outside the scope of this EIS.
10.1		George Lake is a self-contained lake with no possible way for the trout to leave that lake. There is a 1,000 ft. waterfall at the end of the lake.
	10.1	Much of the spawning in the high mountain lakes of the Swan Range occurs in inlet streams and also in the short reaches of streams at the lake outlets. This is also true for George Lake. Young fish are frequently washed downstream shortly after hatching, particularly during high flow, and reside in the streams below the lakes. This is the primary mode of hybrid trout leaving the lakes.
10.2		My family, friends and I have been hiking into George Lake for the last two decades and thoroughly enjoyed the fishery in there. It contains eastslope cutthroat and westslope cutthroat. We do not mind at all about the hybrid fish. The reintroduction would eliminate the fishery for five to ten years. We do no want that to happen. The survey I have taken, 100% of my friends and family would like to see this particular lake left as is. So I hope that lake could be an exception to the rule.
	10.2	We acknowledge that George Lake offers quality angling right now. It also harbors hybrid trout that pose a threat to downstream westslope cutthroat trout populations. Please see response to Comment 6.2.
11.1		The EPA supports the stated goals and objectives of the proposed project to preserve native genetically pure fluvial and adfluvial westslope cutthroat trout populations in the South Fork Flathead drainage, and to avoid and minimize adverse environmental impacts.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.1	Thank you for your comment and interest in the SF WCT Conservation Program.
11.2		We also recommend that maintenance of naturally functioning aquatic ecosystems and compliance with State Water Quality Standards be included among the project goals.
	11.2	See response to Comment 11.14.
11.3		One of our primary concerns with the proposed project involves the need for additional details and information regarding project monitoring and evaluation and adaptive management. Monitoring and evaluation and adaptive management should be critical elements of this conservation program, particularly since there is uncertainty associated with the effects of the proposed activities. There should be a continuing process of planning, implementing, monitoring, and evaluating effects of project implementation, and adjusting implementation and/or mitigation when and where necessary.
	11.3	Using historical and recent data collected by MFWP will aid in determining pretreatment conditions. Post treatment monitoring would provide information to compare and inform adaptive management. Project implementation would be continually improved upon where possible to provide the best possible outcome for safety and success.
11.4		We are pleased that the DEIS indicates that post-treatment monitoring would be conducted, but we are concerned that only general descriptions of monitoring activities are provided. The monitoring program to assess post-treatment effects and natural recovery or repopulation of the lakes by indigenous species should be more fully described, particularly monitoring for non-target species present in or around the lakes (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc,). Additional details of the monitoring efforts and adaptive management strategy should be presented to assure that consistent and meaningful information/data and is generated to evaluate effects of project implementation.
	11.4	Post treatment monitoring is discussed in the monitoring plan on page 2-25 of the DEIS. Also, see responses to Comments 11.40, 11.43, 11.52, 31.7, and 35.13. We have added more information about monitoring to Section 2.4.5.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.5		We also believe it is important to have contingency plans in the event that treatments do not eradicate the entire hybrid trout population, and in the event that continuing illegal reintroduction of non-native trout occurs after the proposed treatments. It is important to project success to both eradicate hybrid trout, and prevent the reintroduction of non-native trout into these lakes. We are concerned that the DEIS contains little information about the actions that would be taken or the strategy that would be employed to reduce these risks, particularly the risk of continuing illegal reintroduction of non-native trout. Contingency planning should also cover the unintended spill or release of toxic or hazardous chemicals during project implementation.
	11.5	See response to Comment 11.27.
11.6		We recommend that a clear and complete list of advantages and disadvantages of the two proposed fish toxins, rotenone and antimycin, be provided, along with further discussion regarding use of one toxicant vs. the other. Such information will assist the decision maker and the public in understanding and evaluating the proposed use of the fish toxins.
	11.6	We have added this table to Appendix D. Appendix C provides a discussion on a lake-by-lake basis about the reasons why one toxicant was preferred over the other. The two principle reasons in choosing one toxicant over the other are the performance advantage for a specific application, and the amount of material required when considering the transport limitations and method.
11.7		We note that it will be important to use appropriate mitigation measures and management practices during project implementation to minimize the potential for human exposure to the piscicides and potassium permanganate.
	11.7	Section 3.9 of the DEIS lists methods of limiting human exposure to the materials.
11.8		The DEIS identifies genetic diversity issues associated with restocking the treated lakes with M012 brood stock. These issues include: 1) potential reduction of westslope cutthroat trout genetic diversity by restocking with a single M012 genetic stock, which may result in a monoculture exhibiting little genetic diversity; and 2) potential dilution of natural genetic uniqueness exhibited in adaptations and phenotypic variations of local westslope cutthroat trout. We recommend that the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		FEIS explain more fully how these concerns will be addressed.
	11.8	See response to Comment 11.59.
11.9		Also, few specifics are provided regarding potential restocking of the lakes with other native non-target species that may be affected by treatments (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc,). We are concerned about potential loss of native non-target species, since proposed fish toxicants and potassium permanganate, used to neutralize the toxins, can be lethal to many aquatic organisms. The loss of non-target species and impacts on overall aquatic ecosystem integrity is an important issue. If some of indigenous species depend on isolated headwater habitat in the lakes or have evolved within the isolated headwater habitat they may not easily repopulate the lakes and may need assistance in repopulation. Restocking and other proposed efforts to restore or compensate for unavoidable impacts that may occur to all affected species should be more fully addressed.
	11.9	See response to Comments 11.47 and 11.60.
11.10		We also believe the potential effects of continuing to restock fish in originally fishless lakes should be more fully evaluated and disclosed in the FEIS. The introduction of trout to support recreational fisheries in lakes that were formally fishless has potential to affect lake ecology. Predation by introduced trout consumes native amphibians and benthic invertebrates and can reduce the population of larger zooplankton, which are effective grazers of the phytoplankton. With the restocking of fish to lakes that were originally fishless, additional biomass is added to the lakes that can influence nutrient cycling and can have unintended effects to water quality and the biological integrity of the lake.
	11.10	Restocking the lakes is not one of the decisions that would be made from the information in this EIS. See Sections 1.4.2.2, 2.4.6, and 3.2.4 of the DEIS. Montana Fish, Wildlife & Parks will manage fish populations in the lakes in the future to maintain established values as described in the DEIS.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.11		We recommend that restocking of fish to originally fishless lakes be based on monitoring and evaluation and full understanding of how lake ecology is affected by fish restocking. We recommend that a cautious approach to the trout restocking program be taken and that the stocking program be accompanied by a sufficiently robust monitoring and evaluation program to evaluate ecological effects of stocking fish in lakes that were originally fishless. Maybe some of the lakes should be left fishless for long-term monitoring and ecological comparison with lakes that are restocked? We note that decisions were made in the past to introduce non-native trout to these lakes without careful, thoughtful evaluation, and full consideration of potential ecological effects. This led to the ecological problems creating the need for this proposed project. We think it would be appropriate to proceed cautiously in restocking of fishless lakes, and to base restocking decisions on careful evaluation of monitoring data and information and full understanding of ecological effects.
	11.11	Thank you for your comment. Creating fishless lakes is not a goal of this project.
11.12		Based on the procedures EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action and alternatives in an EIS, the South Fork Flathead Westslope Cutthroat Trout Conservation Program DEIS has been rated as Category EC-2 (Environmental Concerns - Insufficient Information).
	11.12	We have added new information in all the resource categories throughout the FEIS.
11.13		The EPA supports the stated goals and objectives (page 1-9) of the proposed project involving preservation of native genetically pure fluvial and adfluvial westslope cutthroat trout populations in the South Fork Flathead drainage, and avoiding and minimizing adverse environmental impacts.
	11.13	Thank you for your comment and interest in the SF WCT Conservation Program.
11.14		We also recommend that maintenance of naturally functioning aquatic ecosystems and compliance with State Water Quality Standards be included among the project goals.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.14	There are many naturally functioning aquatic ecosystems in the project area that would not be affected. We would comply with State Water Quality laws.
11.15		Thank you for including Table 2-1 (page 2-5) showing the lakes proposed for treatment, treatment method, method of equipment transport, outlet streams and detoxification measures, Table 2-4 (page 2-28) summarizing the proposed action, and for including the lake descriptions in Appendix C, and additional information on lake treatments in Table C-2 (page C-59). This greatly increases public ability to understand the proposed project.
	11.15	Thank you for your comment and interest in the SF WCT Conservation Program.
11.16		It is stated that likely rotenone dosage would be 1 mg/l, and antimycin dosage 7.5-8 ug/l (page 2-14), and that these target concentrations are based on assays conducted by MDFWP, although it is also suggested that higher levels may be needed based on water chemistry and fresh water inputs. It is our understanding that the 1 mg/l concentration of rotenone is based on using a five percent rotenone solution, so that the actual target concentration of the rotenone active ingredient would be 50 ug/l of rotenone (1 mg/l x 0.05 = 50 ug/l, page 3-54).
	11.16	The DEIS states on page 2-9 that the liquid rotenone is the preferred formulation for this project, and on page 2-14 is a definition and description of the how the rotenone dosage is calculated. The rotenone label provides information on both formulation and active ingredient. Directions for application, provided on the label, refer to the material as either "formulation" or brand name Toxicant. In some places, the label generically refers to the formulation as "Rotenone." For ease in interpretation, the DEIS has referred to the toxicant as "rotenone" or "formulation."
11.17		It is stated that antimycin is shipped by the manufacturer in two parts: the active ingredient of antimycin with some residual fats or lipids, and an acetone - detergent surfactant (page 2-10). We understand that the antimycin formulation used would be a 50:50 mixture by volume of the two parts. It should be clarified if the projected reference dose of 7.5-8 ug/l of antimycin is the concentration of the active antimycin ingredient or of the 50% formulation (which would appear to make the target dose concentration of antimycin approximately ~4 ug/l). Is our understanding regarding the target dosage of the antimycin active ingredient correct?

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.17	Concerning rotenone: The label lists the active ingredient rotenone at 5% and other active ingredients that are 5% (or higher in the powder form). A 1 ppm formulation would therefore supply 0.05 ppm of what is called "active rotenone." Common practice has been to refer only to the rotenone powder (or liquid) as the concentration to deliver because that is the final form in which it is shipped to us to apply. This is what we understand when we read the scientific and field literature about applying rotenone formulations and/or powders. Concerning Antimycin: The EPA analyst has attempted to apply the same calculation method to Fintrol Concentrate (antimycin). The difference in this case is that since Antimycin A complex is a relatively pure product compared to rotenone powder/formulation, the dosages have always referred to the amount of Antimycin A (the only active ingredient) when calculating concentrations for application. Since we only calculate dosages based on the active ingredient that is actually delivered, the additional inactive ingredients in the Fintrol Diluent do not affect the final dosage of Antimycin A. The dosage of Antimycin A (which is the active ingredient) is calculated based on the actual amount of the active ingredient being applied and not on the total formulation whether mixed with diluent or not. We generically refer to Antimycin A when calculating the dosage because when Ayerst made the product there were many confusing dosage formulations. For instance, there were sand formulations of Fintrol 5, Fintrol 15, Fintrol 30, a Bar formulation Fintrol as well as the Fintrol Concentrate liquid. Therefore, referring to dosage amounts for the final formulation would have been very confusing because they would have been different for each different formulation.
11.18		We are interested in seeing the lowest concentration of rotenone and antimycin used that will be effective at removing hybrid trout, in order to minimize adverse effects to other non-target species. We recommend that the lowest dosages of rotenone and antimycin that will achieve effective removal of target species be used in order to minimize adverse effects to non-target species. We believe it would be appropriate to identify the maximum expected concentration of these piscicides

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		that would be used in order to better understand the potential impacts of proposed piscicides upon non-target species.
	11.18	The rotenone label provides guidelines for application rate. For normal pond use, the label recommends applying 0.5 to 1.0 ppm of formulation. Lab studies by MFWP indicate that 100% mortality of WCT can be achieved within 2 hours of exposure to 1ppm formulation. Based on this, following the application rate prescribed by the product label, 1ppm formulated rotenone would be sufficient to meet the objectives of this project. The antimycin label provides prescriptions to remove trout. The label also recommends conducting on-site assays to determine the appropriate amount of antimycin required to meet the objective.
11.19		Some websites with useful information on the proposed piscicides include:http://www.epa.gov/pesticides/ http://www.epa.gov/oppsrrd 1/REDs/factsheets/rotenone fs.pdf http://msds.pdc.cornell.edu/msds/msdsdodIal92/m95857.htm http://msds.pdc.comell.edu/msds/msdsdod/a48l/m240264.htm We understand that Antimycin A currently has 1 active registration, Fintrol Concentrate (registration # 39096-2). The latest label is dated November 29, 1999. This "piscicide" isslated for reregistration sometime after 2006. The current chemical review manager is Mr. Dirk Helder, (phone, 703-305-4610). Rotenone appears to have several active registrations (e.g., registration #'s 299-227, 655-421, 655-422, 655-804, 655-805, 655-806, 769-414, 1439-157, 1439-260, 5481-313, 6458-6) which can be researched at the EPA pesticides website shown above.
	11.19	Thank you for your comment.
11.20		Reasoning is presented (page 3-12) to explain why antimycin is a preferred fish toxin rather than rotenone in the 13 lakes in which bull trout occur downstream of the treated lakes (i.e., rapid detoxification in flowing streams, requires much lower quantity to kill fish, less bulky and easier to transport-fewer aircraft and packtrips and associated transport impacts). Antimycin is also less

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		toxic to amphibians and other non-target species. However, it appears that there is greater experience with using rotenone than with use of antimycin, and that rotenone may be less expensive and more available, and that the chronic exposure public health risk for use of rotenone may be less than for antimycin (see our public health comment #27 below). We believe it would improve public and decision maker understanding to provide a clear and complete list of advantages and disadvantages regarding use of rotenone and antimycin, and further discussion regarding use of one toxicant vs. the other to allow the decision maker and the public to better understand and evaluate advantages and disadvantages of use of either toxicant.
	11.20	We have added this table to Appendix D.
11.21		It may be difficult to apply or precisely maintain consistent piscicide concentrations throughout the lakes due to practical considerations associated with difficulties of maintaining consistent piscicide concentrations horizontally and vertically in the lakes with applications by aircraft, boats, and drip stations and using boats for lake mixing and hoses and pressurized equipment to distribute toxins to deeper depths (page 2-22). It would be of interest to include additional discussion regarding piscicide monitoring and piscicide concentration gradients that may occur during treatments, and how piscicide application and mixing considerations would be managed to maintain the desired range of target dosages. Our interest is understanding how large variations in piscicide concentrations within the lakes and significant exceedances of toxic concentrations, and thus, additional impacts to non-targeted species would be avoided. It is important that efforts to avoid impacts to non-targeted species are described, and that unavoidable impacts to non-targeted species and overall ecosystem integrity are fully disclosed and mitigated.
	11.21	These products are approved by EPA for our proposed use and we would follow all applications instructions and restrictions on the product labels. Both rotenone and antimycin products contain inert ingredients that help them to be soluble in water. For this reason, the toxins are able to penetrate into deep water. Numerous applicators have reported that topical application of both rotenone and antimycin can be made in water bodies up to 30 feet. As an added measure, applicators on this project would apply toxin at varying depths to ensure proper mixing. Laboratory tests conducted by MFWP coupled with numerous field applications support the importance of achieving proper mixing of both compounds.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		The rotenone label indicates that formulated rotenone "…will disperse readily in water both laterally and vertically, and will penetrate below the thermocline in thermally stratified bodies of water." The label further states that "…product be uniformly applied over the water surface or bubbled through underwater lines." This project will employ both methods to ensure complete distribution throughout the water body. The antimycin Use Direction Leaflet indicates the product "…can be applied to lakes and ponds by the boat bailer method or spray equipment…boat bailer and drip tubes when applied at the propeller wash are useful at greater depths…" The commenter raises questions about "…understanding variation in piscicide concentrations within lakes and significant exceedances of toxic concentrations…" When applied at the prescribed concentration, there should be no significant exceedances. There is no way of precisely determining the concentration of fish toxin in a water body during the application process. It is recognized that proper mixing is both important and required to achieve the desired results. Measures to ensure proper mixing include following mixing directions offered on the product labels, and to use water pumps, ventury apparatus harnessed to outboard motors, and spray apparatus to evenly distribute the compounds to all zones of the lakes and stream, including deep water zones. Some non-target organisms would be impacted including some amphibians, some insects and some plankton. The extensive literature, and MFWP field trials and laboratory studies have demonstrated that these impacts will be minor and short term.
11.22		It is suggested that a dosage of potassium permanganate for detoxification would be 4.5 ppm (page 2-10) which includes 1.5 ppm to neutralize the fish toxin, and 3 ppm to account for the organic demand in the stream, although the amount may vary depending upon stream demand (page 2-14). The DEIS also states that bioassays show potassium pennanganate toxicity to westslope cutthroat trout at 1.5 ppm (page 2-10). It would appear likely, therefore, that there is significant potential for potassium permanganate used for piscicide detoxification to kill aquatic

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		biota itself, including biota of non-target species (e.g., amphibians, invertebrates). What precautions or mitigation measures are proposed to assure minimal effects on non-target species from use of potassium permanganate? Can locations of detoxification stations be identified? How far downstream from detoxification stations on streams will potassium permanganate or piscicide toxicity be evident to aquatic life?
	11.22	The laboratory studies conducted by MFWP represented extended exposure times (24 hours) and were conducted in aquaria with static water and with no other substance available to react with the potassium permanganate. This provided a worst-case scenario to measure toxicity of the compound to fish. It is widely recognized that this compound is very reactive to organic substances, and only requires 20-30 minutes of contact time to neutralize rotenone. The rotenone product label recommends measuring the organic demand of the stream, then over applying to ensure enough of the compound is available to neutralize the rotenone. During natural breakdown, this compound is reduced to its parent constituents which are potassium, manganese and water. Any unintended impacts to aquatic biota would likely be limited to the length of stream within the 30-minute travel zone immediately downstream of a detoxification station. Lab assays by MFWP indicate that tailed frog tadpoles exposed to 3 and 4 ppm potassium permanganate experienced 13% mortality at 16 and 24 hours, respectively. It is not known what the specific impacts would be from potassium permanganate, but given its reactive nature, and the already recognized impacts stemming from rotenone and antimycin exposure, results indicate that there would be no additional impacts beyond those described for the fish toxins.
11.23		It is stated that bull trout are not found in any of the lakes to be treated, but they do occur in associated drainages downstream of some lakes (page 3-9). It is important that the bull trout, a threatened species, is not unduly impacted by the proposed project. We understand that the U.S. Fish & Wildlife Service (USFWS) has concurred that the proposed project does not have potential to cause an adverse effect on bull trout, impair suitable habitat necessary for the survival for the local population of bull trout (i.e., biological determination of, "may effect, but not likely to adversely affect," page 3-14). We note that it is important that toxicity in streams draining the lakes be neutralized before the bull trout sections of the streams are reached.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.23	This project will follow the guidelines recommended by the USFWS during Section 7 ESA consultation. We acknowledge that applying fish toxins and potassium permanganate in waters upstream of bull trout populations may affect some individuals, but is not likely to adversely affect the bull trout population.
11.24		It is stated that sentinel fish cages would be used in concert with potassium permanganate detoxification stations to evaluate effectiveness of treatment and to monitor effectiveness of detoxification (page 2-11). It is also stated that several days are anticipated to carry out detoxification and post-treatment cleanup (page 2-4), and that piscicide treatments are proposed to occur just before lake ice-up occurs (late September to early November). Cold water temperatures, reduced water oxygenation and reduced sunlight after lakes ice-up are likely to reduce the rate of toxin decomposition. It appears, therefore, that unless the fish toxins are fully detoxified before lake ice-up there may be potential for residual toxicity to remain for long periods after the lakes ice over. Will full detoxification be required before lakes ice-up? We would expect additional potential for impacts to non-target species if long periods of toxicity are allowed, particularly with rotenone use. We believe that detoxification should occur before lakes ice up.
	11.24	Waters within the target area would be monitored using caged fish to confirm both lethality and neutrality of treated water both upstream and downstream of potassium permanganate detoxification stations. The product labels recommend this practice. Long periods of toxicity are not likely to occur as there are a number of factors that work to degrade these compounds below levels toxic to fish including pH, temperature, depth and turbidity. These factors can accelerate and/or retard the effect on fish and/or detoxification. The project area would be monitored according to product labels up until the water has been detoxified according to the milestones defined by the label (i.e., caged fish survive 24 hours of exposure to treated waters). The rotenone label re-entry statement indicates "…swimming may occur in treated waters only after the application is completed and treated water is thoroughly mixed according to the label instructions..." The antimycin label re-entry statement indicates "…no swimming, drinking, or irrigation should be allowed until caged fish survive 24 hours in the treated waters…" Literature indicates that both rotenone and antimycin degrade rapidly.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Treatments may be implemented in late September and early October to ensure ice up doesn't occur too soon after application. This will take advantage of water temperature, solar radiation, and limnetic turnover to aid in natural detoxification to levels below that toxic to fish. Thermal measurements collected on several lakes over the past few years indicate the lakes experience limnetic turnover and are homoeothermic near the first week of October when water temperatures reach 47 degrees Fahrenheit. Given this, there appears to be an adequate amount of time available for the toxins to degrade before freeze-up, thus preventing long periods of toxicity. . We have also added more information in Appendix D.
11.25		It is suggested that a second piscicide treatment may be implemented if fish are detected following the first treatment (page 2-8), and that resultant action stemming from each treatment and post-treatment evaluation would be considered on a case-by-case basis.
	11.25	Yes, this is what is proposed.
11.26		The DEIS also states that unauthorized, illegal stocking with non-native species may occur as it has in the past (2-27). If unauthorized illegal stocking occurs after proposed treatments it would significantly reduce the effectiveness of this program to eradicate hybrid trout and preserve genetic purity of native westslope cutthroat trout. It appears important to project success to both eradicate hybrid trout and prevent the reintroduction of non-native trout into these lakes.
	11.26	Montana presently has both state law and Fish, Wildlife & Parks Commission rules in place to deter illegal introductions of fish. Nevertheless, this is a practice that still occurs diespite the best efforts of state enforcement agents. Restoring the lake fisheries with genetically pure westslope cutthroat trout could reduce the potential for illegal introductions of non-native species. Rapidly reestablishing a native fishery should remove the primary motiviation for future illegal introductions in the project area.
11.27		We believe it is important to have contingency plans in the event that treatments do not eradicate the entire hybrid trout population, and in the event that continuing illegal reintroduction of non-native trout occurs after the proposed treatments. Given the importance of these elements of the project, we are concerned that the DEIS contains little information about the actions that would be taken or the strategy that would be employed to reduce these risks, particularly risks of continuing

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		illegal reintroduction of non-native trout.
	11.27	If illegal introductions occur MFWP would assess the situation at that time and determine what action to take. See Section 2.4.2.3 of the DEIS. If those who would stock lakes without authorization understand that their actions may result in additional treatments and temporary fishing closues, authorized restocking may reduce illegal introductions.
11.28		Also, efforts should be made to educate the public on the effects of such illegal introductions [of non-native trout], and to improve enforcement programs and deterrents (fines, creel inspections, etc,) to reduce potential for continuing illegal stocking or introductions of non-native species.
	11.28	See response to Comment 11.26.
11.29		It is stated that liquid rotenone would be the preferred formulation for this project (page 2-9). We recognize the hazards to applicators in using powdered rotenone (page D-6), but have some concerns regarding the aromatic solvents that are used as a dispersant in liquid rotenone formulations (page E-6). These aromatic solvents can include trichloroethylene, napthalene, 2-methylnapthalene, and xylene (page D-2), which can be detrimental to public health, and are generally persistent in the environment (i.e., they do not quickly biodegrade). We understand that 5,800 of gallons of liquid rotenone formulations will be used on the eight lakes in which rotenone is the proposed piscicide (Table C-2). Has MDFWP monitored for the presence of these aromatic solvents in rotenone treated waters following treatments in their prior uses of liquid formulations of rotenone? Does BPA or MDFWP propose to monitor the presence and degradation of these compounds in the eight rotenone treated lakes with this proposed project? Are sentinel fish cages the only means of monitoring for toxicity? Is it just assumed that these compounds will dissipate, be diluted, and/or otherwise not result in any adverse effects?
	11.29	MFWP is not, nor has ever been required to monitor surface water treatments for aromatic solvents. Applicators in Montana typically are not required to monitor for EPA registered pesticides. Pages D-7 and D-8 of the DEIS provide some information on the persistence of some of the elements, and some results of monitoring in California. Furthermore, Skaar (2001) summarized

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		some of the water quality sampling that has occurred in Montana. He wrote "…*The Montana Human Health water standards for some of the constituents are: trichloroethylene, 5 ug/L; toluene, 1 mg/L; xylenes 10 mg/L. In addition, the EPA has determined that the water quality criteria for chronic effects of naphthalene and chloroethane to aquatic life are 620 ug/L and 250 mg/L, respectively. None of these levels should be exceeded during a rotenone treatment. At a treatment level of 2 mg/L of formulated rotenone, the maximum expected level of these contaminants are trichloroethylene, 1.1 ug/L; toluene, 84 ug/L; xylenes, 3.4 ug/L; naphthalene 140 ug/L (CDFG 1994). Our own experience at Bootjack Lake in November 1997 showed concentrations to be much lower. In the formulated rotenone products (Noxfish, Prenfish), we found high levels of all of the chemicals mentioned above. However, in samples taken from the lake two days after treatment at a rate of 2 mg/L rotenone, the concentrations of the constituents were: trichloroethylene, <0.5 ug/L; toluene, 2 ug/L; naphthalene, <0.5ug/L; xylenes, 1 ug/L (Attachment 1). Naphthalene was detected later, one week after the treatment, but still at very low levels (57 ug/L). Chloroethane was also detected in Bootjack Lake at low levels (0.8 and 1.2 ug/L) on both day 2 and 7 after treatment. The source of this chemical is unknown since it was not detected in the formulated products. The chemical 1,2,4-trimethylbenzene was also detected in Bootjack Lake water at low levels (2.5 ug/L), but I could find no information on its effects to humans or other animals. Results from the Tetrault Lake sampling were similar to those of Bootjack Lake in that the levels of these chemicals in lake water after treatment were far below water quality standards…*" The two examples provided by Skaar (2001) are based on rotenone treatments of 2 ppm, which is twice that proposed for this project. The threat of aromatic solvents is to human health. The principle exposure to humans would be to the applicators. Applicators would be using safety equipment, as specified on the product label, to reduce the threat to human health. The remote nature of the proposed treatment sites would aid in limiting exposure to humans. In 1998 Carpenter Lake, in northwest Montana, was treated with rotenone. Ground water was drawn from a nearby domestic well and no rotenone or solvents were detected 2 weeks and 4 weeks post treatment.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Both rotenone and antimycin product labels recommend using sentinel fish cages to monitor for toxicity. See Sections 2.4.1.5 and 2.4.4.2 of the DEIS.
11.30		Also, is it known if less persistent or more biodegradable solvents are available for use in liquid rotenone formulations?
	11.30	MFWP would use an EPA registered brand of rotenone formulation. EPA has approved the inert ingredients used in Prenfish and Noxfish brands of formulated rotenone. It is not known if EPA has approved other solvents for use in formulated rotenone.
11.31		Thank you for providing Appendix D discussing use of rotenone, safety measures, and precautions and measures to be used during storage and transport of rotenone to reduce risk of accidental spills. Is similar information available regarding the history and use of antimycin?
	11.31	We have added information in Appendix D. See also responses to Comments 11.20, 11.24, 11.60, and 37.159. See also responses to Comments 34.20 and 34.35 regarding the known toxicity of antimycin. Antimycin threats to animal and human health have been studied extensively. Ritter and Strong (1966) measured accumulation levels of antimycin in muscle, kidney, liver, heart, gill and skin of several fish species. The range of values of antimycin absorbed by fish was 4-10% of that administered into the water. Mammals and birds required much higher concentrations to effect death. Using these data, the authors calculated that a 4-ounce serving of fish containing 201 micrograms of antimycin per kilogram (μg/kg) would provide 23 μg of antimycin or 0.33 μg/kg for a 150 pound human. A dose of even 1 milligram per kilogram (mg/kg) (100 times as much), would require a human to eat 3,000 four-ounce servings; the equivalent of one serving per day for 8.2 years. Twenty-one humans associated with this study consumed from one to five such servings and suffered no ill effects. They concluded that antimycin-killed fish would be safe as human food. Schnick (1974a) reported that antimycin is not hazardous to humans whether it is consumed in water or food.
11.32		Thank you also for providing the MSDS sheets on treatment chemicals in Appendix B. A spill contingency plan is mentioned on page 2-13, but we did not see the details of the spill contingency

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		plan included in Appendix D. We believe information on the contingencies in the event of spill or release of toxic or hazardous chemicals should be included in the EIS appendices.
	11.32	A spill contingency plan would be developed by the Transport and Safety Supervisor (item 5 of the table on page 2-13 of the DEIS). The MSDS sheets provided in the Appendix E of the DEIS provides 16 provisions for safe handling, storage, clean up, and hazards, among others. These guidelines would be used as the principal resource for developing the Spill Contingency Plan. Additionally, the Safety Supervisor and Project Commander would develop the logistical and equipment resources necessary to put into action the provisions listed in the 16 items on the MSDS sheet for each compound, and gasoline. We have added information for $KMnO_4$ in Appendix D.
11.33		We are pleased that it is stated that at least one applicator licensed by the Montana Dept. of Agriculture well versed in the state regulatory requirements regarding safe and legal use of the piscicides must be on-site to supervise or administer the project (page D-7). We are also pleased that the staff involved in implementing the project will receive safety training in regard to the proposed use of the toxic and hazardous chemicals.
	11.33	Thank you for your comment and interest in the SF WCT Conservation Program.
11.34		The method of transport of equipment, people and material to the lake sites and degree of disturbance associated with such access and transport provides an important distinguishing difference between Alternatives B and D and Alternative C. It is stated (presumably with Alternatives B and D) that crew sizes in wilderness lakes would not exceed 15 persons and pack strings would be broken into strings of 10 to 12 animals (page 2-16). No pack trains into wilderness areas would occur in Alternative C, since aircraft would be the mode of transport with Alternative C. It is not clear how many strings of 10 to 12 animals would be required in Alternatives B and D. The extent of potential ground disturbance, disturbance to trails and other resources, and other environmental impacts from use of pack train transport of equipment, people and material to the lake sites should be more fully described to provide an improved basis upon which to evaluate and choose among alternatives.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.34	Section 2.4.3 of the DEIS states that pack string size would be 10-12 animals. The example on page 2-16 indicates that a 17 animal string would be split into multiple strings. This is to reduce trail congestion and comply with FS regulations. Table C-2 provides an estimate of the number of pack animals needed to transport materials to wilderness lakes. Appendix C provides lakes descriptions and disclosed the estimated number of livestock needed to transport personnel and support equipment. Using livestock on establish FS system trails is a conforming activity that does not require an exhaustive analysis. The draft Minimum Tool Analysis on page 3-38 of the DEIS concluded that this was the best approach to accomplish the goals and conform to wilderness values as best as possible.
11.35		Wilderness experience and solitude and wildlife may be affected during transport of equipment, people and material to the lake sites in all action alternatives. It is stated that an estimated nine helicopter flights would be needed to execute the treatment procedure in Blackfoot Lake (page 2-18). Are nine flights estimated to be the average number of flights to each lake?
	11.35	Page 2-18 of the DEIS states that the number of flights would vary depending on the size and complexity of each lake. Table C-2 provides the proposed transport method and estimated number of trips for material. An added number would be required for personnel and equipment, as explained on page 2-18 of the DEIS.
11.36		It appears that environmental impacts and ground disturbance during transport may be least with Alternative C involving use of aircraft for transport of equipment, people, and material to all lakes and use of motor boats for application, although wilderness sites and wildlife would experience additional impacts to solitude from aircraft impacts within wilderness areas with Alternative C. While we realize that wilderness values and wildlife may be impacted in the short-term using Alternative C, it appears that there may be some benefits to Alternative C in reduced ground disturbance from long pack train transport to the wilderness lakes, and shorter disturbance periods. The extent of additional ground disturbance and impacts and intrusion from pack animals and longer durations of intrusion with Alternative B modes of transport should be more clearly and quantitatively compared with the aircraft mode of transport proposed with Alternative C. Improved comparative alternatives evaluation may better define the issues and provide a clearer basis of choice among options for the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		decision maker and the public in accordance with the NEPA implementing rules (40 CFR 1502.14).
	11.36	Yes, aircraft would have the least ground disturbance, but public comments and the draft Minimum Tool Analysis suggested that wilderness values and other social issues play a major role in determining which method would be best. Although aircraft are quicker, have fewer impacts to the ground, have fewer impacts to local users due to time saving, and are less costly, the social impacts would be greater. In order to balance these issues, Alternative B was modified to include the use of traditional transport methods in the wilderness area, where possible.
11.37		[Specific comment on] Table 2-6 (page 2-44) indicates that Alternative D that avoids use of fish toxins would not eliminate non-native trout from headwater lakes; involves unproven techniques; would be less effective; and would result in longer-term angling loss and fisheries impairment in the headwater lakes. Alternative D, however, would avoid many of the uncertain and difficult to quantify aquatic ecosystem impacts associated with use of fish toxins and potassium permanganate (no risk to plankton, insects, amphibians). We believe additional discussion and comparative evaluation of these benefits of Alternative D vs. the reduced effectiveness and risks to angling and fisheries should be provided to better define the issues and provide a clearer basis of choice among options for the decision maker and the public.
	11.37	Section 2.6 and Chapter 3 of the DEIS discloses the likely impacts to the environmental and social socioeconomic resources if suppression is implemented. This information provides a clear basis for consideration of options, and is helpful in trying to balance which option would allow the objectives to be met while balancing and minimizing impacts to the affected resources.
11.38		The method of transport proposed to restock lakes with genetically pure westslope cutthroat trout is not clear to us. Will pack trains or aerial transport be used to transport fish for restocking wilderness lakes? Will aerial transport be used to transport fish for restocking non-wilderness lakes?
	11.38	Page 3-10 of the DEIS discloses the historical fish stocking methods. Helicopters and airplanes stocked all wilderness lakes listed in this proposal before the Wilderness Act was ratified. Based on this, and the number and sizes of fish that are needed to restore the fishery in the lakes, aircraft would be used to restock them. There are no landings proposed for stocking wilderness lakes. In

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		the 1990s a short-term exemption was allowed for aerial stocking of Woodward and Pyramid lakes to implement genetic swampout. When swampout is discontinued, we would revert back to using livestock to stock those lakes.
11.39		Any effects on water quality (e.g., nutrient enrichment) from dead fish decaying in the lake should be addressed in the Water Resources Section 3.4 (page 3-26). Will nutrients released from decaying fish have any potential effects on trophic levels in Hungry Horse Reservoir or Flathead Lake downstream? Special attention should be made regarding the State's identification of Flathead Lake as a water body with impaired beneficial uses in its Clean Water Act Section 303(d) report. It is important that the proposed project does not further degrade Flathead Lake water quality, and that the conservation program be consistent with long term water quality recovery as proposed in the Flathead Lake Nutrient Management Plan and Total Maximum Daily Load (TMDL) (see http://www.deq.state.mt.us/wqinfo,TMDUpdf/FlatheadDoc.pdf). Phase 1 of the Flathead Lake TMDL calls for a 25% reduction in nitrogen and phosphorus loads to the lake. The water quality goals for Flathead Lake are: 80 g carbonlm2/yr; no declining trend in hypolimnionic dissolved oxygen; no measurable blooms of Anabaena or other pollution algae; 1.0 ug/l chlorophyll a maintaining or decreasing near-shore algal growth on rocks; 5.0 ug/l total phosphorus; <0.5 ug/l soluble reactive phosphorus; 95 ug/l total nitrogen; 30 ug/l nitrate+nitrate; <1.0 ug/l ammonia.
	11.39	Pages 3-30 and 3-31 describe the likely changes in water quality. This information is presented in Section 3.5 (soil and vegetation). We acknowledge that it should be presented in the Water Resources Section (3.4).
11.40		It is stated that MDFWP has administered 74 rotenone applications on 63 lakes in the Flathead Basin, including seven lakes requiring multiple treatments (page 2-8), and that previous monitoring shows that short-term impacts to the fisheries resource caused by chemical treatment (using rotenone or antimycin) are undetectable within the first three years (page 3-13). References should be provided for these monitoring results to better support this statement (similar to the references provided on pages 3-22 and 3-23 regarding previous studies of effects on amphibians, plankton and aquatic insects).
	11.40	The purpose of this statement in the DEIS (page 3-13) was to disclose that the fishery was impacted as a result of using fish toxin to remove the fish populations. Consequently, recreation, angling, and to some degree economics were impacted by these projects. Impacts were short term

