

# **SOUTH FORK FLATHEAD WATERSHED WESTSLOPE CUTTHROAT TROUT CONSERVATION PROGRAM**

## *Record of Decision*



**Flathead National Forest  
Spotted Bear and Hungry Horse Ranger Districts  
Flathead County, Montana**

**April 2006**

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USDA Forest Service

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## **Record of Decision**

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## **I. SUMMARY OF DECISION**

After careful consideration of the potential impacts of the management activities analyzed and documented in the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program Final Environmental Impact Statement (FEIS) (Notice of Availability published in the Federal Register on August 19, 2005), I have decided to authorize management actions identified in the FEIS as Alternative B. My decision:

- **Authorizes the use of piscicides (pesticide that targets fish) within several lakes in the Bob Marshall Wilderness for the purpose of eliminating hybrid trout populations;**

**AND**

- **Authorizes the short-term use of aircraft, outboard motors, pumps, and mixers within the Bob Marshall Wilderness and the Jewel Basin Hiking Area to transport equipment, materials and personnel needed to accomplish the goals of this project.**

The details of my decision are more fully described on page 8 of this ROD.

The Forest Service is a cooperating agency for this project and has jurisdiction and responsibility for the use and management of National Forest System lands, including the Bob Marshall Wilderness and Jewel Basin Hiking Area, all of which occur on the Flathead National Forest. For this project, my decision is related to the application of registered and approved piscicides in the Bob Marshall Wilderness with the assistance of motorized equipment/mechanized transport in the Bob Marshall Wilderness and Jewel Basin Hiking Area. The authority to manage fish and wildlife populations falls under the jurisdiction of the State of Montana.

The Forest Service decision to authorize the specific activities described above is also contingent upon the respective approval of the activities described in Alternative B by the Bonneville Power Administration (BPA), and the Montana Department of Fish, Wildlife, and Parks (MFWP).

BPA is the lead Federal agency for this project. BPA is responsible for protecting, mitigating, and enhancing fish and wildlife affected by the development, operation, and management of federal hydroelectric facilities on the Columbia River and its tributaries (see Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. 839 et seq., Section 4(h)(10)(A)).

MFWP is a cooperating agency and has jurisdiction and responsibility to manage all fish and wildlife resources that occur on the state, federal, and private lands of Montana. The decision on whether or not to restock the lakes that are being treated is a decision in which MFWP has authority. They have decided that restocking the lakes with genetically pure westslope cutthroat trout will serve the best interest in meeting the project goals, maintaining established social and recreation opportunity, and minimizing socioeconomic impacts.



## **II. PROJECT BACKGROUND**

The South Fork Flathead River drains 1,681 square miles of land on the Flathead National Forest and is apportioned into several land use areas such as the Bob Marshall Wilderness, the Great Bear Wilderness, and the Jewel Basin Hiking Area (all of which are administered by the Forest Service. The South Fork Flathead drainage also includes general forest areas that are not designated into these special areas. The South Fork drainage has 355 lakes and approximately 1,898 miles of stream habitat. The South Fork drainage was isolated in 1952 by the construction of Hungry Horse Dam approximately five miles upstream of its mouth. Refer to Figure 1 – Map of the Project Area.

The South Fork Flathead River, above Hungry Horse Dam, contains one of the largest genetically pure populations of native westslope cutthroat trout in the nation. The South Fork Flathead is a critical stronghold for this species, representing 50 percent of the statewide range for genetically pure large, interconnected populations. The South Fork drainage is protected from invasion by non-native fish because of the barrier created by Hungry Horse Dam. However, historic stocking has introduced non-native trout species (primarily rainbow trout and Yellowstone cutthroat trout) into some headwater lakes that were historically fishless. By the late 1950s, fish managers became aware of the negative impacts that past stocking could have on native westslope cutthroat trout, and shortly thereafter changed to stocking native trout. Over time many of the fish in these lakes have hybridized (the crossbreeding of two or more dissimilar stocks).

Please reference section 1.2 and Appendix B in the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program Draft Environmental Impact Statement (DEIS)(June 2004) for a more complete description of background information and a chronology for this project. A Final Environmental Impact Statement (FEIS) was also prepared (August 2005) as an “abbreviated” FEIS pursuant to the Council on Environmental Quality’s National Environmental Policy Act regulations because there were no substantial changes to the proposed action, alternatives, or environmental analysis presented in the DEIS. The FEIS should be used as a companion document to the DEIS, which contains the full text of the affected environment, environmental analyses, and appendices.

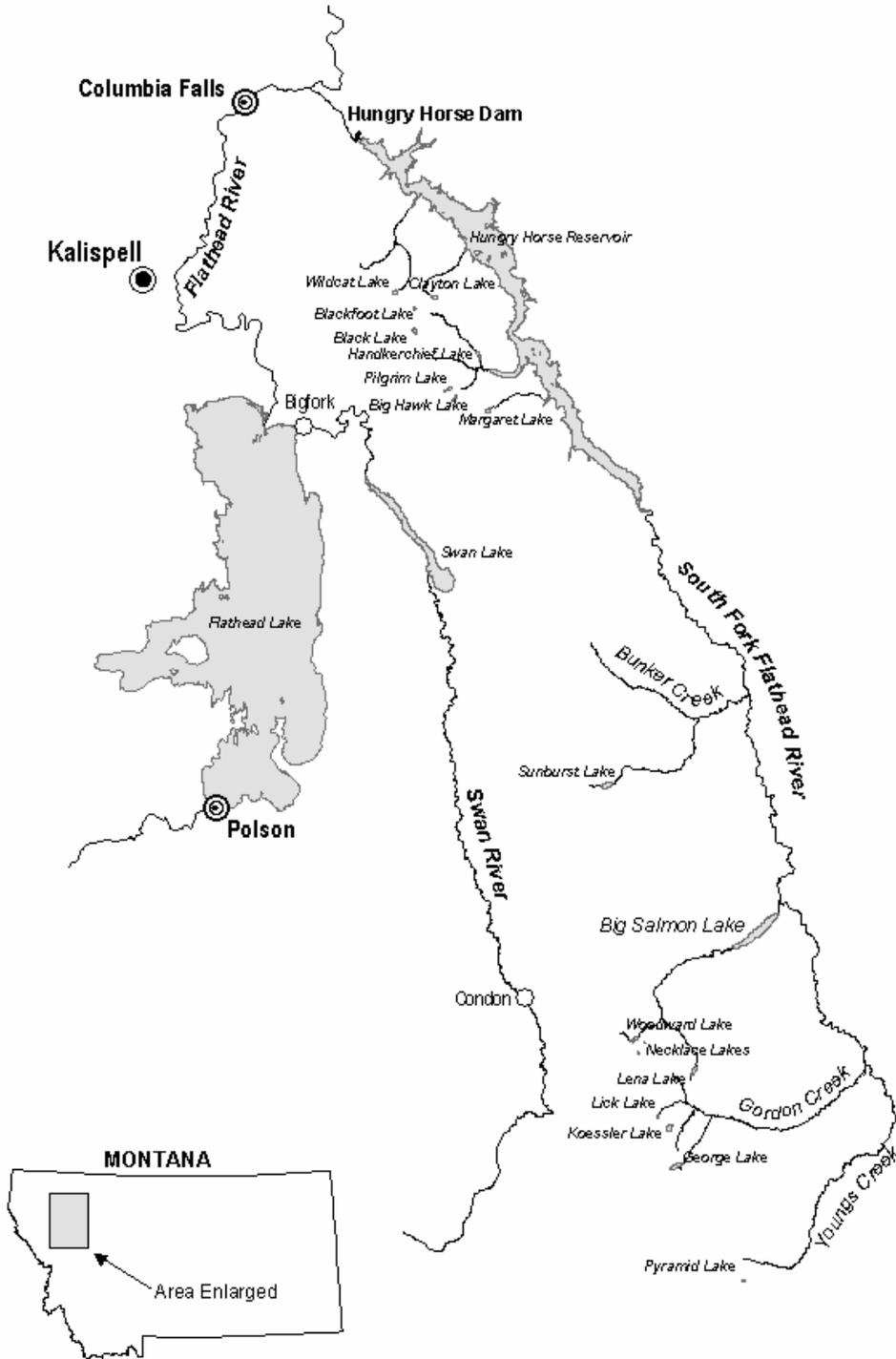
## **III. PURPOSE OF AND NEED FOR ACTION**