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		because in each case, fish were restocked and the fishery resources were restored. Although post treatment monitoring has only recently become a requirement on some treatments in Montana, MFWP has voluntarily conducted pre- and post-treatment monitoring in the last several years. The majority of post treatment evaluations in northwestern Montana have been conducted on waters treated as far back as 1948. These evaluations have provided baseline information regarding the long-term persistence of amphibians following a rotenone treatment. Since 2000, MFWP has conducted annual post treatment monitoring of amphibians and plankton on several lakes to determine the impacts of piscicides on non-target organisms. Aquatic insect have been evaluated on some lakes but not all. See FEIS for more information about monitoring.
11.41		It is our understanding from the information in Chapter 3 that hybrid trout and westslope cutthroat trout are the only fish species present in the lakes to be treated, but that bull trout and whitefish are present in downstream drainages. Is this correct?
	11.41	Yes, hybrid cutthroat trout as well as stocked WCTs are the only fish species in the lake environments. Bull trout and mountain whitefish can be found in some of the stream habitats. Although not common, on occasion, suckers and sculpins can be found in some of the streams. Various electrofishing surveys conducted in the SF drainage since 1987 have revealed that these species are uncommon in the streams listed in this project. The only streams listed in this project where sculpin are known to occur are Youngs Creek and Wheeler Creek.
11.42		It is stated that monitoring of restocked fish would continue for several years to determine population viability and associated characteristics and program success (page 2-5), and that a survey would occur the spring or summer following treatment with setting of gill nets, monitoring of caged fish, and, if possible, the evaluation of the status of non-target organisms like plankton, amphibians, and aquatic insects (page 2-25). Why is it stated that non-target organisms will be evaluated, if possible?
	11.42	Insects, amphibians and plankton surveys would be conducted beginning the summer following the treatment.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.43		We believe it is important that before-and-after surveys and evaluation of proposed treatments be conducted for all aquatic and terrestrial biota that could potentially be affected by the proposed use of fish toxins to remove fish from the lakes, not just westslope cutthroat trout. Baseline monitoring should identify all indigenous aquatic species present in the lakes to be treated. The monitoring program to assess post-treatment effects and natural recovery or repopulation of the lakes by indigenous species should be more fully described, particularly monitoring for non-target species present in or around the lakes (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc,).
	11.43	Evaluation of all indigenous organisms goes beyond the scope of this project or the mitigation proposed. Nonetheless, in 2004, MFWP instituted a comprehensive survey of amphibians and plankton in which surveys were conducted on 86 streams and 75 lakes in the project area. In 2005 this study will be expanded to include aquatic insects. These data will represent the most comprehensive evaluation of these species in the South Fork. The purpose of these evaluations is to provide base-line information by which to characterize these habitats and organisms. Post treatment evaluations would be conducted to measure variation with pre-treatment observations.
11.44		The DEIS states that amphibian surveys have been conducted at each lake and are ongoing (page 2-12), and that four amphibian species and two reptile species were detected in the project area: long-toed salamanders, Rocky Mountain tailed frogs, western toads, and Columbia spotted frogs, and Western terrestrial garter snake and common garter snake (page 3-18). Four other species were believed to be in the project area, but were undetected (pacific tree frogs, northern leopard frogs, western painted turtles and rubber boa). The DEIS also states that these species are widely distributed throughout the project area. It would be helpful to have a table that listed all aquatic species present in or that use each of the lakes to be treated and their abundance and life history stages at time of treatment (i.e., target and non-target species that occupy or use each lake). if species are present in some lakes that are not present in other lakes that should be identified as much as possible. If such baseline information is not available or unknown that should be clearly stated, although we believe such information should be obtained as much as is possible.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.44	Although pre-treatment evaluations of non-target organisms are beyond the scope of this project, Table C-2 of the DEIS provides some information on the association of amphibians to the lake environments, and Table 3-5 of the DEIS provides some information on the association of plankton found in lakes in the project area. As stated above, additional, and comprehensive data are being compiled by MFWP on the lakes and streams listed in the DEIS. This information will be available to provide baseline measures for comparison with data collected in the future.
11.45		Are there any wetlands, springs, seeps and any other special or unique habitats on the edge of the lakes and treated streams that may be affected by the proposed project? If so, efforts to avoid adverse impacts to specialized aquatic habitats such as wetlands, springs, and seeps should be identified.
	11.45	Appendix C of the DEIS describes the known water inputs to each lake. Sections 2.4.2 and 2.4.2.2 describe the pretreatment procedures that include evaluations to identify all sources of water that might include springs and seeps. Section 2.4.4 of the DEIS states that fresh water inputs and seeps would be treated to prevent fish from seeking refuge in them. Both the rotenone and antimycin product labels recommend using sprayer apparatus to apply in " lakes and ponds…shoal areas…and …small isolated ponds,", and in "backwater, stagnant and spring areas" to eliminate refugia for fish to escape the treatment.
11.46		The DEIS states that substantial evidence collected from past rotenone treatments in the Flathead Basin indicates that rotenone would have no long-term impacts on amphibians in the project area, and that laboratory tests conducted by MDFWP indicate that antimycin would not have a negative effect on amphibians at the levels prescribed to kill fish (pages 2-25, page 2-26). The DEIS states that effects on amphibians from use of both compounds is "expected to be minimal or short-term" (page 3-23). It does appear that impacts on amphibians from the application of antimycin are likely to be reduced, since antimycin is less toxic to amphibians than rotenone (pages 3-22 and 3-23). The proposed Fall application of piscicides should also reduce potential impacts on amphibians, since adult amphibians are affected less (page D-2), although Rocky Mountain tailed frogs are quite aquatic and even adult species could be significantly impacted by rotenone. We also note that potassium permanganate used for neutralizing the piscicides may also have toxic effects on

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		amphibians and other aquatic species. We are concerned, therefore, that there may be potential for impacts to occur to amphibians and other aquatic species from the proposed project.
	11.46	See page 3-22 of the DEIS. MFWP has conducted numerous laboratory assays using rotenone, antimycin and potassium permanganate on species like adult and juvenile long toed salamanders, adult and juvenile Columbia spotted frog, and tailed frog tadpoles. Limited laboratory evaluations have been conducted on tailed frog adults. These extensive laboratory assays, coupled with the comprehensive post treatment evaluations of Devine Lake, Tom Tom Lake, and Whale Lake provide a very comprehensive measure of what we could expect the short-term impacts to be from a rotenone or antimycin treatment on a lake. In addition, page 3-22 of the DEIS refers to evaluations on 18 other lakes treated with rotenone in the Flathead Valley over a 44-year period to determine what the long-term persistence of amphibians was following a rotenone treatment. See also Appendix G of the FEIS.
11.47		The DEIS states that if application of either compound show any anomalous effects on local amphibian populations, MDFWP would mitigate those impacts by replacing amphibians that may be impacted (page 2-26). It is stated that a follow-up survey for two years after treatment would be used to confirm whether amphibians are present within treated areas, and whether they need to be replaced. We are concerned, however, that few details are provided regarding follow-up surveys and amphibian monitoring before and after treatments. Lack of information on follow-up surveys and amphibian monitoring does not provide much assurance that any impacts on amphibians that may occur will be detected. More details regarding amphibian monitoring programs and protocols should be provided to assure that any effects to amphibian species are detected, and then mitigated.
	11.47	Amphibians are difficult to detect and collect, especially immediately before winter dormancy. Notwithstanding, we have conducted many laboratory assays, field investigations, and reviewed scientific literature and relavent case histories to predict expected results. The DEIS states that MFWP would measure these segments of the environment to determine if any unforeseen impacts occur, and also lists ways to mitigate potential impacts. We will search for and if found, we will collect amphibians from the site before the treatment and release then back to the project area after the treatment is over.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.48		Information is presented in Appendix D that suggests that the temporary overabundance of dead fish immediately following treatment, and the subsequent temporary loss of fish supplies to predators that rely upon such food supplies will have little impact on bird or mammal populations because most animals can utilize other water bodies and sources for food. We understand that piscicide treatments will occur in the Fall (late September to early November) and that restocking will not begin until the following July, and then would occur annually until a population of westslope cutthroat trout is established (page 2-26). This would appear to leave a period of at least 8 or 9 months for each treated lake to be without fish and other aquatic species that are affected by the fish toxins and potassium permanganate, and perhaps it would take years to establish a healthy population of trout and other affected species. While treatments would be staggered spatially over ten years or more to reduce effects on other species as well as angling, it is surprising that lengthy periods of loss of aquatic life in the lakes will not impact the bird or mammal life near the lakes that may have developed a reliance upon fish and other aquatic species for food.
	11.48	Fish eating birds, namely the osprey, are the only animals in the project area that depend on fish for food. Ospreys are occasionally observed at high elevation lakes. Osprey are more likely to use Hungry Horse Reservoir because it is lower elevation than the project lakes, ice recedes earlier, and fish species diversity and abundance are greater. Other birds and mammals using the area are not dependant on fish for food. Extended periods of ice cover at these high altitude lakes makes them less suitable for other fish eating animals like otter and mink. Otter prefer large rivers and streams, but may use low altitude lakes in the project area. Mink are opportunistic feeders on fish, mammals, crustaceans, reptiles, amphibians and birds. They typically follow food sources, as do otters. In the absence of fish prey, these two species would disperse to other areas or feed on non-fish food items. Mink can frequently be observed in small streams with no fish. In 2004 a mink was observed at Skiumah Lake in the Middle Fork Flathead; the lake is fishless. Species like mergansers would also disperse to areas with higher density food items.
11.49		It is also not clear if the statement of predicted lack of impact on bird or mammals is based on actual monitoring of bird and mammal populations after actual piscicide treatments or on supposition. We are concerned that the MDFWP prioritizes monitoring on game fish, and monitoring for effects on other non-game species may be less attentive, so that effects on non-game species may occur without detection. There is a need to monitor for impacts to all species

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		that may potentially be affected by the proposed use of toxic chemicals in these lakes and streams. We believe the BPA and MDFWP project monitoring and evaluation programs should include evaluation of impacts upon all potentially affected species, including bird and mammal populations that use aquatic species for food. Also, if impacts to bird or mammals from treatment are detected, efforts to mitigate or compensate for such impacts should be made.
	11.49	The literature lists impacts to non-target organisms like birds and mammals due to exposure to these compounds. Any impacts would be temporary, in the form of dispersion from the sites due to increased human activity, and/or lower abundance of food. Monitoring birds and mammals is not part of the proposal.
11.50		Monitoring and evaluation and an adaptive management strategy is critical to the success of project implementation, particularly since there is some uncertainty associated with the effects of the proposed activities. There should be a continuing process of planning, implementing, monitoring, and evaluating effects of project implementation, and adjusting implementation or mitigation where effects are not as predicted. It is only through monitoring of actual effects that occur that the BPA and MDFWP will be able to determine whether: 1) goals and objectives are being met; 2) assumptions/indicators used in developing and implementing the conservation program are valid; 3) effects are as predicted (i.e., addressing uncertainties); and 4) if mitigation is effective or should be increased or decreased or otherwise adjusted to be [sic] meet project goals and objectives.
	11.50	Thank you for your comment. See response to Comment 11.3.
11.51		A properly designed monitoring plan will also quantify how well the preferred alternative resolves the issues and concerns identified during scoping and DEIS review, and provides the flexible program for monitoring and feedback of monitoring results to improve predictive methodology and modify mitigation.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.51	Thank you for your comment. We have proposed treating 2 to 3 lakes per year over an about 10-12 year period to allow ample time for monitoring and corrective feedback.
11.52		We are pleased that the DEIS indicates that post-treatment monitoring would be conducted (page 2-4), but we are concerned that the DEIS provides only general descriptions of monitoring activities that would be undertaken. Additional details of the monitoring efforts should be presented to assure that consistent and meaningful information/data and is generated to evaluate effects of project implementation. A well designed monitoring plan and adaptive management strategy is needed to assure that adequate monitoring is carried out and that results are evaluated and fed back to management for adjustments in project implementation and mitigation when and where necessary.
	11.52	Post treatment evaluations will involve replicating pre treatment evaluations. This provides the most consistent methodology. Pre-treatment plankton evaluations are made by replicate vertical tows using a 5 inch Wisconsin net at 50 feet depth, or maximum lake depth, which ever is greatest. These samples are analyzed to a reasonable degree of taxonomic resolution for average number per species per liter, and by total number per species when feasible. These evaluations have been conducted on monthly intervals, during ice off, in some lakes to capture variation in species richness and abundance in the SF drainage. Amphibian surveys involve walking and dip netting along shorelines, and kick netting and visual observations in streams. Time has been the unit of effort. Monthly amphibian surveys have been conducted on some lakes to capture variation in richness, life stage, abundance and most importantly detectability. Insect evaluations are being designed by MFWP and will begin in 2005. This survey will sample stream and lake insect communities throughout the SF drainage and will determine a baseline by which to compare future insect community status. Kick netting will be used in streams, sweep netting will be used in lakes, where possible, and a sample of lake benthos will be taken from sediments up to 50 feet depth. There is inherent natural variation in insect, plankton and amphibian communities. Evaluations conducted before any treatment would hopefully capture this variation, and therefore be useful in

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		making post treatment conclusions. This information has been added to Section 2.4.5.
11.53		Specifically, we believe that information defining the follow-up actions to the rotenone and antimycin treatments (monitoring and evaluation of effects upon all potentially affected aquatic and terrestrial species, restocking plan for non-target indigenous species, contingency plans, plan for preventing reintroduction of non-native species) should be more completely developed and presented in the EIS. We believe monitoring and evaluation are equally as important as removing hybrid trout from the lakes and restocking with pure strain westslope cutthroat trout, since it is only through monitoring and evaluation that naturally functioning aquatic ecosystems will be restored and protected for the long-term.
	11.53	See response to Comment 11.52. We believe the current level of pre treatment and post treatment evaluation is sufficient to evaluate the non-target aquatic organisms. The DEIS predicts that impacts to these organisms would be short term and minor. Conducting detailed analyses on terrestrial organisms goes beyond the scope of this project. For the purpose of this analysis, the contingency plan speaks of monitoring for only two years post treatment. It is recognized that long-term detailed monitoring offers the greatest probability of detecting subtle or great differences in effects from implementing a treatment.
11.54		We recommend that a monitoring and evaluation plan be completed and included as an appendix to the final EIS (and summarized in the Record of Decision) for the project. We believe that appending the monitoring and evaluation plan to the EIS provides the public with an opportunity to assist in developing and refining the elements of the plan which can potentially result in a better plan.
	11.54	See responses to Comments 11.4, 11.52 and 11.57.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.55		We recommend that the following general components be included in the monitoring plan: Identification of Parameters or Resources to be Monitored — The monitoring plan should specifically identify what is to be measured. For example, if amphibians are to be measured, the amphibian monitoring protocol should be identified. If water quality parameters (e.g., piscicide concentrations, potassium permanganate concentrations, aromatic solvent concentrations, pH, redox, dissolved oxygen, nutrients, temperature, alkalinity, other water chemistry parameters, physical and biological parameters, sentinel fish toxicity, etc,) are to be monitored, the monitoring methods and probable monitoring locations should be identified.
	11.55	See response to Comment 11.52.
11.56		We recommend that the following general components be included in the monitoring plan: Monitoring Methods to be Used-- The monitoring methods we are most familiar with are implemented using Standard Operating Procedures (SOPs) which outline how monitoring approaches could be applied haphazardly with the concomitant inconsistent reporting of the findings from that monitoring. We recommend that SOPs be contained in the monitoring plan or identified as being available by reference.
	11.56	See response to Comment 11.52.
11.57		We recommend that the following general components be included in the monitoring plan: Monitoring Frequency, Duration and Reporting of Results — The monitoring plan should specify the frequency of the monitoring efforts and identify the time-frames within which results would be reported. We suggest that the monitoring plan identify the intended recipients of any monitoring reports and how the reports would relate to evaluating the relative successes and failures of project implementation. We also suggest that the plan identify the duration of the monitoring effort. We recommend that the duration of monitoring efforts be tied to the specific resources or parameters being measured and the reason for measuring them.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.57	See response to Comment 11.52.
11.58		We recommend that the following general components be included in the monitoring plan: Definition of Roles and Responsibilities of Involved Parties — The monitoring plan should identify the parties that would be involved in the monitoring efforts and establish their respective roles (i.e., who will do what). This is particularly important in efforts that involve more than one agency and ensures that roles and expectations are established at the onset of the monitoring program.
	11.58	See response to Comment 11.52.
11.59		The discussion at the top of page 1-11 regarding genetic diversity issues associated with restocking the treated lakes with M012 brood stock raises important concerns. These concerns include: a) potential reduction of westslope cutthroat trout genetic diversity by restocking with a single M012 genetic stock, which may result in a monoculture exhibiting little genetic diversity; and b) potential dilution of natural genetic uniqueness exhibited in adaptations and phenotypic variations of local westslope cutthroat trout. It is not clear to us how these important concerns are addressed with the restocking plan. We recommend that the FEIS explain more fully how these concerns will be addressed.
	11.59	Section 1.4.2 of the DEIS describes the issues we received from scoping comments. One of those issues was that Montana's captive westslope cutthroat trout brood stock (M012) is somehow inadequate. We disagree and that is why using this stock is part of our proposal. There is no evidence that the M012 is not suitable for use in species conservation. In fact, this brood stock was founded from wild WCT mainly from the South Fork Flathead watershed. Genetic analyses since 1985 demonstrate that the M012 stock remains genetically diverse and hatchery practices have maintained a high level of fitness in this stock. This is currently the only safe source of WCT available. Should another stock from the South Fork drainage become available, we would consider using it. The objective of this project is to remove the present threats to the species in this area. We agree

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		that the description of the present westslope cutthroat trout stock was not clearly identified as the M012 stock on page 1-7 of the DEIS. See response to Comment 11.8.
11.60		Restocking of lakes with pure strain westslope cutthroat trout is discussed in Section 2.4.6 (page 2-26), and there is some discussion of restocking of amphibians. However, few specifics are provided regarding potential restocking of the lakes with other native non-target species that may be affected by treatments (e.g., macroinvertebrates, plankton, fish, amphibians, reptiles, birds, wildlife, etc,). We are concerned about potential loss of native non-target species, since proposed fish toxicants and potassium permanganate, used to neutralize the fish toxins, can be lethal to many aquatic organisms. The loss of non-target species and impacts on overall aquatic ecosystem integrity is an important issue. We believe attention needs to be directed to potential impacts to non-target species.
	11.60	Appendix D of the DEIS discloses the potential impacts to non-target species. Related case histories and numerous reports and publications indicate that impacts to non-target organisms would be minor and short term. See Appendix G on the FEIS.
11.61		If some indigenous species depend on isolated headwater habitat in the lakes or have evolved within the isolated headwater habitat they may not easily repopulate the lakes and may need assistance in repopulation. Restocking and other proposed efforts to restore or compensate for unavoidable impacts that may occur to all affected species should be more fully addressed. We have heard of potential longer term effects to invertebrates as a result of piscicide applications, most notably at Strawberry Reservoir in Utah where invertebrate populations have not been fully restored following rotenone applications there.
	11.61	See response to Comment 11.60. We acknowledge the risks identified here, but our past experience suggests the likelihood of these risks materializing is very low.
11.62		We are pleased that amphibians would be collected for release after treatment (page 2-21), and that MDFWP would replace amphibians that may be impacted (page 2-26). We also note that the DEIS states that tailed frogs could be collected from some streams prior to treatment and replaced following treatment (page 2-26), but does not definitively commit to such collection and restocking of tailed frogs and other amphibian species (i.e., the DEIS should say that all amphibian species will be collected from some streams prior to treatment and replaced following treatment). On page

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		3-23 it is also stated that efforts to mitigate impacts could include transplanting amphibians from neighboring populations, if necessary, and/or capturing specimens from within each project area before treatment then releasing them after it is complete. We believe such amphibian mitigation efforts should be committed to more definitively (i.e., "...would include transplanting amphibians...").
	11.62	Relevant case histories from NW Montana indicate that non-target species numbers rebound naturally after treatment. See response to Comment 11.47.
11.63		We also recommend that an accredited herpetologist be involved in supervising amphibian monitoring and evaluation and mitigation efforts. Amphibians have experienced significant decline in many habitats, and we feel particular precautions need to be taken to assure that populations of native amphibian species will be preserved and restored as much as possible in the treated waters.
	11.63	Please see response to Comments 11.43 and 11.46.
11.64		The potential effects of continuing to restock fish in lakes that were originally fishless should be more fully evaluated and disclosed in the EIS. It is our understanding that most or all of the proposed 21 lakes that are proposed for treatment were originally fishless. Is that correct? The DEIS says that MDFWP proposes to continue historical stocking of fish in these lakes order to maintain the current recreational and socioeconomic standards and to increase "biological integrity" by providing genetically pure westslope cutthroat trout to seed downstream areas (page 1-13). It is also stated (page 2-27) that unauthorized, illegal stocking may occur as it has in the past, and that such illegal stocking is likely to occur if MDFWP dose [sic] not restock the lakes that were originally fishless.
	11.64	Correct, most of the lakes were likely fishless before stocking occurred. All of the lakes proposed for treatment have been planted by aircraft. Fisheries management has included not only native species conservation but also providing quality angling. Please see response to Comment 11.10 and Sections 1.2, 2.4.6, 2.6.4, and 3.2.4 of the DEIS.
11.65		The introduction of fish to fishless lakes to create a recreational fishery can have adverse effects on the aquatic ecosystem. Predation by introduced trout consumes native amphibians and benthic invertebrates and can reduce the population of larger zooplankton, which are effective grazers of the phytoplankton. With the restocking of fish to lakes that were originally fishless, additional

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		biomass is added to the lakes that can influence nutrient cycling, and can have unintended negative effects to water quality and the biological integrity of the lake. It is not clear to us, therefore, if "biological integrity" is increased by introducing fish to lakes that did not originally have fish as part of their naturally functioning ecosystem. A case can be made that biological integrity or ecological integrity is compromised by introduction of fish to fishless lakes.
	11.65	There is no proposal to stock currently fishless lakes. Any fish stocking associated with this proposal involves lakes that have supported fish populations for nearly 50 years.
11.66		We recommend that restocking of fish to originally fishless lakes be based on monitoring and evaluation and full understanding of how lake ecology is affected by fish restocking. We recommend that a cautious approach to the trout restocking program be taken and that the stocking program be accompanied by a sufficiently robust monitoring and evaluation program to evaluate ecological effects of stocking fish in lakes that were originally fishless. Maybe some of the lakes should be left fishless for long-term monitoring and ecological comparison with lakes that are restocked?
	11.66	Please see responses to Comments 11.10 and 37.2.
11.67		We note that decisions were made in the past to introduce non-native trout to these lakes without careful, thoughtful evaluation, and full consideration of potential ecological effects. This led to the ecological problems creating the need for this proposed project. We think it would be appropriate to proceed cautiously in restocking of fishless lakes, and to base restocking decisions on careful evaluation of monitoring data and information and full understanding of potential ecological effects.
	11.67	This project was carefully designed to protect this stronghold for westslope cutthroat trout from nonnative fish and hybridization.
11.68		Thank you for including a discussion of public or human health effects associated with using rotenone and antimycin (beginning on page 3-54).
	11.68	Thank you for your comment and interest in the SF WCT Conservation Program.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
11.69		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: The new fish consumption value for the Clean Water Act 304(a) criteria is 17.5 grs/day instead of 6.5 grs/day (although you may be limited to 6.5 grs because that is the value in the current version of the State's WQB-7 criteria document).
	11.69	This information has been added to the FEIS in Section 3.9.
11.70		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: For rotenone, the document lists the appropriate Reference Dose (RfD), but we suggest you provide a citation for the value (i.e., EPA's IRIS document).
	11.70	The DEIS lists that the RfD for rotenone was derived from the EPA IRIS on page 3-54 of the DEIS.
11.71		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: For antimycin, the 0.5 mg/kg-day is a No Observed Effect Level (NOEL), not a Rfd. To arrive at a RD. this value will have to be adjusted downward based on appropriate uncertainty factors. EPA's Regional toxicologist (Dr. Robert Benson) recommends an overall uncertainty factor of 3,000 rather than 300 based on the following: 1) a factor of 10 based on uncertainty in the animal to human translation; 2) a factor of 10 based on intra-human variability; 3) a factor of 10 based on the subchronic/chronic uncertainty; and 4) a factor of 3 based on data limitation (i.e., one study) = 3000 as the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		overall uncertainty. The RfD for antimycin, then, would be 0.0002 mg/kg-day.
	11.71	This information has been added to the FEIS.
11.72		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: For antimycin, the document notes that antimycin does not bioconcentrate, and therefore no bio-concentration factor (BCF) is used in the calculation of the human health value. We suggest that there be a reference supporting this conclusion (note: There are a number of toxicants, some metals for example, that do not bioconcentrate appreciably and are said not to concentrate, but even for these, the BCF is often greater than 1).
	11.72	This has been added to the FEIS.
11.73		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: For potassium permanganate, the document does not present a proposed human health water column value. Dr. Benson has calculated a value. Based on his calculation (see attached) the water column value should not exceed 0.8 mg/L.
	11.73	This information has been added to Appendix D.
11.74		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows:

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		It may be reasonable to base the chronic exposure scenario on the drinking water route of exposure only, since, as the DEIS explains, the fish targeted for removal will be killed quickly and the dead fish will be collected and disposed of (i.e., if the fish are quickly killed and disposed of, there would not appear to be much likelihood of bioconcentration and a fish consumption route of exposure). As a result, the chronic risk assessment calculation for the water column values might be based solely on the drinking water route of exposure. The reasonableness of this assumption, of course, would depend on a 100% (or close to) fish kill, dead fish collection and a short half-life for the chemicals used. Since the objective of a project such as this is generally 100% kill, limited potential for bioconcentration would seem to be a reasonable assumption.
	11.74	This information has been added to the FEIS in Section 3.4.
11.75		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: Based on the adjustments discussed above (using the 17.5 grs consumption assumption for the rotenone "water+fish"), we suggest appropriate toxicant target concentrations and human health values would be: TOXICANT WATER COLUMN TARGET HUMAN HEALTH VALUE Water+Fish Water Only Rotenone 50 ug/L 18 ug/L 140 ug/L Antimycin 7.5-8.0 up/L or 4 ug/L - 7.0 ug/L Potassium Permanganate 4.5 mg/L - 0.8 mg/L

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Based on the figures in this table, the target concentrations lbr rotenone (50 ug/l) would be lower by greater magnitude than the estimated chronic "water only" human health value for rotenone (140 ug/L), more so than target concentrations and "water only" human health values for antimycin and potassium permanganate. This suggests that there may be a greater margin of safety in regard to human health risk for use of rotenone (at the proposed target concentrations) than for the other chemicals. Admittedly, this is an observation based on a limited amount of information and application of uncertainty factors, and it should also be noted that proposed target concentrations of these chemicals may be higher than shown to account for water chemistry and fresh water inputs. In any case, it is important that potential human health risks be considered along with other factors (e.g., rate of detoxification, quantity needed to kill fish, ease of bulk transport, toxicity to non-target organisms, piscicide availability, etc.,) in weighing the advantages and disadvantages of use of the chemicals.
	11.75	This has been added to the FEIS.
11.76		The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows: In regard to acute toxicity and exposure, it appears that the DIMS uses LD5O values from the literature to estimate exposure scenarios that are highly unlikely to occur, such as drinking 12,000 liters of contaminated water in one day, as the basis for dismissing concerns about acute exposures. We believe it is inappropriate to use a lethal dose as the basis for reaching conclusions about public health protection. Also, the extreme exposure scenario approach to presenting the LD5O information may be misleading in a public disclosure document such as an EIS. There appears to a low amount of data with which to derive safe acute exposure levels for these chemicals. The EIS should disclose the uncertainty in human health exposure effects, and identify the mitigation measures and management practices that will be used to avoid and minimize human exposure.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	11.76	This information has been added to Appendix D.
11.77		Thank you for identifying the permits and authorizations that would be needed to implement the proposed project (pages 2-14, 2-15), including the water quality exemption permitted under MCA 7 5-5-308 for short-term exemptions fro the purpose of elimination of undesirable and nonnative aquatic species (pages 3-26, 4-2, D-5). Generally the Montana DEQ establishes conditions that minimize risks to public health and the extent of exceedances of Water Quality Standards and the length of time during which an exceedance may occur. We believe the FEIS should also disclose the Montana DEQ's conditions for use of the MCA 75-5-308 water quality exemption.
	11.77	MCA 75-5-308 lists the conditions that minimize risk to public health and the proposed project would follow the stipulations on the required permit.
11.78		Also, we did not see Clean Water Act Section 401 water quality certification included among the permits and authorizations discussed. It would be appropriate to discuss Clean Water Act Section 401 water quality certification that may be required from the Montana DEQ.
	11.78	Page 4-3 of the DEIS states *"…the Forest Supervisor may authorize use of motorized equipment and chemical applications as deemed necessary for the administration of the area and its resources, such as the proposed action (FSM 2320, Direction for Wilderness, June 1990)…"* The FS has provided authorization in past years for the rotenone treatment of Devine Lake in 1994. Issuing a federal permit is the criteria for requiring a Section 401 certification. Because the FS would not be issuing a permit per se' on this project, there would be no need to initiate the 401 process. Approval by the Forest Supervisor or designee is the appropriate level of authorization.
11.79		The EPA issued an Interim Statement and Guidance on Application of Pesticides to Waters of the U.S. in Compliance with FIFRA (Federal Insecticides, Fungicides, and Rodenticides Act) on July 11, 2003 that indicates that application of a pesticide to waters of the U.S., consistent with all relevant requirements of the FIFRA, does not constitute the discharge of a pollutant under the Clean Water Act. It is our understanding that this policy would cover use of piscicides for managing non-native fish species. Thus, EPA's current position is that the use of fish toxicants in waters of

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		the U.S. for management of non-native fish would not require an NPDES permit (or in Montana-MPDES permit) under Section 402 of the Clean Water Act. You should understand, however, that EPA is still accepting public comments on this position, and that there may be case law with alternative views on such matters.
	11.79	Thank you for your comment and interest in the SF WCT Conservation Program. We will continue to monitor this issue.
11.80		It is stated (page 3-61) that none of the alternatives would affect air quality, although a small possibility of odors from piscicides is noted. We note that there appears to be potential for emissions of air pollutants from aircraft and mechanical equipment used during transport, application and mixing of toxicants. These potential effects, while likely minor, should be assessed and disclosed, especially since emissions may occur in or near the Class 1 air quality areas of the Bob Marshall Wilderness and adjacent Glacier National Park.
	11.80	There will be some jet exhaust and exhaust from outboard motors, but these emissions are expected to be minimal resulting in short term and minor impacts to the air quality. These impacts have been added to Section 3.12.1.
11.81		[BPA should consider the following research]: Suggested Guidance for Application of Manganese RfD to Specific Scenarios In applying the reference dose (RfD) for manganese to a risk assessment, it is important that the assessor consider the ubiquitous nature of manganese, specifically that most individuals will be consuming about 2-5 mg Mn/day in their diet. This is particularly important when one is using the reference dose to determine acceptable concentrations of manganese in water and soils. Following RfD/RfC Work Group deliberations, it was decided that having a single reference dose for total oral intake of manganese is most appropriate, but that guidance should also be provided as to how this reference dose might be applied in specific situations. It is recommended that the upper end of the range recommended by the NRC (5 mg/day, described below) be considered to represent a typical human intake from total dietary sources. For determination of acceptable concentrations of manganese in water and soil, then, the risk assessor would subtract this amount from the level specified by the RfD [i.e., 10 mg/day (RID) - 5 mg/day (typical dietary intake) =5 mg/day (remaining)]. For applying this number to a non-dietary scenario, it is also recommended that a

Comment Number	Response Number	Comment/Response
		modifying factor of 3 be applied. The rationale for this modifying factor is three-fold. First, while the data described in section I.A.4 of the IRIS file suggest that there is no significant difference between absorption of manganese as a function of the form in which it is ingested (i.e., food versus water), there was some degree of increased uptake from water in fasted individuals. Second, the study by Kondakis et al. (1989) has raised concerns for possible adverse health effects associated with a lifetime ingestion of drinking water containing about 2 mg/l manganese. While no data are available to quantify total intake of manganese, one would not expect this concentration of manganese in water to be a problem based on dietary information revealing intakes ranging from 2 to 10 mg/day that are not associated with adverse health effects. Third, although toxicity has not been demonstrated, there are remaining concerns for infants fed formula which typically has a much higher concentration of manganese than does human milk (see section I.A.4 of the IRIS file for further discussion). If powdered formula is made with drinking water, the manganese in the water would represent an additional source of intake. Using the recommended appropriation of 5 mg Mn/day for dietary contributions and a modifying factor of 3 for exposures from soil and drinking water and a body weight of 70 kg, yields a value of 0.0238 mg/kg-day. Exposure from water + Exposure from soil = (l0-5)/(3x70) = 0.0238 mg/kg-day Assuming no exposure from soil and a '70 kg person drinking 2 L/day, the suggested advisory level is: 0.0238 mg/kg-day x 70 kg x 1 day/2 L = 0.8 mg/L
	11.81	This has been added to the FEIS.
12.1		The Service reviewed an April 2002 biological assessment prepared by BPA and Montana Fish, Wildlife, and Parks (MFWP) for this project and concurred with the determination that the proposed project is not likely to adversely affect the threatened bull trout (Salvelinus confluentus), threatened grizzly bear (Ursus arctos horribilis), threatened bald eagle (Haliaeetus leucocephalus), threatened Canada lynx (Lynx canadensis) and the threatened gray wolf (Canis lupus) (UFWS, May 15, 2002,

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		letter of concurrence). Therefore, pursuant to 50 CFR 402.13 (a), formal consultation on the bull trout, or other federally listed species, was not required and incidental take of any threatened and endangered species within the project area is not anticipated. However, although incidental take is not anticipated, should unforeseen circumstances accidentally result in incidental take of a listed species, the Service must be notified. Further, if the final design of the project is changed so that it changes the effects on federally listed species, a revised biological assessment may be required.
	12.1	We will continue to comply with the ESA throughout this project.
12.2		The Service has reviewed the DEIS for the proposed project and supports the activities outlined in the DEIS that would reduce the threats to a native species that has been degraded due to anthropogenic factors, specifically westslope cutthroat trout. The anticipated net effect of the proposed project ... may help prevent westslope cutthroat trout being driven toward federal listing in the future.
	12.2	Thank you for your comment and interest in the SF WCT Conservation Program.
12.3		The anticipated net effect of the proposed project will likely return portions of the Bob Marshall and Great Bear Wilderness areas to a condition that is consistent with the spirit and purpose of the Wilderness Act… .
	12.3	Thank you for your comment and interest in the SF WCT Conservation Program.
12.4		The Service considers alternatives B and C as having the greatest potential of achieving westslope cutthroat trout conservation. We believe that MFWP is cognizant of the public's high regard for the qualities and values in designated wilderness areas, and the MFWP has provided the assurances that the Proposed Action represents a carefully considered attempt to balance objectives that sometimes appear to conflict (i.e., protection of wilderness values opposed to conservation of rare species) with the reality of conducting business in a financially conscientious manner.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	12.4	Thank you for your comment and interest in the SF WCT Conservation Program.
12.5		We wish to convey our appreciation of the agencies involved for actions that promote the conservation of westslope cutthroat trout. Projects such as what is proposed in the DEIS will be helpful in protecting the existing range and in increasing the number of populations of the westslope cutthroat trout. Such actions will be extremely beneficial for this rare species and we hope, will factor prominently into preventing the need to add this fish to the Secretary of Interior's list of federally threatened and endangered species.
	12.5	Thank you for your comment and interest in the SF WCT Conservation Program.
13.1		You need a sample fish from Martin Lake tested before you poison them. I was asked to go with a group of people to catch 25 fish as a sample (I was unable to go). The group didn't catch any fish to test.
	13.1	Martin Lake is not part of this proposed project.
13.2		The fish they have been catching from the lake look pure.
	13.2	You are correct; some of the fish are pure. MFWP has been stocking genetically pure fish in these lakes for years to correct the problem and maintain angling quality, but hybrid trout are still there. See Sections 1.1, 1.2 and 2.6.4 of the DEIS.
14.1		We understand the rationale behind this project and we think it is admirable for the BPA, USFS, and Montana Fish, Wildlife, and Parks to try to restore our native fisheries and eliminate introduced trout competition. Unfortunately, we introduced non-natives into these mountain lakes and watershed in the first place during the past years and we may now be playing "God" again when we try to reverse those previous mistakes.
	14.1	These lakes were stocked with different needs in mind, for different social reasons, and before preservation and conservation were concerns of our country and culture. History has shown us

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		that it is difficult, to near impossible, to restore a species once it is gone. It would be irresponsible to allow the westslope cutthroat trout in the South Fork Flathead drainage to become hybridized even further.
14.2		We believe it is highly unlikely that all hybridization and non-natives would be eliminated in this tremendously expensive project. It is unrealistic to think we can totally correct or "undo" our past.
	14.2	See response to Comment 35.16. Montana and many other states, have successfully removed fish from lakes and streams using fish toxin. Six lakes in this project area have been successfully treated to remove undesirable fish. Westslope cutthroat trout were restocked in all six lakes, and they currently are providing a fishery.
14.3		If this project does continue as planned, we suggest that initial attempts be limited to one drainage or basin for a test case to be certain that it has the positive outcome you intend.
	14.3	Thank you for your comment and interest in the SF WCT Conservation Program. Section 2.4.1.1 and Appendix D lists examples of successful treatments in this project area.
14.4		The effect upon existing recreation opportunities is substantial! This region has a rapidly expanding human population and the public is continuously demanding improved and increased recreational use days. The South Fork Westslope Cutthroat Trout Program would be harmful to the local public fishing opportunities… . This effect upon the loss of public recreation must be an important consideration during the EIS process.
	14.4	This issue was addressed throughout the DEIS. Starting on page 1-2 of the DEIS, some commenters wish that the wilderness lakes be rendered fishless and left that way. The analysis in the DEIS considered this and determined that there may be a negative and long-term impact to anglers and outfitters if this happened. Section 3.7 and 3.8 of the DEIS provide additional information that was evaluated or considered during this analysis.
14.5		The South Fork Westslope Cutthroat Trout Program would be harmful to … local outfitters' livelihoods for nearly half a decade following the application of fish toxins.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	14.5	The DEIS acknowledges this on pages 1-12 and 3-51. Section 3.8.3.1 provides some information on alternatives to dealing with these impacts, including rescheduling clients for different times of the year, and rescheduling destinations to adjacent lake fisheries.
15.1		The Department has reviewed comments submitted by the Montana Office of the EPA dated July 29, 2004, and fully concurs with those comments. The only minor exception pertains to Human Health comment 27. Montana has not adopted the new EPA fish consumption value of 17.5 g/day. The adopted fish consumption value for calculating Human Health criteria is 6.5 g/day. See the extensive comments previously submitted by the Department to the Department of Fish, Wildlife and Parks during the internal draft review pertaining to the calculation of Human Health criteria.
	15.1	This information has been added to Appendix D.
15.2		Since water quality sampling for rotenone may be difficult and a laboratory method for antimycin does not exist, instead of chemical monitoring, DEQ requests that biological monitoring for lakes and streams be performed at least during the first two years of the project. According to Sections 2.4.2.2 and 2.4.5 pre- and post- biological surveys are already planned and some of the information has been collected from lakes within the project area (Sections 3.3.2.2 and 3.3.3.1).
	15.2	Pages 2-25, 26, 27 of the DEIS lists the monitoring plan and we have added new information to the FEIS.
15.3		DEQ requests that information from pre- and post- biological sampling be organized into a report and submitted to Department after each year of treatment to document that no adverse short-term or long-term impacts to non-target species will occur. This information will also justify allowing the project to continue if the information demonstrates water quality and beneficial uses will be protected.
	15.3	Thank you for your comment. We would comply with any reporting requirements stipulated by your office.
15.4		[Specific comment on section] 1.5.4: In addition to the "308 Authorization" DEQ has §401 Certification authority for federal permits (i.e., Forest Service special use permits) that may cause a discharge to state waters. The §318 "Turbidity Authorization" should also be mentioned because

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		construction of dams, weirs or other structures (that cause sediment or turbidity increases) may be installed during the life of the project.
	15.4	Section 2.7.3 of the DEIS discloses and analyzes this as an option, but it was eliminated for further consideration. The FS would not be issuing a "Special Use Permit" but rather would "approve" the activity as was the case in the Devine Lake rotenone treatment of 1994.
15.5		[Specific comment on] 2.4.24 Add provisions for the §401 Certification and possible §318 Authorization. The 308 Authorization conditions listed are an example; additional conditions, such as biological monitoring, may be required by DEQ.
	15.5	See responses to Comments 11.78 and 15.4. MFWP will comply with the terms of the 308 permit.
15.6		[Specific comment on section] 3.4.1 Typical stream types found in the project area generally have gradients from 4 to 10 percent, and are characterized by straight (nonsinuous) cascading reaches with (REMOVE) "frequently" (INSERT) "closely" spaced pools. Many of the outlet streams associated with the lakes in this project have large waterfalls immediately downstream of the lakes, some reaching 200 feet tall. (REMOVE) "Also common are" Streams with gradients from 2 to 4 percent (REMOVE) "; these-streams" usually occupy narrow valleys with gently sloping sides. There are no federal or Montana numeric water quality standards for rotenone or antimycin. However, the Montana Water Quality Act has narrative standards for water quality that prohibit the introduction of substances into waters that are injurious to aquatic life or that affect exiting uses. Under this project, MFWP would apply piscicide for the expressed purpose of killing unwanted fish. (REMOVE) "There may be some minimal and short term impacts to other aquatic organisms, but the MDEQ will permit an exemption for this activity under section 75-5-308 of the MCA." (INSERT) "The Montana WOA in §75-5-308 MCA and the EPA through FIFRA acknowledge the use of pesticides under special circumstances is beneficial. FIFRA registration and label instructions reduce the potential for impacts to non-target organisms or long-term impacts and protects human health. Conditions imposed by DEQ when it issues a "308 authorization" will add an additional level of protection to non-target organisms and designated beneficial uses. The conditions may include limitations to the time of year the piscicides are applied, monitoring treated waters to ensure

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		detoxification of the piscicides is complete, biological monitoring and ensuring that the duration of toxic conditions is as short as possible, among others."
	15.6	We have corrected this in the FEIS in Section 3.4.1.
15.7		[Specific comment on section] 3.4.3.1 Add a section describing the movement and detoxification of Antimycin by organic sediment. Add a section about the proper management of Rotenone. (REMOVE) "The only downstream users of water would be outfitter and private hunter camps." (INSERT) "Impact to drinking water use (human health) and livestock uses will be minimized by temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary." (REMOVE) "Some livestock watering would be expected at some of these downstream locations." A number of (INSERT) "other precautions will" (REMOVE) "factors would" aid in the reduction or elimination of REMOVE "project areas users'" exposure to (INSERT) "these compounds by wildlife and other aquatic life proper containment of piscicide treatments (low concentrations used for fish killing do not have harmful effects on mammals); rapid detoxification of both compounds in flowing streams (INSERT) "and the treated lakes;" (REMOVE) "temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary." (INSERT) "Impacts to agricultural uses in the project areas is [sic] expected to be slight to no effect. Recreation (swimming) use impact will also be slight because of the time of year and cold water conditions when the treatments will be applied. Recreational fishing will be impacted until the restocking efforts are complete."
	15.7	We have corrected this in the FEIS in Section 2.4.1.3 and provided additional information.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
15.8		[Specific comment on section] 4.1.5 Add sections discussing the §401 Certification and possible 318 Authorization.
	15.8	See responses to Comments 11.78 and 15.4.
15.9		[Specific comment on] Appendix D Rotenone Effects Describe in detail the environmental factors affecting the decomposition of Rotenone and Antimycin. Discussions with FW&P staff have described toxic conditions in a Rotenone treated lake well in the winter following treatment. Toxic conditions to aquatic life for months after treatment probably will not be considered short term as required in the 308 authorization. Outlet streams will have to be monitored and detoxified until a no effect level is reached.
	15.9	The example you refer to is the treatment of Rogers Lake on November 4, 1993 in which the lake was treated at 1.1 ppm rotenone to remove yellow perch, brook trout and red side shiners. This was the third time in history that Rogers Lake was treated with rotenone (1957, 1967). On March 12, 1994, three lots of caged fish were installed in the lake under the ice and monitored for 24 hours. Lot 1 was installed at the lake surface, Lot 2 at 11 feet depth, and Lot 3 on the bottom at 19 feet depth. At 24 hours exposure to treated water, Lot 1 fish had 100% survival, Lot 2 fish had 71% survival, and lot 3 fish had no survival. Dissolved oxygen (DO) measurements were taken at the corresponding cage depths. At the lake surface DO was 7.1 ppm, at 11 feet deep DO was 4.4 ppm, and at the bottom DO was 0.8 ppm. Rogers Lake toxicity did not persist through March 1994, and low DO levels are the likely explanation for the survival at these different strata. Based on this evaluation, Rogers Lake met the “no longer toxic” requirement listed on the product label, which is necessary for restocking the lake. Rogers Lake has a history of experiencing almost annual DO sags in February and March, which has affected the fish population in this lake.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
15.10		[Specific comment on] Appendix D Regulatory Status Use the correct citations. The citation for 17.30.63 7(3)(b) does not exist. This was brought to your attention during the internal draft review comments.
	15.10	We have updated the text as suggested.
15.11		Specific comment on Appendix D: Municipal Wastewater Applications ...Hydrogen sulfide is (REMOVE) "one of the" (INSERT) "a" deadly (REMOVE) "gases" (INSERT) "gas" that can be formed in the collection and treatment of municipal wastewater…
	15.11	Thank you for your comment. Appendix D of the DEIS should be corrected to read "...Hydrogen sulfide is a deadly gas that can be formed in the collection and treatment of municipal wastewater…"
15.12		Specific Comments on Appendix D: Cleanup ...sub-sample of the dead (INSERT) "fish" is collected... Aesthetics is an important reason to clean up the dead fish, but odor control, bacteria and fungus control and removing the potential food source for bears, eagles and other wildlife to consume rotenone killed fish is even more important.
	15.12	The reasons for cleaning up a project site are described on page 2-23 of the DEIS. Page 3-31 of the DEIS specifically addresses the biological benefits of leaving dead fish in a lake.
16.1		First is that we think that any lake that is poisoned needs to be restocked with – [no species listed] to preserve that fishery.
	16.1	Thank you for your comment.
16.2		We would not support poisoning out the existing fish and keeping the lake fishless.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	16.2	Thank you for your comment.
16.3		The second comment is the use of mechanized equipment in the wilderness or Jewel Basin hiking area. We think it ought to be done in a way that's relatively cost effective as well as maintaining the wilderness qualities and the hiking qualities of the area. So in summary, we support using some mechanized equipment. It seems to be a reasonable balance between maintaining the wilderness qualities as well as being cost effective in dealing with the fishery issue.
	16.3	Thank you for your comment and interest in the SF WCT Conservation Program.
17.1		I fully support the project that's been presented, with one exception. The exception is Handkerchief Lake. It's my view that the resource; that is, the grayling, are of two high of value to be poisoned out. I appreciate the fact that they're going to trap and hold and restock, but it's my opinion that far too many grayling will escape the traps and be killed. And I just don't think that's the approach we should take based on the value of the grayling in our current societal situation.
	17.1	Handkerchief Lake is an important fishery for grayling and trout. To mitigate the impacts to the fishery, MFWP would remove some of the larger grayling and hold them in net pens in Graves Creek Bay until the treated waters are no longer toxic to fish. Handkerchief Lake has a demonstrated ability to produce large grayling and will continue to do so.
17.2		I guess I would support poisoning the Graves Creek from the outlet down to the reservoir, which is where, in my view, the majority of the trout are. I first began to fish Handkerchief in 1958 and have caught very, very, very few trout in the lake itself and lots and lots and lots of grayling.
	17.2	Thank you for your comment and interest in the SF WCT Conservation Program.
17.3		And I just think it's an inappropriate decision, and I'd like to speak for the fish and say, let's just bypass Handkerchief Lake on this one and go ahead with the remainder of the project and just leave that alone.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	17.3	Thank you for your comment. Please see response to Comment 2.2.
18.1		I would like to voice that there be no fish removal or fish toxins used in the high mountain lakes.
	18.1	Thank you for your comment.
18.2		I would like to see Montana Fish and Wildlife & Parks plant pure strain westslope Cutthroat Trout on existing populations and bring the ninety to ninety-five percent (90/95%) genetically pure fish population up genetically by using a swamp out method instead of killing all the wild Cutthroat. This would be a lot more beneficial than using a fish toxin, and keep the water quality untouched by a foreign chemical in the water/drainage.
	18.2	Section 1.2 (page 1-8) of the DEIS addresses this issue.
18.3		Not to mention the incidental killing of other aquatic life and small animals using the water to drink.
	18.3	See response to Comment 11.60.
18.4		There is an article in the Hungry Horse News from a former Biologist Joe Huston discussing this matter and was very concerned with the notion of MTFWP position on the removal of all these fish.
	18.4	Some people have different opinions about the reasons for proposing a project like this. MFWP is mandated by state law to provide an abundance and diversity of angling opportunities for the public. MFWP is also mandated to safeguard sensitive species and make efforts to prevent sensitive species from becoming extinct. Mr. Huston had other opinions about this problem that are described in Rick Hulls article "The return of the king" in the 1986 May/June issue of Montana Outdoors. In 1986, Mr. Huston was responsible for implementing the rotenone treatment of the 4

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Jewel Lakes to remove the threat that rainbow trout posed to the pure WCT in the drainage. That project was a complete success.
18.5		Montana Fish Wildlife & Parks has lost a lot of credibility in recent years and sportsman [sic] like myself would like to see them quit messing with the fish populations in region 1.
	18.5	Thank you for your comment. MFWP's duty is to the resources and those who enjoy them (see page 1-8 of the DEIS).
19.1		(see *18.1) I would like to see Montana Fish Wildlife & Parks plant more pure strain westslope Cutthroat Trout on existing populations and bring the ninety to ninety-five percent (90/95%) pure fish population up genetically instead of killing all the wild Cutthroat.
	19.1	See response to Comment 18.2.
19.2		[Genetic swamping] This would be a lot more beneficial than using a fish toxin, and keep the water quality untouched by a foreign chemical in the water/drainage.
	19.2	Sections 2.1 and 2.6.4 of the DEIS state that many lakes in the SF Flathead, including the wilderness, have been subjected to the genetic swamping management concept for nearly 19 years in an effort to correct this problem.
19.3		(see *18.2) Not to mention the incidental killing of other aquatic mammals and small animals.
	19.3	Aquatic mammals, i.e., otter and mink, are addressed in the response to Comment 11.48 and Section 3.3 of the DEIS addresses other small animals that are likely to be affected.
19.4		Montana Fish Wildlife & Parks has lost a lot of credibility in recent years and sportsman like myself would like to see them quit messing with the fish populations in region 1.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	19.4	Thank you for your comment.
19.5		I voice that there be no fish removal in the high mountain lakes.
	19.5	Thank you for your comment.
20.1		Have attended a meeting at FWP and read the DEIS. Please use alternative B.
	20.1	Thank you for your comment and interest in the SF WCT Conservation Program.
20.2		Think the idea of moving some of the grayling from Hankerchief [sic] Lake during the poisoning is good, perhaps could move a few more than planned? I worry you might interrupt the spawning, perhaps similar to Rogers Lake where no one seems to know what is altering the spawning there.
	20.2	Handkerchief Lake is capable of producing a quality grayling fishery. See response to Comment 17.1.
21.1		I don't think we should destroy anymore fisheries by poisoning lakes in the drainage. Most of us fishermen like to catch cutthroat or any trout. I would guess 99.9% of us don't care if the fish we catch has papers or is possibly a pure strain.
	21.1	We understand that not all anglers care about the genetic status of the WCT. MFWP has a duel purpose to enhance hunting and fishing and to preserve and protect native species for future generations; this project would achieve both agency missions. Actions to preserve and protect westslope cutthroat trout are also important when the US Fish and Wildlife Service considers whether this species should be listed as threatened or endangered under the Endangered Species Act (ESA). MFWP, BPA, and the USFS are trying to prevent WCT from being listed under the ESA by reducing the threats to this species in this area. See Section 1.2 of The DEIS.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
21.2		[The project] seems to me another way to create jobs and destroy more fishing. There is no way there is ever any reason for catch and release if the fisheries program is working. A perfect example of a failed program is keeping fish under 10" along with the salmon that disappeared.
	21.2	Catch and release angling is not being proposed in this project.
21.3		Walleye Comments: Don't poison any more of Montana's waters with pike/walleye-Fort Peck and Yellowtail reservoirs are places for people to already fish for them.
	21.3	Thank you for your comment. There is no proposal to poison pike or walleye.
22.1		Your plan seems well thought out, although given the depth of some lakes I'm not sure fish kill will be as thorough as you would like.
	22.1	See response to Comment 11.21.
22.2		I've spent a lot of time in my 64 years in the Flathead hiking and fishing in these areas and I can tell you that you are going to kill a lot of beautiful fish in some of these lakes. I also have a hard time with wiping out a healthy grayling population in Handkerchief Lake.
	22.2	See response to Comment 2.2.
22.3		Given that there are already several lakes in the area which hold pure Westslope Trout, I question if they really are in danger of being listed as endangered and I wonder why every lake has to contain nothing but pure Westslope Cutthroat.
	22.3	This project balances the issues of providing angling opportunity and conserving the WCT. It is true that Yellowstone cutthroat trout and rainbow trout provide good fishing opportunities; however these species threaten the persistence of pure WCT in this area. Removing the hybrid trout and restocking with pure WCT provides this balance.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
22.4		In this case, however, I wish you would scale back and downsize the scope of the project. I really think it is being overdone and the money could be better spent.
	22.4	Attempting to correct the problem using less intrusive means has been ongoing for 19 years (see Sections 1.1 and 1.2 of the DEIS). Given the threats facing the species in this area, we believe a more decisive method is warranted.
23.1		But I have a specific concern that is George Lake which I have enjoyed going into and fishing several times with friends and family. … I am 60 years old and I would like to be able to continue to go in with my friends and family to fish George Lake.
	23.1	Angling would continue at George Lake if this project is implemented.
24.1		The need to establish a pure cutthroat species does not strike me as necessary since your on [sic] information states that the subject lakes originally had no fish in them. If you are trying to go "Pre-European", restocking with any species is unnecessary.
	24.1	It is the responsibility of MFWP to address this problem, even though it is unpopular. We are not proposing to create fishless lakes.
24.2		The vast majority of tax payers and voters could not differentiate between a cutthroat and a sore throat. This project appears to have all the markings of appeasing a tiny group of elitist conservationists while providing work for some misled wild life professionals.
	24.2	State law (MCA 87-1-201[9ai]) mandates that wildlife professionals of Montana "…manage wildlife, fish, game and non-game animals in a manner that prevents the need for listing by the state (87-5-107) or under the federal Endangered Species Act, and [ii] manage listed species, sensitive species, or a species that is a potential candidate for listing by the state (87-5-107) or under the federal Endangered Species Act in a manner that assists in the maintenance or recovery of those species…" This project serves to meet those mandates.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
24.3		I am not aware of any such project having any long term success as the interbreeding will undoubtedly re-occur naturally or through the acts of detractors.
	24.3	There are numerous examples of successful projects like this throughout the country, across Montana, and specifically within the South Fork Flathead. In 1986 the four Jewel lakes were treated with rotenone to remove rainbow trout and restocked with genetically pure westslope cutthroats. In 1994, Devine Lake in the Bob Marshall Wilderness was treated with rotenone to remove brook trout, then restocked with westslope cutthroat trout. In 2000, Whale Lake in the North Fork Flathead, and Tom Tom in the South Fork Flathead were treated with rotenone to remove hybrid Yellowstone cutthroat trout. The lakes were restocked with pure westslopes and are providing a fishery. These projects have been successful at removing nonnative fish and maintaining a sport fishery. The threat of sabotage exists at any time and cannot be used to drive the management of a species. Removing all, or as many threats to this species in this area would have a long-term positive benefit to the species, long-term positive benefit to the angling public, and would ensure the long-term persistence of the species in this area.
24.4		The slaughter of thousands of fish to appease the whims of a few is not in the best interest of conservation or society.
	24.4	Comment noted.
25.1		It appears that this project will preserved the integrity of the current westslope population while creating a location to restore a swindling [sic] statewide population.
	25.1	The SF drainage is widely recognized as the largest refuge for this species in the world. Maintaining the integrity of this species will ensure the long-term persistence for conservation and recreation.
25.2		I support the proposed action of removing non-native trout from the lakes in the south fork river drainage. My approved action would be action B, or the proposed action.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	25.2	Thank you for your comment and interest in the SF WCT Conservation Program.
25.3		My only concerns would be with the introduced populations not establishing a healthy population in the lakes within the 10 year period and planting fish in historically fishless lakes.
	25.3	Please see response to Comments 24.3, 37.78 and 40.26.
25.4		I am not concerned with angling pressures and would be interested in the process the ecosystem takes when fish are removed and restocked.
	25.4	MFWP has conducted follow up surveys on past rotenone projects in the project area. See pages 3-22 and D-5 of the DEIS and Appendix G of the FEIS.
26.1		We have taken a look at the DEIS and ask that you revisit our scoping letter of June 20, 2003. We still have the same concerns and find that the DEIS fails to put them at rest.
	26.1	We have reviewed the comments you submitted jointly with Friends of the Wild Swan during the scoping process in June 2003. You have commented on eight general areas of concern. **1.** The evaluation of a full range of alternatives. *Response:* Chapter 2 of the DEIS specifically considers and analyzes several methods and alternatives to achieve the objectives of this project. Also see the response to Comment 35.2. **2.** Inappropriateness of restocking fishless lakes. *Response:* Creating fishless lakes is not an objective of this project. This is disclosed on pages S-2, 1-9, 1-12, and 2-27 of the DEIS. Also see the response to Comments 37.35 and 11.10. **3.** Concerns related to bull trout. *Response:* This project will follow the guidelines recommended by the USFWS during Section 7 ESA consultation. See response to Comment 34.3 for additional information. **4.** The EIS must address effectiveness of antimycin and rotenone and monitoring results of past projects. *Response:* See Chapters 2 and 3 of the DEIS and responses to Comments 11.40 and 37.109. **5.** There is a need for a monitoring plan. *Response:* Pages 2-25, 2-26, and 2-27 of the DEIS lists the monitoring plan and we have added new information to the FEIS. **6.** History of impure WCT. *Response:* See DEIS Sections 1.2, 1.4 and 2.1. **7.** The Wilderness Act prohibits

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		the use of motor vehicles. *Response:* See the response to Comment 1.4. **8.** Why are you proposing to re-establish WCT in lakes that were naturally fishless and have no trail access and receive little angling use? *Response:* The objective is to conserve westslope cutthroat trout in the project area. The goal does not include restoring lakes to historic fishless conditions. Restocking the lakes is not one of the decisions that would be made from the information in this EIS. See Sections 1.4.2.2, 2.4.6, and 3.2.4 of the DEIS. Montana will continue to manage fish in the lakes to maintain established values as described in the DEIS.
26.2		In a nutshell, we remain supportive of the restoration of native fish but doubt this project/program will be of much value in this regard. The program would appear to be largely ineffective in totally eliminating non-native and hybrid species of fish so it is likely they will return to these waters over time.
	26.2	Comment noted.
26.3		Moreover, the program is intended largely to attempt to establish pure strain westslope cutthroat in lakes that were historically fishless anyway - so how is this to truly be viewed as restoration?
	26.3	The objective is to conserve westslope cutthroat trout in the project area. Hybrid trout would not continue to expand downstream and the restored native population would help protect genetically pure populations downstream. The proposed action does not propose to restore lakes to historic fishless conditions.
26.4		The lack of a sound monitoring program integrated in a step-by-step manner that moves forward from one lake or stream to the next only after success has been firmly established makes us all the more doubtful that this is a wise expenditure of time and money.
	26.4	Section 2.4.2.2 of the DEIS states that a pre-treatment survey and evaluation would be conducted. As stated in the DEIS, many of the plankton and amphibian surveys and evaluations have been conduced and are ongoing. The post treatment plan is disclosed in Section 2.4.5 of the DEIS. Pages 2-5 and 2-29 of the DEIS state that lessons learned from the treatments would be used to modify successive protocols and treatments. Please also see responses to Comments 11.40, 31.7 and 37.134. More information about monitoring is provided in the FEIS. Please also see Section

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		2.4.1.1 and page D-5 for information about past successful treatments.
26.5		With these doubts in mind, we simply cannot lend our full support to a program that would, according to some alternatives at least, require the use of motorized vehicles and equipment in Wilderness areas, Jewel Basin Hiking Area, and other areas where motorized use is otherwise prohibited or a non-motorized backcountry setting is expected.
	26.5	We understand that the use of motorized equipment and vehicles in the wilderness is objectionable to some. Such use for this project would be infrequent and temporary. We anticipate that successfully completing the project would result in a net reduction of wilderness flights over time. See Section 2.4.6 of the DEIS.
27.1		I [sic] seems your plan is well thought out, however given the depth of some lakes I'm not sure fish kill will be as thorough as you like.
	27.1	See response to Comment 11.21.
27.2		In principal [sic] I'm still opposed to the project. I know from personal experience that you are going to kill a lot of beautiful fish in some of those lakes—4 to 5 pounders. I also don't know how you justify wiping out a healthy grayling population in Handkerchief Lake.
	27.2	The DEIS states that this fishery is acknowledged to be very strong and popular and will be maintained as such (see pages C-7 and C-8). See response to Comment 17.1.
27.3		Given that there are already some lakes in the area that hold pure Westslope Cutthroat I question why every lake has to be for pure Westslope Cutthroat.
	27.3	Any lake or stream that harbors hybrid trout and has an opportunity to hybridize with the pure WCT populations is a threat to the SF WCT population.
27.4		I urge you to downsize the scope of the project, I think the money could be better spent.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	27.4	Thank you for your comment and interest in the SF WCT Conservation Program.
28.1		I have mixed feelings about this project. Your intentions are good... your odds of success are not so good. Lakes the size of George, Woodward, or Sunburst are extremely hard to poison out successfully. You will have no way of knowing for years whether or not it was a success.
	28.1	The lakes you refer to are large and deep. We recognize that treating them will present challenges, but implementing a successful treatment should be possible. We propose to use gill netting initially to determine the level of kill, then later to use genetic sampling to confirm purity.
28.2		In the meantime you spoil some first class fisheries in these lakes. You also have to wonder what the risks to the genetic pool in the South Fork really are. Those fish have been in the lakes for a lot of years.
	28.2	Although the hybrid fish have been in the project area for many years, the problem was recognized many years ago and corrective measures were implemented to safeguard the WCT populations (see Section 1.2 of the DEIS). Those measures have slowed the progression of hybridization, but have not eliminated the threat. Once hybrid trout become firmly established in the SF Flathead River or Hungry Horse Reservoir, there is little that can be done to reverse the circumstance. The SF Flathead drainage is unique in the sense that it offers high quality angling for primarily native fish. Other Montana rivers offer very high quality angling, but are comprised mostly of non-native fish. Although the value of those other fisheries is high and irreplaceable, the SF Flathead is unique. Conserving the native fishery and high quality angling opportunity for native fish in this drainage is a responsible course of action.
28.3		A lot of money has been thrown at the problem with the various studies, the overstock program, etc. Maybe that money could be spent by the BPA better somewhere else.
	28.3	BPA funding is available to Montana to mitigate for fish and wildlife impacts from Hungry Horse Dam. It simply cannot be spent in eastern Montana for bass. This project is a direct mitigation effort to aid in conserving and maintain high quality native fish populations, and angling opportunities for native fish.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
28.4		Last, but not least, you have the distinct possibility of some "bucket biologist" dumping a bucket full of fish into the system at some time in the future.
	28.4	Illegal introductions continue to occur despite education programs and law enforcement. We share your concern about the potential for live fish transport violations. . Restoring the fishery rapidly would remove the primary motivation for future illegal introductions.
28.5		I suspect that you're going to upset some people when you poison out their favorite lake.
	28.5	We acknowledge that some will be upset. MFWP is planning on reestablishing a fishery in each lake that is treated.
29.1		I am opposed to the poisoning of the roughly 20 lakes in the South Fork of the Flathead River system, to remove the hybrid trout. I believe the impacts to the total river system is [sic] not fully evaluated.
	29.1	Thank you for your comment. The impacts that have been identified have been disclosed and evaluated in the DEIS.
29.2		Some of those lakes have fantastic fishing opportunities that will be changed for many years. This proposal will add more mistrust between anglers and MTFWP.
	29.2	The DEIS (page 2-26) indicates that fish stocking would occur the next summer following the treatment. Multiple year classes and sizes of fish would be stocked in some lakes to restore angling quality as quickly as possible.
30.1		I have tramped these hills and fished these waters for almost 50 years and I see no reason try to alter what has been fine for 50 years.
	30.1	Thank you for your comment and interest in the SF WCT Conservation Program.
30.2		The likelyhood [sic] that these lakes will stay genetically pure is remote. Just look at what has happened to all the other lakes around here with the introduction of other species both by illegal or

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		legal means. How do you suppose they became slightly impure today?
	30.2	The lakes were stocked with rainbow trout and Yellowstone cutthroat trout from the 1920s through the 1950s by several agencies and individuals. In the late 1950s this practice was halted and the lakes were stocked with westslope cutthroat trout only. Over the years these populations have become mixed, but they still have some non-native genes that stem from the original stocks. The lakes contain hybrid trout that are escaping and posing a threat to the genetically pure westslopes in the SF Flathead River drainage, and in Hungry Horse Reservoir.
30.3		My choice is to keep these lakes as they are now with intermittent stocking of pure westslope cutthroat and this will gradually improve the purity.
	30.3	Thank you for your comment and interest in the SF WCT Conservation Program.
31.1		American Wildlands continues to strongly support the protection and restoration of both pure populations of WCT and their native habitat. However, we do have several concerns regarding the current BPA proposal for the South Fork Flathead Watershed:
	31.1	Comment noted.
31.2		Several of the twenty-one proposed project lakes were historically fishless before Montana Fish, Wildlife and Parks began an aggressive non-native stocking strategy in the 1950's. We would like to see that upon removal of all non-native fish species, each of the historically fishless lakes remain that way. We support the reintroduction of WCT only to those project lakes and streams where WCT historically inhabited. AWL does not believe it is appropriate to "restore" westslope cutthroat trout to lakes and streams where the fish never naturally occupied.
	31.2	Thank you for your comment. Please see response to Comments 11.26 and 30.2.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
31.3		We also would like to see the project focus first on closed basin lakes, as past projects have shown the difficulty of eradicating hybrids in open basins.
	31.3	None of the lakes are considered closed basins, but barriers prevent upstream movement of fish from downstream sources. Pyramid Lake frequently experiences low to no flow during the summer and fall months, however, the outlet stream does connect with Youngs Creek during spring runoff in most years. Some of the other lakes experience subsurface flow during low flow times of the year. This feature will be used advantageously, as much as possible, to help contain the lake and stream treatments. Lakes where low flow and subsurface flow have been observed include Margaret (see page C-18 of the DEIS), Pilgrim (see page C-19 of the DEIS), and Pyramid (see page C-21 of the DEIS). In 2003, the outlet of Big Hawk Lake flowed underground for approximately 200 yards due to low flow in the fall of the year.
31.4		The federal Wilderness Act defines a wilderness as "an area where the earth and its community of life are untrammelled by man…which is protected and managed so as to preserve its natural conditions…with the imprint of man's work substantially unnoticeable." The utilization of helicopters, planes and motorboats in a wilderness area violates the directive of the Wilderness Act, as the law specifically prohibits the use of motorized equipment unless use demonstrates the minimum necessary for protecting the wilderness resource. American Wildlands therefore does not support the proposed alternative to use motorized mechanization to transport materials, chemicals and staff to the restoration sites. In all project areas within designated wilderness, we would like to see utilizations of solely non-motorized transport. In non-wilderness areas, we support the use of helicopters to transport materials, as this method would avoid conflicting with current Forest Service management prohibiting pack stock in the Jewel Basin.
	31.4	Please see the response to Comment 1.4. The DEIS considers the restrictions placed on wilderness and has worked to determine the best way of accomplishing the objectives.
31.5		The Montana Department of Fish, Wildlife and Parks (FWP) should develop a local "near neighbor" stock of westslope cutthroat trout for restoration purposes. Although it does take time to develop the near neighbor stock, we prefer to see WCT reintroduction take place in its historical habitat with near neighbor stocks and not MO12 hatchery fish that lack the 100 percent locally developed genotype.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	31.5	See response to Comment 37.97.
31.6		None of the lakes within designated wilderness should be stocked with MO12 fish.
	31.6	Please see the response to Comment 37.97.
31.7		The Final EIS must disclose specifically how the applications and affects of toxins and piscicide will be monitored.
	31.7	Pages 2-25, 26, 27 of the DEIS lists the monitoring plan and we have added the following information to the FEIS. Monitoring also includes the following: • Setting caged fish in lakes and streams to determine the lethality and/or neutrality of treated waters, and when to restock. • Gill netting lakes to determine fish population status. • Visual observation of spawning redds, in part, to determine natural reproduction. • Electrofishing surveys in streams to determine fish abundance. • Sampling lakes with a Wisconsin net to determine plankton species and abundance. • Angler surveys and reports to determine satisfaction. • Sweep netting and kick netting to determine insect species and abundance. • Visual surveys, kick netting, and electrofishing to determine amphibian presence and abundance.
31.8		The document should detail how undesirable genetic drift will be slowed in the South Fork watershed and eliminated in specific drainages.
	31.8	Section 1.1 of the DEIS describes the problem created by hybrid fish moving downstream from the source populations. When hybrid trout are replaced with pure WCT, geneticly pure fish would be

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		moving downstream. Over the long-term, the trend would be toward genetic purity, safeguarding the downstream pure WCT populations, and ultimately species conservation.
31.9		The FEIS should disclose the specific impacts of the project on each wilderness lake and the impacts to recreational/angling usage.
	31.9	Recreational/angling impacts at the lakes would be similar. Please see Chapter 3 of the DEIS.
31.10		In addition, the project must be carefully monitored to ensure that bull trout populations associated in downstream drainages from the treated lakes are not adversely impacted by the treatment. The FEIS must clearly define how the downstream detoxification stations will function and ensure that bull trout and other native downstream species of concern are protected.
	31.10	Appendix C of the DEIS provides detailed descriptions of the treatment zones in streams. We have also added more information about the stations in Section 2.4.5 of the FEIS.
31.11		We prefer the application of antimycin to remove the hybrid fish species from all the proposed project areas. As antimycin requires less volume per area treated than other piscicides such as rotenone, fewer trips and pack animals are required which would limit associated impacts. In addition, antimycin detoxifies more rapidly in streams after oxidation and photolosis, thus we prefer the use of this toxin to ameliorate any possible impacts on downstream bull trout and other native species.
	31.11	There are advantages and disadvantages to both antimycin and rotenone. See the DEIS (pages 2-16, 2-18). Livestock are not allowed in the JBHA. The reasons you cited for preferential use of antimycin are correct. The DEIS lists these attributes (page 2-10), as well as in the management objectives and preferred course of action for each lake in Appendix C of the DEIS. Although the performance benefits are clearly listed in the DEIS for antimycin, we acknowledge that the DEIS is not clear on the performance advantages that were used to help determine where

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		rotenone would be used. First, rotenone has performance characteristics in stream environments that can be used to the advantage of an applicator to cover longer reaches of streams in rugged remote terrain. As a result, this does not require as many drip stations to maintain lethality of stream water. In areas where downstream bull trout populations are not at risk of exposure to the fish toxin, rotenone is preferred to make advantage of this. When bull trout are at risk of exposure, antimycin would be used to reduce the impacts to them. Second, MFWP has a long history, success with, and is experienced at using rotenone, specifically within the project area. Finally, aircraft transport in the JBHA is easier to approve than in the wilderness. This is the quickest, safest, and least ground-disturbing mode of transport in the JBHA. Margaret Lake is located on National Forest, but has no trail that would support livestock use. The only other option is to use aircraft. We have added this information to Appendix D. Tables 2-1 and 2-3 of the DEIS provides a list of transport methods by lake and analyzes the options, respectively. Appendix C lists the reasons why aircraft would be used at Lick Lake and George Lake.
32.1		Due to the size and water volume in many of these lakes the cost would be huge. I feel available dollars could be used more wisely on productive projects.
	32.1	See response to Comment 28.3.
32.2		There is also no guarantee of 100% success.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	32.2	See response to Comment 35.16. Chemical treatments are highly effective and have been proven to be 100% effective at removing all fish from both streams and lakes, including some in the project area. Some opponents of this project demand a 100% guarantee. This guarantee cannot be given because there can be unforeseeable circumstances that can confound 100% success. It is best to recognize that there are legitimate circumstances that can confound 100% success. It is also important to recognize that chemical treatments are highly successful and have been 100% successful.
33.1		I have never, in 50 years of fishing in Montana, heard of a more stupid, ill-conceived idea than the present one of poisoning the lakes in the headwaters of the South Fork drainage. You are going to be destroying a precious resource that sportsmen have paid for with their yearly fees.
	33.1	Comment noted.
34.1		Friends of the Wild Swan supports native restoration however, this proposed project violates the Wilderness Act, is risky and does not restore native cutthroat trout.
	34.1	Please see responses to Comments 1.4 and 34.10.
34.2		The money being spent on this project would better serve native fish restoration if it was used to implement the road reclamation authorized under the Forest Service's Paint Emery and Bent Flat Records of the Decision. Road reclamation has proven benefits to native fish and their habitat. The Paint Emery project is located in westslope cutthroat trout streams in the South Fork Flathead drainage and the environmental analysis is completed. However, funding is lacking to reclaim the remaining 72 miles of road that fall under this decision. The Bent Flat project is also located in the South Fork Flathead drainage and the environmental analysis is completed but funding is not available to reclaim the remaining 8 miles of road that fall under this decision. It would be consistent with Hungry Horse mitigation and restoration of cutthroat trout habitat to fund and implement these projects.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	34.2	In 2001, BPA funding from Hungry Horse Dam Fisheries mitigation was used to implement the Emery Creek road relocation and stream habitat project, which is related to the Paint/Emery timber project. That project was a success at maintaining the high level of WCT production in the Emery Creek drainage and greater SF Flathead drainage. Rebuilding roads goes beyond the scope of this proposal.
34.3		The DEIS fails to disclose that most suppression projects are not successful and could require repeated applications of the toxins into these lakes and streams. The Montana Bull Trout Scientific Group's paper Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery concluded that toxicant, use in lakes is more difficult in lakes with springs and inlet and outlet streams. And typically the suppression effort must be repeated every few years because the adversely interacting species usually return to pre-suppression levels. Repeated use of toxicants on these lakes was not analyzed in the DEIS nor disclosed as a possibility. The DEIS does not disclose whether these lakes are spring-fed and the increased difficulty of attempting to eradicate fish from these lakes.
	34.3	Sections 2.6 and 2.7 of the DEIS specifically address suppression methods, the potential for success, and the limitations for success. You may have considered fish toxin as a suppression method based on the descriptions provided in the Bull Trout Scientific Group document (1996). That document was studied and referred to in the DEIS numerous times (pages 2-32, 2-33, 2-34). In fact, as defined in the DEIS, fish toxin is considered an absolute, or near absolute method of achieving complete removal of fish, and when compared to the other fish capture methods, it offers the highest probability of success at meeting the objectives of this project. Page 2-25 of the DEIS discloses that a second treatment may be necessary if the objectives are not met. Pages 2-14 and D-6 of the DEIS specifically lists the importance of identifying all fresh water inputs to each lake in order to facilitate an effective treatment. We believe the 1996 Bull Trout Scientific Group citation was incorrectly cited "…typically the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		suppression effort must be repeated every few years because the adversely interacting species usually return to pre-suppression levels…" The language cited specifically referred to the Strawberry Reservoir, Utah project, which had objectives to only suppress the target species to improve angling quality. This project has different objectives with different species. MFWP has examples, in this project area, where complete removal of hybrid trout with rotenone was the objective, and has been successful.
34.4		Regarding the use of toxicants in streams the Scientific Group stated that typically toxicants needed to be used for two years in a row on a reach of stream. The DEIS does not analyze the cumulative effects of the repeated use of toxicants in these streams, [and] the success rate of using toxicants in streams… .
	34.4	The anticipated impacts of multiple treatments in streams are expected to be similar to the impacts of a single treatment, only prolonged to account for the second treatment the following year. Page 2-8 of the DEIS provides examples of some lakes in the Flathead basin that have had multiple applications of rotenone. Appendix D of the DEIS provides some information on rotenone use in streams, and Section 2.4.1.3 of the DEIS provides information on antimycin performance in streams. We have expanded the cumulative impacts discussion in the FEIS.
34.5		The DEIS does not analyze the cumulative effects of the impacts of repeated [toxicant] use on amphibians, invertebrates and other wildlife.
	34.5	We have added more information about cumulative impacts to the FEIS. Please see response to Comment 34.4.
34.6		The DEIS fails to disclose that rotenone can persist for up to five months. Higher water temperatures will degrade the rotenone faster. These high mountain lakes do not get warm even in the summer so it should be assumed that it takes longer for the rotenone to break down in these lakes. (Hinson 2000) [Dustin Hinson, Rotenone Characterization and Toxicity in Aquatic Systems, University of Idaho, Principles of Environmental Toxicity, November, 2000.]