The following is the purpose and need for the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program:

- To protect the genetic integrity of the genetically pure populations of native westslope cutthroat trout that currently exist in the South Fork Flathead River Watershed by reducing/eliminating the threat of hybridization with non-native trout that currently inhabit lakes and streams in the South Fork River drainage.

Further description of the purpose of and need for action is found in the DEIS on pages 1-2 and 1-9.

Figure 1 – Map of the project area





## IV. PUBLIC INVOLVEMENT

Extensive public involvement was conducted with this project. The key public involvement activities are listed below. Additional details can be found in the DEIS on pages 1-9 through 1-12 and in Appendix A (Scoping and Public Involvement Process). In addition, the FEIS includes comments received on the DEIS as well as the various government agencies' response to these comments. The project record contains all of the comments received during the planning process for this EIS.

### Scoping Process

- A *Notice of Intent to Prepare an Environmental Impact Statement* was published in the *Federal Register* on May 5, 2003.
- Several radio spots, a radio call-in show, and newspaper articles also publicized information about this project.
- Over 200 letters were mailed to the public, government agencies, and groups or individuals potentially interested in or affected by the project, asking them to review and comment on the proposed project.
- On May 22, 2003, an open house was held in Kalispell, Montana, to share information, answer questions and accept comments for this project.
- Presentations were provided to small groups such as Backcountry Horsemen, Trout Unlimited, and the Professional Wilderness Outfitters Association who requested further information on the project in May through June 2003.
- The public was provided approximately several weeks to comment during the "scoping" process. We received nearly 75 letters, phone calls, and e-mails commenting on the proposed action.
- This project has appeared in the Schedule of Proposed Actions (SOPA) for the Flathead National Forest since the April 2004 issue. These issues of the SOPA are on display in the ranger district office in Hungry Horse, and on internet websites for the FNF and Forest Service headquarters in Washington, D.C.

### Draft Environmental Impact Statement (DEIS)

- The DEIS was published and made available for public comment in June 2004. Copies of the DEIS were provided to interested people and letters were sent to rest of the mailing list informing them of the availability of the DEIS. In addition, the DEIS was posted on the Bonneville Power Administration website at [www.efw.bpa.gov/environmental\\_services/Document\\_Library/South\\_Fork\\_Flathead/](http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/).
- A *Notice of Availability* was published in the *Federal Register* on June 18, 2004. A legal notice was published in the *Daily Inter Lake* on June 25, 2004.



- News releases were sent to the local news media for publication and broadcasting. *The Daily Inter Lake*, *Hungry Horse News*, and *Missoulian* were among the local newspapers to include articles about the project. Local radio and television stations also broadcasted information from the project.
- A public meeting was held on July 12, 2004 in Kalispell, Montana, to accept comments on the DEIS.
- The public was provided until August 20, 2004 to comment on the DEIS. During the comment period, 40 individuals, groups or agencies submitted comments on the DEIS. These comments were addressed in the FEIS, Chapter 1.

#### Final Environmental Impact Statement (FEIS)

- A *Notice of Availability* was published in the *Federal Register* on August 19, 2005.
- Copies of the FEIS were provided to interested people and letters were sent to the rest of the mailing list informing them of the availability of the FEIS. In addition, the FEIS was posted on the Bonneville Power Administration website at [www.efw.bpa.gov/environmental\\_services/Document\\_Library/South\\_Fork\\_Flathead/](http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/).
- 5 letters were received that commented on the FEIS. The letters are included in the project record and were considered in my decision.

#### Reopening of the Wait Period

- After the FEIS was released, some parties interested in this trout conservation program informed the Bonneville Power Administration that the FEIS did not include comments they submitted during the DEIS comment period, which ran from July 12 through August 20, 2004. As a result, a 45 day wait period before acting on the FEIS was provided which allowed resubmitting of comments or comments that raised new information or identified changed circumstances from those discussed in the FEIS. This wait period concluded on December 12, 2005.
- A legal notice was published in the *Daily Inter Lake* on October 28, 2005.
- A *Notice of Availability* was published in the *Federal Register* on October 25, 2005.
- Approximately 16 letters were received during this wait period. The responses to these comments are found in the Bonneville Power Administration's ROD. I also considered these comments in my decision.



## V. ISSUES

Comments generated during the scoping process suggested several alternatives to the proposed method of using fish pesticides (piscicides) to address the need for this project, including installing outlet barriers, screening spawning areas, gill-netting, increasing or removing catch limits, and continuing management concepts like the genetic swamping theory. These alternatives are discussed in more detail in Chapter 2 of the DEIS.