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	34.6	The information about the persistence of rotenone is disclosed on pages 2-9, 2-24 and Appendix D of the DEIS. We acknowledge that some environmental conditions may cause rotenone to persist, just as they would cause it to detoxify more rapidly than intended. See Sections 2.4.1.2, 2.4.1.4 and 2.4.4.3 for information about proposals to detoxify the rotenone. We have reviewed the Hinson paper and have added it to our references.
34.7		The DEIS fails to disclose that potassium permanganate can leave fish vulnerable to bacterial and fungal infections. This is a serious effect to downstream native fish populations. (Hinson 2000) [Dustin Hinson, Rotenone Characterization and Toxicity in Aquatic Systems, University of Idaho, Principles of Environmental Toxicity, November, 2000.]
	34.7	We have reviewed the Hinson 2000 report and added it to the reference section. Hinson cites Bradbury (1986) in his discussion on potassium permanganate. We also have reviewed Bradbury (1986), and referred to that paper numerous times throughout the DEIS. It is unclear where Hinson gets the information that potassium permanganate leaves fish more vulnerable to bacterial and fungal infection. However, we cite Lay (1971) on page 2-10 of the DEIS. The Lay (1971) paper also states that potassium permanganate is an effective disease agent used in fish aquaculture with particular success against the control of saprolegnia, achlya, ich, parasitic copepods, and trematodes. This information appears to confound what is reported in Hinson (2000). The DEIS also acknowledges that potassium permanganate can be toxic to fish on page 2-10 of the DEIS.
34.8		Deploying poison in a wilderness area is inconsistent with the Act's legal mandate to preserve wilderness areas in a condition that is "untrammeled" by man. Although National Forest Service regional foresters are given the authority to approve the application of pesticides in wilderness areas, this should be reserved for emergencies that threaten human health or the environment. Other, non-toxic methods have not been tried. Given the health and environmental effects of using these toxicants, they certainly should not be used in a wilderness area.
	34.8	Sections 2.1 and 2.6.4 of the DEIS state that lakes in the SF Flathead, including the wilderness, have been subjected to the genetic swamping management concept for nearly 19 years in an effort to correct this problem. Furthermore, Pages S-1 and 1-2 of the DEIS describe some historical reference to this problem and the methods of correcting it. The Wilderness Management Handbook allows chemical treatment: Using poisons or "[c]hemical

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		treatment may be necessary to prepare waters for the reestablishment of indigenous species, to protect or recover federally threatened or endangered species, or to correct undesirable conditions resulting from the influence of man." *Wilderness Management Handbook*, 23.1--7.The Forest Service Manual (FSM 2323.34f.) states: "Chemical Treatment. Chemical treatment may be used to prepare waters for reestablishment of indigenous, threatened or endangered, or native species, or to correct undesirable conditions caused by human influence (FSH 2309.19). The Regional Forester approves all proposed uses of chemicals in wilderness (FSM 2150)." Additionally Item 13 of Chapter IV of the FWMF for the BMWC addresses chemical treatment to control exotic fish. It states: *…Chemical treatment may be necessary to prepare waters for the reestablishment of indigenous species, to protect federally listed Threatened and Endangered species, or to correct undesirable conditions resulting form the influence of humans (for example, the establishment of an exotic fish population that threatens a native gene pool). The action must be necessary to maintain wilderness values or to recover a Threatened and Endangered species. Guidelines: (a) Consider over planting or "swamping" technique to restore indigenous species where practical rather than chemical techniques. Include in the management proposal an alternative using the over-planting technique if practical. (b) If chemical treatment is proposed, design a baseline and post treatment survey of aquatic fauna to gain scientific value from the action. (c) In selecting pesticides, give preference to those that will have the least impact on non-target species and the wilderness environment. (d) Schedule treatments during periods of low human use and immediately dispose of fish in a manner agreed to by FWP and the USFS.* We believe the limited use of the piscicides is appropriate to help control a problem that began before the BMWC was protected as wilderness. See DEIS Section 3.2.1.
34.9		Use of helicopters, planes and motor boats in the wilderness area violates the Wilderness Act. The Wilderness Act specifically prohibits the use of motor vehicles unless their use is the minimum necessary for protecting the wilderness resource. Wilderness is "...an area where the earth and its community of life are untrammeled by man...retaining its primeval character and influence.. .protected and managed so as to preserve its natural conditions." This proposal is not consistent

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		with those values nor are we aware of exceptions to the Wilderness Act to conduct this type of project.
	34.9	See the response to Comment 1.4.
34.10		Restocking lakes that were naturally fishless in the wilderness violates the Wilderness Act. This project does not restore the wilderness character of the lakes or westslope cutthroat trout. The wilderness character of these lakes is that they did not contain fish. If the fish are removed from these wilderness lakes they should not be restocked with any fish, that would be restoration. Restoration is the act of putting something back into a prior position, place or condition, the prior condition of these lakes is that they were fishless. Restocking these naturally fishless lakes with westslope cutthroat trout is not restoration of this species because they never naturally occupied this habitat.
	34.10	Restocking the lakes continues as a practice that was well established before the creation of the Bob Marshall Wilderness Complex. See Section 3.2.1. Historically, restocking was done to provide recreational fishing opportunities. And to some extent, though it was not a purpose of the stocking, it supported commercial guides and outfitters. Now, however, restocking has taken on a new and possible greater ecological importance. We believe, based on experiences (see DEIS Section 3.2.4), that substantially reducing hybrid trout, and then restocking with genetically pure WCT is the best way to conserve the WCT while maintaining angling opportunities. See DEIS Section 3.2.3.1. Absent this action, the agencies believe efforts to list the WCT under ESA will continue. These lakes contained fish for many years prior to wilderness designation and fish stocking is among the reasons why the area is regarded as having a high resource value for recreation and other solitude-type experiences. The debate on interpretation of the Wilderness Act, and perception as related to values, is difficult to resolve due to differences in values among people. In that sense, people who wish to use the fishless lake resources of the wilderness are able to in abundance. Not restocking the lakes with fish may have long-term impacts and consequences on the social and economic practices in this wilderness. MFWP does not propose to impact these segments.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		This is not considered a species restoration project; it is clearly defined as a species conservation project. The word "restoration" appears in the DEIS on 16 occasions, and the word "conservation" appears 324 times. Granted, many of these instances are in titles and page labels, but nevertheless highlight the focus of this project as one of species conservation. See also the response to Comment 37.28. The Wilderness Act considers conditions of the area at the time the area is designated, not at a time before European men inhabited the area. The condition of the area at time of designation is used as a baseline to define "natural" condition. Restocking these lakes after treatment "restores" the natural condition under this definition.
34.11		The DEIS must have a comprehensive monitoring plan to determine success or failure of the project prior to implementing treatment to all lakes so success or failure could be determined and the project halted or modified. It appears that this project will proceed on many lakes in one season with no provision for evaluating environmental effects or success or failure.
	34.11	See responses to Comments 11.40, 11.43, 11.52, 31.7, and 35.13.
34.12		While the petition acknowledges that antimycin will have an initial adverse impact on stream macroinvertebrates, it assumes that the macroinvertebrate community will eventually return to its pretreatment status. But several studies have found that while macroinvertebrate communities frequently return, they may be altered from their original composition. And many unanswered questions remain regarding the long-term effect of antimycin on macroinvertebrates.
	34.12	See response to Comment 11.60. Page 3-24 lists information on the long-term affects of antimycin on aquatic insects. We acknowledge that there may be some variation in response between taxa, regionally. Pre- and post- treatment evaluations would help to describe the likely affects, but these evaluations are not the principle focus of this project. Based on the known reaction of aquatic insects to antimycin field trials, we would expect impacts to be minimal and short term. The antimycin label states that "…in the usual, recommended concentrations it causes no apparent

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		harm to aquatic plants, insects, or bottom fauna…"
34.13		According to a NM Department of Game and Fish study in 2001 by fisheries biologist Steven Sanders, "the use of antimycin for fish eradication is extensive in the USA, but its affects [sic] on benthic populations are not well known". In an Aquatic Macroinvertebrate Survey of Animas, Seco and South Palomas Creeks [in New Mexico], the author states that "a few macroinvertebrate taxa that are particularly sensitive to antimycin and have poor recuperative powers may suffer long-term impacts from the (antimycin) treatment". This would be especially true for organisms with longer reproductive cycles. And there may uniquely adapted macroinvertebrate species that do not return at all. The author also notes that based on the sparse macroinvertebrate community in these streams they are only "marginal trout streams". (McCampbell, 2002) [Ann McCampbell, MD, Technical Testimony at the Hearing on New Mexico Game and Fish Department's Petition to Deploy A Piscicide in Animas Creek Watershed before the Water Quality Control Commission, August 14, 2002.]
	34.13	See response to Comment 34.12.
34.14		[BPA should consider the following research]: In an Aquatic Macroinvertebrate Survey of Animas, Seco and South Palomas Creeks [in New Mexico], the author states that "a few macroinvertebrate taxa that are particularly sensitive to antimycin and have poor recuperative powers may suffer long-term impacts from the (antimycin) treatment". This would be especially true for organisms with longer reproductive cycles. And there may uniquely adapted macroinvertebrate species that do not return at all. The author also notes that based on the sparse macroinvertebrate community in these streams they are only "marginal trout streams". (McCampbell, 2002)
	34.14	See response to Comment 34.12.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
34.15		[BPA should consider the following research]: It is well recognized that there has been a disturbing global decline in amphibian populations in recent years and many scientists suspect that exposures to toxic chemicals are a significant cause. Several studies have linked pesticide exposure to adverse effects in frogs. As mentioned above, one study found that frogs exposed to as little as .lppb of the herbicide atrazine developed male and female sex organs. Another study found that frogs exposed to either atrazine or a pyrethroid insecticide, esfenvalerate, were more susceptible to infection by a parasitic worm that caused limb deformities. The pesticides appeared to depress the frogs' immune systems even at the low concentrations used, which were within EPA drinking water standards for humans. The authors concluded that "these negative impacts may help explain pathogen-mediated amphibian declines in many regions."
	34.15	Thank you for your comment. We are not proposing to use these compounds for this project.
34.16		[BPA should consider the following research]: In another study, frogs given trace amounts of DDT experienced a near total collapse in their immune systems, which was identical to their exposure to cyclophosphamide. The latter is a drug given to humans to suppress their immune systems so they do not reject organ transplants. The researchers found that as little as 75 ppb DDT caused frogs' immune systems to malfunction.
	34.16	Thank you for your comment. We are not proposing to use DDT for this project.
34.17		To avoid causing harm the environment must be kept as free of pollutants as possible since, as noted above, amphibian immune and endocrine systems are very fragile and can be adversely impacted by even extremely low levels of toxic chemicals. Thus, even if poisons such as antimycin/Fintrol do not kill amphibians immediately, they may still harm them by making them more vulnerable to serious diseases, due to immune suppression, or cause them to have developmental abnormalities or reduced fertility via endocrine disruption. (McCampbell, 2002) [Ann McCampbell, MD, Technical Testimony at the Hearing on New Mexico Game and Fish Department's Petition to Deploy A Piscicide in Animas Creek Watershed before the Water Quality Control Commission, August 14, 2002.]

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	34.17	Thank you for your comment and interest in the SF WCT Conservation Program.
34.18		Impacts to wildlife, bull trout, amphibians, macroinvertebrates and humans from deploying these chemicals were glossed over or ignored in the EIS.
	34.18	Section 3.9 of the DEIS addresses human health issues. Appendix G of the FEIS adds more information about impacts to non-target species.
34.19		[BPA should consider the following research]: The registration of Fintrol by the U.S. Environmental Protection Agency does not mean it is safe to use. The U.S. EPA admits that all registered pesticides pose some risk. The range of potential adverse effects of deploying Fintrol is unknown. It was registered in the 1970's when the EPA required little data prior to registering a pesticide product. Fintrol is now undergoing the reregistration process and there is still an extensive lack of data regarding this product. The potential wildlife and environmental impacts of deploying Fintrol are also unknown because no one has ever done comprehensive post-deployment assessments. California will not register Fintrol in that state because data is missing in at least 22 standard toxicology tests. The New Mexico Department of Health has not approved the use of Fintrol in fish restoration projects. Also, the New Mexico Game and Fish Commission on August 18, 2004 cancelled all use of fish poisons in the state without prior approval.
	34.19	Fintrol is an EPA registered product that is legal to use to control fish and we would follow all the application safety requirements on the product label. See Section 3.9 of the DEIS.
34.20		[BPA should consider the following research]: Fintrol concentrate carries the highest acute toxicity rating given by the U.S. Environmental Protection Agency (EPA), Toxicity Category I. The label contains the warning "DANGER POISON" next to a skull and crossbones. Under "hazards to humans and domestic animals" it says this product is "FATAL IF SWALLOWED" and "MAY BE FATAL IF ABSORBED THROUGH THE SKIN". (McCampbell, 2002)
	34.20	Thank you for your comment. The DEIS discloses the human health threats beginning on page 3-56. We propose following all safety regulations listed on the product labels to protect humans and domestic animals. Antimycin was previously classified by the EPA as a category I toxin which

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		required the label to display the signal words "Danger-Poison" and have the skull and crossbones present. However, on November 3, 2004, the EPA reclassified antimycin to a category II toxin based on oral toxicity tests. The EPA granted permission to the manufacturer to change the label to reflect the reclassification by changing the label to display the signal word "Warning," and have the skull and crossbones removed.
34.21		[BPA should consider the following research]: The Hazards Information section of the Material Safety Data Sheet states that routes of entry for antimycin A include the skin, inhalation, and ingestion. The ingestion hazard rating is "highly toxic Antimycin A is also noted to be an eye, skin and respiratory irritant. Target organs include eyes, skin, respiratory tract, cardiovascular system, nervous system, kidneys, and possibly fetus. Inhalation of vapors or aerosol can irritate the eyes, nose, and respiratory tract. Direct contact with skin or eyes can produce severe irritation. And systemic intake can produce a decrease in blood pressure, nausea, light headedness, dizziness, excitement, in coordination, weakness, loss of coordinated speech and drowsiness. Medical conditions said to be aggravated by antimycin. A exposure are pre-existing eye, skin, respiratory, kidney, nervous system or cardiovascular ailments.
	34.21	Please see response to Comment 34.20.
34.22		[BPA should consider the following research]: A University of California at Santa Cruz Laboratory Standard Operating Procedure guide on antimycin A states that this material is considered a Particularly Hazardous Substance by the CAL OSILA Lab Standard. It also says that antimycin A is "highly toxic" and "may be fatal if swallowed, absorbed through skin, or inhaled". It notes that "respiratory distress, impaired reflexes, incoordination, and terminal symptoms consistent with CNS (central nervous system) depression have been reported in experimental animals poisoned by the oral or parenteral route."
	34.22	Please see response to Comment 34.20.
34.23		[BPA should consider the following research]: ToxNet Hazardous Substance Databank Information on antimycin A, which includes data from PoisonDex, states that respiratory distress, incoordination, impaired reflexes, and CNS (central nervous system) depression have occurred in

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		animals. It further notes that the minimum lethal human exposure level is unknown.
	34.23	Please see response to Comment 34.24.
34.24		[BPA should consider the following research]: Besides its extreme acute toxicity, ToxNet also states that antimycin A is an experimental MUTAGEN. The NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) also includes "mutation data" on antimycin A. And there are 36 references regarding antimycin on the ToxNet Environmental Mutagen Information Center (EMIC) web page. At least one study describes antimycin-induced DNA fragmentation and strand breaks. (McCampbell, 2002)
	34.24	Please see response to Comment 34.20. There are 218 references to antimycin in ToxNet and several combinations of search keywords were required to give 36 references. This search is likely the one used to derive 36 references that you cite from McCampbell. There are actually several hundreds of references to Antimycin each year in the scientific literature because Antimycin is used to study all types of bacterial and cellular metabolism. After all, it was first used to control fungus on rice plants. After several attempts in querying ToxNet, it was determined that McCampbell must have used "Antimycin" and "EMIC" (Environmental Mutagen Information Center) as the search parameters to get exactly 36 "hits." ToxNet disclaims the fact that they might be wrong about things and guarantee nothing in the database. They do make the statement that Antimycin is an experimental mutagen. However, none of the papers show that Antimycin by itself is a mutagen. Antimycin is used with other chemicals to effect/study a mutation. McCampbell refers to the paper… "The respiratory-chain poison antimycin A promotes the formation of DNA single-strand breaks and reduces toxicity in U937 cells exposed to t-butylhydroperoxide." In this paper title we see that McCampbell probably truncates it so as to leave out the t-butyhydroperoxide part, which is what causes the mutations to occur. In fact, the Antimycin even reduces the toxicity of the t-butylhydroperoxide. Nevertheless, this does not address Antimycin as a fish pesticide. Perhaps this paper was cited by McCampbell

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		because the title includes the language " …promotes the formation of DNA single-strand breaks..." One of the other papers in the 36 is titled, "Evaluation of a Genotoxicity Test Measuring DNA-Strand Breaks in Mouse Lymphoma Cells by Alkaline Unwinding and Hydroxyapatite Elution." In this paper, the researchers have come up with a new test as to whether a chemical is a mutagen or not. And of the chemicals (some known mutagens and some not) they choose to test, Antimycin is one of them. The results demonstrate that Antimycin is not a mutagen by two different tests. The new test that they have developed shows Antimycin to not be mutagenic and the regular test for mutagen, the mouse lyposome test also shows Antimycin not to be mutagenic.
34.25		[BPA should consider the following research]: The EPA considers diethyl phthalate to be an endocrine disruptor. Endocrine disruptors mimic natural hormones and have an adverse effect on the structure or functioning of the endocrine system, which includes the pituitary, hypothalamus, thyroid, adrenals, pancreas, thymus, ovaries, and testes. Compounds which are toxic to the endocrine system can cause health effects ranging from hypothyroidism and diabetes to infertility, low sperm count, birth defects, and testicular, breast, and prostate cancer.
	34.25	Thank you for your comment. Please see Section 3.9 of the DEIS for information about plans to limit applicators' and recreationists' exposure during and after treatment.
34.26		[BPA should consider the following research]: There is growing scientific concern about the health impacts of human exposure to endocrine disrupting chemicals, in large part because of their widespread presence in the environment and because their adverse effects can often be caused by extremely minute quantities, at levels not previously considered to be in the toxic range. For example, a recent study found that frogs exposed during larval development to as little as .1 part per billion (ppb) of the herbicide atrazine developed male and female sex organs. The authors concluded that "this widespread compound and other environmental endocrine disruptors may be a factor in global amphibian declines."
	34.26	We are not proposing to use atrazine.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
34.27		[BPA should consider the following research]: Diethyl phthalate is a priority pollutant under the Clean Water Act. It is also listed as a hazardous constituent under the Resource Conservation and Recovery Act and as a hazardous substance under Superfund. The EPA may be considering the removal of diethyl phthalate from all pesticide products.
	34.27	Thank you for your comment. This substance is an inert trace ingredient of antimycin. We would follow all precautions on the product label.
34.28		[BPA should consider the following research]: According to a National Toxicology Program fact sheet, diethyl plithalate is toxic by ingestion and inhalation and poisonous by the intravenous route. It is an irritant of the skin, eyes, mucous membranes and upper respiratory tract. It is a narcotic in high concentrations. It is also listed as an experimental teratogen, which means it can cause birth defects in developing fetuses, and it can cause other experimental reproductive effects. Studies have shown, for example, abnormal development of male fetuses in rats exposed to this chemical.
	34.28	Please see response to Comment 34.27.
34.29		[BPA should consider the following research]: The New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet notes numerous toxic effects of diethyl phthalate. Exposure to vapors can irritate the nose and throat. Contact can irritate the eyes and skin, and repeated exposure may damage the nervous system. It also notes that chronic (long-term) health effects can occur at some time after exposure to diethyl phthalate even if the exposure levels were not high enough to make someone immediately sick. It also warns that there is evidence that diethyl phthalate is a teratogen in animals and that until further testing is done, this chemical should be treated as a possible teratogen in humans. And while those working directly with diethyl phthalate are at higher risk than the general public, the fact sheet states that people in the community may be exposed to diethyl phthalate in contaminated water and air and that children and people who are already ill would be at the most risk of developing health problems from it.
	34.29	Please see response to Comment 34.27. The lakes proposed for treatment are all in remote areas. Recreationists would be restricted from access during treatment (see Section 3.9 of the DEIS for measures to reduce human exposure).

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
34.30		[BPA should consider the following research]: Diethyl phthalate is moderately persistent in the environment and has moderate acute and chronic toxicity to aquatic life. According to one source, the concentration of diethyl phthalate found in fish tissues is expected to be somewhat higher than the average concentration found in the water from which the fish was taken.
	34.30	We understand the concern about the compounds that may be in the materials we are proposing to use. Contamination is part of the production process and is controlled by EPA, not by us. We propose to apply EPA-approved products for an approved use according to the requirements and restrictions on the product label. We propose doing everything possible to reduce impacts to other than targeted animals. We have disclosed information about possible impacts in Sections 3.3 and 3.9 of the DEIS.
34.31		[BPA should consider the following research]: Finally, one can not be sure that the diethyl phthalate in the Fintrol product is not contaminated with other phthalates, such as diethyl-hexyl phthalate (DEJJP), which is listed as a chemical known to the state of California to cause cancer (California's Proposition 65 list, June 22, 2001). (McCampbell, 2002)
	34.31	See response to Comment 34.30.
34.32		[BPA should consider the following research]: According to Philip Dickey in his publication "Troubling bubbles", nonoxyl 9 is an alkylphenol ethoxylate that can disrupt the endocrine systems of fish, birds, and mammals. For example, nonylphenol, a breakdown product of nonyiphenol ethoxylate, can cause a reduction in testicular size in rainbow trout and cause male trout to produce an egg-yolk protein that is normally only produced by females. Rats administered nonoxynol-9 in one study produced a statistically significant, dose-related number of fetuses with both extra ribs and slightly dilated pelvic components.
	34.32	See response to Comment 34.30.
34.33		[BPA should consider the following research]: Nonylphenol ethoxylate is also noted for its slow incomplete biodegradation. It tends to persist in the environment and bioconcentrate. Many times the breakdown products are more toxic to aquatic life than the original chemical. There is evidence for synergism between nonylphenolic metabolites, indicating that the adverse effects from a

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		mixture of compounds may be greater than the sum of the effects from the individual compounds. Nonyiphenolic compounds have been detected in groundwater. Alkylphenol ethoxylates have been banned in many countries in Europe. And it is the recommendation of the author that the use of alkyiphenol ethoxylates as inert ingredients in pesticide formulations applied to aquatic environments be discontinued. (McCampbell, 2002)
	34.33	See response to Comment 34.30.
34.34		[BPA should consider the following research]: Acetone is a volatile neurotoxic solvent, which can cause central nervous system depression. It constitutes more than 50% of the Fintrol product. (McCampbell, 2002)
	34.34	See response to Comment 34.30. Acetone is also a naturally produced ketone in human body metabolism and it volatilizes rapidly.
34.35		[BPA should consider the following research]: Clearly, the safety of Fintrol and antimycin has not been established. At the very least, the possible effects of Fintrol on the human environment are highly uncertain and involve unique and unknown risks.
	34.35	See response to Comment 34.20.
34.36		[BPA should consider the following research]: Potassium permanganate is a hazardous caustic alkali. Targets organs include the respiratory and central nervous system, blood, and kidneys. If swallowed, it can cause nausea, vomiting, gastrointestinal irritation and burns to the mouth and throat. It may also cause severe irritation or burns to the eye and skin. Prolonged inhalation of potassium permanganate can cause manganism from a toxic build up of manganese in one's body. According to one Material Safety Data Sheet, potassium permanganate has also been reported to cause reproductive toxicity in laboratory animals and states that the ecological effects of this product have not been evaluated.
	34.36	Pages 2-10, 3-59 and D-9-12 of the DEIS address potassium permanganate.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
34.37		[BPA should consider the following research]: Potassium permanganate can be directly toxic to fish, even at deployment concentrations of 1 part per million. It can also kill phytoplankton and macrophytes that fish use for food.
	34.37	Pages 2-10 and 2-11 of the DEIS specifically addresses the toxicity of KmNO4 to fish.
34.38		[BPA should consider the following research]: Although potassium permanganate will help neutralize the antimycin A it comes in contact with, it does have its limitations. According to the authors of "Limitations on Potassium Permanganate Detoxification of Antimycin" , potassium permanganate rapidly detoxifies antimycin to a toxicity level equivalent to about 4% of the original concentration. From there on, the detoxification is quite slow. They conclude that the use of antimycin-potassium permanganate systems in fish control would probably entail undue risk in most situations involving antimycin-sensitive fish, soft water and a need for rapid detoxification. There will also inevitably be some uneven mixing of potassium permanganate with antimycin A as well as other factors that retard their chemically reacting with each other.
	34.38	Page 2-10 of the DEIS addresses the detoxification of antimycin with potassium permanganate. The Use Direction Leaflet for Antimycin provides direction on how to detoxify the compound using potassium permanganate.
34.39		[BPA should consider the following research]: It is overly optimistic to think that potassium permanganate will totally neutralize antimycin A or that deploying another toxic chemical will return the stream to its former non-polluted condition. It also ignores the fact that potassium permanganate will have little or no effect on the levels of acetone and nonoxyl-9 present. (McCampbell, 2002)
	34.39	See response to Comment 34.38.
34.40		[BPA should consider the following research]: Rotenone is a broad spectrum mitochondrial poison similar to antimycin. It is used to induce Parkinson-like illnesses in lab animals and is more persistent in the environment than antimycin.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	34.40	Page D-3 of the DEIS addresses the Parkinson-like reaction of rats injected with rotenone. The mode of action of Rotenone is specific to complex 1 of the NADH Succinate chain of ATP production. Rotenone binds with the Fe molecule at this site. The mode of action of antimycin is similar, but it is specific to complex III (two sites down gradient from where rotenone binds) and binds immediately in front of the Fe_2 molecule.
34.41		[BPA should consider the following research]: Rotenone products are often formulated with toxic solvents such as trichloroethylene, xylene, trimethylbenzene, naphthalene, l -m-naphthalene, 2-m-naphthalene, toluene and the liver poison piperonyl butoxide (PBO). Piperonyl butoxide is a possible human carcinogen according to the EPA and naphthalene and trichloroethylene are known to the state of California to cause cancer. (Dr. Ann McCampbell pers. comm.)
	34.41	Section 3.9.1 and Pages D-2 through D-4 of the DEIS address these issues.
34.42		[BPA should consider the following research]: Montana Bull Trout Scientific Group, Assessment of methods for removal or suppression of introduced fish to aid in bull trout recovery, March, 1996.
	34.42	The DEIS references this report numerous times (see pages 2-32, 2-33, 2-34).
34.43		[BPA should consider the following research]: Dustin Hinson, Rotenone Characterization and Toxicity in Aquatic Systems, University of Idaho, Principles of Environmental Toxicity, November, 2000.
	34.43	We have read the Hinson paper and have included it in our reference section.
34.44		[BPA should consider the following research]: Ann McCampbell, MD, Technical Testimony at the Hearing on New Mexico Game and Fish Department's Petition to Deploy A Piscicide in Animas Creek Watershed before the Water Quality Control Commission, August 14,2002.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	34.44	We have reviewed this hearing transcript and added it to our reference section.
35.1		Wilderness Watch supports the restoration of native westslope cutthroat trout populations in the Flathead River drainage where that species originally existed. At the same time we believe that fishery programs must be administered in a manner that gives equal consideration to the entire aquatic ecosystem and that respects the resource of Wilderness. For those reasons we have a number of concerns with the proposed project and can not [sic] support it in its current form.
	35.1	Please see responses to Comments 1.4 and 34.10.
35.2		At the outset we would point out that every alternative in the DEIS proposes to stock these naturally fishless lakes. This violates NEPA's requirements to provide a reasonable range of alternatives. Whether to stock these lakes with fish in the future has been a major public and agency issue since the outset of this project. Failing to provide alternative ways to address this issue is a major failure of the process to date.
	35.2	An agency is under no obligation to consider every possible alternative to a proposed action, nor must it consider alternatives that are unlikely to be implemented or those inconsistent with its basic policy objectives. NEPA and CEQ's implementing regulations do not require a "reasonable range of alternatives" (40 CFR 1502.2). Nevertheless, the alternatives in the EIS are indeed reasonable because they cover the feasible alternatives for eliminating non-native fish from the high mountain lakes. The effects of the action alternatives have been examined assuming that MFWP would choose to restock the lakes after hybrids are removed from lakes in the Bob Marshall Wilderness. As the current condition of the wilderness lakes attests, if MFWP does not reestablish pure westslope cutthroat after treatment, hybrid populations could rebound. Another concern is that private citizens who are willing to risk prosecution could stock the lakes with non-native species that threaten westslope cutthroat trout. DEIS at Section 2.4.6. Without some form of restocking, MFWP does not believe that the threat to westslope cutthroat trout from hybridized trout can be removed. Alternatives that considered not restocking were unnecessary because the effects of not restocking are already considered in the EIS and not restocking is already within MFWP's

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		discretion to choose.
35.3		Further, the DEIS is wrong to conclude that the decision to stock these lakes lies solely with the Montana Dept. of Fish, Wildlife and Parks (MDFWP). In fact, Congress has charged the USDA Forest Service with administering the Flathead National Forest and the Bob Marshall Wilderness. It has also been well established by the US Supreme Court that federal agencies retain the authority for administering federal lands and the wildlife that reside thereon. The federal government generally allows the states to regulate hunting, fishing and trapping on public lands; the Wilderness Act did not change that. But the Wilderness Act did mandate that the Forest Service ensure that the area be administered so as to preserve its wilderness character. This mandate applies to both public uses and the actions of the agency(s). Whether or not to restock these lakes must take into account the fact that several of the lakes are within a federally designated Wilderness. The DEIS should have taken into account the federal government's role in determining whether or not stocking is appropriate.
	35.3	This comment appears to find a conflict where the agencies agree there is none. This issue is discussed in DEIS Section 3.2.4. To reiterate: The Forest Service "[r]ecognize[s] that States have jurisdiction and responsibilities for the protection and management of wildlife and fish populations in wilderness." *Forest Service Manual* (FSM) 2323.32. The agencies drafting and cooperating on the EIS agreed that, "[t]he decision whether or not to restock the [lakes] lies solely with MFWP." DEIS at Section 2.4.6.2; see also Section 1.5.2. The Forest Service will decide whether to approve the use of piscicides within the wilderness areas for the elimination of hybrid trout populations and whether to approve the short-term use of motorized craft and equipment with the wilderness area as needed to accomplish the proposed goals. See Section 1.5.3. The EIS will provide the NEPA compliance for the USFS to grant or deny its authorization. Fish stocking may be conducted by the state agency in coordination with the administering agency, using means appropriate for wilderness when either of the following criteria is met: (a) to reestablish or maintain an indigenous species adversely affected by human influence; or (b)

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		to perpetuate or recover a threatened or endangered species… Barren lakes and streams may be considered for stocking, if there is mutual agreement that no appreciable loss of scientific values or adverse effects on wilderness resources will occur. This guidance is verbatim to that found in the *Wilderness Management Handbook*, 23.1—9, and tracks closely that in the *Forest Service Manual* at 2323.34. Moreover, the proposed project and its goals and responsibilities are in accord with the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana signed by both MFWP and the USFS. The Wilderness Act in Section 4(7) also recognizes that nothing in the Act changes the responsibilities of the states "....nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the National Forests (16U.S.C. 1133)... Pages 1-8 and 1-9 of the DEIS lists the laws, legislation, and agreements that were used to help plan this project. The decision for each participating agency is provided on pages 1-11 and 1-12 of the DEIS.
35.4		Restocking these lakes violates a principle tenet of the Wilderness Act: that these areas will be untrammeled by humans, retain their primeval character and influence, and be administered so as to preserve their natural conditions. Nothing could be more trammeling or unnatural than to fill naturally fishless lakes with fish. If the fish are removed from these lakes then the lakes should remain fishless and allowed to follow their natural evolutionary path.
	35.4	Please see EIS Section 3.2.4. In some respects, the agencies agree with this comment. However, given the history of private individuals taking BMWC fisheries management into their own hands without the knowledge or consent of state or federal fisheries managers, we believe the course of action most likely to preserve the greatest sense of an untrammeled wilderness would be to

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		replace the nonnative fish species and hybrids with indigenous westslope cutthroat trout. We understand that some people feel that continuing to stock historically fishless lakes with fish in violation of their wilderness standards. The lakes listed in this proposal were "filled" with fish many years prior to the Wilderness Act. The fishery resources have helped to define the character of this area, and have driven the high social and economic value of this wilderness. Creating fishless lakes may have a negative and long term social and economic impact to the wilderness resources. See Sections 1.4.2.2 and 2.4.6 of the DEIS.
35.5		The DEIS fails to consider the damage to the aquatic ecosystem from restocking these lakes with fish. The scientific literature is filled with studies that show fish stocking reduces the abundance of amphibians in stocked lakes. Recent studies in the Northern Rockies have shown that fish stocking also influences the distribution and abundance of amphibians in entire mountain basins including those lakes which are not stocked and remain fishless (see Pillion and Peterson. Ecosystems (2001) 4:322-333). These studies show that the impacts do not end with stocking, but instead continue to effect [sic] the area (and in all likelihood get worse) as long as fish remain. The DEIS is silent on these impacts which will occur under every alternative that restocks the lakes with fish.
	35.5	The Proposed Action does not include stocking any fishless lakes. Impacts from fish stocking are part of the affected environment. See Sections 1.4.2.2, 2.4.6, and 3.2.4 of the DEIS.
35.6		Likewise, the DEIS failed to consider the damage to the rest of the aquatic biota from stocking these lakes. While "lip-service" is given to the effects of poisons on these species, there is no analysis of the effects of stocking fish on these biota. Again, the literature is replete with evidence of the negative effects of fish stocking in these systems, but that information doesn't make it into the DEIS. The DEIS does acknowledge that restocking is a "connected" action (p. 2-26), however it fails to disclose the environmental effects of those actions.
	35.6	See response to Comment 35.5. Sections 3.2 and 3.3 discuss the impacts to fish and wildlife. Appendix G adds more information about impacts to non-target organisms.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
35.7		Further, the DEIS fails to evaluate the cumulative effects of fish stocking by MDFWP throughout the S. Fork Flathead drainage.
	35.7	For each alternative, we have included cumulative impact sections. Our cumulative impact analysis is not limited to those sections, because of the difficulty in distinguishing clearly between kinds of effects, and may be found throughout the DEIS. DEIS Section 3.2, Fisheries Resources, is the primary basis for determining cumulative effects of the alternatives. See especially Sections 3.2.5.2, 3.2.6.2, and 3.2.8.2. MFWP's stocking program has been credited by the U.S. Fish and Wildlife Service as the kind of activity that protects extant westslope cutthroat stocks throughout their historic range from the adverse effects of nonnative fish (see DEIS at Section 3.2.3.1). MFWP has demonstrated its ability to implement a rotenone treatment and restocking to remove a threatening species and restore angling opportunities for westslope cutthroat trout (see DEIS at Section 3.2.4). Absent these stocking activities, westslope cutthroat would probably become a more likely candidate for listing under the Endangered Species Act. Failure to continue protecting and restoring westlope cutthroat trout could lead to restrictions on angling or other activities in the basin. There are no other reasonably foreseeable similar projects in the basin that would be likely to have similar impacts in addition to those discussed in the EIS. The DEIS recognizes impacts from fish stocking (see Section 3.2). We believe our cumulative impacts discussion has taken past impacts into consideration.
35.8		The Wilderness Act prohibits the use of motorized equipment and mechanical transport "except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act." (emphasis added). The purpose of the Act is to preserve the Wilderness. This project which is designed to establish a westslope cutthroat trout fishery in naturally fishless lakes fails to meet that test.
	35.8	Please see responses to Comments 1.4 and 35.4.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
35.9		Further, the MDFWP does not administer the Bob Marshall Wilderness and thus MDFWP's activities, unless authorized by the Forest Service as part of the federal agency's mandate to protect the Wilderness, do not fall within the administrative exception in the law.
	35.9	See response to Comment 35.3.
35.10		The only justification given for using helicopters to access George and Lick lakes is that these lakes aren't accessed by system trails. That doesn't mean they are inaccessible by foot or with packstock (horses, donkeys or llamas). Both are within one mile of system trails that could be used to bring materials to within a mile of lakes. There's nothing in the DEIS that suggests materials couldn't be hauled the last mile with horses, mules or donkeys, or by backpacks or llamas to lessen the impact on vegetation and soils. The DEIS should be revised to address the possible use of other non-motorized means for delivering materials, supplies and personnel to George and Lick lakes.
	35.10	The draft Minimum Tool Analysis determined that using livestock in areas that do not have a system trail would create an adverse impact on the soil, vegetation, and ultimately on the wilderness value (see page 3-38 of the DEIS). Transporting with personnel would require a large group of people to be present in the lake vicinities for an extended period of time. Humans are not the most efficient, nor is it safe to rely on humans to backpack outboard motors and large rafts to high altitude lakes in rugged mountainous terrain. For these reasons, and others, it was determined that using aircraft offered the safest, quickest and least intrusive means of transport to achieve the objectives of the project. Some people who commented on the proposed action during public scoping in May 2003, specifically requested that horses not be used to access George Lake, but rather preferred the use of aircraft to reduce impacts to the ground and to expedite the activity.
35.11		Similarly, every scenario assumes that a motorboat must be used, whether its [sic] for gill netting, trap netting, spreading poisons or other uses. It appears to more a matter of convenience than need. The DEIS should be revised to address using non-motorized watercraft on lakes in the Wilderness.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	35.11	We have added more information in the FEIS. See Section 3.6.5. As listed in the DEIS, the reasons for using a motorboat are listed for each method. The principle reasons for requiring a motorboat include the scope of the project (size of lakes), personnel safety, and the fact that any attempt to use manually powered craft would be considered experimental. During the 1994 rotenone treatment of Devine Lake in the Bob Marshall Wilderness, a raft was used to distribute rotenone. This lake is less than 1 acre is size and is less than 15 feet deep. All of the lakes or lake complexes proposed for treatment in this project are larger than Devine Lake and so are much more complex and require the use of a motorboat to be effective.
35.12		The use of poisons also runs counter to the idea of Wilderness. All Wildernesses have been modified to some degree by human impacts prior to designation, and some of those changes are ubiquitous and ongoing (i.e. human-caused global warming). Yet the choice society makes when designating an area as Wilderness is that from that point forth we will no longer try to "play God." The Wilderness must be allowed to operate freely in the future with intentional human manipulation. MDFWP should stop doing harm by continuing to stock these lakes with alien predators. There may be rare occasions where toxicants are appropriate in Wilderness to save a species that might otherwise be lost forever. But this project is geared toward expanding the range of cutthroat trout into lakes where it did not naturally exist. The use of poisons are [sic] not justified in this context.
	35.12	See response to Comment 34.8. The agencies view the proposed action as protecting the existing range of westslope cutthroat, not expanding it. If the current situation persists, the wilderness would continue to be home to non-indigenous fish species, and the remaining native cutthroat may be lost. The existence of the non-indigenous species in the wilderness is evidence that individuals have and will possibly continue to stock those lakes. In addition we note that that if this commenter's views are taken together, they oppose all the proposed forms of protecting westslope cutthroat trout from the threat of hybridization and, by extension, the very wilderness values—such as indigenous fish (FSM 2320.5(10))—that they cherish. In other words, adhering to the management limitations proposed by these comments would likely be more destructive to the untrammeled nature of the BMWC than would be treating

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		one or two wilderness lakes for a few days once a year over a decade. This project was designed to shift the wilderness and surrounding project area toward a more natural state. Impacts on wildness would be short term and reduce the need for human intervention for species restoration in the future. This project was designed to achieve a trend toward greater wildness over time.
35.13		We are also concerned with the limited information on the impact of poisons on non-target aquatic species. The diversity, abundance and population trends for these species in the Bob Marshall Wilderness are not well known, nor is the effects from rotenone or other poisons.
	35.13	See response to Comment 34.12. The monitoring that is part of this proposal would help to increase the knowledge base for these species in the South Fork including the Bob Marshall Wilderness. We plan to monitor these species after treatment and would share the information that we gather.
35.14		Before embarking on a project of this magnitude in a designated Wilderness, BPA the Forest Service and MDFWP should implement a long-term inventory and monitoring study so that irreparable harm is avoided.
	35.14	Please see response to Comment 11.46.
35.15		The DEIS fails to explain why, after nearly a century of stocking non-indigenous trout in the Flathead drainage the remaining hybrids pose a substantial risk to the remaining westslope cutthroats. Obviously there is something acting to keep the populations isolated from one another, or to inhibit hybridization. How have these populations managed to remain "pure" and why won't that continue if MDFWP no longer stocks the drainage with non-native species.
	35.15	The potential impacts of stocking non-native trout in the project area were recognized by MFWP biologists in the 1950s. Most fish introductions prior to 1950 were unauthorized by MFWP and some were unrecorded. The SF presents a unique example of slowed progression of hybrid trout, for a variety of reasons. Starting in the late 50's and early 60's MFWP determined that stocking only native trout was the best management and conservation approach. This activity was designed to limit the progression of hybrid trout in the drainage. The lakes are not isolated and all drainages downstream of these lakes contain hybridized fish. Hybridization will expand with time if the source

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		populations are not removed. Although we have been fortunate that hybrid expansion has not been more widespread, downstream expansion of hybrids remains the primary threat to pure westslope cutthroat trout in the South Fork upstream of Hungry Horse Dam. If hybrid trout become established throughout the SF drainage, there are no reasonable measures that can be taken to reverse the impacts. Recognizing that a threat still exists is responsible and warrants the attention of the agency responsible for managing this species.
35.16		We want to note that it is doubtful the project will meet the DEIS purpose of preserving "genetically pure" cutthroat trout in the South Fork Flathead drainage. Genetically pure trout are defined as those that are 100 percent pure through the testing of species-specific proteins. Many of the westslope cutthroat in areas of the South Fork drainage that won't be treated are not 100 percent pure. Many of the areas where the range of introgressed trout and bull trout overlap can not be treated. Moreover, because the poisons are not expected to be 100 percent effective, any remaining hybrids will impart their genes into the genetically pure stock that is supposed to be planted in the lakes. Genes go both ways, and the plan to restock these lakes is as likely to result in less than 100 percent pure fish downstream as is not restocking the lakes.
	35.16	The majority of westslopes in the SF drainage have not been influenced by non-native trout. We are proposing a treatment that we expect would be 100% effective. However, we acknowledge that 100% might not be attainable. Please see Section 2.4.5 and Appendix D of the DEIS. After Hungry Horse Dam was installed, the headwater lakes became the only remaining source of non-native genes in the South Fork Watershed. In nearly every case, any remaining hybrids downstream of the lakes cannot recolonize the lakes, so they will not impart their non-native genes into the lake populations. In this sense there is a “one-way flow of genes.” Establishing genetically pure cutthroat in the lakes will provide a source of pure genes to any downstream populations.
35.17		If a decision is made that it is necessary to remove the exotic species (fish) from these lakes in order to preserve the wilderness character of the Bob Marshall Wilderness, then we would suggest that the Wilderness lakes remain fishless after the removal. ... Leaving the lakes in their natural condition would not only respect the wilderness values of the area, it would also provide an