**Fish**—As expected, BPA received more comments on fish and the condition of the fishery than on any other resource topic. Commenters discussed their concerns for impacts on non-target species (particularly bull trout populations), and questioned the need to preserve the westslope cutthroat at the risk of losing other fish and angling opportunities. There were also several comments regarding the conclusions drawn from genetics research and testing. Of particular note were commenters that questioned using the M012 brood stock for restocking and swamping purposes. These commenters suggested that the brood stock itself may actually dilute the genetic uniqueness exhibited in the adaptations and phenotypic variations of local pure westslope cutthroat populations. Along this line, several commenters mentioned that with the removal of all hybrids and other non-natives and the use of the M012 genetic stock, the South Fork would become a virtual monoculture, exhibiting little genetic diversity among populations.

There were also a number of comments questioning whether or not the decision to restock lakes after fish removal should be part of the proposed action. Commenters expressed that, “In keeping with the Wilderness Act, the lakes should be restored to their historic fishless condition.” Several commenters suggested keeping a few lakes fishless and restocking the rest for angling.

**Wildlife**—Commenters expressed considerable interest in the effects of fish removal on local wildlife. Aquatic-dependent organisms such as plankton, insects, and amphibians were mentioned as non-target species. Threatened, endangered, and sensitive terrestrial species were also mentioned. Commenters expressed concern about potential impacts to wildlife habitat from the implementation of treatment options as well as from the transportation of equipment and materials to and from treatment sites. Commenters also expressed that they needed information regarding the impact additional dead fish would have on the environment.

**Water**—Commenters voiced concern about the impact of piscicides on water quality in the watershed. Comments included discussions about the safety of drinking water for humans and animals, and the potential for nutrient loading in lakes and streams caused by dead fish. The rate and extent of detoxification of treated waters was also a concern for many. Some commenters urged the careful avoidance of implementation measures within sensitive environments such as wetlands and springs.

**Soil and Vegetation**—Though not mentioned directly by many commenters, BPA will assess impacts to both soil and vegetation resources. These resources may be impacted by access to remote treatment sites, as well as by the use of piscicides.



**Land Use and Wilderness**—BPA received many comments regarding the implementation of the proposed action within a designated wilderness area. Many commenters voiced opposition to the use of aircraft, outboard motors, or any other motorized/mechanized equipment in designated wilderness areas, while others recommended using motorized equipment exclusively, as authorized under the administrative exemption clause, in order to expedite procedures. Several commenters expressed concern that the use of piscicides was not appropriate in the management of wilderness areas, and urged the development of a minimum tool analysis.

**Recreation**—Many commenters expressed concern for the loss of angling opportunities at treated lakes due to the length of time it would take for fish stock to recover, the initial limited size of fish, and the remaining monoculture of fish. Commenters questioned the validity of protecting genetic purity and native species versus providing quality fisheries. Other commenters discussed the visual and auditory impacts treatment activities would have on recreationists. Commenters claimed that these intrusions would result in a lost potential for solitude and a quality wilderness experience.

**Socioeconomics**—Several commenters expressed concern about the economic impacts that may be sustained by commercial outfitters if lakes were treated, as well as the short and long-term effects to the local tourism industry.

**Methods of Access**—As was mentioned above, many commenters were keenly interested in the methods used to convey personnel, materials, and equipment to remote locations, particularly to lakes located within wilderness areas. Some commenters supported the use of aircraft to access wilderness sites in order to expedite the work and to shorten the length of disturbance, and reduce livestock and human impacts to trails, campsites, and lake access areas potentially affected by the project. Others claimed that the use of any motorized or mechanized conveyance in wilderness areas was in direct conflict with the intent of the Wilderness Act. Similar conveyance activity in Jewel Basin was also questioned as it is a designated hiking area, and managed as semiprimitive, non-motorized recreation area. A few commenters pointed out that pack stock should be used in the summer when the trails are dry to avoid excessive impact. Commenters said that pack animals should not be held overnight within wilderness areas.

## **VI. ALTERNATIVES**

Alternatives for this project were developed from the issues identified and discussed above. The alternatives were grouped into one of two categories. These categories are “alternatives considered in detail” and “alternatives considered but eliminated from detailed study.”

### **A. Alternatives Considered in Detail**

Four alternatives (including the No Action) were analyzed in detail in the EIS:



- **Alternative A (No Action)** – Current fisheries management practices would be maintained, including current fish stocking practices, angling regulations, and future fish stocking.
- **Alternative B (*Proposed Action – this was the action that was first proposed to the public*)** - Use motorized/mechanized and non-motorized/nonmechanized means to access all project sites and to apply piscicides to remove hybrid trout from designated lakes and designated portions of outflow streams. These designated lakes and streams would then be restocked with genetically pure westslope cutthroat trout.
- **Alternative C** - Use motorized/mechanized means to access all project sites and to apply piscicides to remove hybrid trout from designated lakes and designated portions of the outflow streams. These designated lakes and streams would then be restocked with genetically pure westslope cutthroat trout.
- **Alternative D** - Use gill netting or other mechanical means of fish removal to suppress hybrid trout populations in designated lakes and, where possible, in designated streams. An intensive “genetic swamping” program would then be implemented.

## **B. Alternatives Not Considered in Detail**

There were ten methods of fish removal that were initially considered for inclusion as a potential alternative to achieve this project’s stated purposes. Seven of the alternatives have been eliminated from further consideration. The remaining three methods (gill netting, trap netting, genetic swamping) may be used in part, in whole, or in combination with each other in order to offer the best suppression strategy for individual lakes. Alternatives eliminated from further consideration were:

- **Angling**
- **Seining**
- **Constructing downstream barriers**
- **Using explosives**
- **Electrofishing**
- **De-watering**
- **Introducing predatory fish (i.e., tiger muskellunge)**

The DEIS on pages 2-35 through 2-43 provides detailed rationale for eliminating these alternatives from further study.

## **VII. DECISION**

As the responsible official for this project, I have decided to authorize the actions within Alternative B where I have jurisdiction. As described on page 1-14 of the DEIS, the decision authority for the Forest Service includes the following:



**To authorize the use of the piscicide, antimycin, within the following lakes in the Bob Marshall Wilderness for the purpose of eliminating hybrid trout populations:**

- George
- Koessler
- Lena
- Lick
- Necklace Chain of Lakes
- Pyramid
- Sunburst
- Woodward

**To authorize the short-term use of either aircraft, outboard motors, pumps, and mixers within the Bob Marshall Wilderness and the Jewel Basin Hiking Area to transport equipment, materials and personnel needed to the accomplish the goals of this project. The following lakes are affected by this authorization:**

**Bob Marshall Wilderness**

- George
- Koessler
- Lena
- Lick
- Necklace Chain of Lakes
- Pyramid
- Sunburst
- Woodward

**Jewel Basin Hiking Area**

- Black
- Blackfoot
- Clayton
- Lower Big Hawk
- Lower Three Eagles
- Pilgrim
- Upper Three Eagles
- Wildcat

Livestock will be used to transport materials, equipment, and personnel to the lakes identified above in the Bob Marshall Wilderness, with the exception of two lakes, Lick and George. These two lakes have no maintained access trails suitable for livestock use. Party sizes of 15 and 12 will not be exceeded in the wilderness and Jewel Basin Hiking Area, respectively. Pack strings will be broken into strings of 10 to 12 animals. No livestock will be used within the Jewel Basin Hiking Area.

Helicopter use will be allowed to transport materials, equipment, and some personnel to these two lakes (Lick and George) as well as the lakes in the Jewel Basin. Foot and/or stock use (excluding stock use in Jewel Basin) is the expected mode of access for any pre or post-survey work. The Food Storage Order will be followed by personnel transporting and administering piscicides as well as any pre or post-survey work. This order directs human and livestock food be stored in a bear-resistant manner and requires any left over food and garbage to be packed out.

Single Engine Air Tanker (SEAT) airplanes may also be used to transport and apply large quantity of material to some of the lakes within the Jewel Basin to minimize ground disturbance and minimize the amount of time necessary for application at some lakes. The on-the-lake piscicide application process will involve motorized equipment such as outboard motors, pumps, and mixers within both the Bob Marshall Wilderness and the Jewel Basin Hiking Area.

MFWP is expecting to treat, on an average, about 2 to 3 lakes per year over a 10 to 15 year time period. Piscicides will generally be administered during the fall seasons.



Alternative B also includes the treatment of the following two lakes that are outside of wilderness and the Jewel Basin Hiking Area and therefore do not require Forest Service approval for application of piscicides or use of motorized equipment or mechanized transport:

- Handkerchief
- Margaret

Appendix A of this ROD provides further details from the selected alternative.

## **VIII. RATIONALE FOR THE DECISION**

In selecting Alternative B, I have determined that my decision is consistent with all laws, regulations, and agency policy. I have considered the potential cumulative effects and reasonably foreseeable activities. I believe that my decision provides the best balance of management activities to respond to the purpose and need, issues, and public comments.

The criteria I used to make my decision on this project included:

- Achievement of the project's purpose and need
- Relationship to environmental and social issues, and public comments

### **A. Meeting the Purpose and Need**

I believe that the specific aspects of Alternative B associated with my decision authority represent the best opportunity to maintain the genetic integrity of the genetically pure populations of native westslope cutthroat trout that currently exist in the South Fork Flathead River Watershed. The authorization of the use of piscicides within wilderness and allowing motorized equipment/mechanized transport in wilderness/Jewel Basin lakes are essential support actions to achieve this purpose.

### **B. Consideration of the Issues and Public Comments**

The interdisciplinary planning team considered a variety of issues in the process of preparing the proposed action, developing alternatives to respond to those issues, and identifying the consequences of the alternatives in the FEIS. The following section will address how I believe my selection of Alternative B responds to the issues associated with my decision authority.

In arriving at a decision for this project, I recognized that I would not be able to fully satisfy all public concerns, as many of them are mutually exclusive and do not recognize the need for some type of action. I have made a decision that I believe is based upon sound analytical and ecological principles and does the best job of responding to the comments and concerns expressed throughout the project while striving to meet the purpose and need of the project. Throughout this project, I have given serious consideration to balancing concerns associated with satisfying the requirements of the Wilderness Act while striving to ensure that westslope cutthroat trout populations can thrive in the South Fork Flathead River drainage. The selected



alternative has been designed to have the least impacts on wilderness attributes while achieving its purpose of restoring native westslope cutthroat trout.

The following is how I have considered the key issues in which I have decision space:

**Wilderness** - Maintaining and restoring wilderness values has been a critical component in designing the treatment methods and goals for this project. I believe the selected alternative best achieves the restoration of pure westslope cutthroat trout populations with the least impact on the wilderness resource.

Other alternatives may have less short term impact on certain wilderness characteristics but have less chance of succeeding in restoring westslope cutthroat trout populations. In addition, other options that may have less immediate impact on the wilderness resource would have overall longer impacts to this resource. For example, genetic swamping which was included as one of the management tools included in Alternative D has already been in use for about 20 years in the South Fork Flathead River drainage and is expected it would have taken another 40 years to reduce hybrid trout to the point where they were essentially non-detectable. Swamping affects the wilderness resource since fish populations would be artificially sustained as opposed to a self-sustaining natural fishery.

The State's treatment plan call for the application of piscicides along with potassium permanganate (a neutralizer applied after the piscicides), the equipment to mix and apply the piscicides (e.g. inflatable raft with motor, pumps, mixers), and camp materials. Motorized boats, pumps, and mixers are necessary to disperse the piscicides to assure a complete kill. Material transport methods within the wilderness include livestock and helicopter. Helicopter use is necessary to two lakes (Lick and George) because there is no maintained trail access to these lakes. Foot/stock use is not being authorized to these lakes because I was concerned with the potential degradation of wilderness resources due to the amount of access that is necessary to transport equipment, material, and personnel to treat these lakes.

Use of motorized equipment and mechanical transport is not a normal or generally acceptable practice within wilderness. Language within the Forest Service Manual Direction for Wilderness directs that management activities within 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. Such use of motorized and/or mechanized equipment was described as being rare and temporary and should be supported by a draft minimum tool analysis which is included in the project record. I find that the limited use of motorized equipment/mechanized transport as described in Alternative B is the minimum necessary to achieve project objectives.

In addition to motorized equipment/mechanized transport, piscicide use within wilderness is allowable to prepare waters for reestablishment of indigenous, threatened or endangered, or native species or to correct undesirable conditions caused by human influence. Antimycin is preferred in wilderness over other piscicides because it requires fewer trips for transport due to less volume thereby reducing potential impacts to the wilderness resource.



I believe that the use of antimycin and motorized equipment/mechanized transport within the wilderness is necessary to protect the genetic integrity of the genetically pure populations of native westslope cutthroat trout while striving to protect wilderness resources.

**Recreation** - The effects associated with the treatments on the affected lakes will have an effect on a persons' recreational experience in these areas. These effects include noise, visual and effects to angling opportunities. These effects will be minimized through design criteria that include raising awareness of treatment activities so one can choose to avoid these areas during treatment periods. The timing and duration of treatments (in the fall and over a 10 to 15 year period) as well as spatially separating the treatments will reduce impacts to anglers. After treatment, angler displacement is expected to occur until the fishery is recovered which is expected to be one year but could take up to 3 years. The Forest is committed to working with our outfitter and guide permittees and the general public to find alternative lakes until the treated lakes are fishable again.