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		outstanding opportunity to study the effects of fish removal on the natural aquatic ecosystem and to compare those effects to lakes outside Wilderness where stocking is likely to occur. This kind of scientific inquiry is one of the public purposes of Wilderness and one of the greatest benefits that it can provide to people of present and future generations.
	35.17	See response to Comment 37.78. Conserving the WCT is the priority for this project. There are other studies being conducted to analyze natural systems. Creating fishless lakes may have a long term and negative impact on established social and economic practices in this area.
35.18		The concern that the lakes will be illegally stocked could be largely ameliorated by closing the lakes to fishing.
	35.18	Closing these lakes to fishing would not necessarily eliminate illegal stocking because the public could still access them. Trials could be closed, but again, the public could access the lakes other ways.
36.1		I have again reviewed the proposed action listed above and feel that chemical treatment of these waters should not occur until Montana Department of Fish Wildlife and Parks (MDFWP) thoroughly reviews and considers all the available data regarding current levels of hybridization within these systems.
	36.1	The lake populations and most of the stream populations have been genetically tested; some many times. As long at the lakes contain hybrid fish, they will always serve as a source of non-native genes.
36.2		As I stated in my previous letter many of the lakes they are proposing to chemically treat do not require such a drastic and unnecessary action. For example, upper Three Eagles Lake is over 99% pure westslope, and it cannot be said with certainty that it is not pure westslope. Based on this information how can the chemical treatment of this lake be justified? The answer is that it cannot be justified. There is also lack of justification for the chemical treatment of Black Lake and Pilgrim Lake. Recent genetic data obtained from a 1999 collection of fish from Black Lake and a 2001 collection from Pilgrim Lake indicated that both of these lakes now harbor populations of trout that are also at least 99% pure westslope cutthroat trout. Why is there a need to chemically treat these populations? What is to be gained? Without an absolute guarantee of a100% kill of the current populations within these lakes there is nothing to be gained and even with a 100% kill the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		overall cost of the treatment, both environmentally and economically, far outweigh any gains that might be realized from such an action.
	36.2	The management objectives have changed. The objectives for this project are to remove the threat of hybridization to the pure WCT trout populations in the SF. Even a fish with a small percentage of non-native genes is a threat to pure fish downstream and could reduce their purity. The data you cited for the Pilgrim Lake sample is based on an 11 fish sample. Based on this, the power is greatly reduced far below 95% probability of detecting non-native markers. Second, the Black Lake sample was determined to contain a first filial hybrid, suggesting that a high level of rainbow trout influence still exists in this population. Furthermore, the analysis was conducted on an incomplete sample (n=21) and concluded that the unusual mixture of markers suggests that this population is not randomly mating, which is a violation of the probability analysis. Finally, this population is stocked heavily with M012 fish, which conclusively violates the probability analysis. The fact that rainbow trout markers are present in this population confirms that the population harbors non-native genes and is a threat to the genetically pure populations in the SF drainage.
36.3		In addition to the examples above where there is absolutely no need for chemical removal, there also appears to have been large decreases in the level of non-native genes present in many of the other lakes proposed for chemical treatment. For example, in the initial genetic surveys conducted on Lena, Necklace, Pyramid and Sunburst Lake no westslope cutthroat trout genes were present. However, in the most recent genetic surveys conducted on these waters for MDFWP's, Lena and the Necklace Lakes contained over 60% westslope cutthroat trout genes, Sunburst Lake contained 82% westslope cutthroat trout genes, and Pyramid Lake contained 97% westslope genes. How can MDFWP pretend that the genetic swamping of these lakes is not effective when the only mechanism for change in these lakes has been the introduction of pure westslope cutthroat trout from their broodstock? In fact, based on this data, there is also little justification for the proposed chemical removal of fish from Pyramid Lake. Similar changes in the genetic composition of other lakes on the chopping block have also been observed, i.e. Lower Big Hawk and Blackfoot Lakes. The level of non-native genes in these systems has been reduced by 40% and 50% respectively through the introduction of westslope from MDFWP's broodstock. In fact in almost every case where the swamp out technique has been implemented there has been a decrease in the overall

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		percentage of non-native genes present. This technique has proven to be highly effective and it should be restarted, not discarded, as is currently being done.
	36.3	The increase in percentage of westslope genes has not been great enough to consider the area safe from non-native influence. The objective of the genetic swamping management concept that was established in 1985 was to "…increase the percentage of westslope cutthroat trout genes…" in several populations using a passive method. This has been effective. However, the social, political and biological environment has changed since the swamping concept was implemented. For these reasons, the management objective has likewise changed and now favors conclusively removing the non-native genes from these populations through an active management strategy.
36.4		MDFWP's also indicates that they will chemically remove fish downstream of many of the lakes that are proposed for chemical treatment. In most cases, however, they lack sufficient genetic data to determine the necessity and extent of this action, and in some cases they are proposing chemical treatment when their own data indicates that it is not warranted. For example, MDWFP's is proposing to chemically treat 3.7 miles of Lick Creek even though no hybridization was detected in a sample of westslope cutthroat trout collected for genetic analysis in 2000. As the stewards of our resources it is irresponsible for MWFP's to disregard available information or to proceed with the chemical treatment of these streams without sufficient data to justify their actions.
	36.4	The information you cite about Lick Creek is inaccurate. The Lick Creek sample you cited was actually collected from Gordon Creek (T19N, R15W, S1, 2) in 2000 and the population was determined by geneticists to be hybrid. Twenty-four percent of the fish sampled in 2000 were derived from a hybrid swarm. The geneticist conducting the evaluation concluded, "hybridization has been occurring in this population for generations." In 2002 another sample was collected from this stream in the same reach and determined to be hybridized. Interestingly, rainbow trout were detected in this sample, but not the 2000 sample. Nevertheless, these tests indicate the population is hybridized.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
36.5		As I stated in my initial June 23rd letter, these examples indicate the need for MDFWP's to carefully evaluate and justify the need for chemical treatment of each of the 21 lakes and downstream reaches they are proposing to poison. They must not be allowed to continue to ignore or disregard their own genetic data indicating that the chemical removal of fish from many of these waters is unwarranted.
	36.5	In past years experimental measures were instituted to address this problem (i.e., "genetic swamp out"). The objective of the proposed project is to address changing political and social issues, which have warranted a more decisive approach in dealing with hybridization in the SF Flathead.
36.6		As I previously commented, the very first action to be taken prior to any chemical removal of fish from any these systems is to genetically retest the populations, using both allozyme and nuclear DNA techniques to determine the current genetic composition of each lake and downstream reach. Most of these lakes were repeatedly stocked with hatchery fish from the states westslope cutthroat trout broodstock after they were first genetically characterized in the mid 1980's and early 1990's, and before any chemical treatment of these waters is conducted the effectiveness of the genetic swamping needs to be thoroughly evaluated. Based on the genetic information presented above, the assertion that this method of removal of non-native genes doesn't work is not supported. In fact, in the lakes discussed above this method has significantly reduced the percentage of non-native trout genes present. The benefits to genetically retesting each lake and downstream reach proposed for chemical treatment should also not be overlooked. First, it will determine which lakes and streams may still require chemical removal of hybrid trout, and also assist in the prioritization of lakes and streams to be treated based on their current genetic composition. Second, it will save money by reducing the number of lakes and streams that need to be treated. Third, it will lower disturbance, leave a smaller footprint, and maintain fishing opportunities that would otherwise be temporarily lost from some lakes. Fourth, it would provide hard scientific data on the effectiveness of genetic swamping for many different systems allowing MDFWP's to fully evaluate its potential as a management tool. Finally, and perhaps most importantly, it will provide baseline data on the current genetic composition of the lakes and streams that are ultimately poisoned so MDFWP's can evaluate the effectiveness of chemical removal on each population poisoned.
	36.6	Many of the genetic samples from the 1980s and 1990s have been updated. For example, samples from Cataract, Smokey, Big Salmon, George, Lick, and Doctor creeks have been

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		analyzed and updated in 2000 and/or 2002. This EIS has been based on the most recent genetic studies we have. To collect the additional data you request would take additional state time and money. We believe our proposal is the safest way to remove the threat these fish pose to the cutthroat. Please see Page 1-7, Section 2.1, and Section 2.6.4 of the DEIS.
37.1		While I think the objective to protect Westslope cutthroat trout from becoming listed as an endangered species is a very good one, I do not believe it should be at the expense of the wilderness resource.
	37.1	The westslope cutthroat trout is considered a wilderness resource. All agencies participating in this project are mandated to safeguard species from becoming listed under ESA, whether they occur in a wilderness area or not. The Wilderness Act does not preclude the responsibilities of state and federal agencies with regard to ESA.
37.2		The draft EIS says that 50 of 355 lakes in the South Fork have fish in them, all except Doctor and Big Salmon Lakes were very likely originally fishless. The draft EJS [sic] proposes to only remove fish from 20 of these 50 lakes that do not have genetically pure WCT in them. Fish are now located mainly in the larger, deeper lakes in the South Fork. Apparently, research has not been done on these South Fork Lakes except in the last couple of years on the proposed lakes to be treated to determine what assemblages of non-fish species inhabited these lakes, marshes, and downstream areas before the introduction of exotic fish predators.
	37.2	You are correct. There are few historic records of all of the non-fish species that existed before lakes were stocked with trout. MFWP is using the existing conditions as the baseline for ongoing surveys of species assembleges.
37.3		Glacier National Park, North Cascades National Park have done research and are doing an EIS to determine what species existed there in lakes before fish. Studies in the Sierras show a dramatic decline in yellow-legged frog due to the introduction of fish. There is so much that we do not know about these natural systems. We tend to focus on species that have immediate, direct benefit to humans- elk, deer, fish, and maybe grizzly bears and wolves because they are large and people can relate to them better. However, it seems that many of human management actions can have dramatic impacts on the associated flora and fauna as humans attempt to manage species so they can more directly benefit human needs. Humans pave, build, and farm on 99% of the United States. It seems only reasonable that at least wilderness should be left as unaltered as possible. In

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		wilderness lately we even try or propose to manipulate habitat and systems to try to undo past human influences - consider lighting fires to make up for the lightning strikes that have been put out over the years. Consider planting whitebark pine to replace trees that have been killed by an exotic blister rust. Consider building new trails or reopening long unused Wails to facilitate more human use and access into the wilderness. If the Bob Marshall Wilderness Complex at 1.5 million acres, the second largest wilderness in the lower 48 states can't have natural processes left basically unaltered in the large size with limited potential effects on areas outside of the wilderness, where can we have places that are not manipulated, turned into gardens to try to undo past human impacts or shape the wilderness landscape into something that is more desirable from a human perspective? Not a natural process perspective, but from current human needs?
	37.3	Thank you for your comment and interest in the SF WCT Conservation Program.
37.4		This draft EIS displays several methods of accessing the area for fish removal, by stock or aircraft. This seems to have a reasonable discussion.
	37.4	Thank you for your comment and interest in the SF WCT Conservation Program.
37.5		For the actual fish removal, the poisons to be considered, rotenone and antimycin, are well discussed, but the gill netting gets minimal consideration. The EIS quotes gill netting might be effective on lakes 7.4 acres in size and 32 feet deep. This would include Necklace Lakes #2, 3, 4, 6,7,9,10,11. With much thought and consideration of minimum tool and the potential effects on non-fish species with the use of poison, it seems like Pyramid Lake at 9.6 acres and 37 feet deep could also be reasonably be considered for gill netting. The EIS then discounts this method because the Montana Bull Trout Scientific Group concluded that gill netting would not result in a complete removal of fish. (p.2-32) in the discussion in Alternative B, the Proposed Actions, one of the excuses for immediate restocking of lakes the next summer after the fall poisoning of each lake, was to ensure genetically pure cutthroat populations in sufficient quantities to ensure domination over any hybrid fish that might remain, and to re-establish the fishery. (P.2-5) this seems to display that rotenone and antimycin are not 100% sure to kill all fish by treatments. If this

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		is the case, then gill netting, trap nets, using explosives might certainly be reasonable to consider.
	37.5	Alternative D considers suppression as a means of achieving the objectives of the project. The analysis of this alternative determined that there would be major and long-term impacts to five of the seven resource categories that were identified. Table 2-7 on page 2-45 of the DEIS summarizes these impacts. See also response to Comment 37.109.
37.6		The DEIS does not say that for each lake and downstream area following fall poisoning, that the following summer, in what manner the lake would be monitored to see if any fish remain for the next year or two. This would serve two purposes, the first to ensure that all fish had been removed and if not, a second treatment would be in order to actually remove those non-wct genes and not just swamp them, and second, it would open the possibility to leave the lake fishless.
	37.6	Page 2-25 of the DEIS states that gill nets would be set in lakes to evaluate the success of the treatment. Section 2.4.1.5 on page 2-11 describes the use of sentinel fish to monitor the success of the treatment and to monitor the success of the detoxification.
37.7		To leave some lakes fishless, to be more in their original condition, especially for non-fish species, would certainly be appropriate for the natural processes to occur in wilderness instead of the initial stocking and continued stocking in the case of some lakes. Of the over 220 wilderness lakes in the South Fork Flathead, the 20 lakes with fish average over 90 acres in size, while the 200 lakes without fish average less than 1 acre. Certainly leaving representative larger lakes in larger basins with other fishless lakes to represent the original natural systems and to allow possible seriously depleted non-fish species to reestablish themselves would be prudent. Pillod's paper, "Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes," describes such a strategy method. In Jason Dunham's paper "Assessing the Consequences of Nonnative Trout in Headwater Ecosystems n Western North America"; they list 7 key issues for assessing the consequences of nonnative tour in headwaters ecosystems. The North Cascades National Park in the beginning of their EIS to determine strategy on long-term fish management strategy will look at this alternative to restore natural processes in some historically fishless lakes.
	37.7	Please see response to Comment 37.163.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.8		With the seemingly good intentions Montana Fish Wildlife and Parks has now decided that genetically pure Westslope cutthroat trout would be good for the long term for the restocking of these originally fishless lakes and the downstream areas with the fish they want to remove. One thinks of the good intentions of miscis shrimp in Flathead Lake and the disruption on native fisheries. Lead poisoning of hatchery raised fish this summer and how that might affect fish that are stocked in the wilderness. The Hungry Horse dam has cut off the rest of the South Fork Flathead River to protect the upstream section from the various problems of introduced fish down stream. This originally genetically pure Westslope cutthroat trout population has evolved with the stocking of fish (except in these lakes). They have adapted to their places on the 1,898 miles of habitat. A WCT trout likely has different characteristics if it is found in Abbot Bay then [sic] if it is found in Youngs Creek. The basic genetic material may be the same, but the behavior and local adaptations cannot be duplicated, if these hatchery fish that were taken from various streams on the South Fork Flathead and an entirely different Clark Fork drainage and are all mixed together, then are continually stocked into lakes and dribble down into the main originally "pure" WCT area, aren't we potentially polluting these original native genes with our new combo mix genes and saying it is close enough as far as we know now?
	37.8	The citizens of Montana are faced with the westslope cutthroat being listed as a threatened species under the Endangered Species Act. MFWP would like to prevent an ESA listing. We acknowledge that there are unforeseen risks associated with any management action. We believe the risks of no action are greater than those associated with the proposed action. The current WCT brood stock is genetically pure and genetically diverse, founded mainly from donor populations in the South Fork Flathead River drainage. The outmigration of these fish from the lakes poses less threat to native WCT than the present outmigration of hybrid trout. MFWP's long-term goal is to conserve the remaining diversity native WCT.
37.9		Again, 50 years ago as outfitter, angler, and fish and game folks all dumped fish into these barren, useless lakes to try to make productive fisheries out of them, no one gave a second thought to the non-fish species and natural processes that were being disrupted. They just did it. Now it seems, with a broader awareness of ecosystems and how intricately connected everything is, to continue to just dump more exotic fish, even if the basic genetics match, and how humans can so easily

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		mess up things they really do not understand, it is appalling to think that is what is proposed. Most of these lakes have had fish since before the 1964 Wilderness Act, it is a state's right to manage the fishery, so the state will just continue to keep stocking fish as it always has.
	37.9	Comment noted.
37.10		The Forest Service manages the habitat, and for broader landscape systems. Since the state does not really show much more than required cursory concern about non-fish species, it is incumbent on the forest service to look out for non-fish species and natural processes. There is a link and precedent for the forest service to have a say in short and long term impacts of stocking of fish and impacts on habitat. See Peter Landres paper, "The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation."
	37.10	The USFS is a signatory of the WCTCA, and has agreed to protect and conserve the species. The FS role in this project complies with this agreement.
37.11		My proposal for the wilderness lakes would be to consider all lakes with fish, since all but Big Salmon and Doctor were originally fishless. This must be done to correlate the cumulative effects on the wilderness of fish introduction into these fishless lakes. Since almost all lakes with fish have exceeded Limits of Acceptable Change standards, most in one to four of the measured standards, most for all years since the standards were adopted in 1987, over 17 years it should be a major consideration on whether to continue to stock or not stock fish. Opportunity Class should be the main player in trying to balance which of the larger, deep fishless lakes should remain fishless after fish removal. Opportunity Classes I and II are to be managed as an unmodified and and [sic] essentially unmodified natural environment. Ecological and natural process are not measurably affected by the actions of users. Management strongly emphasized sustaining and enhancing the natural ecosystem. These are the most primitive, natural areas within the wilderness. To meet this Forest Plan management requirement, I would remove all fish from Opportunity Class I and II areas and not replant them. Woodward, Lena, Lick, Koessler, George, Devine, Upper and Lower Marshall, and Diamond. I would remove all fish in Opportunity Class 3 and 4 areas and replant them with WCT as a compromise with more recent recreation values, and realizing that continued stocking will likely continue to have LAC standards exceeded well into the future. These two areas

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		are the more impacted end of the wilderness use spectrum. Necklace Lakes, Pyramid, and Sunburst. I would leave Big Salmon and Doctor Lakes alone, since apparently they originally naturally had fish, they have exceeded LAC standards, even though they are in Opportunity Classes 4 and 2 respectively. Westslope cutthroat trout are important, and we want to protect this species. However, WCT is part of the river system, not a part of these alpine wilderness lakes. To artificially continue this fish stocking gives a unique recreation experience for visitors, but at the expense of natural processes. We do not achieve naturalness or wildness. as Landres describes in "Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness." The lakes of the Cascade Mountains in Washington and Oregon, the Sierras of California, the Rocky Mountain Lakes of Idaho and Montana all have had exotic species put into originally fishless lakes. This proposal to remove fish from originally fishless lakes, and then to leave lakes fishless as outlined in the previous paragraph would meet the purpose of action of the project - to preserve genetically pure Westslope cutthroat populations in the South Fork drainage, and to eliminate from headwater lakes and their outflow streams, the non-native trout that threaten genetically pure stocks of Westslope cutthroat trout. My proposal above would even better meet these two goals, and provide additional wilderness resource benefits, by treating these lakes, once, possibly twice to make sure all non-WCT trout were removed, you would know for sure those non-WCT genes were out of the system, never to trickle down to pollute those original pure WCT genes. The opportunity class 1 and 2 lakes remaining fishless would not have any fish to trickle down to pollute river genes. The OC 1 and 2 areas are more remote and would cause less impact on recreational users. Having no fish would reduce for at least some people the draw of going to a lake to fish. This should contribute to LAC standards improving. Also, the non-fish species would have a chance to have a comeback. If remote, nearby ponds, and marshes that did not ever get planted with fish, might allow amphibians, and insects to recolonize and possibly restore at least some of these originally fishless lakes to a more natural system. The state would not continue stocking and further disrupting these lakes.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		They could eventually be more representative of natural processes in the wilderness. The lakes that would be restocked in OC 3 and 4 areas, would also be tested and monitored after the initial poisoning to ensure all non-WCT genes were gone. Once this was assured, then as a compromise between natural processes and recreation use WCT would be planted into these lakes. If these WCT trickled down to the river, at least every lake would not dribble down these hatchery genes. LAC standards would likely still be exceeded, but this is no worse off then the last 17 years. The original non-fish species of these stocked lakes would be severely suppressed or become extinct, but at least it is in only part of the deep fishless lakes. The state would hopefully just stock these lakes until they became a sustainable fishery and then cease stocking. This would at least leave the human manipulation finished at each lake, and the lake could evolve with these fish. Visitors would not have planes flying over with fish being dumped into them every few years, and a new normal could evolve.
	37.11	Correlating the cumulative effects of fish stocking goes beyond the scope of this project. There is no way of determining what the impacts were, as those impacts occurred many years ago. The Interdisciplinary Team of the Forest Service (IDT) in preparing this document and analysis considered many of the same factors you have described, if not all, and reviewed available literature and case histories of similar projects. Within the DEIS restocking is discussed in Section 2.4.6. In addition the genetics and hatchery issues have been described. The LAC is the means to evaluate the resource conditions within the wilderness – it sets the monitoring guidance and then as managers we can select actions to take that will manage these indicators appropriately. Limiting public access and/or trail closures are examples of appropriate mechanisms to reduce public use at designated sites, and improve resource conditions and/or monitoring results.
37.12		Additional background that shows the impact of fish on non-fish species: Ptarmigan Lake Project, Glacier National Park, Jack Stanford- Ptarmigan Lake and two nearby control lakes were studied 2001-2002 and the biotic assemblages that exist in the three study lakes differ noticeably form one another during the 2001-2002 sampling seasons.
	37.12	Please see responses to Comments 37.105 and 37.108.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.13		Additional background that shows the impact of fish on non-fish species: Amphibians of Glacier National Park, Leo Marnell- the introduction of sport fish into a large number of formerly fishless lakes may have contributed to the loss or decline of several amphibians in portions of Glacier National Park. The presence of fish has been implicated in the decline of some amphibian species. Long-toed salamanders were particularly vulnerable to predation by introduced fished in portions of the Cascade Mountains in western Washington and Oregon. Long-toed salamander larvae were not observed in any Glacier National Park water harboring fish, and this species existed close to fish at only 2 of 25 sites. The extent of damage to native amphibians in Glacier National Park as a consequence of fish introductions may never be fully understood.
	37.13	We agree that the full extent of impacts of introduced fish on amphibians will never be known. The MFWP 2004 SF lake survey found long-toed salamanders in 26 (35%) of the 75 lakes surveyed. Salamanders were found between elevations of 3,720 feet to 7,150 feet above sea level. The mean number of salamanders found at each site was 33 (1-328). The salamander was the second most abundant amphibian found in the SF during the 2004 survey representing about 8% of all amphibians found in lakes. Results indicated that salamander numbers are not driven exclusively by the presence of fish. Habitat availability was the most influential factor driving amphibian numbers. Please see Appendix G of the FEIS for more information about amphibians.
37.14		Additional background that shows the impact of fish on non-fish species:. The Fish-stocking Controversy, North Cascades National Park Service Complex, 1968-2003, David Louter- the consent decree required that the agency review the fish stocking program through an EIS. The research program, carried out by Oregon State University, lasted for 12 years instead of 3, and only recently concluded in July 2002. The research concluded that zooplankton, insects and amphibian in lakes with high densities of reproducing fish have undergone statistically significant changes in abundance and species composition.
	37.14	Thank you for your comment and interest in the SF WCT Conservation Program.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.15		Additional background that shows the impact of fish on non-fish species: An evaluation of Restoration Efforts in Fishless Lakes Stocked with Exotic Trout, Deanne Drake-Diatom assemblages in two restored lakes have not returned, with several potential explanations- First, recovery may take longer than the 20-30 years since fishes were removed from the lakes. Second, ecological conditions in stocked lakes may have been driven past a threshold of change-exceeding the bounds or resiliency- from which they will not return spontaneously. Third, other disturbances, such as loss of lakeshore vegetation, may also have affected diatom communities in lakes over the last 30 years. Because few ecosystems are well understood in terms of history, function, or structure, the results of our study imply that ecological restoration of other systems also may be more difficult than managers expect.
	37.15	Thank you for your comment and interest in the SF WCT Conservation Program.
37.16		If the project is to proceed on any lakes, I feel the following items should be included: Trails that do not have a well maintained system trail should not have stock used to transport people, gear and chemicals into them - this includes Woodward, Lena, Lick, George, and Koessler.
	37.16	The draft Minimum Tool Analysis listed on page 3-38 of the DEIS acknowledges your point with the exception of Woodward, Lena and Koessler. In 2002, the FS trail crew cleared avalanche debris from the trail to Koessler Lake. The FS concluded that livestock could be used to access those three sites. Page 2-3, and Table 2-3 provide information on this subject.
37.17		If the project is to proceed on any lakes, I feel the following items should be included: Any stock carrying in people, gear, supplies should be round tripped out back to the trailhead if this mileage is 20-22 miles. It sounds like each lake will take 3-7 or more days to complete. At these sensitive alpine lakes, have many head of riding and pack stock staying for 3-7 nights would largely contribute to the continued exceeded LAC standards. Round tripping stock out to the trailhead should include - Sunburst, Necklace, Pyramid, and possibly Woodward.
	37.17	In many cases stock would be returned to trailheads. In some cases the Forest Service would have stock overnight at appropriate locations and would require using nearby administrative sites or setting up camps.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.18		If the project is to proceed on any lakes, I feel the following items should be included: If boats with motors have to be used to effectively mix in poisons, it seems like electric motors or at least 4 stroke cleaner motors should be used. They are quieter, would not spill fuel, and would not give off fumes. It would only seem like the state would have to buy an electric motor.
	37.18	Four stroke motors would be used in the wilderness portion of this project. Electric motors require support equipment like batteries, and don't have the thrust of an internal combustion engine. There is a risk of spill of battery acid, which would have more of a threat to operators using the batteries. As both are mechanized apparatus, the internal combustion engine offers the best chance of success at meeting the project objectives.
37.19		[Specific draft EIS comment on section] S-3- the EIS implies that more lakes and streams than the 21 listed might be treated if hybridization was determined. I assume a new EIS would be prepared if this came to pass.
	37.19	Please see Sections 2.2 and 2.4.2.5 of the DEIS.
37.20		[Specific draft EIS comment on section] 5-4- in Alternative B, the EIS says that all lakes that have fish removed would have WCT stocked in the lake without sampling to see if all of the fish in each lake were killed. Why wouldn't another poisoning occur to make sure all non-WCT genes were removed from each lake instead of just swamping over the top? For each lake and stream below each lake to be treated, what is the expected success rate for the proposed action, 80%, 90%, 99%, 100%?
	37.20	Section 2.4.5 of the DEIS states that post treatment evaluations would be made to determine the effectiveness of a treatment, and determine if a second treatment is warranted.
37.21		[Specific draft EIS comment on section] S-4- in Alternative D, the EIS says that when fish numbers are reduced, intensive fish stocking would be used to swamp the remaining fish. How does this compare to Alternative B in the number of fish that would be swamped, percentage of success, etc.? It sounds like they are they same alternative except that in some cases some lakes in alternative B would have fewer fish remaining to be swamped.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.21	These two alternatives differ greatly in the associated impacts. Table 2-7 of the DEIS lists the comparison of effects and provides a measure of impacts associated with each affected resource. This table points out substantive differences between Alternative B and Alternative D. Fish stocking density is related to the surface area of a lake. In the presence of the genetic swamp out management concept, numbers of fish many be increased or the frequency of stocking may be increased. Alternative B does not propose post treatment swamping. Page 2-26 of the DEIS states that stocking is for the purpose of dominating any remaining hybrids that might exist after a treatment.
37.22		[Specific draft EIS comment on section] S-5- gathering and sinking dead fish in the treated lake would stimulate plankton growth as a food source for restocked WCT. The poisoned fish as well as the restocked fish are exotic species to the wilderness. The poisoned fish should be removed. The wilderness should not be considered a garden when the original natural processes are manipulated for human perceived better conditions.
	37.22	Please see responses to Comments 11.10 and 37.2.
37.23		[Specific draft EIS comment on section] S-6- Alternative D- gill netting would require long term camping and storage of equipment to accomplish and this lead to trampling and site degradation. This is what currently exists at almost all lakes with fish. Limits of Acceptable Change standards are exceeded, largely because of the human impacts of people being attracted to lakes with artificially placed fish. Many stock users, outfitters, and hikers come to fish at lakes and cause LAC standards to be exceeded because of these fish. By saying that gill netting might cause standards to be exceeded might be a short term price to pay if the fish were removed and not replanted, so fewer people would come to each lake without the unnatural fish attractant.
	37.23	Page S-6 of the DEIS that you refer to discloses the direct and indirect effects on this method. If LAC scores are exceeded at the sites you've indicated, this method would likely make the scores worse. Further, long-term camping and operation of a boat at the sites would have a negative impact on solitude, noise and wilderness experience. Finally, the fishery would be impaired for 5-10 years. These impacts are believed to be greater in effect and intensity than others evaluated.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.24		[Specific draft EIS comment on section] 1-8- the 1999 MOU and Conservation Agreement for WCT, says WCT is to be managed within its historic range in Montana. These fishless lakes are not within its historic range.
	37.24	This project was designed to conserve westslope cutthroat trout in the South Fork Flathead drainage which is the historic range of this species. The MOU recommends that the species not be restored to geographic areas and drainages that are not within its historic range. Examples of this would include eastern Montana, or the Yellowstone River drainage.
37.25		[Specific draft EIS comment on section] 1-8-Protect all genetically pure WCT. The South Fork Flathead River is the only genetically pure WCT. Get rid of all fish in its headwater lakes and the river WCT will take care of itself. The more we try to garden fish management, the more disruptive this is to fish and non-fish species, especially in wilderness where natural processes are to dominate.
	37.25	Thank you for your comment.
37.26		[Specific draft EIS comment on section] 1-9- purpose- eliminate from headwater lakes the non-native trout. Removing all WCT and non-WCT from these lakes and not restocking them meets this purpose very well. This is not displayed as an alternative to be considered.
	37.26	Though there may be a debate about the definition of native, the Forest Service Manual defines native as "any species of flora or fauna that naturally occurs in the United States and that was not introduced by man" FSM 2320.5. We consider the WCT native and so this proposed project would meet this purpose. See also response to Comment 35.2.
37.27		[Specific draft EIS comment on section] 1-13- MFWP is proposing to continue historical practices of stocking fish for recreation and to increase biological integrity. Again, not having any fish, WCT or non-WCT in lakes or streams from these lakes, does the best job of protecting the genetics of the native WCT in the South Fork Flathead River.
	37.27	Fish stocking and native fish management in the wilderness section of the South Fork Flathead was occurring before the area was designated as wilderness. This project proposes to reduce the threat of hybridization (also see response to Comments 37.100 and 37.103).

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.28		[Specific draft EIS comment on section] 2-4- management goals for the fisheries in the South Fork focus on managing fisheries consistent with wilderness management guidelines - the fact that it is proposed to do at least some of this project with primitive tools, stock versus aircraft, is a plus. However, in the bigger picture, removing fish and then putting more fish back into originally fishless lakes has the bigger impact to the overall natural processes that are supposed to be occurring in wilderness. Your proposal does certainly not meet wilderness values.
	37.28	Fish existed in the lakes long before a portion of the project area was designated wilderness. Fish stocking with genetically pure WCT would replace hybrid trout and maintain established social and economic practices.
37.29		[Specific draft EIS comment on section] 2-5- alt b. again, [sic] it is not displayed what the expected outcome is by lake for poison treatment. is [sic] Lick Lake expected to have 100 of the original 1,000 fish remain alive after poisoning, then it is restocked with 10,000 WCT so the genetic swamping dominates more quickly than waiting for 40 years? If the objective really is to remove all non-WCT genes from the South Fork Flathead River drainage, would it not be prudent to sample each lake after poisoning to confirm if all fish are dead and then re-treat the lake if fish still live? And if indeed fish are finally all gone, does that not meet the objective of not having any polluting non-native WCT genes dribbling down to the main South Fork Flathead River?
	37.29	This information is stated in Sections 1.3, and 2.4.5 of the DEIS. Section 1.3 of the DEIS states that maintaining angling is an objective. This point was made numerous times throughout the DEIS including the analysis of socioeconomic impacts in Table 2-7, Chapter 3, and Table C-1.
37.30		[Specific draft EIS comment on section] 2-8- speaks to a post treatment survey, but does not commit to anything besides just restocking with more fish.
	37.30	Section 2.4.5 of the DEIS details the post treatment survey. See response to Comment 31.7.
37.31		[Specific draft EIS comment on section] 2-12 amphibian surveys have been conducted at each lake. Surveys have not been done at all large, deep lakes in the South Fork to see what non-fish species do or did exist at these lakes. Fish certainly had an impact on non-fish species, and by only looking and comparing what exists at lakes with fish, you are not looking at what species have been lost and how stocking and restocking effects them in the short and long term.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.31	Surveying all lakes, or even all large deep fishless lakes, in the SF Flathead is not feasible and is not an objective of this project. In 2004, MFWP initiated a study to survey plankton and amphibians at 75 lakes and 86 streams in the SF. Surveys will continue during 2005. To date, no unusual species with restricted geographical range have been identified in the project area. See also Appendix G of the FEIS.
37.32		[Specific comment on section] 2-25- post treatment gill nets. If live fish remain, a determination would be made to impellent another treatment. Are you supposed to remove all non-WCT genes or not? What is the threshold that will be used to remove the last fish or just dump 10,000 more fish on top of them? What are the professionals anticipating the success is? See S-4 above.
	37.32	Page 2-25 of the DEIS discloses the post treatment evaluation. If fish are not detected by visual observation and gill netting, then the lake would be considered fishless. If fish remain in the lake, a determination would be made whether to implement a second treatment.
37.33		[Specific draft EIS comment on section] 2-25- rotenone would have on long-term adverse impacts on amphibians in the project area. it is not displayed what the range of amphibians currently are at the proposed treatment lakes, much less what amphibians were there before fish.
	37.33	Table C-2 of the DEIS lists the relationship of amphibians at the project lakes. In addition the 2004 MFWP surveys of 75 lakes and 86 streams in the SF further describes the status and distribution of amphibians in the drainage. See also Appendix G of the FEIS. Please see response to Comment 11.46.
37.34		[Specific draft EIS comment on section] 2-26- isolated fish have survived piscicide treatment. So you are saying that no treatment at these lakes is 100% effective. All treatments at removing fish are really to reduce as many fish as possible and continue long term swamping. If this is the case, poison, gill netting, and explosives all seem reasonable methods to use and may have less impact on non-fish species.
	37.34	Chapter 2 of the DEIS considers alternatives, evaluates them, and proposes the most effective alternative that will meet the project objectives.
37.35		[Specific comment on section] 2-27 - there is not a "no restocking" option. This is a reasonable alternative to be displayed to show what the effects on possible non-WCT genes dribbling out of lakes might be, what types of non-fish species could recolonize deep, fishless lakes, etc.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.35	This option was ruled out of the scope of analysis on page 1-12 of the DEIS. The reasons stated are that the goal to replace hybrids with pure WCT would be compromised and that the socioeconomic impacts would be too great. The possibility of creating fishless lakes was considered as a result of public scoping, but was eliminated from detailed analysis. See also response to Comment 35.2.
37.36		[Specific comment on section] 2-27- restocking decisions - the flat out statement that all lakes would be subject to illegal restocking is not accurate. With some credible education of the public about natural processes in the wilderness, the only places that they have any chance to possibly work with little human manipulation, and FWP puts fish into basically every lake outside of wilderness, putting fish back into opportunity class 3 and 4 areas, and not restocking in opportunity class 1 and 2 areas, would keep the more pristine, remote areas that way and more likely to return to Limits of Acceptable Change standards.
	37.36	Illegal introductions documented by MFWP demonstrate that determined people will transport fish to difficult locations. Education about the damage caused by species introductions is important to reduce future violations, especially in wilderness. The Limits of Acceptable Change (LAC) is the means to evaluate the resource conditions within the wilderness and establish monitoring guidance so that managers can select actions to manage these indicators appropriately. Limiting public access and/or trail closures are examples of appropriate mechanisms to reduce public use at designated sites, and improve resource conditions and/or monitoring results.
37.37		[Specific comment on section] 2-27- Just restocking all lakes shows little appreciation or understanding of the wilderness resource, or natural processes. Wilderness is just another recreation place to hunt and fish, it does not have any roads, but fish and wildlife can be manipulated like they can in any non-wilderness area.
	37.37	See response to Comment 34.10.
37.38		[Specific comment on section] 2-35- genetic swamping may not be able to completely remove the genetic introgression. Genetic swamping seems to be part of all alternatives, it just varies by how many fish are being swamped. In this event, none of the alternatives completely remove all non-WCT genes. If that is the case, then the project is to just take out as many potential non-WCT

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		genes as we can.
	37.38	Please see response to Comment 37.172.
37.39		[Specific comment on section] 2-39- explosives estimate 85-95% fish kill. This is from one persons [sic] estimate. It seems like maybe 5 people should be asked their opinion, or maybe do a test lake. If poisons and gill nets do an estimated 95-98%, is that that much better?
	37.39	One local person was consulted who has expertise in general demolition and underwater demolition. Section 2.7.4 of the DEIS also considered information provided in Campbell and O'Neil (1999) and Lennon (1970). In both instances, these authors concluded that explosives and pneumatics killed fish but would not likely meet the objectives defined for this project.
37.40		[Specific comment on section] 2-45- not discuss wilderness in terms of naturalness and wildness in terms of short and long term impacts as per Landres paper.
	37.40	Please see response to Comments 37.147 and 37.179.
37.41		[Specific comment on section] 3-2- bob marshall wilderness complex is 1.5 million acres, about 110 miles north to south from hwy 2 to lincoln.
	37.41	Thank you for your comment and interest in the SF WCT Conservation Program. There are many ways to describe the area included in the Bob Marshall Wilderness Complex.
37.42		[Specific comment on section] 3-7- protect and restore WCT in their historic range. Outside wilderness, maybe the FWP is empowered to do more manipulation, but it still should consider natural processes. Inside wilderness, natural processes should be dominant, and putting exotic fish into originally fishless lakes does not promote natural processes today or into the future. Growing WCT in the wilderness lakes where they were not historically located does no service to natural processes in the one area where natural processes are to prevail.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.42	Please see response to Comment 37.28.
37.43		[Specific comment on section] 3-10- there is internal and external debate as to when a fish should be considered indigenous. If 1964 is the date, then hybrids should count as indigenous. Continuing to stock fish in fishless lakes regardless of semantics does not serve the natural processes of wilderness.
	37.43	Please see Section 3.2.4 of the DEIS. Though there may be a debate about the definition of indigenous, the Forest Service Manual defines it as "any species of flora or fauna that naturally occurs in a wilderness and that was not introduced by man" FSM 2320.5.
37.44		[Specific comment on section] 3-12 – protect bull trout by removing as many hybrid WCT as possible. Again, it sounds like some, if not quantified, WCT will remain after poisoning to protect bull trout, and because poisons might not be effective in every nook and cranny of every lake and stream. If this is so, say so and what the anticipated success is for each lake and stream segment. This display might help determine which treatment is best for each area.
	37.44	Page 3-12 of the DEIS reads "… it will be necessary to protect as many downstream bull trout populations while removing as many hybrid trout from those streams as possible…" We propose using safeguards to protect the bull trout. However, in our biological assessment for this project we acknowledge that some bull trout may be lost. See Sections 4.1.1 and 4.2.
37.45		[Specific comment on section] 3-13 if piscides [sic] combined with swamping any remaining non-WCT should reduce but not eliminate non-WCT genes. Again, what are the chances of success by lake and stream segment? If some are very assured of success, this would rate that segment much higher in remaining fishless.
	37.45	See page 1-12 of the DEIS. Creating fishless lakes is not proposed for this project.
37.46		[Specific comment on section] 3-13- using the same MO 12 stock for all lakes again seems economical, but likely will lead to future genetic contamination of the really, original genetically pure WCT in the main South Fork Flathead. If the proposal persists in wanting to stock WCT into lakes, the least that should be done is to get WCT fish that live in the main stem and use these fish to stock lakes that drain into them. For example, for Lick, Koessler and George Lakes, use WCT that