**Water Quality/Fish** - The piscicides selected by the State have been registered and approved by the Environmental Protection Agency (EPA) for use in fishery management and for application within the environment. Both piscicides have been shown through numerous studies to present a minor risk to the environment due to the minimal concentrations needed to affect the desired removal of target organism. In addition, the piscicides have a short life expectancy and subsequently breakdown into non-toxic components. Furthermore, these piscicides have been shown to be readily detoxified by potassium permanganate which also breaks down rapidly into non-toxic components. The treatment plan, selected by MFWP, reflects a reasonable and prudent approach with ample safeguards against undesirable environmental influences. Selection of antimycin, as the first piscicide of choice, for treatment within the wilderness reflects a sensitivity to wilderness management concerns. Antimycin was selected in the wilderness because its application rates are substantially lower than for rotenone and the active toxicity of the chemical is also somewhat reduced. There are also indications that antimycin may have a lesser effect on non-target organisms.

The effects to water quality from both the piscicides and potassium permanganate will be temporary and become undetectable after detoxification. Temporary closure of affected areas, signing and advance notification about impending treatments, proper containment of piscicide treatments, and rapid detoxification will aid in reducing or eliminating potential user's exposure to these compounds.

I find that piscicide use in the wilderness is consistent with the Fish, Wildlife, and Habitat Management Framework for the Bob Marshall Wilderness Complex and corroborates our close relationship with MFWP's mandate for managing fish and wildlife populations particularly when dealing with a species that has a potential for listing on the Endangered Species List.

## **IX. FINDINGS REQUIRED BY LAWS, REGULATIONS, AND POLICIES**

I have determined that my decision is consistent with the laws, regulations, and agency policies related to this project. The following summarizes findings required by major environmental laws:



### **The National Forest Management Act (NFMA)**

The Flathead Land and Resource Management Plan (Forest Plan) establishes direction for the Flathead National Forest. This management direction is achieved through the establishment of Forest-wide goals and objectives, standards, and guidelines, and Management Area site-specific goals and accompanying standards and guidelines. Project implementation consistent with this direction is the process in which desired conditions described by the Forest Plan are achieved. The National Forest Management Act requires that all resource plans are to be consistent with the Forest Plan (16 USC 1604(i)). The DEIS (p. 3-33) describes the Management Area (MA) requirements applicable to my decision for the South Fork Flathead Watershed project area (i.e. MA 19 for the Jewel Basin Hiking Area and MA 21 for the Bob Marshall Wilderness area).

The Forest Plan also includes the amended Recreation Management Direction for the Bob Marshall Wilderness Complex (1986). After reviewing the DEIS and FEIS, I find that the activities associated with Alternative B are consistent with Forest Plan standards, goals, and objectives and management area requirements.

### **Wilderness Act of 1964**

The 1964 Wilderness Act prohibits motorized equipment and mechanical transport unless it is determined to be the minimum requirement for administration of the area for the purpose of the Act (Section 4(c)). Working closely with the MFWP, the Flathead National Forest has carefully assessed the need for motorized equipment and mechanical transport and the selected alternative reflects the minimum necessary to accomplish this project.

Section 4(d)(8) of the Wilderness Act recognizes the States' responsibility and jurisdiction with respect to managing wildlife and fish in the national forests. As such, Forest Service Manual direction (FSM 2323.34(f)) provides the authority for chemical treatment to occur within wilderness to prepare waters for reestablishment of indigenous, threatened or endangered, or native species or to correct undesirable conditions caused by human influence. Further, the Fish, Wildlife, and Habitat Management Framework for the Bob Marshall Wilderness Complex (1995) was developed to meld the state's responsibility for managing fish and wildlife populations and the Forest Service's responsibility as the administering agency in wilderness habitat management into a collaborate role. This fish and wildlife framework allows, under Article 13, chemical treatment for preparation of waters for the reestablishment of indigenous species or to correct undesirable conditions resulting from the influence of humans.

I find that the activities associated with Alternative B are consistent with the Wilderness Act and subsequent Forest Service Handbook and Manual direction.

### **Clean Water Act and Montana State Water Quality Standards**

Upon review of the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program DEIS/FEIS, I find that activities associated with Alternative B will comply with state and federal water quality standards.



### **Clean Air Act**

Since the selected alternative will have minimal effects on air quality (short-term odor during application), I find that the selected activities in my decision will be coordinated to meet the requirements of the State Implementation Plans, and Federal air quality requirements.

### **National Historic Preservation Act, American Indian Religious Freedom Act, and Native American Graves Protection and Repatriation Act**

None of the alternatives contain any ground-disturbing activities that would compromise or degrade any cultural resource sites.

### **Government-to-Government Relations**

Bonneville Power Administration consulted the Confederated Salish and Kootenai Tribes, the Blackfeet Tribe, and the Kootenai Tribe of Idaho during the analysis process. The intent of this consultation was to remain informed about Tribal concerns regarding the American Indian Religious Freedom Act (AIRFA) and other tribal issues. In addition, the Salish and Kootenai Tribes reserved rights under the Hellgate Treaty of 1855. These rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land." The federal government has trust responsibilities to Tribes under a government-to-government relationship to insure that the Tribes reserved rights are protected. Consultation with the tribes during project planning helps insure that these trust responsibilities are met.

### **The Endangered Species Act (16 USC 1531 et. seq.)**

In May 2002, the U.S. Fish and Wildlife Service (USFWS) concurred with our determination that the project is "not likely to adversely affect" the gray wolf, grizzly bear, Canada lynx, bull trout or bald eagle (refer to Biological Assessment and USFWS concurrence letter in the project record).

Under provisions of this Act, Federal agencies are directed to seek to conserve endangered and threatened species and to ensure that actions are not likely to jeopardize the continued existence of any of these species. Upon review of the South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program DEIS and FEIS, and the Biological Assessments, I find that Alternative B complies with this Act.

### **Migratory Bird Treaty Act**

On January 10, 2001, President Clinton signed an Executive Order outlining responsibilities of federal agencies to protect migratory birds. Upon review of the information in the FEIS, I find that Alternative B complies with this Executive Order.

### **Environmental Justice**



The Selected Alternative was assessed to determine whether it would disproportionately impact minority or low-income populations, in accordance with Executive Order 12898. No impacts to minority or low-income populations were identified during scoping or effects assessment.

Compliance with other laws, regulations, and policies are listed in various sections of the DEIS/FEIS, the Project Record, and the Forest Plan.