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		naturally live where Gordon Creek empties into the South Fork for brood stock. Plant these fish into Lick, Koessler and George Lakes. If over the years, fish happen to dribble down from the lakes to the main river, at least these fish will carry the genetics of the original fish from the drainage.
	37.46	The M012 has been used in the South Fork Flathead for 19 years. It is genetically pure, genetically diverse, and we believe it would not "genetically contaminate" the drainage.
37.47		[Specific comment on section] 3-18 - amphibian baseline data has been collected from the project area that indicates that these species are widely distributed throughout the project area. Apparently, the amphibian survey did not consider other large, possibly deep fishless lakes to compare what the lakes currently stocked with fish might have had for non-fish life forms before fish. Lakes without fish, such as Palisades, Olor lakes, Crimson, Pendant, Christopher, Hart, Recluse, Rubble, Marshall Mt., Cooney, Lion Creek, Terrace, are some examples of the many larger and possibly deep lakes that could be surveyed to see what amphibian, reptile, plankton, aquatic insect, etc. may have existed in these lake prior to fish introduction. Until the surveys are done on all large lakes with and without fish, it seems that saying none of the alternatives would have any effects is premature.
	37.47	Thank you for your comment and interest in the SF WCT Conservation Program. Six of the lakes you listed have been surveyed in recent years. The detailed study you describe was not conducted on each lake because this project does not include those areas.
37.48		[Specific comment on section] 3-20- basing a Glacier National Park FONSI that said noise would not effect wildlife, without displaying what the FONSI said, the project background, etc. seems pretty presumptuous in saying the same effects apply for this project.
	37.48	We acknowledge that the DEIS failed to adequately describe the scope of the EA to *CONDUCT ADDITIONAL ADMINISTRATIVE HELICOPTER AND FIXED WING FLIGHTS IN 2003, GLACIER NATIONAL PARK, WEST GLACIER, MONTANA*, and the associated FONSI. The EA reads "*…Approximately 34 helicopter flights are proposed to remove untreated human waste from the public toilets at Granite Park Chalet before it can open for the season, remove untreated human waste, and remove a failing composting toilet at the administrative patrol cabin in that area. Approximately 30 helicopter flights are proposed to rehabilitate the Porcupine Lookout in the backcountry and 6-8 helicopter flights are proposed to conduct radio tower maintenance*

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		throughout the backcountry of the park. In addition 15-30 fixed-wing flights are proposed to conduct wildlife monitoring for research purposes of bald eagles, bighorn sheep, bull trout, Canada lynx, gray wolves, grizzly bears and wolverine…" The proposed action involved conducting only one landing at these sites. Based on this finding, we expect impacts to be similar.
37.49		[Specific comment on section] 3-22- what food storage method would be used at lakes? Camp occupancy or bear resistant containers? Will piscide [sic] be stored in bear resistant containers? Although they are not a food consumed by humans, it could be odorous and intriguing to a grizzly bear to just check it out and tear it open or bite it to see what it is, like has been know to happen with oil and gasoline containers.
	37.49	Page 3-22 of the DEIS states that the proper food storage orders would be followed.
37.50		[Specific comment on section] 3-23- impacts on amphibians would be minimal. If piscide [sic] use kills all fish, it seems likely that it will kill all amphibians in the water. It might be true that some amphibians would still be around after treatment, it does not go into the various life cycles that different amphibians have, where over several years they go from pond, to marsh to lake, and depending on time of year, treatments can be deadly to different species.
	37.50	Numerous reviews of scientific literature case histories, field trials and MFWP laboratory assays were used to evaluate possible effects on amphibians in general, and specific life stages of amphibians. Some of these findings are listed on pages 3-22 and 3-23 of the DEIS. We are proposing to initiate action in the fall when most adult amphibians are not in the lakes and other life stages are metamorphosing, specifically to reduce the potential for impacts to non-target organisms.
37.51		[Specific comment on section] 3-28 - spills from pumps and outboard motors. It seems like electric motors instead of those run from gasoline would prevent this possible problem.
	37.51	See responses to Comment 37.18.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.52		[Specific comment on section] 3-26- "Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces." This project is supposed to help correct imbalances cause by past actions. People put fish in lakes in the past. We do not like those fish, so we want to kill off the old fish and everything else that lives in these lakes and streams, then put in new fish into these originally fishless lakes, and continue to stock them with fish so people can fish for them. What about this description sounds like wilderness responding to natural forces?
	37.52	The project goal is to protect and conserve WCT and to maintain established socioeconomic and recreational practices.
37.53		[Specific comment on section] 3-37- "where a choice must be made between wilderness values and visitor and other activity, preserving the wilderness resource is the overriding value." Maybe taking the fish out of lakes might help preserve the wilderness resource, but putting them back into every lake to continue an unnatural process certainly does little to preserve the wilderness resource.
	37.53	Thank you for your comment and interest in the SF WCT Conservation Program.
37.54		[Specific comment on section] 3-37 maintaining naturalness and wildness should dominate what is done in this proposal. Natural and Wildness: The Dilemma and Irony of Managing Wilderness, Peter Landres' paper says that wildness is free from human control or manipulation. Naturalness is native, indigenous. Both are essential elements of wilderness. The present and future of these originally fishless lakes meets neither. In the past fish were planted in fishless lakes- human control of stocking, manipulating the setting, and making less native. Every time the lakes are stocked it is more human manipulation of a non-native organism put into a lake at the expense of those species that were there before fish. This proposal would have deadly human manipulation to remove most life from lakes and affected streams, and then put non-native fish in the short and long term back into these lakes. Neither naturalness nor wildness is met by any measure.
	37.54	Please see response to Comment 37.28 and 37.147.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.55		[Specific comment on section] 3-38 a final minimum tool analysis it not normally completed prior to having an approved decision. At a minimum the analysis and decision go side by side. If a decision is made without knowing what the minimal tool choices are, it is not a very informed decision. The EIS should display what minimum tool is for each lake and stream segment. To say that it will be discussed in the details after a broader decision is made does not reasonably display to the public and decision maker what the various consequences are to each decision.
	37.55	The draft Minimum Tools Analysis on page 3-38 of the DEIS considered the project as a whole, considered the major differences in the possible outcomes, and narrowed the decision space based on land use restrictions, and methods of transport and application.
37.56		[Specific comment on section] 3-39 - cumulative effects on wilderness resources. There are 50 lakes in the South Fork stocked with fish; all but two were originally fishless. Almost all are in designated or proposed wilderness. The cumulative effects of having 50 of 355 large, deep lakes stocked with exotic fish, on the non-fish species needs to be displayed as an effect on wilderness resources.
	37.56	Please see response to Comment 35.5.
37.57		[Specific comment on section] 3-40- it is not clear how gill netting and other suppression techniques would disrupt natural wilderness processes and adding poisons and swamping would not.
	37.57	The analyses for these methods describes the likely impacts on "wildness" and "naturalness" including extended stays at lake sites, impacts to the soil and vegetation from extended camping, impaired fisheries, and extended presence at the sites. See Section 2.6 of the DEIS.
37.58		[Specific comment on section] 3-42-it seems to misrepresent the fishing impacts of listing 21 lakes for this project, and adding them up to represent the 157th out of 1,529 fisheries in the state. Each is a widely separated lake and the highest any lake rates is 320. To then say all of these together represent the 157th biggest fishery does not seem to make sense. One lake ranks at 1,175 out of 1,529.
	37.58	It is widely accepted that anglers using the high mountain lakes in the Swan Range frequently fish more than a single lake during a trip. In fact, it is very common for anglers using lakes in the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Gordon and Big Salmon drainages to fish multiple lakes during an extended trip. The data presented in Table 3-6 of the DEIS does not include the recreational value of the SF River, or the angler use of lakes that are not listed in this proposal but are important fisheries in the SF drainage (Big Salmon, Spotted Bear, Beta, Jenny, North Biglow, Seven Acres, Cliff, Crater, and Doctor). If these were added, the importance of these fisheries would rank higher than described in the table.
37.59		[Specific comment on section] 3-43- Limits of Acceptable Change- most lakes with fish have exceeded standards. Most have one and up to four measured standards, most have been exceeded for all 17 years since these standards were established. Lakes stocked with fish play a major role in attracting people to lakes. The fact that the forest plan states that wilderness is to be managed within standards should prevail, the fact that some lakes might be getting closer to being within standard, but are still are outside standard after 17 years should be part of the display of information and have a bearing on which, if any lakes should be considered for restocking with fish.
	37.59	The intent of the LAC monitoring was to know the existing conditions, to have managers understand the indicators, both independently and jointly with factors, and then to make informed decisions about means to continue to improve the wilderness resource conditions. As described on page 3-43 of the DEIS, overall the standards are improving.
37.60		[Specific comment on section] 3-48 - the EIS notes that the LAC standards are not expected to change in alternative B. The connected action of restocking lakes will continue to have lakes not being managed within LAC standards. An alternative that would not restock some or all lakes based on Opportunity Class would likely have at least the lakes that were not stocked come back within LAC standards.
	37.60	Restocking is addressed in Section 2.4.6. There are many actions that could contribute to a change in the LAC monitoring results.
37.61		In general, even though we will never know all we need to know before making a decision on these lakes, I still believe there is a basic level we need to know on the larger, deep fishless lakes. Do we have representative basins that can reflect what non-fish species were present before the introduction of fish?
	37.61	This information could be gathered from lakes in the project area that do not have fish. Although MFWP has conducted surveys on amphibians, surveying fishless lakes is not part of this proposal.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.62		Can we keep the most pristine areas fishless as they originally were in Opportunity Class I and 2 areas whether they have any fish at all?
	37.62	As identified on Page 1-12, since all lakes included in this proposal within the wilderness had established fish populations at the time of wilderness designation, and when opportunity classes were established, managing these fish populations by MFWP was a preexisting activity.
37.63		If we must remove fish from all lakes and restock them into some lakes for compromise or political or social reasons, can we stock the fish for one or two years, and then let them become self-maintaining or not, and try to restore as much naturalness and wildness as we can to wilderness without continued human manipulation?
	37.63	Page 2-27 of the DEIS states that where possible, stocking would be reduced in the absence of the "genetic swamp out" management concept.
37.64		In the proposed wilderness for Jewel Basin, can you keep the more remote lakes fishless to represent natural processes in other areas as well, especially those areas likely to become wilderness?
	37.64	Please see response to Comment 37.163.
37.65		Your EIS addressed many of the issues I outlined in attachment A, and did not seem to embrace and include much of the wilderness and amphibian research outlined in attachment B.
	37.65	Please see response to Comment 35.2. The research has been considered and included in the references.
37.66		This EIS is still not a very balanced document. Poison non - WCT in some lakes, put WCT back in, and keep providing a recreational fishery. This does not contribute to natural processes, naturalness or wildness, as part of wilderness; it is totally subservient to fish. A dangerous precedent to manage for a wildlife species at the expense of the overall wilderness resource.
	37.66	The westslope cutthroat trout and angling are wilderness values also. This project considers striking a balance between natural processes, promoting naturalness and wildness over time, and conserving the genetic integrity of WCT.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.67		Alternative methods to remove fish: Alternatives include ending all fish stocking, liberal angling rules, netting, electrofishing, targeting spawning areas, stocking with predatory sterile hybrids, etc. All alternatives should be fully considered and displayed, not just for convenience and economics.
	37.67	Your recommendations have been considered and analyzed in Chapter 2 of the DEIS.
37.68		Alternative methods to remove fish: Non-toxic alternatives such as trapping, and screening off of spawning beds. These alternatives could be combined with gill netting and other non-toxic methods in treating some lakes.
	37.68	See Chapter 2 of the DEIS. Non-toxic alternatives were considered.
37.69		Alternative methods to remove fish: Antimycin, advantages should be listed. You need 115 the volume of rotenone so for wilderness situations it has merit. Its effect on nontarget organisms is less than rotenone. Antimycin is used in the Wilderness lakes but rotenone is proposed in the non-wilderness. Both sets of lakes have non-fish species that are sensitive to chemicals and areas of streams below lakes that have hybrids. Explain why there is the difference in the types of chemicals being used.
	37.69	Although the performance benefits of antimycin are listed in the DEIS, we acknowledge that, aside from the references in Section 3.6.5 of the DEIS, it is not clear on the performance advantages that were used to help determine where rotenone would be used. See response to Comment 31.11. We have added this information to the FEIS.
37.70		Alternative methods to remove fish: Gill netting has been shown to be effective in lakes up to 33 feet deep and 8 acres in size. (Knapp and Matthews June 1998) this method should be seriously evaluated and considered for the Necklace Lakes and Pyramid Lake.
	37.70	The Knapp and Matthews (1998) paper was cited on page 2-31 of the DEIS. Alternative D of the DEIS considers suppression as a means of achieving the objectives of the project. The analysis of this alternative determined that there would be major and long-term impacts to five of the seven resource categories that were identified. Table 2-7 on page 2-45 of the DEIS summarizes these impacts.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.71		Alternative methods to remove fish: Lakes with chemicals flown in — have people walk in, stay there, walk out. To minimize flights, serious consideration should be given to having people walk in instead of riding stock and then having stock not stay at the lake but taken out to the trailhead to minimize impacts to trails and to lakeshore areas.
	37.71	Thank you for your comment.
37.72		Bull trout spawning and rearing tributaries. It will be critical that a failsafe method be adopted to preclude the accidental discharge of toxified water downstream from these removal efforts. How many miles of stream have both bull trout and hybrid fish? In those areas with both types of fish, is the hope that potential dribble down of planted wct from the lakes will swamp out any hybrids in these sections? If wct were not planted in the lakes, couldn't any hybrids be swamped out with pure native wct from the South Fork Flathead River? What is uppermost bull trout distribution in each of these drainages? Also, assuming that most of the uppermost reaches end at some kind of barriers or falls. Again, why can't hybrid wct above the barriers be removed, and not replant wct in the lakes and in the streams above the barriers? If these toxins are supposed to be so effective, there should not be a problem with not having to plant wct in lakes to dribble down to do more swamping.
	37.72	It is not known precisely how many miles of stream have both bull trout and hybrid fish. Yes, Section 1.1, page 1-7, and page 2-27 of the DEIS, describes the mode in which headwater lake fish have moved downstream and will likely continue. Translocation of fish from the SF River requires extensive genetic and disease testing to absolutely determine no hybrid fish or pathogens are transferred into the lakes or creeks downstream. Second, translocations of wild fluvial fish from the river to a lake environment must be limited to avoid impacting the donor population. The number of fish available using this method may not be sufficient to reestablish lake populations or meet genetic purity objectives. Depleting fish from the SF River may have a negative impact in the integrity of that population, and ultimately on the recreational angling in the SF River.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Appendix C of the DEIS provides details on the distribution of bull trout in their respective drainages as well as Table 3-2. Not replanting lakes with fish could create social and economic impacts to the recreational and commercial enterprises in the area. See Sections 1.4.2.2 and 2.4.6. There is no proposal to impact angling other than that described during the repopulating phase following a chemical treatment. Also please see the response to Comment 37.44.
37.73		FSM 2320.22: Objectives — "Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces". This is not being proposed based on past actions of planting by FWP, by fish removal, then proposed continued restocking of lakes forever.
	37.73	Thank you for your comment.
37.74		FSM 2320.3: Directs FS Line Officers to select an action alternative which gives precedent to maintenance of wilderness values where there are alternatives among management decisions... except where limited by the Wilderness Act, subsequent legislation or regulations. Maintaining naturalness and wildness should dominate what the Forest Service does and what the Forest Service does in partnership with Fish, Wildlife and Parks. Both agencies need to consider wilderness values, not just specific wants and needs for one project like this fish removal and restocking proposal.
	37.74	This project has included an in-depth analysis of the wilderness and potential effects related to the westslope cutthroat trout conservation.
37.75		FSM 2320.6: "where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value." Wilderness values should dominate all agencies decisions, not just Forest Service decisions based on one species of fish.
	37.75	Thank you for your comment.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.76		Inconsistency between FSM direction and MOU guidelines/criteria - Define statutory authorities given court rulings. (Landres and Meyers 2000). This paper notes that "backed by the Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values." By having the Forest Service say that the state can stock and continue to stock fish in any and all wilderness lakes that it so chooses, is an abdication of federal responsibility of protecting long term wilderness values, natural processes, and minimizing continued human manipulation of the wilderness.
	37.76	As described in the DEIS, the agencies have followed the appropriate direction. See Chapter 4 of the DEIS.
37.77		Inconsistency between FSM direction and MOU guidelines/criteria - "Territorial imperative" is a barrier to wilderness management - There is some comfort level with the current perception that State has jurisdiction over fish stocking in wilderness as long as there is recognition of shared responsibility for meeting intent of the Act, as well as, other laws that regulate Forest Service actions. There does not appear to be any shared responsibility for meeting the intent of the Wilderness Act. This project is purposely divided into decisions that each agency is supposed to make independently, without cooperation or adherence to the much touted Bob Marshall Wilderness Complex framework of cooperation between the Forest Service and FWP. There should be shared responsibility for meeting needs of wet as well as wilderness values. Believe that the Forest Service does not have the authority to allow the State to perform this procedure. It does not seem to meet the Forest Service mission of maintaining wilderness values and natural processes by just letting the state perform exotic fish removal from lakes, and then just let them put in different exotic fish back into these lakes.
	37.77	Thank you for your comment. The Forest Service and the State are working cooperatively to make stocking decisions as described in the Bob Marshall Wilderness Complex Framework.
37.78		We have a very unique and rare opportunity to recreate many large fishless lakes.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.78	There are presently a number of fishless lakes in the wilderness portion of the project area that provide unique recreational opportunities (Rubble, Upper Terrace, Lower Terrace, Christopher). Other wilderness lakes that are believed to be fishless include Diamond, unnamed Little Salmon, unnamed Youngs Creek, Otis, and Prisoner, among others. These are representative of complete naturally-functioning ecosystems that are not influenced by fish stocking. Fishless lakes are available both inside and outside the wilderness for use by the public in proportion to the demand.
37.79		Stocking fish in naturally fishless waters has had a devastating effect on native aquatic biological diversity and biological integrity. I don't believe non-fish species in these originally fishless lakes has been fully considered. What did all fishless lakes look like prior to fish? What is left in these and the remaining lakes as far as non-fish species diversity and makeup?
	37.79	Please see response to Comment 11.10.
37.80		Use such [fishless] lakes for the study of recolonization by amphibians and affected aquatic insect populations? For any of the lakes that don't end up being restocked, they should be studied to see what the recolonization by non-fish species looks like.
	37.80	The proposal is to restock lakes and we would monitor the recolonization of amphibians and aquatic insect populations after treatment.
37.81		How many of these 355 lakes are capable of sustaining fish. [sic] A rough guess is that 95-100% of lakes that can sustain fish in the South Fork have fish in them. Bottom line is that there are few to no large deep fishless lakes due to stocking practices. Large, deep fishless lakes likely have different, if not unique, assemblages of non-fish species. Even though most lakes in the Wilderness lakes have not had fish planted in them, most of the lakes with fish planted, are the largest and deepest. Some of the largest and deepest lakes need to be left fishless.
	37.81	It is unknown how many of the fishless lakes are capable of sustaining fish (see response to Comment 37.78).
37.82		There were some lakes, Marshall and Crimson that were stocked by FWP after Wilderness designation. Of all of the lakes in the wilderness, when was each lake likely stocked and by whom, and when was each lake first officially stocked? If any lakes were first stocked after 1964 they stock

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		[sic] have all fish removed and not replanted.
	37.82	Marshall and Crimson lakes are not part of this project. When each lake was first stocked is also outside the scope of this project. The DEIS does provide some background information about stocking.
37.83		Which lakes are most likely to have 100% fish kill? This should be a strong consideration for lakes to be left fishless.
	37.83	Our goal is to get a 100% fish kill at all the lakes that we treat. Creating fishless lakes is not part of our proposal.
37.84		From a genetic standpoint, it is important that we provide for local adaptations-and phenotypic variation. We thought that it would not make any difference to plant lake trout, Kokanee, and shrimp in Flathead Lake, and now a lot of the native fish populations are declining. How do [sic] know that using M012 brood stock from 2 Clark Fork and 10 South Fork drainage streams will not seriously impact the pure native wct that is in the South Fork Flathead River? Is it possible that the unique adaptations that the wct have in the main river and the side streams may allow unique opportunities to survive and thrive?
	37.84	We do not believe stocking genetically pure westslope cutthroat trout that were largely derived from the South Fork would impact the WCT in the South Fork. Allowing non-native fish to continue hybridizing with the WCT will have a serious impact on the pure native WCT. Current measures of genetic differences in WCT do not provide a measure of "unique adaptations." At this time, removing introgressed populations and establishing pure WCT populations in the lakes presents fewer risks to the SF WCT populations than leaving the existing hybridized populations. Drainage specific stocks are not yet available. If they become available MFWP would consider using them to implement this type of conservation strategy.
37.85		The South Fork is the best wct river system that we have left. We have kind of messed up the lakes and some streams from them with hybrid fish. What makes us think by the continued gardening of adding fish with genes not of the exact local streams may lead to genetic pollution and the eventual

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		losing of this native species?
	37.85	This project serves to mitigate the threat to native westslope cutthroat trout caused by historic stocking of non-native fish in headwater lakes. Case histories from other American rivers and lakes serve as examples of what could occur in the SF if the native WCT metapopulation becomes hybridized further. Fish from the exact local stream may be considered if they become available.
37.86		What is the best WCT source for rebuilding the lake fishery? Can a downstream pure WCT population or other nearby wild WCT populations serve as the donor? This might take more time and expense for the short term, but for the long term would this be a better consideration?
	37.86	See response to Comments 37.85 and 37.84.
37.87		MOU for Wct in Montana, "Protect all genetically pure populations," "Thus, each tributary that supports WCT, regardless of its length, constitutes a population." If this is the case, M012 should not be used to stock lakes or other streams.
	37.87	See response to Comment 11.59.
37.88		We have been told that the genetic diversity among WCT populations may be the result of founder effects or genetic drift. How likely is this?
	37.88	Determining the origin of genetic differences between individual WCT populations is beyond the scope of this project.
37.89		What is the Committee's best informed estimate on the issue of whether or not the diversity of these local populations reflects a significant amount of local adaptations rather that founder effects or genetic drift?
	37.89	See response to Comment 37.88.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.90		Suppose the appropriate genetics data formed into, say four or five clusters of local populations. And suppose a lake cluster brood stocks were formed by taking stock over the tributaries in each cluster. Would the use of such stocks (compared to MO 12's serve to: a) decrease the chances of losing alleles, b) decrees [sic] the extent of loss of local adaptations, and c) decrease that loss of genetic diversity among the local populations? Extensive discussion on the genetic implications of this project is needed.
	37.90	This is a hypothetical question that goes beyond the scope of this analysis.
37.91		We have been told that, since MO 12's have been in these lakes for some time now as part of the "swamp-out" program, the downstream WCT populations are probably already inter bred with the MO 12's. Is this simply a guess, or is there evidence for this claim? Is there any reason to think that there are pure local populations in sections of the tributaries that are not interbred with the MO 12's? Are there any genetic markers that can be used to distinguish (with a fairly high degree of confidence) pure WCT's that have MO 12 genes from those that have not?
	37.91	The diversity and number of protein markers are used, at times, to determine differences among populations. In some instances, these markers have been used to infer the influence or the presence of the M012 in some streams. It is unknown how these differences relate to adaptations, or whether they are beneficial or detrimental to the population or the species.
37.92		It has been suggested that the leaking of MO 12's into the downstream local populations could provide a remedy (or prevent) inbreeding depression. Is there any evidence that these populations are suffering from (or on the verge of) inbreeding depression? If so, is interbreeding with MO 12's the best way to deal with the problem from the conservation genetics standpoint?
	37.92	Genetic surveys have not detected or measured inbreeding depression in wild populations or the M012 broodstock. No WCT populations located downstream of waters stocked with M012s have been documented as being extirpated. It is unlikely that downstream populations are at such low levels that inbreeding depression would occur.
37.93		If there is currently insufficient genetics (or other) data to answer many of the above questions, does the Committee believe that — strictly from the standpoint of the conservation biology of the project — acquiring the relevant data before restocking these lakes with MO 12's would be the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		appropriate course of action?
	37.93	The DEIS in Section 1.2 states that over 130 genetic tests have been completed. The DEIS in Sections 2.4.2.1 describes where we need more genetic testing. We believe this is sufficient genetics data to propose these activities.
37.94		We are deeply concerned about the ongoing hybridization in thee [sic] tributaries, and agree that the immediate remedy is to eliminate the non-native (and hatchery cutthroat) lake populations using techniques most compatible with wilderness.
	37.94	Thank you for your comment and interest in the SF WCT Conservation Program.
37.95		We believe that in a project of this magnitude and potential impact on wild native WCT populations, it is extremely important that it not be launched until the scientific issues most relevant to its success as a conservation project are considered and resolved in accord with the best available science.
	37.95	Thank you for your comment. Scientists for the Forest Service, MFWP, BPA and the USFWS all support this proposal and the accompanying analysis. This support is based on full consideration of opposing scientific views to the proposed action. "Best available science" does not resolve scientific issues; it simply informs decision makers who must use it in good faith, and in a reasonable manner to reach policy decisions.
37.96		Our preliminary review of the genetics data available indicates that it is focused on the hybridization issue and is insufficient in scope to provide a basis for assessing the overall genetic makeup of the tributaries affected by the project.
	37.96	See response to Comment 37.93.
37.97		Before restocking, we would like to see a thorough review of alternatives to restocking with a single generic brood stock. (Raise local brood stocks instream, or at a local hatchery, or plant lakes directly from their associated tributaries?)

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.97	At present we do not have drainage-specific stocks. Developing drainage specific stocks is not part of this proposal. However, if a stock becomes available in the future, Montana would consider using it.
37.98		Restocking with M012 WCT appears to be in conflict with the Upper Missouri Westslope Cutthroat Trout Committee. We do not now recommend that WCT be introduced into waters containing or connected to waters that contain pure WCT populations unless the existing pure population is the source of the introduced fish. This recommendation will prevent the possibility of breaking down local adaptations due to interbreeding of extant fish with introduced fish.
	37.98	Recommendations of the Upper Missouri Westslope Cutthroat Trout Committee do not apply to conservation efforts in the Flathead Valley. Section 1.2 gives information about how this proposal meets the goals of conservation plans in the Flathead Valley. It was developed specifically for conservation and management of the SF Flathead, and has been used extensively in the SF for 20 years.
37.99		At a minimum FWP should address the consequences from stocking M012 on phenotypic variation versus the consequences of a few remaining hybrids (if a complete fish kill is not achieved) on the downstream native fish population.
	37.99	Phenotypic variation is not used to determine the genetic purity of a population. A genetically diverse population will have a wide range of phenotypic variation as well. MFWP relies on genetic testing (genotyping) of fish populations to determine their purity.
37.100		It is highly possible that once hybrid genes are removed from lakes that seeding and swamping of remaining hybrids in the stream is achieved by pure wild fish moving upstream. This possibility without restocking the lakes should be displayed.
	37.100	Upstream movement into all of the lakes is not possible. All of the lakes have waterfalls or other fish barriers that prevent upstream movement. If upstream movement were possible, the lakes would have complete native fish assemblages (i.e., bull trout, westslope cutthroat trout, mountain whitefish, sculpins and possibly suckers).
37.101		Given that hybrids have been present for 70 years, it is important to remove hybrids, but not sure of the urgency. Whatever we do, let's do it right with the best information that we have, or with more information to collect if needed.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.101	Thank you for your comment and interest in the SF WCT Conservation Program.
37.102		If we are stocking with MO 12 is viability an issue since there is always a hatchery source?
	37.102	The M012 is a genetically pure, genetically diverse and performance proven stock of westslope cutthroat trout. This stock of fish was developed using wild westslope cutthroat trout mainly from the South Fork Flathead River drainage and is used extensively throughout the project area now.
37.103		We know that there are WCT downstream. We don't have enough genetic info yet but in all likelihood there is a gradient of hybridization with the highest near the lake to little or no downstream at confluence. If hybrids are removed from lake and trickle down effect is removed or reduced doesn't seeding also happen from downstream pure wild fish upstream? In other words, wild pure fish swamp out hybrid stream fish since hybrid source is gone from lake.
	37.103	Most of the high gradient streams below these lakes did not historically contain fish. Since the development of fish populations in headwater lakes, the suitable high gradient stream reaches below alos developed populations from downstream drift. Fish move upstream from Hungry Horse Reservoir and from the South Fork Flathead River system to spawn and deposit their eggs. Most of the young fish produced in this manner return to the larger streams, rivers and reservoir downstream. Upstream movement is limited by waterfalls and other barriers. It is likely that pure fish would help repopulate the treated reaches of these streams. Restocking pure fish in the headwaters would also serve this objective, especially in areas where upstream movement is limited by natural barriers.
37.104		Indicate how the thousands of poisoned fish will be disposed. If they are not removed from the wilderness, what will be the effects on wildlife, including threatened and endangered species like grizzly bears, that feed on the poisoned carcasses and to whom fish will be food attractants?
	37.104	Page 2-23 of the DEIS states that dead fish would be removed from lakeshores and as much of the streams as possible. Dead fish would be sunk in the lakes to boost phosphorus and ultimately plankton production. Section 3.5.6.1 of the DEIS describes the affect on water chemistry and plankton from this action.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		See page 3-22 of the DEIS. Appendix D of the DEIS also provides information on the effects of rotenone on mammals. Page 3-56 of the DEIS provides information on human health threats from exposure to antimycin. Much of the information used to derive the values for mammals were determined from studies conducted on rats (Stillmeadow 2001). The Schnick (1974a) paper that is cited on page 3-57 of the DEIS reported that guinea pigs and mice have also been used to determine the effects on mammals. The Ritter and Strong (1966) paper that is cited on page 3-57 concluded that mammals suffered no ill effects from eating fish killed with antimycin. On this basis, we would expect the same results with other mammals, including bears, which might consume antimycin-killed fish.
37.105		Fish are not a natural part of this ecosystem- all dead fish should be removed from site by packing or flying out to minimize unnatural food sources for grizzly bears and to minimize artificial nutrient additions to this area. To sink dead fish to add to the unnatural nutrient loading of the lake further disrupts natural processes.
	37.105	We are using existing conditions as the baseline for this project and fish currently inhabit these lakes. Sinking dead fish in the lake would release nutrients and stimulate primary production of the lakes. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surface. Although no trout were involved with his study, Parker (1970) reported that at water temperatures of 40°F and less, dead fish required 20-41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (<50°F) and deep water (>15 feet). Nearly all of the lakes listed in this proposal meet those criteria and they usually have ice formation by the end of October. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock will be released into the lake through bacterial decay. This action stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish.
37.106		In response to the concern that outfitters or other will illegally stock these waters with exotic fish, we would suggest that if the existing fish are removed, the State of Montana should permanently

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		close these lakes to angling. This should be included as mitigation in alternatives.
	37.106	Montana will have the choice to restock or not. However, closing waters to angling would impact the social and economic interests in the area. Closing lakes to angling and closing trails would not necessarily prevent illegal introductions.
37.107		The success of chemical rehabilitation should be assessed through pre and post treatment inventory using gill nets, electrofishing, and/or underwater visual inspection. If this isn't done, FWP will never know how successful their treatments were.
	37.107	Page 2-25 of the DEIS acknowledges this.
37.108		The full extent of the impact of introduced fish on amphibians (specifically Columbian spotted frogs) will probably only be able to be determined through experimental removal or introduction of fish with post, pre and post treatment estimates of relative abundance.
	37.108	The full extent of impacts of introduced fish on amphibians (specifically Columbian spotted frogs) may never be fully documented because any possible impacts would have occurred beginning in 1926 when the first fish were stocked in the project area. The MFWP 2004 SF lake survey found Columbia spotted frogs in 40 (53%) of the 75 lakes surveyed. Frogs were found between elevations of 3,464 feet to 7,208 feet above sea level. The mean number of frogs found at each site was 217 (1-1856). The Columbia spotted frog was the most abundant amphibian found in the SF during the 2004 survey representing 91% of all amphibians found in lakes. Results indicated that frog numbers are not driven exclusively by the presence of fish. Habitat availability was the most influential factor driving amphibian numbers. See Appendix G for more information about amphibians.
37.109		We have been told that one reason for immediately restocking the lakes is to swamp out any remaining Yellowstone cutthroat trout or rainbow that remain after rotenone or antimycin treatment. This project has as its goal the total removal of all exotics in the lakes involved. It is technically

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		reasonable to suppose that (at least in some cases) the rotenone or antimycin treatment will be totally successful? Could a program of subsequent monitoring (say, by netting) give reasonable assurance of the completeness of the treatment program?
	37.109	It is reasonable to conclude that antimycin and rotenone treatments can be 100% successful at removing all fish. It is also responsible to disclose that some chemical treatments have not been 100% successful for a variety of reasons. Section 2.4.1 of the DEIS describes both circumstances. Page 2-25 of the DEIS acknowledges the post treatment gillnetting to evaluate success.
37.110		Some amphibian surveys have been done over the last year or two, but I don't believe they have been done on all 350 lakes to determine what biota is out there or what used to be out there. What is the likelihood that a species like the mountain yellow-legged frog exists near extinction or is extinct from past fish introduction? What type and amount of surveys should reasonably be done to be satisfied what species are or have been out there?
	37.110	Surveying amphibians at each one of the 350 lakes in the SF drainage is not feasible and is not an objective of this project. Montana is not within the known range of the Yellow legged frog.
37.111		This project should not proceed without substantial information on the biota of the lakes being treated. It is critical to know what species of zooplankton, invertebrates and amphibians live in these lakes prior to treating them. This project has focused on the fish and barely addressed the other organisms in the lakes.
	37.111	In 2004 MFWP initiated a comprehensive survey to evaluate amphibians and plankton in lakes and streams in the SF drainage. This will continue in 2005 and insect surveys in lakes and streams will be added to the scope of that project. Table C-2 of the DEIS provides information on the relation of amphibians to each lake, and Table 3-5 of the DEIS provides information on other aquatic invertebrates sampled from lakes in the project area, many of which are included in this project.
37.112		The best way for this project to proceed it to use 2-3 lakes as a pilot to document the impacts, or lack of impacts, on these aquatic communities to justify proceeding with the full scale watershed restoration project. I highly recommend doing a BACI (Before, After, Control, Impact) type pilot study to document the potential effects of this project before proceeding. This could be completed

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		in 2004 and 2005, and would not hold the project up because (1) 3 lakes could be treated in 2004 as part of the pilot study and (2) the pilot study could provide useful information by the end of 2005. By conducting biotic inventories prior to treatment, this project could be used as a model for future restoration work throughout the west and provide important and timely scientific information.
	37.112	Conducting a comprehensive analysis on historic impacts from fish stocking is not an objective of this project. The potential effects from this project were based on case histories from other chemical treatment projects including the Jewel lakes, Tom Tom Lake and Devine Lake. See Section 2.4.1.1; D-5; Section 3.2.4.; and Section 3.3.4.1.
37.113		We specifically request discussion of impacts to non-target organisms such as amphibians and invertebrates from local and national research.
	37.113	Impacts from chemical treatment is provided on pages 3-22 through 3-24 of the DEIS, and in Section 3.5.6.1.
37.114		There is an assumption by FWP that we may not get a complete fish kill. The effectiveness of the treatment will vary by lake, the most compounding factors being depth and volume. We should be ranking lakes from low to high on what our expectations are for a complete kill and then monitor to determine if we get a complete fish kill. We could defer stocking for 1-2 years at a minimum in high probability lakes (of getting complete fish kill) to determine if we met our objective to remove hybrids. If we get a complete kill, this should eliminate the need to stock a lake to "swamp" the remaining hybrids. We can couple this information with angler days, remoteness, chances of bait bucket reintroduction, needs of non-fish species, etc. to identify lakes which provide the best opportunity to return to fishless characteristics. To date FWP has had a 100% success rate on the 7 treated lakes to remove trout. Observations from the lakes that have been treated in the Flathead over the last 7 years was that a complete kill was achieved in all cases. Professional fisheries biologists concur that complete kills for trout are common in lakes.
	37.114	Returning lakes to a fishless condition is not an objective of this project. Page 1-12 of the DEIS addresses this issue.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.115		Several times over two seasons survey all 44 lakes with fish and their surroundings to determine existing biota to determine, which, if any lakes should remain fishless. This should capture most of the life cycles of non-fish species.
	37.115	Much of this work has been completed, or is ongoing. See responses to Comments 37.111, and 37.113.
37.116		Agencies should set a good example by conforming to the regulations that make Wilderness Areas special places.
	37.116	The purpose of this project is to conserve a native species that relies on portions of the wilderness for its persistence. The WCT is a wilderness value that would be conserved through this project. We are also conforming to state law and preventing the need for the USFWS to implement protection of the species under the Endangered Species Act.
37.117		I think the only way this project can justify the use of helicopters and motorboats in federally designated wilderness is if doing so will result in higher success of exotic fish eradication. And then, how much higher success?
	37.117	The use of a helicopter to carry out the wilderness portion of this project is not a factor in determining success or failure. A helicopter was considered because it would reduce impacts caused while trying to access lakes with no system trail. A helicopter would provide less impact. Comparison of transport methods is provided in Table 2-3 of the DEIS. The reasons and benefits of using a motorboat were listed in the DEIS (see pages 3-38 and D-6). Using a motorboat offers the greatest level of success, it allows for proper mixing, it is the safest method, and is the quickest. For example, overcoming a simple environmental factor, such as wind, by manual rowing, could influence the success of a chemical treatment, especially on lakes that are large (>5 acres). The judgments of applicators were used to determine whether a motorboat was necessary. Rosenlund and Stevens (1992) have described in detail the procedures for implementing a successful antimycin project. They reported that an outboard motor is absolutely necessary to obtain an effective mix of antimycin during a lake application, because it is applied in such low concentrations, and the compound requires thorough mixing. If an outboard motor cannot