### **Environmentally Preferred Alternative**

It is also required by law that one or more environmentally preferred alternatives be disclosed. The environmentally preferable alternative is not necessarily the alternative that will be implemented and it does not have to meet the underlying need of the project. It does, however, have to cause the least damage to the biological, and physical environment and best protect, preserve, and enhance historical cultural, and natural resources (Section 101 NEPA: 40 CFR 1505.2(b)).

Alternative A, the No Action Alternative, has been identified as the environmentally preferred alternative. Under this alternative, current management practices would continue with no piscicides being applied to lakes and streams. In the short term, this has the least impact to the environment as a whole since no piscicides would be applied; however, in the long term, hybridization would continue to threaten the genetic purity of the westslope cutthroat trout population.

## **X. APPEAL PROVISIONS AND IMPLEMENTATION**

Copies of the South Fork Watershed Westslope Cutthroat Trout Conservation Program FEIS are available for review at the Hungry Horse Ranger Station in Hungry Horse, Montana, and at the Forest Supervisor's Office in Kalispell, Montana. The supporting project record is available for review at the Hungry Horse Ranger Station (P.O. Box 190340/8975 Hwy 2 East, Hungry Horse, MT 59919).

This decision is subject to appeal pursuant to 36 CFR 215.11. A written appeal must be submitted within 45 days following the publication date of the legal notice of this decision in the Daily Inter Lake Newspaper, Kalispell, Montana. It is the responsibility of the appellant to ensure their appeal is received in a timely manner. The publication date of the legal notice of the decision in the newspaper of record is the *exclusive* means for calculating the time to file an appeal. Appellants should not rely on date or timeframe information provided by any other source.

Paper appeals must be submitted to:

**USDA Forest Service, Northern Region  
ATTN: Appeal Deciding Officer  
P.O. Box 7669  
Missoula, MT 59807**



Or

**USDA Forest Service, Northern Region  
ATTN: Appeal Deciding Officer  
200 East Broadway  
Missoula, MT 59802**

**Office hours: 7:30 a.m. to 4:00 p.m.**

Electronic appeals must be submitted to:

**[appeals-northern-regional-office@fs.fed.us](mailto:appeals-northern-regional-office@fs.fed.us)**

In electronic appeals, the subject line should contain the name of the project being appealed. An automated response will confirm your electronic appeal has been received. Electronic appeals must be submitted in MS Word, Word Perfect, or Rich Text Format (RTF).

It is the appellant's responsibility to provide sufficient project- or activity-specific evidence and rationale, focusing on the decision, to show why my decision should be reversed. The appeal must be filed with the Appeal Deciding Officer in writing. At a minimum, the appeal must meet the content requirements of 36 CFR 215.14, and include the following information:

- The appellant's name and address, with a telephone number, if available;
- A signature, or other verification of authorship upon request (a scanned signature for electronic mail may be filed with the appeal);
- When multiple names are listed on an appeal, identification of the lead appellant and verification of the identity of the lead appellant upon request;
- The name of the project or activity for which the decision was made, the name and title of the Responsible Official, and the date of the decision;
- The regulation under which the appeal is being filed, when there is an option to appeal under either 36 CFR 215 or 36 CFR 251, subpart C;
- Any specific change(s) in the decision that the appellant seeks and rationale for those changes;
- Any portion(s) of the decision with which the appellant disagrees, and explanation for the disagreement;
- Why the appellant believes the Responsible Official's decision failed to consider the substantive comments; and
- How the appellant believes the decision specifically violates law, regulation, or policy.

"If an appeal is received on this project there may be informal resolution meetings and/or conference calls between the Responsible Official and the appellant. These discussions would take place within 15 days after the closing date for filing an appeal. All such meetings are open to the public. If you are interested in attending any informal resolution discussions, please contact the Responsible Official or monitor the following website for postings about current appeals in the Northern Region of the Forest Service:

[http://www.fs.fed.us/r1/projects/appeal\\_index.shtml](http://www.fs.fed.us/r1/projects/appeal_index.shtml)."



If no appeal is received, implementation of the portions of this decision that are not exempted from stay may occur on, but not before, five business days from the close of the appeal filing period. If an appeal is received, implementation on the non-exempted actions may not occur for 15 days following the date of appeal disposition.

For further information on this decision, contact Debbie Mucklow, District Ranger, at 387-3800 or Michele Draggoo, Planning Team Leader, at 387-3827.

/s/ Cathy Barbouletos

May 4, 2006

**CATHY BARBOULETOS**  
**Forest Supervisor**

**Date**



## APPENDIX A

### Details of Selected Alternative from DEIS and FEIS

#### 2.4 Alternative B: (Proposed Action) Fish Toxins– Combined Delivery and Application Methods

Under the Proposed Action, all fish would be removed from selected lakes and designated portions of their outflow streams in the South Fork of the Flathead that harbor hybrid species that threaten to enter and genetically contaminate streams leading from those lakes, down into the Flathead River and Hungry Horse Reservoir. The piscicides rotenone and antimycin would be used to remove these fish.

The size and volume of these lakes and the quantity of the piscicide needed to treat them has already been measured and calculated. The downstream treatment distances and boundaries have been determined based on past genetic tests, natural barriers such as waterfalls, and the presence of bull trout populations. Calculating the amount of piscicide necessary to treat stream segments would be conducted prior to treatments, and would be based on up-to-date flow measurements and on-site assays. This amount would be small compared to the amount needed for each lake. The piscicides, equipment, and licensed applicators would be transported by livestock, or flown in by helicopter and/or by fixed-wing aircraft. After personnel and material transport is completed, the anticipated time to implement the application on each lake is one day, but may vary depending on unforeseen circumstances. Equipment, materials, and staff would be packed up and removed from the area beginning on the day after the lake treatment.

Afterwards, additional personnel would evaluate the lake and collect and measure fish. Stream segments would be treated as necessary to accomplish the downstream goals, and is expected to require one day for setup of **drip stations**, caged fish monitoring stations, and **detoxification stations**; one day for treatment; and several days for detoxification and clean-up. All of these time estimates would vary based on the transport method used, the size and complexity of each project, and site conditions.

Before the re-stocking of fish occurs, MFWP would install sentinel fish cages in each lake to determine if water conditions are appropriate. If so, the lake and stream would be stocked in order to establish genetically pure cutthroat populations in sufficient quantities to ensure domination over 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; to determine program success such as presence; and degree of natural reproduction, genetic purity, angling quality, and growth rates of fish. Lessons learned from these evaluations would be applied to succeeding applications on other lakes. Many of these lessons have already been learned on previous rotenone treatments in the Flathead Basin, contributing to the refinement of safety and technical procedures and the promotion of successful projects. Appendix D provides background detail on the application of



rotenone and antimycin, along with their characteristics and historic uses. Table 2-1 below lists the lakes currently being considered for treatment, along with transportation and treatment strategies.