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		be used, they recommended not conducting the treatment.
37.118		Outboard motor use should be specified to consider 4 stroke motors or other low pollution models such as electric motors. We request further substantiation that rowing is infeasible.
	37.118	A four-stroke outboard motor would be used in the wilderness area to reduce air, water and noise pollution.
37.119		Helicopters are noisy and obtrusive. The noise assessment should include the numerous overhead trips affecting residents living in adjacent wilderness and users of wilderness expecting freedom from such motorized obtrusion. I urge you to avoid setting an undesirable precedent by using motorized equipment for this purpose.
	37.119	Sections 3.7.1.4 through 3.7.5.2 and page 3-20 provide information about the effects of noise on the soundscapes.
37.120		This is definitely not an emergency. If this is not a cost effective project, by using conventional methods such as horseback or on foot, then it should not be done.
	37.120	Please see response to Comment 1.4.
37.121		I hope that at some point there is some strong consideration given to using an efficient helicopter. Cost can't be the only factor considered. There needs to be some discussion of the value of reducing the number of flights. The number of flights and cost could be reduced by leaving the crew on site over night in non-wilderness lakes. People should walk in, or ride in if they must, but stock should not overnight at the lakes.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.121	Cost is one reason why the SEAT airplane method was evaluated and found to be a better alternative than rotor wing aircraft.
37.122		Would it be better to disturb 2 lakes in the same area in a year rather than 2 lakes in 2 very different areas?
	37.122	Yes, if logistics and costs are the only issues being considered. However, spatially staggering lakes would reduce the socioeconomic impacts in a particular area. See Section 3.2.6.2.
37.123		Motorized use precedent from the past. For ALL lakes with fish, identify when fish were first officially or unofficially planted by foot or stock, and then each was first planted by aircraft.
	37.123	Please see Sections 1.1 and 1.2 of the DEIS.
37.124		When were Sunburst, Pyramid and Woodward Lakes planted?
	37.124	The first known stocking was Sunburst-1939, Pyramid-1950, Woodward-1928.
37.125		It should be clearly displayed when and how fish were originally stocked in the lakes. If they were stocked before the Wilderness Act in 1964, there might be an argument for a preexisting condition, but any lakes originally officially stocked after 1964 for the first time really should have done so with analysis and public review in context with the Wilderness Act and I do not believe this has been done. This current proposed project should take into account the cumulative effect of the Wilderness and non-Wilderness lakes of the South, Middle, and North Forks, and put it in context with the rest of the Bob Marshall Wilderness Complex and how many lakes remain in their original fishless state. Put this in context with the western United States as to how many lakes of any size and depth really remain fishless to fully represent the non-fish flora and faun of these unique ecosystems.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.125	MFWP file information and stocking records indicate all of the lakes listed in this proposal were stocked prior to 1964. Some of the stocks were unauthorized and therefore are not included in official records. Letters to the file indicate that fish managers reported the presences of rainbow trout and Yellowstone cutthroat trout in many lakes, and were unaware of how or when some of these fish were planted. Evaluating cumulative effects on lakes in the North Fork and Middle Fork Flathead drainages, and in other parts of the United States goes beyond the scope of this project.
37.126		The wear and tear of the trails can be done by lighter loads and traveling when the trails are dry. Consider packing in any chemicals in bear resistant containers in August when the trails are more apt to be dry.
	37.126	Thank you for your suggestion and interest in the SF WCT Conservation Program. We are concerned about the potential for vandalism to supplies of materials left unattended in the forest or wilderness. If we packed the chemicals in earlier than we planned to use them, we would be bound by Department of Agriculture requirements that stipulate a person must be present to attend to the proper storage and protection of the materials.
37.127		Non-motorized project: No size and number limit Yellowstone Cutthroat, Rainbow, cutthroat, for a three-year period. But this may ultimately be a social issue where some compromises become necessary to gain public acceptance. A more limited use of motorized equipment may be feasible for some of the lakes.
	37.127	Page 2-36 addresses this comment: … *MFWP would pursue lifting bag limits two full seasons prior to any removal effort to reduce the number of fish in most lakes, and to allow anglers to harvest fish for consumption…*
37.128		We realize that some of the lakes will be hard to access, but with a little work and some ingenuity we are sure a non-motorized solution can be found. One of the things that make wilderness areas stand out from the other 99% of the land in the United States is that motorized and mechanized

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		equipment are not allowed. The management of wilderness is not always cost efficient.
	37.128	Please see response to Comment 1.4.
37.129		Where round trip travel is less than 20-22 miles consider taking stock out of the wilderness rather than camping with stock at the lakes.
	37.129	Sections 2. 4 and 2.5 of the DEIS discuss the reasons why each mode of transportation was selected. Additionally many lakes are in the Jewel Basin Hiking Area and no pack stock are allowed.
37.130		So will non-motorized boats with oars be used to go around each lake for 2-3 days to make sure all fish are picked up and removed from wilderness?
	37.130	We acknowledge that this information was not made clear in the DEIS. The motorized rafts that are used for the treatment would be used in the clean-up of dead fish at the lakes. We would also use dip nets to collect fish from around the shoreline.
37.131		Once extirpated from a lake, the large-bodied species may not be able to recolonize, even if fish are removed, due to their limited ability to disperse.
	37.131	We agree with your assessment. Thank you for your comment.
37.132		Loss of amphibian species and populations are of global concerns. Declines for both endemic and widespread amphibians are believed to be the result of habitat degradation and alteration. Despite widespread declines of amphibians, we still to not have a definite answer with regards to our local species, spotted frog, long toed salamander, and boreal toad. Deferring stocking will enable us to search for answers.
	37.132	Much of the research referred to in Comments 37.108 and 37.131 will add to our knowledge base of these species.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.133		Describe what other species exist in these lakes, and how they might be affected by rotenone or antimycin. What will happen to the native amphibians, zooplankton, macroinvertebrates, and the wealth of native biota that may still exist?
	37.133	The anticipated impacts to non-target species have been disclosed in Chapter 3 of the DEIS. Please see Appendix G of the FEIS for more information about amphibians.
37.134		Trout reproduction was occurring in inlet/outlet streams (presence of juveniles) which indicate that rotenone or antimycin would have to be applied to the streams also, not just the lakes. Result of applying rotenone to feeder streams would be the probable loss of 4 years of tailed frog cohorts.
	37.134	There is no data to support the claims that 4-year classes of tailed frog would be lost during the application of rotenone to a stream. In fact, MFWP data suggests the opposite. For instance, Tom Tom and Whale lakes were treated with rotenone in 2000 and subsequent amphibian surveys demonstrated that tailed frogs persist at these lakes and their outlet streams. Please see Appendix G of the FEIS for more information about amphibians.
37.135		Leave the lakes fishless, so the native biota can regenerate. Regeneration of the native biota will be in the long-term interest, support, and preservation of the Concept of Wilderness and the wild character of this area.
	37.135	MFWP considers the westslope cutthroat trout a “native biota” and a “wilderness value” and believes this proposal would help maintain the character of the wilderness and surrounding forest for future generations.
37.136		While it is possible that fish stocking has extirpated species from local sites and portions of watersheds they clearly have not extirpated either of these species [no species specified] from the entire landscape.
	37.136	Thank you for your comment and interest in the SF WCT Conservation Program.
37.137		We concluded that various life stages of 4 species could be negatively affected by the use of chemicals.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.137	See Chapter 3 of the DEIS for information about impacts. Please see Appendix G of the FEIS for more information about amphibians.
37.138		The effects from inbreeding depression and changes in local adaptations should be discussed. What are the effects of restocking on amphibians, WCT, invertebrates. What is the effect on impacts around the lakes, etc?
	37.138	See response to Comments 35.5, 37.92, 37.108, and 37.13. Section 3.6 of the DEIS addresses impacts around the lakes.
37.139		For all 44-50 lakes with fish in the South Fork, a strategy will be determined to insure that native amphibians and other biota are represented in natural processes to restore or maintain these populations.
	37.139	Thank you for your comment and interest in the SF WCT Conservation Program.
37.140		Are there any thoughts of how to treat non-lake origin streams that contain non-native genes? It would also be useful to complete more genetic surveys of the tributaries in question to get some measure of the genetic diversity of these populations.
	37.140	Section 2.2 of the DEIS states the scope of this project, the known hybrid populations, and what actions would occur if new populations are discovered. Treating non-lake environments is discussed in Section 2.4.4 of the DEIS, and also in some of the lake descriptions in Appendix C of the DEIS.
37.141		Start developing "subbasin management plans" which should cover how we manage all aquatic (including fishless lakes, amphibians, etc.)
	37.141	Developing a sub-basin management plan goes beyond the scope of this project. However, a Flathead Subbasin Plan was completed in 2004 and adopted by the Northwest Power and Conservation Council. This project is consistent with this approved subbasin plan. There are also fisheries management plans and the Conservation Agreement for Westslope Cutthroat Trout, to help guide the conservation, management, and recreational goals in the area.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.142		I propose that there are several lakes in the South Fork that can be considered isolated and thus should have fish removed and not replanted.
	37.142	Thank you for your comment and interest in the SF WCT Conservation Program.
37.143		Identify the lakes which pose the greatest threat to WCT genetic integrity.
	37.143	All of the lakes that harbor hybrid trout and have an outflow stream pose a threat. Prioritizing the sequence in which the hybrids would be removed would consider many issues including biological, social, economical, and logistical.
37.144		The main purpose for this proposed action seems to maintain the integrity of westslope cutthroat trout. I believe at least an equally compelling reason for this project is to restore and maintain naturally occurring processes in the Wilderness as required by the 1964 Wilderness Act.
	37.144	Thank you for your comment and interest in the SF WCT Conservation Program.
37.145		How can we ensure the persistence of native amphibians at the level of a local watershed for the long term given that fish may not be the only management issue of concern while maintaining enough sport fishing opportunities to maintain public support?
	37.145	Please see responses to Comments 37.13 and 37.108. That information will be useful in measuring the status of native amphibians in the South Fork.
37.146		From a cumulative effect and looking at the short and term effects of allowing natural processes to operate at least in the wilderness, should the different environments that the 350 lakes represent - size, depth, elevation, wetlands, amphibian habitat, etc. be sorted into some kind of representative groups for the 350 lakes, and then see how many of the total 46 lakes with fish should be kept fishless to represent natural processes in these groups? If only the 27 of 46 lakes with fish are looked at for removing fish, the 19 lakes with wct that aren't being considered to have fish removed might have better representative habitat for being fishless for the long term.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.146	Conducting a comprehensive analysis of every lake in the SF drainage goes beyond the scope of this project. The DEIS states the goal of the project is to replace nonnative fish species and hybrids with genetically pure WCT after treatment. Although creating fishless lakes may, for a short while, move the lakes closer to their original condition, it may compromise the objective of reducing the threat of hybridization and create long-term impacts to established social and economic practices in the area. See Section 2.4.6 of the DEIS.
37.147		I think this project is somewhat misguided. Wilderness lakes should not be used as genetic refuges or a source of genetic swamping for westslope cutthroat trout at the expense of native biota. This approach may be appropriate management for non-wilderness lakes, but wilderness lakes should be managed to maximize both naturalness and wildness. Removing an exotic fish using invasive procedures (helicopters, boats, poison) only to restock with a different non-native fish (to those ecosystems) is inappropriate for wilderness. From the wilderness perspective, leaving the lakes as they are is far better than what this project proposes to do. However, given the status of westslope cutthroat trout and the perpetual (and real) problems with downstream movement of exotic fish out of these mountain lakes, I recommend leaving the lakes fishless after treating with rotenone or antimycin. The argument against this approach is that any fish that were not killed by the treatment would repopulate the lake. If this is true, then maybe an alternative or combination of fish eradication procedures should be implemented to insure success. Leaving the lakes fishless would serve several purposes: (1) protect downstream pure strain populations of westslope cutthroat trout, (2) allow amphibian populations to recover (there are many well documented studies that demonstrate that introduced salmonids suppress native amphibian populations), (3) allow other native flora and fauna to recover, restoring the natural ecosystem processes of the lakes, (4) gain support from wilderness advocates.
	37.147	Thank you for your recommendation, however, it does not meet the need for action. The DEIS states that this project was designed to safeguard the pure cutthroat trout populations in the SF, not the lake populations themselves. It is our intent to increase naturalness by protecting an important ecosystem component; native westslope cutthroat trout. The action itself would have short term impacts to wildness, but would result in less intentional manipulation in the future, so wild conditions would be restored over time. There are established social and economic practices

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		(angling and outfitting) that may be impacted if the lakes were rendered fishless.
37.148		A recent federal court ruling now requires, under the Clean Water Act, a National Pollution Discharge Elimination System permit?
	37.148	See Comment 11.79.
37.149		Our original intent with forming the Limits of Acceptable Change approach to planning and dealing with Wilderness issues was to involve as many diverse citizen interests as possible. In doing so, we hoped a better understanding of state and federal responsibilities could be achieved (i.e. "consensus building"). It appeared to be a better way of doing business.
	37.149	Comment noted.
37.150		High mountain lakes have had little research conducted on them. There is so much that we do not understand. Are there unique assemblages of zooplankton or aquatic invertebrates in large, deep, fishless lakes that do not occur in shallower lakes because of potential winter kill?
	37.150	Studies by MFWP that began in 2004 will help determine the attributes of the community structure of the SF Flathead lakes. See Appendix G for more information.
37.151		One of the objectives would also be to conduct research in cooperation with the State and the Aldo Leopold Wilderness Research Institute.
	37.151	Please see the response to Comment 35.13.
37.152		Discuss the effectiveness of the rotenone and antimycin treatment for killing all the existing fish in the lakes. Without that information there is no way to determine how MDFWP's preferred method stacks up against other potential methods of fish removal.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.152	Chapter 2 of the DEIS discusses the proposed action and alternatives and compares them.
37.153		The effects of the rotenone or antimycin downstream as water flows from lakes.
	37.153	Appendix C of the DEIS provides descriptions on a case-by-case basis of what the desired effects are for stream segments downstream of the lakes.
37.154		There should be analysis of impacts to other species such as amphibians, plants, insects, invertebrates and other sensitive taxa from using rotenone or antimycin.
	37.154	See Chapter 3 and Appendix D of the DEIS. We have also added information in Appendix G of the FEIS. Please also see response to Comment 11.60.
37.155		Poison making their way down creeks via the extensive faulting of sedimentary rock in this area? How long will the poison persist in the lake? The creek and other streams?
	37.155	We are not aware of extensive faulting in the area. Basic geologic information suggests that high altitude glacial cirques would not exist if there was "extensive faulting" in this area. If extensive faulting were present in this area, the lakes would have drained through those faults and would not exist. Also, the streams would not be flowing on the surface. There are some instances of losing reaches, but this is a natural process that is quite common in many streams-worldwide. In the case of rotenone, the product label states that it will likely persist for 1 to 4 weeks. There will likely be some variance in this range based on existing environmental conditions. As for Antimycin, the use direction leaflet indicates the product detoxifies so rapidly that the waters may be restocked within about a week or as soon as caged fish survive in treated water for 48 hours.
37.156		What about the thousands of dead and decaying fish after treatment and affect on water quality? The nutrients from the dead fish are not part of the natural system.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.156	Pages 3-30 and 3-31 of the DEIS address this.
37.157		Does rotenone or antimycin pose any threat to other species — birds, mammals, aquatic micro-organisms?
	37.157	Chapters 2 and 3, and Appendix D of the DEIS disclose this. We have also added information to the FEIS in Appendix G. Please see response to Comment 11.60.
37.158		Concerns with the use of potassium permanganate (KmnO4).
	37.158	See pages 2-10, 2-24 through 2-25, and Appendix D of the DEIS.
37.159		rotenone and antimycin: What would be the tradeoffs of powdered vs. liquid in terms of weight? If pack animals are to be used it might be worth pursuing an analysis?
	37.159	Powdered rotenone has been added as an option in the proposal. See the FEIS.
37.160		To date FWP has had a 100% complete kill on mountain lakes. Options also exist to do a 2nd treatment rather than stocking to remove remaining fish if a complete kill is not achieved. What are the economics of a 2nd treatment vs. restocking to remove remaining hybrids if any?
	37.160	Restocking would occur in any case. The purpose of conducting a second treatment would be to remove any detectable fish that remain after the first treatment. See Page 2-25 of the DEIS.
37.161		Fish would be removed from the shoreline. How would they be disposed of?
	37.161	See Page 2-23 of the DEIS.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.162		KMnO4 can be applied using detox stations far downstream of the lakes, but still above bull trout range. This implies that streams may be treated so the effects should be analyzed and sites disclosed.
	37.162	The DEIS addresses the anticipated impacts and other information about potassium permanganate on page(s) 2-10, 2-14, 2-24, and Section 3.9. Appendix C discloses information about specific treatment zones of each stream below each lake. Pages D-9 through D-12 provide more information on potassium permanganate.
37.163		If rotenone and antimycin are supposed to be so effective, why is there a need to restock? It doesn't seem reasonable to not consider gill netting or other methods than chemicals because they aren't 100% effective, and then propose chemical use as very effective. But if chemicals too are not 100% effective, and then say you must swamp just in case, then all methods of treatment should be reasonably considered.
	37.163	Creating fishless lakes is not an objective of this project. This is disclosed on pages S-2, 1-9, 1-12, and 2-27 of the DEIS. Chapter 2 of the DEIS specifically considers and analyzes several methods and alternatives to achieve the objectives of this project.
37.164		An alternative would be to request a one time stocking that will minimize long term mechanized impacts from aerial stocking.
	37.164	Aerial stocking for most lakes is a pre-existing condition to wilderness designation and is outside the scope of the analysis. Although this issue is outside the scope for analysis, page 2-27 of the DEIS provides information about the reduction in flights that could result if the proposed action is implemented.
37.165		Likelihood to be restocked by public — size, access, ease in getting to lake, amount of use, wilderness opportunity class, LAC standards, average angler use, outfitted use, year originally stocked- if so, by who? Should help determine which lakes remain fishless. "Accessibility" by the public would seem to be criteria for stocking.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.165	Section 2.4.6 of the DEIS states our reasons for reestablishing fish populations.
37.166		I do not believe this project can be fully accomplished as planned due to your statements that the Big Salmon Lake would not be treated because of its size would be impossible to do so. Therefore, there would always be the exotic fish in the wilderness.
	37.166	Big Salmon Lake is not a lake proposed for action. Appendix C of the DEIS recognizes that some hybrid trout may remain, and also describes why restocking would aid in mitigating that circumstance. We believe that most or all of the hybrids would be removed and by doing so the project would be successful at removing sources of hybrid trout in the SF drainage over time. Removing hybrids and restocking with genetically pure WCT would remove and/or reduce the threat to the remaining pure WCT in the SF drainage.
37.167		If stocking after rotenone or antimycin is proposed because there may not be a complete kill, is it possible to pursue these other alternatives and achieve similar objectives and outcomes? It appears that they may have been dismissed too quickly.
	37.167	Page 1-12 discloses the reason why restocking would be conducted.
37.168		Has swamping out worked in many cases and has failed in other cases?
	37.168	This management concept has met its original (1980s era) desired goal of increasing the percentage of westslope cutthroat trout genes in lake populations. There is no known example of this management concept eliminating the non-native genes.
37.169		You also state that populations have not responded to swamp-out over a 16 year period. Has swamping out been working on other lakes and their outlet streams and can this be proven with genetic data?
	37.169	Genetic swamp out is a management concept that was started in the early 1980s. This strategy has met its original goal of increasing the level of westslope genes in a population. However, hybrid trout still exist.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.170		If we attempt to remove exotic fish, and not all are successfully removed, do we need to keep adding more fish to these lakes indefinitely to try to swamp out the exotics? What is the probability of success with swamping lakes, and when do we know when we have succeeded?
	37.170	See Section 2.4.6 of the DEIS.
37.171		"Swamping" could occur from wild pure fish downstream rather than from M012 from the lake.
	37.171	See responses to Comments 37.100 and 37.103.
37.172		Swamping has been attempted and cannot assure complete eradication of exotic species — why then is swamping all lakes still part of the proposed action?
	37.172	"Swamping" is a loosely defined term that has been misused or misinterpreted over the years. Sections 1.1, 1.2, and 2.6.4 of the DEIS provide information on genetic swamping. Swamping refers to "stocking high numbers of fish on a frequent or annual basis." The original intent of this action was to reduce non-native genes to an undetectable level. The DEIS does not propose swamping after a chemical treatment. Swamping would only be implemented under Alternatives A and D. Alternatives B and C propose restocking after a chemical treatment. Page 2-26 of the DEIS specifically states that restocking would occur after a chemical treatment, and part of that objective would be to dominate any possible remaining hybrids. Other reasons for restocking are listed on page 2-26 of the DEIS.
37.173		Limits of Acceptable change standards from the 1988-1992 period and changes to the 1993-1997 period and on to the 1998-2002 period should be reviewed to determine which lakes might benefit by not restocking to reduce the human impacts on these Wilderness lakes.
	37.173	The LAC is the means to evaluate the resource conditions within the wilderness – it sets the monitoring guidance and then, as managers, we can select actions to take that will manage these indicators appropriately. Limiting public access and/or trail closures are examples of appropriate mechanisms to reduce public use at designated sites, and improve resource conditions and/or

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		monitoring results.
37.174		Once designated as Wilderness, nature must be allowed to operate unrestrained or untrammeled. Thus, unless there is a management requirement (such as protecting an endangered species) or a specific exception in the law (such as fire control), the existing condition should evolve on nature's terms. This should be discussed related to wildness and naturalness.
	37.174	We have added more information about this issue to the FEIS to Section 3.7. Please see response to Comment 1.4.
37.175		While FWP may view economic considerations as the overriding factor for the alternative it chooses, the Forest Service is required to put Wilderness first. "Where there are alternatives among management decisions, wilderness values shall dominate over all other considerations..." FSM 2320.3 "Where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness." FSM 2320.6 FWP cannot undertake this project without Forest Service approval, and is should strive to meet the standards of the federal agency and the Wilderness Act before requesting it.
	37.175	The intent of the proponents of this project, including the FS, is to carry it out under FS regulations guidelines. Please see page S-2 of the DEIS for a description of FS responsibilities.
37.176		A minimum requirement decision guide evaluation including a minimum tool analysis should be completed for each lake that is determined to be restocked with western cutthroat trout.
	37.176	Fish stocking of the lakes in the wilderness is an activity that predates wilderness designation, therefore no analysis is required to continue this activity. The MFWP and the FS are working together to best accomplish the restocking and value the wilderness resource.
37.177		How accessible are the lakes to stocking/ [sic] consideration [sic] should be given to how many miles in by maintained stock trail? How many miles by user made trail? How many angler days occur at each lake now? Are one or more Limits of Acceptable Change standards at a lake exceeded? The lakes in the most pristine opportunity classes 1 and 2 should have as natural

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		occurring processes and be as fishless as possible.
	37.177	Fish occurred in these lakes long before the LAC process was developed. That process was neither developed to reduce recreational opportunity of the wilderness, nor to curb the biological integrity of native species that occur in the wilderness. The Forest Service has evaluated conditions at each lake and the details are included (see pages 3-44 – 3-46 of the DEIS). MFWP has included estimates of the angler use at the lakes (see page 3-42, Table 3-6 of the DEIS).
37.178		The sight and sound of helicopters and motor boats in these areas is offensive to those who enjoy and recreate in these areas.
	37.178	Yes, we understand that the sounds of aircraft and motorized boats in the Wilderness are offensive to people. We also understand that using these vehicles may be offensive to those who won't be in the wilderness at the time. All activities involving aircraft would be short term and temporary.
37.179		Highlight wilderness solitude versus outside wilderness.
	37.179	Page 3-37 of the DEIS provides information on wilderness naturalness. Sections 3.6.4 through 3.6.9 of the DEIS provides information about wilderness solitude. Section 3.7 of the DEIS also addresses this issue. We have also added more information about this issue to the FEIS in Section 3.7.
37.180		The State wants to remove fish from just those lakes containing non-wct, and then put wct back into those lakes to maintain recreation fishing opportunities. They want to do this as economically and efficiently as possible and do not want to consider any other variables or options.
	37.180	The draft Minimum Tool Analysis referred to on page 3-38 of the DEIS considered things like economics, social issues, recreation, wilderness values, etc. The quickest way of implementing the project in the wilderness is to use exclusively motorized equipment. Although that was an alternative considered (Alternative C), Alternative B (combined motorized and traditional transport means) is preferred.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.181		Most of this proposed project is located in Wilderness, whose legal mandate is to retain its primeval character and influence, and is protected and managed so as to preserve its natural condition. Wilderness should promote both wildness- an area free from human control or manipulation, and naturalness- native and indigenous systems in Wilderness. Wilderness is intended to be managed with minimal human intrusion and to let natural systems operate freely.
	37.181	Thank you for your comment and interest in the SF WCT Conservation Program.
37.182		Past and continued fish stocking provides recreational fishing opportunities, but does not promote or provide for natural processes within Wilderness.
	37.182	Please see response to Comment 34.10.
37.183		Fish stocking impacts many non-fish species, such as amphibians, zooplankton, and invertebrates and the unique food webs that each lake represents.
	37.183	Thank you for your comment and interest in the SF WCT Conservation Program.
37.184		Almost all of the other lakes proposed for fish removal and restocking are located in areas that are proposed as wilderness in the Flathead National Forest Plan, and management direction states that no action can occur which will reduce these area's wilderness attributes.
	37.184	The FS considered the "proposed wilderness" status of the JBHA when working through the draft Minimum Tool Analysis listed on page 3-38 of the DEIS. This project would conserve native westslope cutthroat trout and would not diminish wilderness attributes.
37.185		Initial issues that should be considered in developing the purpose and need and creating a proposed action — (see attachment A) [responses 37.69 to 37.179] I believe that all of these issues should be considered in the assessment of this project.
	37.185	Thank you for your comment.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.186		From the research I have read (See attachment B) [responses 37.b1 to 37.b39] related to this project, I believe a broader study should evaluate all 224 Wilderness lakes and also the 134 non-wilderness lakes in the South Fork Flathead River drainage. In Wilderness determining how many lakes have ever been stocked, how many still have fish (17?), how many may have fish (10?), and what the non-fish flora and fauna currently looks like at each lake. What deep lakes need to remain or which lakes need to become fishless so that at least representative natural systems can remain in place and endure for the long term? Right now in the wilderness, the average size of all lakes is 8 acres, while the size of the lakes with fish is 83 acres. For the non-wilderness lakes the average size of all lakes is 5 acres and the size of lakes with fish is 17 acres. The point is, that even though there are many lakes without fish, most of them are very small, and probably freeze out every winter and have very different characteristics than the larger, deep lakes with fish that probably don't freeze out and support different types of non-fish life.
	37.186	Your recommendation goes beyond the scope of this project. The information we have about lakes is different from the information you present. Rubble Lake is fishless and is 87 feet deep, Upper Terrace Lake is fishless and is 32 feet deep, Lower Terrace lake is fishless and is 34.4 feet deep, Christopher Lake is fishless and is 21 feet deep. There is some empirical information that suggests the two Terrace lakes were stocked in 1928-30 with rainbow trout, during the lake stocking in the upper Big Salmon Creek drainage. MFWP records indicate the two Terrace lakes were stocked with 10,000 cutthroat trout in 1946, but that stock apparently did not become self sustaining. A survey in 2002 revealed that the lakes are fishless, indicating neither stock was successful.
37.187		All of this referenced research indicates that there is so much more to consider in these wilderness lakes than just the westslope cutthroat trout and hybrid trout that people have put into these lakes. I think All of these referenced research papers should be considered to develop a better proposal. Two articles seem to be especially relevant, "Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds" and "Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes", both by David S. Pilliod and Charles R. Peterson.
	37.187	Thank you for your comment. We have considered the research you have listed.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.188		To restore natural processes it would be important to consider and evaluate removing all fish from all lakes that were originally fishless. (Except Big Salmon and Doctor Lakes that apparently originally had fish).
	37.188	Thank you for your comment and interest in the SF WCT Conservation Program.
37.189		For Wilderness character and values, the effects on wildness and naturalness should be fully considered. The use of motorized equipment, chemicals, gill nets and other tools should be fully evaluated with the minimum tool analysis to determine, which lakes, if any, might warrant some kind of manipulation.
	37.189	See the draft Minimum Tools Analysis listed on page 3-38 of the DEIS.
37.190		The action of restocking lakes with westslope cutthroat trout that have had fish removed should be evaluated separately and fully consider whether stocked lakes are necessary to provide a recreational fishing as a wilderness-dependent activity. A balance between recreation fishing opportunities and natural processes needs to be assessed, with the effects of exotic fish on non-fish native species, and the short and long term impacts of stocking considered, evaluated, with effects displayed.
	37.190	The proposed action strives to achieve this balance. Both the wilderness and non-wilderness portions of the project area contain fishless lakes that provide natural ecosystem processes and unique opportunities for recreation. Evaluating the effects of fish stocking on non-fish species goes beyond the scope of this project. Any impacts from fish stocking occurred many years ago, prior to wilderness designation.
37.191		While westslope trout conservation and protection is a very important objective, I don't believe it should be the primary or the only objective for this proposal. I think the purpose and need should protect westslope cutthroat trout, but also maintain and restore natural processes, to increase wildness and naturalness, to manage wilderness within limits of acceptable change standards, and to manage the wilderness for the use and enjoyment by visitors, but keep the lands unimpaired for future use and enjoyment as wilderness. Limiting the purpose and need to just fisheries values and

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		not including wilderness with its natural processes and native non-fish species seems to be an abdication of Forest Service management responsibilities to use this opportunity of this fisheries driven proposal to help in restoration of wilderness natural systems. All lakes in the South Fork should be assessed for the cumulative impacts of past actions from the historical base of not having fish in any of the lakes but two. The proposed restocking of new exotic fish by the state into these lakes is a foreseeable connected action, and needs to be considered for the short and long term effects.
	37.191	The impacts from fish stocking occurred many years ago prior to wilderness designation. The wilderness component of this project represents only half of the lakes listed in this proposal. The WCT is a wilderness value, as is angling, as is outfitting. These values already exist. Any attempt to impact these biologic and socioeconomic segments further than defined in the DEIS, may preclude the project form being implemented. Some people have proposed that we implement detailed studies on non-target organisms, leave lakes fishless, and reduce public use of the wilderness by removing fish. These issues were brought up in scoping, but go beyond the scope of this project, and if implemented may cause severe and long-term impacts on established socioeconomic practices. This consideration is listed on page 2-27 of the DEIS. Further, many commenters, including you, seem to imply that this project is the only opportunity for research. The opportunity for research exists today, whether this project is implemented or not. MFWP has been responsible in implementing many surveys and research efforts to understand basic status and distribution aspects of amphibians, fishless lakes, plankton, and aquatic insects in the SF Flathead.
37.192		I would offer these types of alternatives to be considered to meet your proposed purpose and need, while also meeting other wilderness values. (See Attachment C) I believe that this is a reasonable range of alternatives to consider for this EIS that would still meet your proposed primary objective of protecting wct.
	37.192	Please see response to Comment 35.2.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.193		With what I know about the entire project, I would offer my Attachment D as my preferred alternative to be evaluated. This would provide some recreational fishing opportunities in the more accessible opportunity classes of the wilderness, while maintaining fishless status and more pristine conditions in the more remote areas. Note that I would consider ALL lakes for their potential for fish removal, whether wct or hybrid. This would meet your proposed primary objective of protecting wet, but would also protect the wilderness values of naturalness, wildness, and natural processes.
	37.193	Thank you for your comment. Please see response to Comment 35.2.
37.b1		It is perfectly clear to me that there is so much more to the issue recreational fishing of westslope cutthroat trout in Wilderness Lakes. Wilderness values, effects on the original non-fish species, and disruption of natural processes have as much weight, if not more, then a potentially threatened fish species being considered to be stocked in originally-barren, fishless lakes in the Wilderness.
	37.b1	Thank you for your comment and interest in the SF WCT Conservation Program.
37.b2		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: He concludes that in the face of increasing public support for protecting natural process, the continued stocking of fish into wilderness ecosystems is no longer justified.
	37.b2	Thank you for your comment.
37.b3		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: They conclude that although US federal policy currently grants the authority for fish stocking to the states, case law allows the federal agencies to be directly involved in decisions regarding fish stocking wilderness areas.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.b3	The Flathead National Forest is a cooperating agency in this EIS. See Section 1.5 of the DEIS.
37.b4		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: This work shows that the introduction of salmonid fishes into headwater lakes can result in disproportionately larger effects on native fishes than introductions lower in drainages. However, introductions of nonnative fishes into headwater lakes provide point sources capable of invading all downstream habitats, as the fish surmount barriers that normally hinder upstream-directed invasions. These results suggest that widespread fish stocking has caused substantial changes to nutrient cycles in hundreds of lakes throughout montaneprotected areas of western North America, with impacts being greatest in lakes stocked with high densities of trout.
	37.b4	Please see Appendix G.
37.b5		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: They report that at a local scale, after accounting for habitat differences between fishcontaining and fishless water bodies, the abundance of all life stages of long-toed salamanders and spotted frogs was lower in water bodies containing nonnative trout than in water bodies remaining in a fishless condition. At the landscape scale, the presence of fish in some water bodies had important influences on the abundance of amphibians in the remaining fishless water bodies.
	37.b5	Please see Appendix G.
37.b6		Of the two large zooplankton species believed to have been present in the lake prior to fish introductions, one reappeared while another failed to do so, apparently because the egg bank of this latter species had been depleted during the 30 years of fish presence.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.b6	It is unclear where these sources of information can be found. Because this comment does not list specific information that we should consider, we are unable to dedicate the time to secure these articles, review these articles, and find information that would relate to this project.
37.b7		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Collectively, these papers indicate that the effects of widespread trout introductions into wilderness landscapes are not limited simply to direct effects on prey taxa, but instead can be transmitted throughout lake food webs and even beyond the shorelines of fish-containing lakes to fishless lakes. In addition, following fish removal, full recovery of ecosystem structure and function may not occur.
	37.b7	It is difficult to determine where the quotes in this comment are derived from. However, the project does not propose to provide a full recovery of ecosystem structure and function.
37.b8		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: If managers are to truly balance these often opposing goals, it is imperative that current fisheries management practices be evaluated in the context of their effects on ecosystem structure and function may not occur.
	37.b8	It is difficult to determine where the quotes in this comment are derived from. However, the project does not propose to provide a full recovery of ecosystem structure and function.
37.b9		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: The highly utilitarian ethic that drove resource management until well into the 1960s was gradually replaced by one that acknowledges the value of all life forms and their ecological complexity, a view currently supported even by many anglers. The necessity for wilderness fish stocking is now the subject of widespread debate, especially in view of changing social values and priorities. Options for future generations cannot be preserved if introductions continue to erode the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		biodiversity of mountain lake ecosystems. Future management of waters that already contain introduced trout must be directed toward overall ecosystem health and stability, with biodiversity and ecosystem integrity as a paramount objective. Options for future generations cannot be preserved if introductions continue to erode the-biodiversity of mountain lake ecosystems. This should be our greatest concern.
	37.b9	Please see response to Comment 35.2. The research has been considered and included in the references.
37.b10		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Further, although current federal regulations recognize state authority for fish stocking, judicial interpretation gives federal agencies the authority for direct involvement in decisions regarding fish stocking in wilderness. Fish stocking does compromise certain wilderness values, and wilderness designation does impose restrictions on the types of wildlife management actions that are appropriate in wilderness-areas. In some cases, these compromises and restrictions have led to an "either/or" dichotomous view that pits state fish stocking programs against federal responsibility for protecting wilderness values. Differences in agency missions, traditions, and cultures also tend to exacerbate "us vs them" attitudes. Backed by Supreme Court decisions, federal managers can be involved in wildlife management decisions to defend wilderness values.
	37.b10	Thank you for your comment.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.b11		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: [sic], headwater lake stocking provides source populations that may be capable of invading most downstream habitats, including headwater refugia of native fishes. Trout introductions to high-elevation headwater lakes thus pose disproportionately large risks to native fishes—even when the place of introduction may appear to be spatially dissociated from populations of the native species. It is important to consider, however, that stocking of a mere handful of lakes could allow nonnative fishes access to nearly an entire stream network.
	37.b11	The information you provide supports the reason for implementing this project is to stop the downstream progression of hybrid trout in the South Fork Flathead River. Escapement from headwater lakes is the primary threat to westslope cutthroat trout downstream. Removing the sources of hybrid trout will interrupt their expansion throughout the drainage. This project proposes to remove the source of non-native fish species from the project area for the long-term protection of westslope cutthroat trout. We are proposing to stock only native fish species to lakes following the treatment (with the exception of Handkerchief Lake, see page C-8 of the DEIS).
37.b12		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Similarly, the stream area negatively affected by nonnatives could be minimized by stocking multiple lakes in one tributary basin instead of one lake each in multiple basins. Systems where nonnative fishes have emigrated from headwater lakes-and occupy, but have not successfully colonized, the outlet streams should be considered good candidates for eradication projects.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		Introduced fish may alter lake nutrient cycles and primary production, but the magnitude and variation of these effects have not been fully explored. The results of our modeling and paleolimnological analyses indicate that introduced trout fundamentally alter nutrient cycles and stimulate primary production by accessing benthic P sources that are not normally available to pelagic communities in oligotrophic mountain lakes. These effects pose a difficult challenge for managers charged with balancing the demand for recreational fisheries with the need to maintain natural ecosystem processes.
	37.b12	Thank you for your comment.
37.b13		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Conserving natural biodiversity and maintaining functioning ecosystems is a goal of protected area management. The results of this study suggest that wildlife managers need to consider restoring a few deep lakes in each basin to create fishless breeding and overwintering habitat for amphibians (Knapp 1996; Knapp and Matthews 1998; Pilliod and Peterson 2000).
	37.b13	Knapp and Mathews 1998 is cited in Section 2.6.1 of the DEIS. We have read Pilliod and Peterson 2000 and have added it to the references section. Please see responses to Comments 11.46 and 37.78.
37.b14		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Gill netting is a viable fish eradication technique for smaller (less than 10 ha, (25 acres)), shallow (less than 10 m (33 feet) deep)) lakes that lack habitable inflows and outflows or other sensitive species. Further work is required to define appropriate removal methods for larger lakes and watersheds.
	37.b14	See response to Comment 37.70.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.b15		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: We believe that shallower lakes (less than 10 m deep) of up to 10 ha should be amenable to gill net eradication of nonnative fishes over reasonably short periods, without resorting to rotenone or other poisons. If the restoration of substantially larger or deeper lakes is proposed, alternate methods of fish removal including, but not limited to, electrofishing, trap netting on spawning grounds, disturbing spawning habitat, creating under-ice anoxia by the addition of nutrients (see Brunskill and others 1980 for a possible method), lake drawdown and/or the application of piscicides should be given consideration in addition to, or as a replacement for gill nets. These alternate methods will be controversial, but they may be more practical for removing fish from certain lakes. Canadian national parks managers have previously used chemical agents in their attempt to eradicate fish from dozens of lakes.
	37.b15	Many of the fish removal methods you recommended were considered in the evaluation in Chapter 2 of the DEIS.
37.b16		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Further, nontarget species such as Harlequin Ducks (Histrionicus histrionicus) and even bears might be adversely affected by restoration activities on some water bodies.
	37.b16	Impacts on avian species and mammals are in the DEIS in Section 3.3. We have added information about the impacts to Harlequin ducks.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.b17		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Last, because organisms such as Gammarus may be extirpated but leave no trace of their prior existence, it will be difficult to ascertain that full food web restoration has been achieved for the many lakes that lack prestocking records of their original invertebrate communities.
	37.b17	Please see Sections 1.5.2 and 2.4.6 of the DEIS.
37.b18		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Further experimental restoration work is needed to better define the practical limits of gill netting as a management tool and to provide alternate solutions for larger or otherwise “difficult” stocked lakes. A better understanding of our few remaining pristine ecosystems is also needed if we wish to undo a century of past fisheries management practices and return a small suite of lakes to their natural state [sic]
	37.b18	Gill netting was considered in the evaluation in Chapter 2 of the DEIS.
37.b19		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Life history traits vary among amphibian species, however, the fish stocking may affect species differently. In addition, amphibian population structure may be affected at a broad scale when a