**Table 2-1. Lakes proposed for treatment, length of designated outlet stream that would also be treated, and detoxification measures.**

Lake	Land Use*	Proposed Treatment Method	Proposed Method of Transport for Personnel, Materials, And Equipment	Outlet Streams or Waters Proposed for Treatment	Detoxification Measures
Wildcat	JBHA	Antimycin	Helicopter	Unnamed pond directly downstream of lake and 1 mile of stream below it.	Use caged fish and potassium permanganate
Clayton	JBHA	Rotenone	SEAT, Helicopter	4.52 miles of stream between the lake barrier and waterfall.	Use caged fish and potassium permanganate
Blackfoot	JBHA	Rotenone	Helicopter	5.76 miles of Graves Creek flowing out of Blackfoot Lake to Handkerchief Lake.	Use caged fish and potassium permanganate
Black	JBHA	Rotenone	SEAT, Helicopter	6.09 miles of stream between Black and Handkerchief Lakes.	Use caged fish and potassium permanganate
Handkerchief	FNF	Antimycin	Truck (lake is accessible by road)	0.5 mile of Graves Creek upstream of lake, and 1.33 miles of stream between the lake and Hungry Horse Reservoir.	Use caged fish and potassium permanganate
Upper Three Eagles (Would be Treated concurrent with Lower Three Eagles.)	JBHA	Rotenone	Helicopter	Treated lake water would be allowed to flow downstream, and hybrid trout in the stream would be removed between Upper & Lower Three Eagles Lakes.	Use caged fish and potassium permanganate
Lower Three Eagles	JBHA	Rotenone	Helicopter	2.23 miles of stream to the confluence of Graves Creek.	Use caged fish and potassium permanganate
Pilgrim	JBHA	Rotenone	SEAT & Helicopter	3.27 miles of stream between the lake and the Aeneas-Graves confluence.	Use caged fish and potassium permanganate
Lower Big Hawk	JBHA	Rotenone	Helicopter	2.97 miles of stream between the lake &	Use caged fish and potassium



Lake	Land Use*	Proposed Treatment Method	Proposed Method of Transport for Personnel, Materials, And Equipment	Outlet Streams or Waters Proposed for Treatment	Detoxification Measures
				Graves Creek confluence.	permanganate
Margaret	FNF	Rotenone	SEAT & helicopter	3.0 miles of stream between the lake & road 895 crossing.	Use caged fish and potassium permanganate
Sunburst	BMW	Antimycin	Livestock	6.1 miles of stream between the lake & the waterfall near Feather Creek.	Use caged fish and potassium permanganate
Woodward	BMW	Antimycin	Livestock	2.96 miles of stream between the lake & Cataract/Big Salmon Creek confluence.	Use caged fish and potassium permanganate
Necklace Chain of Lakes (Smokey Creek Lakes)	BMW	BMW Antimycin Livestock Stream	Livestock	Stream segments between the lakes; 2.1 miles of stream between Lower Necklace & Cataract/Big Salmon confluence.	Use caged fish and potassium permanganate
Lena	BMW	Antimycin	Livestock	4.25 miles of Big Salmon Creek between Lena & Cataract Creek confluence.	Use caged fish and potassium permanganate
Lick	BMW	Antimycin	Helicopter	3.7 miles of stream between the lake & rock waterfalls near the Doctor Creek confluence.	Use caged fish and potassium permanganate
Koessler	BMW	Antimycin	Livestock	Treated water will flow from lake to the Doctor Creek confluence.	Use caged fish and potassium permanganate
George	BMW	Antimycin	Helicopter	3.92 miles of stream between the lake and waterfall near its mouth.	Use caged fish and potassium permanganate
Pyramid	BMW	Antimycin	Livestock	Small pond downstream from the lake; 3.3 miles of Stream between the lake & Youngs/ Devine Creek confluence.	Use caged fish and potassium permanganate

JBHA = Jewel Basin Hiking Area; FNF = Flathead National Forest; BMW=Bob Marshall Wilderness



Based on past experience, piscicide treatments offer the best probability of complete fish removal. However, there have been instances where unforeseen circumstances have required implementing a second treatment to reach project goals. As a measure of treatment success, MFWP would conduct a post treatment survey, which may include netting and observation. Complete success would be defined as no detectible fish. If fish are detected, a second treatment may be implemented to reach project goals. The resultant action stemming from each post treatment evaluation would be considered on a case-by-case basis.

## **2.4.1 Piscicide Use**

### **2.4.1.1 Background**

MFWP has the statutory authority to manage (MCA 87-1-201) and/or restore (MCA 87-1-207) the fishery resources of Montana, specifically to prevent any species from being listed as **endangered** under the federal ESA. Furthermore, it is within the state's purview to stock fish into waters designated as sustainable fisheries, or into those waters where it is necessary to achieve the management goals identified under the above statutes to prevent a species from being listed as endangered.

From 1948 through 2001, MFWP has administered 74 rotenone applications on 63 lakes in the Flathead Basin. Seven of these lakes (11 percent) have required multiple treatments. Reasons for multiple treatments include: survival of unwanted fish in untreated areas (springs, tributaries, etc.); inability to completely remove the source of unwanted fish; or the illegal introduction of a fish species following a treatment. In some of these examples, complete removal has not been an objective of rotenone treatments. Rather the objective has been to reduce unwanted fish to improve angling. Hubbart Reservoir, west of Kalispell, is one such water body that has been treated four times since 1958 to restore quality trout and salmon angling at 12 to 15 year intervals.

The target species from these aforementioned seven lakes have been among the least sensitive to rotenone and include: pumpkinseed sunfish, northern pikeminnow, black bullhead, red-side shiner, yellow perch, largemouth bass, coarse scale sucker, longnose sucker, finescale sucker, and peamouth. Brook trout and rainbow trout are the other species removed from some of these lakes. The average length of time between repeat treatments has been 19 years; and ranges from 8 to 36 years. The number of lakes treated with rotenone in the Flathead Basin represents only 12 percent of the 505 lakes that MFWP considers as managed fisheries in this area.

Piscicides have been used successfully to remove non-native trout from lakes that occur in the project area. In 1986, the East, West, North, and South Jewel lakes were treated with rotenone to remove populations of rainbow trout. In 1994, Devine Lake (located in the Bob Marshall Wilderness) was treated with rotenone to remove the only known population of brook trout from the South Fork drainage. In 2000, Tom Tom Lake was treated with rotenone to remove hybrid trout. All six lakes were restocked with genetically pure westslope cutthroat trout.