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		portion of lakes and streams in a watershed are stocked. This habitat fragmentation may isolate amphibian populations and result in increased extinction rates.
	37.b19	Please see Sections 1.5.2 and 2.4.6 of the DEIS. Please see Appendix G for more information about amphibians.
37.b20		These are quotes from the research paper summaries that follow. … I believe that at least all of these referenced research papers should be considered in a balanced proposal to address fish removal and the possible replanting of fish into originally fishless lakes in the Wilderness. [No source cited]: Amphibian Research and Monitoring Initiative Initiate long-term monitoring to determine trends in amphibian populations Conduct research into causes of amphibian declines and malformations Habitat alteration and destruction have long been major causes of amphibian declines. More recently, significant declines have occurred in protected areas in the western United States that have not shown obvious changes in habitat. These unexplained declines may be caused by contaminants, non-native species, or disease.
	37.b20	See Chapter 7 for our references.
37.b21		Research related to the effects of stocking fish in fishless lakes within Wilderness: The paper "The Introduction of Nonnative Fish into Wilderness Lakes: Good Intentions, Conflicting Mandates, and Unintended Consequences" [Roland A. Knapp, Paul Stephen Corn, and Daniel E. Schindler] references 6 other papers which describe the effects of stocking fish in wilderness lakes. The abstracts and conclusions of these 6 papers follow. At the end of these papers are additional references that are relevant to the fish stocking issue.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		No public concern listed.
	37.b21	Thank you for your comment. This research was reviewed and cited in the references section.
37.b22		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Wilderness Fish Stocking: History and Perspective", Edwin P. Pister. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b22	Thank you for your comment. This research was reviewed and cited in the references section.
37.b23		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "The Wilderness Act and Fish Stocking: An Overview of Legislation, Judicial Interpretation, and Agency Implementation," Peter Landres, Shannon Meyer, and Sue Matthews. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b23	Thank you for your comment. This research was reviewed and cited in the references section.
37.b24		[BPA should consider the following research] related to the effects of stocking fish in fishless lakes within Wilderness: "Geography of Invasion in Mountain Streams: Consequences of Headwater Lake Fish Introductions" Susan B. Adams, Christopher A. Frissell, and Bruce B. Rieman. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b24	We reviewed the Adams et al. (2001) paper in 2002. They reported *"…headwater lake stocking provides source populations that may be capable of invading most downstream habitats, including headwater refugia of native fishes…"* This paper supports the conclusions of MFWP, the associated genetic results, and the foundation for this proposal, in that, the headwater lakes in this proposal are serving as a source of hybrid trout that pose a threat to the genetically pure populations downstream. Adams et al. (2001) concluded that *"…headwater stocking allows fish access to more stream area within a watershed than does main stem or low elevation stocking…"* This paper focuses on brook trout, which are more aggressive at pioneering new habitats. Based

Comment Number	Response Number	Comment/Response
		on the already known ability of fish in these headwater lakes to out-migrate and become established downstream, which is supported by the Adams et al. (2001) paper, we would rely on this strategy for newly stocked genetically pure westslope cutthroat trout to establish new populations in downstream habitats.
37.b25		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Alteration of Nutrient Cycles and Algal Production Resulting from Fish Introductions into Mountain Lakes", Daniel E. Schindler, Roland A. Knapp, and Peter R. Leavitt At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b25	We have read the Schindler et al. (2001) paper you cited and added it to the reference section. Although the conclusions made by these authors may support the thesis of removing fish from lakes in the Sierra Nevada Mountains and Canadian Rocky Mountains, the study provided anecdotal information by which to base conclusions about the implications that such actions would have on recreation angling and established social practices. The DEIS acknowledges that if the proposed action is implemented, fish stocking frequency would be reduced from present levels in most, but not all lakes in the wilderness section of this project. In part, this is what Schindler et al. (2001) is advocating.
37.b26		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds", David S. Pilliod and Charles R. Peterson. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b26	We have read Pilliod and Peterson (2001) and have added it to the reference section. Those authors cite 61 references. We can not dedicate the amount of time necessary to acquire and review each of these papers.
37.b27		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "The Effects of Stocking and Removal of a Nonnative Salmonid on the Plankton of an Alpine Lake", B.R. Parker, D.W. Schindler, D.B. Donald, and R.S. Anderson. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b27	We read the Parker et al. (2001) paper in 2002 and cited it in the MFWP Specialist Report (Grisak 2003c). We also cite it in the DEIS, and we retrieved and cited information from 2 of the sources listed as references in Parker et al. (2001) to formulate the DEIS. Those authors cite 52 papers in

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		their reference section. We can not dedicate the amount of time necessary to acquire and review each of these papers.
37.b28		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Naturalness and Wildness: The Dilemma and Irony of Managing Wilderness", Peter B. Landres, Mark W. Brunson, Linda Merigliano, Charisse Sydoriak, and Steve Morton. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b28	Thank you for your comment. We were unable to find this research, but considered other references suggested by this commentor.
37.b29		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: “Evaluating Effects of Fish Stocking on Amphibian Populations in Wilderness Lakes”, David S. Pilliod, Charles R. Peterson. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b29	We assume this refers to the same paper that is cited in Comment 37.b26. Please see response to Comment 37.b26.
37.b30		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: “Fish Stocking in Protected Areas: Summary of a Workshop”, Paul Stephen Corn, Roland A. Knapp At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b30	Thank you for your comment. We were unable to find this research, but considered other references suggested by this commenter.
37.b31		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: “IMPACTS OF TROUT STOCKING ON AMPHIBIAN POPULATIONS”, David S. Pilliod, Charles R. Peterson, Peter B. Landres At the end of these papers are additional references that are relevant to the fish stocking issue.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	37.b31	It is unclear where these sources of information can be found. Because this comment does not list specific information that we should consider, we are unable to dedicate the time to secure these articles, review these articles, and find information that would relate to this project.
37.b32		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Amphibian declines: review of some current hypotheses", Corn, Paul Stephen At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b32	Please see response to Comment 37.b31.
37.b33		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: "Perspectives from the Aldo Leopold Wilderness Research Institute: amphibians and wilderness", Corn, Paul Stephen. At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b33	Thank you for your comment. We were unable to find this research, but considered other references suggested by this commenter.
37.b34		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute, Current Wildlife Research Projects, Amphibian Research and Monitoring Initiative At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b34	Please see response to Comment 37.b31.
37.b35		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute's Wildlife Publications (1991-2002) WILDLIFE MANAGEMENT ACTIVITIES IN WILDERNESS At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b35	Please see response to Comment 37.b39.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
37.b36		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute's Wildlife Publications (1991-2002) RECREATION IMPACTS - GENERAL At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b36	Please see response to Comment 37.b39.
37.b37		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute's Wildlife Publications (1991-2002) EFFECTS OF HUMAN INTRUSIONS ON BIRDS At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b37	Please see response to Comment 37.b39.
37.b38		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute's Wildlife Publications (1991-2002) AMPHIBIAN CONSERVATION AND FISH STOCKING FISH STOCKING At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b38	Please see response to Comment 37.b39.
37.b39		BPA should consider the following research related to the effects of stocking fish in fishless lakes within Wilderness: Leopold Institute's Wildlife Publications (1991-2002) FISH STOCKING IMPACTS TO MOUNTAIN LAKE ECOSYSTEMS At the end of these papers are additional references that are relevant to the fish stocking issue.
	37.b39	This commentor does not list specific literature, but all literature produced by the Aldo Leopold Institute over a 12-year period. We are unable to dedicate the time to secure these articles, review them, and find information that would relate to this project.
38.1		Professional Wilderness Outfitters Association does support a healthy and viable native cutthroat trout population in the upper South Fork of the Flathead River drainage in the Bob Marshall Wilderness Complex.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	38.1	Thank you for your comment and interest in the project.
38.2		We question the technique proposed for the poisoning. Such as motorized boats, helicopters and the poison itself. The Wilderness Act states "no motorized equipment" to be used unless in emergency.
	38.2	Thank you for your comment. Please see response to Comment 1.4.
38.3		Also how safe is the poison to human [sic] ...?
	38.3	See Section 3.9 of the DEIS.
38.4		Also how safe is the poison to ... wildlife?
	38.4	See Chapter 3 of the DEIS. Appendix D of the DEIS also provides information on the effects of rotenone on mammals. Page 3-56 of the DEIS provides information on human health threats from exposure to antimycin. Much of the information used to derive the values for humans were determined from studies conducted on rats (Stillmeadow 2001). The Schnick (1974a) paper that is cited on page 3-57 of the DEIS reported that guinea pigs and mice have also been used to determine the effects on mammals. The Ritter and Strong (1966) paper that is cited on page 3-57 concluded that mammals suffered no ill effects from eating fish killed with antimycin. On this basis, we would expect the same results with other mammals, including bears that might consume antimycin-killed fish.
38.5		Our concerns [include]: The size and the scope of this project and the lake sizes is [sic] untested in relation to getting a good kill on the existing fish populations.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	38.5	Please see response to Comment 28.1.
38.6		Our concerns [include]: there is little evidence that non-native species are infiltrating down the tributaries and into the main river.
	38.6	Genetic tests prove that hybrid trout reside in the lakes and the streams below the lakes (see Sections 1.1, 1.2, and 2.4.2.1 of the DEIS). You are correct that there is little evidence that non-native species are in the main river. One goal of this proposed project is to prevent hybrids from reaching the main river.
38.7		Our concerns are: loss of recreational opportunities for non-outfitted and outfitter public.
	38.7	The impacts to recreational anglers and outfitters would be short term and minor. There would be some change in angling quality and quantity for up to 3 years, and would vary from site to site. In smaller lakes, the fishery can be restored rather quickly (within 1-3 years), whereas it is anticipated that restoring the fishery in larger lakes would likely require 2-4 years to achieve some level of quality. See Sections 2.4.6, 3.7 and 3.8 of the DEIS.
38.8		At this time there is there [sic] seems to be no imminent threat to the native cutthroat trout in this area.
	38.8	Please see response to Comment 38.6.
38.9		Our concerns [include] chances of litigation to prevent the restocking of the lakes due to Bonneville Power Assn and Montana Fish, Wildlife and Parks doing separate portions of the project.
	38.9	BPA and MFWP are working together on this proposal and have and will continue to follow all applicable legal and policy requirements to make sure the proposal has a complete public and agency review. BPA is proposing to fund this project and MFWP is proposing to implement it. No

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		decision on the project has been made at this time. Neither BPA nor MFWP can control any person or group who might want to prevent the project from going forward through litigation.
39.1		Recently I had the good fortune of fishing Sunburst Lake in the Bob Marshall wilderness. What a wonderful fishery that is. Being able to catch Westslope and Yellowstone cutthroat in the same lake is quite a thrill. It just doesn't make any sense to me to poison all of these lakes that provide such successful angling right now.
	39.1	Thank you for your comment and interest in the SF WCT Conservation Program.
39.2		Besides, if there are already hybrid fish in these lakes and streams that flow out of them, your [sic] not going to be able to reverse that unless you poison everything. And that would be the wrong thing to do.
	39.2	We believe removing hybrid trout would safeguard the species. Thank you for your comment.
40.1		As a signatory to the Westslope Cutthroat Trout Conservation Agreement, we fully support the goal to preserve the genetic purity of populations in the South Fork of the Flathead River drainage. We also agree with the immediate need to remove hybrid source populations from identified lakes and to replace them with genetically pure and appropriate stocks of WCT in most cases. The proposed activity to remove non-native species from 21 lakes, therefore, is an important conservation action for WCT on which we would like to comment.
	40.1	Thank you for your comment.
40.2		First, we would like to make it clear that MCAFS strongly supports the concept of removing non-native species from the South Fork Flathead River basin. We concur that non-native fish (hybridized cutthroat trout) pose a serious threat to the long-term conservation and persistence of westslope cutthroat trout.
	40.2	Thank you for your comment and interest in the SF WCT Conservation Program.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
40.3		We also believe that reestablishment of fishless conditions in some of the high mountain lakes is desirable. We are pleased that the Bonneville Power Administration, Montana Fish, Wildlife & Parks (FWP), and the U.S. Forest Service are willing to take on such a bold conservation action. The South Fork Flathead is a rare ecosystem because it is one of the largest sub-basins in the West that supports a native, intact species assemblage, with the glaring exception of hybrid and non-native fish in some of it's high mountain lakes.
	40.3	Thank you for your comment. We are not proposing to create any new fishless lakes.
40.4		MCAFS also concurs that the only viable method to remove non-native species from these 21 lakes is the application of either antimycin or rotenone. While we appreciate that chemical reclamation can be controversial, we think that the risks to non-target species are acceptable and that FWP has sufficient experience to implement the project.
	40.4	Thank you for your comment and interest in the SF WCT Conservation Program.
40.5		The proposed actions implement the chemical reclamation by a variety of means (fixed-wing airplane, helicopter and boats, livestock) based on social, economic, and logistical concerns for each lake. This is a commendable approach and it should help reduce the controversy around working in the Bob Marshall Wilderness or the Jewell Basin Hiking Area.
	40.5	Thank you for your comment and interest in the SF WCT Conservation Program.
40.6		However, the DEIS does not contain a matrix upon which to base biological, logistical, political, recreational, and economical prioritization of this phased approach. This matrix should include a detailed analysis of risks and benefits associated with the treatment and subsequent stocking or non-stocking of each lake among others. The matrix should also contain biological information (fish genetics and relative abundance, invertebrate and amphibian communities etc.) for each lake to characterize physical and biological conditions upon which treatment decisions will be made.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	40.6	A number of factors would be used to determine the treatment schedule including size of lake, complexity of treatment, weather, social and economic issues, logistical requirements, etc. Thank you for your comment. Please see responses to Comments 11.10, 37.143 and the added Appendix G.
40.7		We recommend that the most critical lakes be addressed first in case the funding or political situation changes in the future. Lakes that pose the greatest and most immediate threat to neighboring WCT populations should be given the highest priority, since that is the goal of the project. High priority should be given to lakes located in the Bob Marshal [sic] Wilderness and those that contain hybrid populations that have significant non-native contributions (e.g., degree of introgression) and large population sizes.
	40.7	Please see response to Comment 40.6.
40.8		In the case of mixed stocks assemblages (i.e., M012s planted on hybrid swarms), we recommend that the degree of introgression should be calculated on those individual fish in the sample that contain non-native rainbow trout genes. This may require collecting additional genetics samples, as sample sizes will likely be reduced.
	40.8	Please see response to Comment 40.11.
40.9		We commend your plan to develop an adaptive approach that carefully analyzes risks and benefits to prioritize treatment and non-treatment lakes. However, a sound adaptive management plan should also include a research plan to guide the ensuing treatment phases, and in turn guide a comprehensive long-term adaptive aquatic ecosystem monitoring program. We suggest that prioritization consider the degree of hybridization, the likelihood of maintaining the lake as a pure population (or fishless), the potential for recolonization by native amphibians and zooplankton assemblages, recreational and wilderness values, and the degree of purity of WCT downstream, among others. Each lake should be analyzed independently and then placed in geographic context with neighboring lakes and streams; only then can a wide range of uses and values be accommodated through the proposed actions.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	40.9	See response to Comment 40.6.
40.10		We recommend that drainage or stream specific donor stocks be used for WCT reintroductions in lakes of the South Fork Flathead River in the Bob Marshal Wilderness. The best available scientific information has clearly shown that using a "nearest neighbor" approach for reintroduction of WCT in the South Fork is the best conservation strategy to ensure the long-term genetic integrity of remaining populations. We recognize that this may conflict with a prioritized schedule based upon degree of introgression, therefore some lakes may need to be deferred until after a "nearest neighbor" brood is developed.
	40.10	See response to Comment 37.97.
40.11		Recent genetics studies have shown that genetic differentiation between populations is a key factor for WCT reintroductions in South Fork lakes: Leary (2002) concluded: "Since substantial genetic differences exist between the M012 fish and the westslope cutthroat trout populations in Big Salmon Lake, Gordon Creek, and Danaher Creek, and the supposed middle Wheeler Creek population, continued introduction of M012 fish into these drainages genetically does not represent the best conservation approach. This practice could potentially result in significant genetic changes in the downstream populations. Whether or not these changes will negatively affect the viability of the downstream populations is unknown, but the possibility they may negatively impact viability exists. Thus, from a genetics perspective a less risky conservation strategy would be to use westslope cutthroat trout either collected directly, or descended from those collected directly, from each of these drainages as the source of fish for introductions within each respective drainage.
	40.11	The Leary (2002) letter you cited indicates that Big Salmon, Gordon, and Wheeler Creeks all have non-hybridized populations in them. However, the same Leary (2002) letter provides Table 1 that lists the history of genetic sampling used to make that determination. In the case of Big Salmon drainage, there are three headwater lakes that have hybrid populations, and one of the Big Salmon Creek samples showed slight hybridization. The analysis failed to

Comment Number	Response Number	Comment/Response
		consider the 8/13/00 sample from Cataract Creek (immediately downstream from Woodward Lake), which showed 91% influence of rainbow trout. On this basis alone, there appears to be substantial influence of non-native genes in the Big Salmon Creek drainage and therefore substantial risk in developing a brood stock from this drainage that is not influenced by rainbow trout and Yellowstone cutthroat trout. With this considered, it does not offer the best conservation strategy for WCT in this drainage or the SF. In the case of Gordon Creek, three of the four lakes in this drainage have documented hybridization. The 8/06/00 sample from Lick Creek, that was used to make this determination, was misnamed and was actually collected from Gordon Creek. The legal description for this sample is T19N, R15W S1, 2. George Creek was also sampled at this time and found to be hybridized. On this basis, there appears to be influence of non-native genes in the Gordon Creek drainage and therefore substantial risk in developing a brood stock from this drainage that is not influenced by non-native trout. In the case of Wheeler Creek, the sample that was used to make this determination was collected in 1991, and based on a seven fish sample. Leary (2002) admittedly recognizes the low statistical power with such a small sample size. Table 1 from the letter correctly lists genetic test conducted in 1994 and 1999, taken both upstream and downstream, of the 1991 sample site, respectively. Both samples showed hybridization with Yellowstone cutthroat trout. Based on the history of the non-native Yellowstone cutthroat in Tom Tom Lake located in its headwaters, this is not surprising. On this basis, there appears to be influence of non-native genes in the Wheeler Creek drainage and therefore substantial risk in developing a brood stock from this drainage that is not influenced by Yellowstone cutthroat trout. When considering the previous and subsequent history of these three drainages, from a fish management perspective, a less risky conservation strategy rather, would be to NOT use westslope cutthroat trout either collected directly from, or descended from those collected directly, from each of these drainages as the source of fish for introductions within ANY drainage in the SF Flathead. There is substantial risk in perpetuating non-native genes if donors are collected from

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		streams known to harbor hybrid fish.
40.12		Recent genetics studies have shown that genetic differentiation between populations is a key factor for WCT reintroductions in South Fork lakes: Leary (2002) concluded: Similarly, Dunning and Knudsen (2004) determined the genetic relationships among WCT in the upper Flathead River system and found that samples from the South Fork were significantly differentiated from those of the North and Middle Forks, and that Youngs Creek was the only one that showed significant differentiation between sites in the entire basin.
	40.12	We have read the Dunning and Knudsen (2004) paper. Please see response to Comment 37.97.
40.13		Recent genetics studies have shown that genetic differentiation between populations is a key factor for WCT reintroductions in South Fork lakes: The Montana Westlope Trout Technical Committee (1998) also recommended using using [sic] a "nearest neighbor" strategy for WCT reintroductions and concluded that "we do not now recommend that WCT be introduced into waters containing or connected to waters that contain a pure WCT population unless the existing pure population is the source of the introduced fish." Furthermore the report states: "The allelic diversity of westslope cutthroat trout also suggests that historically there has been very little gene flow among populations, except possibly at a very local level (Wright 1932). In this situation, even fairly weak natural selection can effectively establish local adaptations. Thus, there is a good possibility that some populations of westslope cutthroat trout may have some degree of local adaptation (e.g. Fox 1993, Phillipp and Clausen 1995) which could be broken down, compromising population viability, if the native fish interbreed with westslope cutthroat trout from other populations."
	40.13	See response to Comment 40.11.
40.14		Thus, the combined information clearly demonstrates the need to implement a "nearest neighbor" approach for reintroduction of WCT in the South Fork. Our comments on this approach are best summarized by Dunning and Knudsen (2004): "In the case of managing populations using the "nearest neighbor" approach within the Upper Flathead drainage, it is advisable that genetic

Comment Number	Response Number	Comment/Response
		differentiation between populations be taken into consideration. Management actions that increase the amount of genetic exchange among locally adapted populations, such as transferring fish between streams, could be detrimental if these local adaptations are lost due to outbreeding depression (Allendorf et al. 2001, 2004). Also, given the complex life history of westslope cutthroat in this system, we cannot be certain that migratory forms from one area will thrive in another. However, if a population is actually part of a larger metapopulation, then the threats of transfer of fish to such a population may be overestimated. Management of populations should be done on a case by case basis, depending on the demographic and genetic makeup of the populations at risk."
	40.14	We have read the Dunning and Knudsen (2004) paper. See responses to Comments 40.11 and 37.97. Management of the SF Flathead WCT populations involves consideration of many factors that include conservation of the species, angling quality, economics, wilderness management, logistics, and application of all five that can reasonably be balanced to achieve the overall objective of managing the SF Flathead WCT populations.
40.15		Sekokini Springs Natural Rearing Facility provides an ideal opportunity to develop stream-specific donor populations for WCT reintroduction in the South Fork. Donor populations should be selected based on the degree of genetic relatedness using microsallelite or allozyme genetic analyses (Dunning and Knudsen 2004). Again, the document should identify specific lakes that will be reintroduced with pure WCT using the "nearest neighbor" approach. This is a critical component of the rehabilitation process for each lake and needs to be addressed and disclosed in the DEIS.
	40.15	The SSNRF is currently under administrative review for funding and development. It is not part of this proposal.
40.16		Loss of amphibian species and populations are of global concern. In recent years, there has been an increased number of species declines in the United States, from 5 species in 1980 to 33 in 1998. Declines for both endemic and widespread amphibians are believed to be the result of habitat degradation and alteration. A complicating factor is the inexplicable loss of amphibians in "pristine" areas such as wilderness areas and National Parks that generally lack obvious loss or alteration of habitat. These declines in remote areas appear to be the result of pollutants or effects from introduced species, such as trout. Despite widespread declines of amphibians, however, we still do not have a definitive answer with regards to our local species, like the spotted frog, long toed salamander, and boreal toad.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	40.16	We have added more information in Appendix G on the status of amphibians in the project area.
40.17		Fish stocking in the 1.5 million-acre Bob Marshall Wilderness complex appears to be a controversial fisheries management issue due to the potential conflicts with wilderness values and impacts on native fish fauna, invertebrates, and amphibians.
	40.17	Thank you for your comment and interest in the SF WCT Conservation Program.
40.18		The basic question is whether to stock all the 21 lakes, or leave some fishless due to potential impacts to invertebrates and amphibians. The DEIS addresses this as an important issue, so we believe that the proposing agencies should consider leaving some lake fishless as a viable alternative. If the fishless issue jeopardizes this project from moving forward, we urge you to consider leaving a couple lakes fishless to ensure that this important project proceeds and achieves our mutual goal.
	40.18	See response to Comment 37.78.
40.19		Leaving a couple lakes fishless could also provide a scientific framework to evaluate the potential changes to the fish, invertebrate and amphibian communities; fishless lakes could serve as controls and the stocked lakes could serve as experimental treatment groups. This experimental approach would ensure that the best scientific information is used to evaluate the potential impacts of chemical treatments on lake and river systems using an adaptive management approach.
	40.19	Please see responses to Comments 11.46 and 37.78.
40.20		We suggest that the scientific design and interpretation of the existing data regarding the potential impacts of fish on invertebrates and amphibians in the Flathead are inconclusive. While these data suggest limited impacts, we recommend that more rigorous studies will be necessary to conclusively prove that impacts from fish on invertebrates and amphibians in mountain lakes of the South Fork are inconsequential. We strongly recommend that this uncertainty be disclosed in the

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		DEIS. We believe studies to address these issues should be recommended as part of the adaptive management plan for the South Fork. Ideally, these studies should be designed and implemented so that their results could be published in peer-reviewed journals.
	40.20	Please see response to Comment 37.13.
40.21		We encourage FWP to conduct additional research because little is known about high mountain lake ecosystems. Are there unique assemblages of zooplankton or aquatic invertebrates in large, deep, fishless lakes that do not occur in shallower lakes because of potential winterkill? For example, zooplankton communities in high elevation, fishless lakes are dominated by large-bodies species. Introduction of trout results in the rapid elimination of these species and replacement by smaller-bodies forms. Once extirpated from a lake, the large-bodied species may not be able to recolonize, even if fish are removed, due to their limited ability to disperse. How do recolonization rates of amphibians differ between lakes restocked with fish versus those that are not stocked? What happens to re-established amphibian populations when fish are re-stocked on top of that amphibian population? In the past, we have only been able to infer impacts because fish have been present in these lakes for so long. Now we have a chance to actually determine what impacts may or may not occur. The DEIS fails to mention these research opportunities and the proposal to stock all lakes will result in a tremendous loss of opportunity to further our knowledge in this area.
	40.21	Studying the over winter abundance of plankton is not an objective of this project. MFWP has instituted surveys on the status and distribution of plankton and amphibians in 75 lakes and 86 streams in the SF that began in 2004. This study will continue over the next few years and be expanded spatially, and would also include sampling of insect communities. Please see response to Comment 40.20. See Appendix G.
40.22		There is an assumption in the DEIS that a complete fish kill may not be achieved. The effectiveness of the treatment will vary by lake, with the most influential factors being depth and volume. Lakes should be ranked from low to high using these factors on what the expectations are for a complete kill and subsequently monitored to determine if a complete fish kill is achieved. Stocking could be deferred for 1-2 years (at a minimum) in high probability lakes for a complete kill to determine if objectives were met to remove hybrids. If a complete kill is achieved, this may

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		reduce the need to stock a lake to "swamp" the remaining hybrids.
	40.22	The DEIS acknowledges and discloses the fact that not every piscicide treatment can guarantee 100% success. Although many remove 100% of the fish, including those in this project area, there are others that have not achieved 100% removal. Section 2.4.1.1 of the DEIS provides most of this information. If stocking is deferred, this will allow any possible remaining hybrids to gain a foothold once again. Obviously there are limitations in the length of time that can be invested in evaluating if 100% of the fish were removed. If gill netting and visual observation do not detect fish, then a reasonable assumption can be made that the project removed all of the fish. Restocking the lakes is an objective of the project. If the lakes were not restocked, the goal of replacing the hybrids with pure WCT would be compromised and there may be negative and long-term impacts on established social and economic values. Monitoring and evaluating the effectiveness of each treatment is a project component identified in the DEIS. See response to Comment 11.52.
40.23		The potential for future illegal introductions should be elaborated on in the DEIS. Lakes should be rated according to risk of illegal introductions. All the proposed wilderness lakes are remote and the risk is low, whereas outside of the wilderness only one lake (Handkerchief) can be reached by road.
	40.23	See response to Comment 40.37. Several lakes in the wilderness portion of this project area including Devine Lake, Palisade Lake, Marshall lakes, and two unnamed lakes in Palisade Creek drainage have been stocked by illegal and/or unauthorized means. The lakes are located in very remote and rugged terrain with trail access only. MFWP has successfully stocked eyed eggs or small fish in numerous lakes by backpack (Devine) and horseback (Woodward, Pyramid, Sunburst) in wilderness. MFWP has also had reports of unauthorized fish stocking by aircraft which is in the realm of possibility for all lakes

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		in this proposal. MFWP records indicate that in 1957 biologists discovered rainbow trout in the Graves Creek drainage. There are no records of rainbow trout being stocked in that drainage. MFWP records indicate that in 1965 biologists discovered rainbow trout in the Big Salmon Creek drainage, and there are no known records of this occurring other than through empirical information. These are two examples of widespread and indiscriminant stocking conducted in primitive areas and with primitive methods that were available in 1957. It is reasonable to assume that more determined people using the modern technology of 2005 could make unauthorized stocks of fish. It is also responsible to recognize the possibility of this happening based on the history of this area and comments made by the public during this process.
40.24		[Specific comment on] Section 1.2. The DEIS fails to list which lakes were previously "swamped" and to describe the potential genetic effects from the years of "swamping". For example, has inbreeding depression or the potential for changing local adaptations associated with the large amounts of M012 occurred?
	40.24	See Section 2.4.2.1 in the DEIS for information about genetic testing. This proposal does not address which lakes were previously swamped, but rather focuses on the existing genetics in the lakes. Sampling protocols for genetic testing are not designed to detect or measure inbreeding depression in wild populations. No WCT populations below waters stocked with M012s have been documented as being extirpated by effects of stocking M012s adjacent to them.
40.25		[Specific comment on] Section 1.4. During the scoping process, BPA received 71 comments. A summary is presented in this section. It will be important in the FEIS to respond to these comments as to whether they were substantive and lead to alternative development or were beyond the scope of the project. A detailed analysis of the comments (grouped by theme) is desirable.
	40.25	The FEIS responds to comments on the DEIS as required by NEPA. We used the comments that we received during scoping to refine the alternatives and develop the DEIS, and a summary of the comments was provided.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
40.26		[Specific comment on] Page 1-13. MCAFS questions whether biological integrity will be increased by stocking. Conversely, the aquatic ecosystem and biological integrity of that system is being altered by restocking/perpetuating fish in a previously fishless ecosystem.
	40.26	Any damage to aquatic ecosystems from fish planting occurred many years ago This project attempts to correct previous damage to the ecosystem by replacing hybrid trout with genetically pure, native westslope cutthroat trout. The project does not propose to create fishless lakes.
40.27		[Specific comment on] Section 2.3 The ESA and USFWS would look at a reduction of imminent threats range wide for the species. To prevent a listing there would have to be significant efforts range wide. A case could be made if the statement " The No Action alternative could also lead to a WCT ESA listing…" was true why not propose actions in the MF, NF or throughout the Flathead. This statement has little validity, although in concept it may be good. This project is a great conservation measure, however, implemented alone it is unlikely that it would prevent an ESA listing.
	40.27	Thank you for your comment. We did not mean to suggest this project alone would avoid ESA listing of the WCT. This kind of project, along with others (such as habitat improvement and isolating WCT from non-natives with barriers), offers the WCT its best chance at maintaining healthy abundance and distribution levels.
40.28		[Specific comment on] Section 2.4. Pages 2-5 and 2-8. It is commendable that adaptive management will be applied by using lessons learned from previous treatments. It would be worthwhile to mention what was learned. For example, if previous treatments were 100% successful then restocking to swamp out remaining fish would not be necessary but it may be for recreational angling. It is our understanding that FWP has had a 100% success rate (a complete kill was achieved) on the 6 treated lakes to remove trout over the last 10 years. It is our Chapter's understanding that complete kills for trout are common in lakes when trout are the targeted species. Another option is to design the project for a second treatment as in the case of Cherry Lake. If a second treatment is truly needed then this should be presented up front and the environmental effects analyzed in the FEIS.

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	40.28	Retreatment may be necessary and is recognized in the plan. Effects would be the same or similar to effects of the first treatment. Section 2.4.5 of the DEIS discloses the possibility of implementing a second application. We have expanded the cumulative impacts discussion in the FEIS. See response to Comment 34.4.
40.29		The post treatment plan will be critical to the success of this project as will a pre-treatment plan that would determine if a lake should be stocked and, if yes, with what brood (M012 or nearest neighbor) and at what frequency. Adaptive management learned over the last decade should allow for these decisions to be made in the FEIS rather than post treatment.
	40.29	See responses to Comments 11.3, 11.4, 37.13 and 40.28.
40.30		We appreciate the thorough discussion associated with the treatment. The use of antimycin and rotenone being applied by various methods will enhance our knowledge in this field.
	40.30	Thank you for your comment and interest in the SF WCT Conservation Program.
40.31		We appreciate your attention to downstream aquatic organisms such as tailed frogs and bull trout.
	40.31	Thank you for your comment and interest in the SF WCT Conservation Program.
40.32		[Specific comment on] Pages 2-26 and 2-27. There should be some discussion about using nearest neighbor fish and the effects of inbreeding and changes in local adaptations associated with M012. The WCT Tech. Committee recommendations should be noted and followed. It is assumed that M012 will be used in all lakes since stocking will be conducted the following year with a variety of age classes. Once again, here is an opportunity to put together a pre-treatment plan that would have a variety of restocking options. The statement "restocking streams would expedite the restoration of a viable fish population" is confusing. Does this infer that viable populations

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		currently do not exist in streams below these lakes? If portions of stream segments are treated immediately below the lakes down to a barrier, leaving these stream segments unstocked should be harmless for several reasons. 1) they are rarely fished, 2) the hybrid source is removed from the lake, 3) pure M012 would trickle out to "swamp" remaining hybrid stream fish, 4)little spawning habitat seldom exists in these high gradient reaches and 5) pure endemic SF WCT can move up from downstream until that barrier is reached.
	40.32	Please see response to Comment 37.97. See also the DEIS in Section 1.4.2.1. Our purpose for restocking streams is to repopulate them at a rate faster than would occur through normal drift out of the lake. These fish in addition to those that trickle out of the lake will provide the source of pure fish to repopulate these sections of the streams.
40.33		[Specific comment on] Section 2.7 The MCAFS supports the decision not to use tiger muskies to reduce trout populations and to refrain from creating barriers in wilderness areas.
	40.33	Thank you for your comment and interest in the SF WCT Conservation Program.
40.34		[Specific comment on] Section 2.7 We fully agree that rotenone and antimycin provide the best chance of removing non-native trout from these lakes. Impacts associated with the use of these compounds will be limited in duration.
	40.34	Thank you for your comment and interest in the SF WCT Conservation Program.
40.35		[Specific comment on] Section 3.2 Page 3-9. Mention is made of bull trout fishing being re-opened in the South Fork, which we agree is a great opportunity for the angling public. However, the DEIS fails to analyze the socioeconomic affects [sic] to outfitters associated with this action. Would this not enhance if at least replace any lost angling opportunities these outfitters may have if a lake was left fishless in their area?
	40.35	Analyzing the socioeconomic effects of the bull trout fishery is beyond the scope of this project. Additionally, the current experimental bull trout fishery is only authorized by the USFWS, via a Section 10 permit, through 2005. The decision to extend this permit has not been made and will not be made until late in 2005. It is currently illegal to angle for bull trout in any lake in the SF

Comment Number	Response Number	Comment/Response
		except Hungry Horse Reservoir. Consumptive use or angling for bull trout is not allowed in any wilderness waters.The only reason this information is in the DEIS is to describe the present status of this species in the project area. Creating fishless lakes would likely direct angling pressure to adjacent lake and river fisheries in the project area. This would cause an increase in use and would likely cause long-term unintentional impacts on the resources at those sites, ground disturbance, etc. This project does not propose to cause long-term impacts to adjacent fisheries through a "no restocking" option.
40.36		[Specific comment on] Page 3-12. We appreciate the efforts that are being made to safeguard bull trout populations. The section on direct and indirect effects fails to mention impacts on WCT, such as the purpose of the project to reduce the likelihood of introgression and direct mortality to hybrids. Furthermore, effects upon sculpins, whitefish, or suckers are not disclosed.
	40.36	Page 3-12 of the DEIS states "… it will be necessary to protect as many downstream bull populations while removing as many hybrid trout from those streams as possible…" This section also discloses the recognized limitations in removing all of the hybrids from certain stream segments. We acknowledge that the impacts to other fish species was not clearly stated in the DEIS. Pages 3-9 and 3-10 discuss the likely impacts to the mountain whitefish. The primary reason the other species were not discussed in detail is based upon their limited distribution in the project area. For example, there is no record of suckers occurring in any of the streams listed in this proposal. We cannot discount the possibility of suckers using some of the streams for certain life stages, but based on the information we have, it is likely a rare occurrence. Sculpins were documented in Youngs Creek in 1993 (Fredenberg) and were characterized at that time as rare. In 2001 and 2002 sculpins were electrofished from Wheeler Creek during post treatment evaluations of the Tom Tom Lake rotenone project. Annual electrofishing of Hungry Horse Reservoir tributaries consistently does not produce any evidence of sculpins or suckers.
40.37		Page 3-13. The MCAFS agrees that illegal bait bucket biology is a risk in any given water body. Illegal introductions are often driven by the availability of fish and access. We request that a risk assessment is completed for each of the treated lakes that would look at the likelihood of illegal

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
		introductions and where the potential source would come from. For example, most wilderness lakes, especially those without trails would have a very low likelihood of illegal introductions due to their remoteness and the closest source would be a neighbor lake or fish downstream in the creek. Illegal introductions with these fish may have less genetic risks associated with them than use of M012. The risk assessment would break this issue down from a programmatic risk that "it could happen anywhere" to a site-specific risk that may be very low on a certain waterbody such as Lick Lake. Many of the issues cited are programmatic in nature and given the scale of the proposal don't necessarily apply to every lake that is proposed.
	40.37	Humans on foot or horseback stocked nearly all of the lakes described in this EIS beginning in the 1920s. Warm water fish like yellow perch, black bullhead, walleye pike, black crappie, fathead minnow, pumpkinseed sunfish, and bluegill sunfish have been routinely introduced to western Montana waters that are located 100s of miles from the nearest sources for these species. Eyed eggs and young fish can be bought from private hatcheries, or moved from wild sources. Although some lakes are more easily accessed than others, the threat of illegal introductions includes all lakes, limited only by the determination of humans.
40.38		[Specific comment on] Section 3.3 Table 3-5. This table would be much more useful if divided between fish versus fishless lakes. Adding presence, densities, sizes, etc would allow for a better understanding of potential impacts associated with the proposal.
	40.38	Thank you for your comment. This table was not designed to qualify or quantify the planktonic species from lakes with or without fish. It is designed to provide a measure of known diversity and abundance within the project area. In 2004 FWP instituted a more comprehensive analysis of plankton in 35 lakes in the project area. That study was designed to measure seasonal variation in abundance and diversity, and attempt to measure any spatial variation. Lakes with fish and without fish have been sampled. A revised Table 3-5 has been added to the FEIS.
40.39		As you may be aware, many studies have documented the changes associated with zooplankton communities in the presence of fish (see Knapp et al. 2001).

Table 1-2. Responses to Comments

Comment Number	Response Number	Comment/Response
	40.39	We are aware that fish use zooplankton for food.
40.40		Page 3-22. There is a good discussion associated with impacts associated with the chemical treatment but no discussion about the effects upon amphibians and zooplankton associated with restocking. We request that the effects of restocking should be analyzed and included in this section.
	40.40	Please see the responses to Comments 11.10 and 37.2. By restocking lakes after a treatment, we are maintaining conditions similar to those that existed prior to the treatment. No additional impacts are expected from continuing to stock fish.
40.41		Section 3.6 Page 3-40. Cumulative effects on the wilderness resource would vary depending on the number of chemical treatments and if the lakes become self-sustaining versus a rotational stocking. A pre-treatment plan that determines how each lake will be treated, i.e., fishless, one time stocking, rotational stocking, would lead to a better cumulative effects analysis.
	40.41	A post treatment plan is provided in Sections 2.4.5 and 2.4.6 that addresses your concerns. Much of the information that is needed to make these determinations cannot be made until after the treatment has occurred and an evaluation has been made.
40.42		The South Fork Flathead Watershed WCT Conservation Project is a opportunity to protect existing pure and appropriate WCT to their former distribution and abundance. We urge your agencies to consider our recommendations to conserve WCT in the South Fork Flathead, as the decisions made now will influence these important conservation areas for many years.
	40.42	Thank you for your comment and interest in the SF WCT Conservation Program.