The following was added by the FEIS:



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.

#### **2.4.1.2 Rotenone**

Rotenone is a compound registered with the U.S. Environmental Protection Agency (EPA) that is used to remove undesirable fish from bodies of water. This compound is extracted from the roots of tropical plants. These roots have been used for centuries by South American natives for a variety of purposes, including capturing fish for food (Gleason, et al. 1969; Teixeira, et al. 1984). The compound was first isolated in 1895, and its chemical structure was established in 1933 (Haley 1978).

Fish managers in North America began using rotenone to manage fish populations in the 1930's. By 1949, 34 states and several Canadian provinces were using rotenone routinely for management of fish populations (Finlayson, et al. 2000). Rotenone is also used as a natural insecticide for gardening and agricultural purposes. Haley (1978) reported that it has been used in humans to control intestinal worms.

Rotenone acts by interfering with cellular respiration in gill-breathing animals. It is particularly effective with fish because it is quickly assimilated into the blood stream through the single cell layer of the gills. Formulations of rotenone products are manufactured (under the brand names Noxfish®, Nusyn-Noxfish®, Prenfish®, and others) and shipped in two different forms: powdered and liquid. For this project, liquid rotenone would be the preferred formulation. Powdered rotenone would have to be mixed at the site with a cement mixer, requiring an auxiliary power source, respirators, protective suits, and additional time to perform the mixing.

Typical dosages of rotenone-based formulations administered to kill fish, range from 0.5 to 6 parts per million (ppm) depending on the species (Gilderhus 1972; Grisak, et al. 2002; Finlayson, et al. 2000). Trout typically require low dosages of 0.5-1 ppm whereas more resilient species like carp and bullhead require dosages of 4-6 ppm. Both fish and aquatic invertebrates (Rach, et al. 1988) are highly susceptible to rotenone. Insects and plankton that are affected by rotenone recover within short periods of time, generally within weeks to months. Bills, et al. (1988) reported that no rainbow trout eggs died from exposure to rotenone.

Rotenone naturally degrades within one to four weeks, depending on water pH, water temperature, alkalinity, ultraviolet light, and dilution by fresh water (Schnick 1974b). Detoxification may be hastened with the addition of a neutralizing agent such as potassium permanganate (Engstrom-Heg 1971, 1972, 1976). For more detailed information on rotenone and its characteristics and uses, see appendix D.



The following was added by the FEIS:

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.

#### **2.4.1.3 Antimycin**

Antimycin is an EPA registered chemical under the brand name Fintrol®. It was first discovered in 1945 at the University of Wisconsin as an antifungus treatment for plants (Leben and Keitt 1948). It is a product derived from the fermentation of a species of *Streptomyces* bacteria (Romeo 2002). It has been used in Japan for the control of fungus on rice (Harada, et al. 1959) and is an extremely potent fungicide (Dunshee, et al. 1949).

Antimycin works by inhibiting cellular respiration only in selected organisms. In 1963, Derse and Strong found that it was extremely toxic to fish in much lower concentrations than typically used to control plant diseases. It has been used for over 35 years in commercial aquaculture to kill scaled fish in catfish ponds (Finlayson, et al. 2000). Walker, et al. (1964) reported that trout were extremely sensitive to antimycin, but several plankton and aquatic insects were affected by concentrations much higher than those used to kill fish. Callaham and Huish (1969) reported that zooplankton were severely depleted by antimycin, but began to reappear within 6-9 days, and bottom insects were not affected. Fish are particularly sensitive to antimycin because their gill membranes are only one cell layer thick, which allows for the rapid transfer of it into the blood stream where it ultimately disrupts the electron transfer at the cellular level in vital organs (Schoettger and Svendsen 1970). This is accentuated in trout because their high oxygen



demand requires the movement of a high volume of water across their gills. Different species of fish manifest a different resiliency to the compound.

Antimycin is shipped by the manufacturer in two parts; one is the active ingredient antimycin A with some residual fats, and the second is the surfactant which consists of acetone and detergent. The two parts combined form one “unit,” 480 ml weighing 3.75 pounds.

The physical properties of antimycin make it beneficial for site-specific application. When applied to a stream, it loses much of its toxicity with every 200 feet of downstream elevation drop (Tiffan and Bergersen 1996; Romeo 2002). It detoxifies rapidly in a stream because of oxidation created by stream turbulence, interaction with organic substances on the stream bottom, and exposure to sunlight (photolysis). Numerous applicators have described the need to install drip stations at specified intervals to recharge a stream with antimycin in order to successfully carry out the treatment to the designated downstream boundary. This property also makes it an attractive tool in areas where a lake population is targeted and downstream populations are not. Non-target fish populations that occur downstream of a lake treated with antimycin may be safeguarded in this manner if this 200-foot elevation differential is met. In areas where non-target populations are within the 200-foot elevation zone, potassium permanganate has been used to detoxify antimycin (Stefferd, et al. 1992; Gilderhus, et al. 1969). In a stream treatment, more than 1 ppm potassium permanganate would be needed, due to the organic demand of the stream bottom, which reduces much of the compound before it can act with the antimycin.

The following was added by the FEIS:

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 39oF required two to three times as much exposure time for mortality than water treated at 71oF (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.

#### **2.4.1.4 Potassium Permanganate**

Potassium permanganate is a strong oxidizer that breaks down into potassium, manganese, and water (Finlayson, et al. 2000). This compound is used in fish aquaculture to remove fungus and parasites, and to increase soluble oxygen in water, thus averting fish kills (Lay 1971). It can be used to detoxify both antimycin (Marking and Bills 1975) and rotenone (Engstrom-Heg 1972, 1976; Lay 1971). Although it is used in fish aquaculture to benefit fish and to neutralize fish toxin, it also can be toxic to fish. Marking and Bills (1975) reported that it is most toxic in low water temperatures, in hard water, and in high pH. Recent bioassays conducted by MFWP indicate that when applied at 1.5 ppm and greater, and with no other substances to oxidize with, it can achieve 100 percent mortality in westslope cutthroat trout after 16 to 24 hours of exposure (Grisak, et al. 2002). Fish exposed to concentrations less than 1.5 ppm survived. Grisak (2003b) found that tailed frog tadpoles and tailed frog adults exposed to 3 and 4 ppm caused 13 percent death at 16 and 24 hours exposure, respectively. No greater mortalities were observed after the 16-hour observation at 3 ppm. A hypothetical application of potassium permanganate might be 4.5 ppm, which includes 1.5 ppm to neutralize the fish toxin, and 3 ppm to account for the organic demand of the stream bottom.

Readily oxidizable substances rapidly decrease the activity of potassium permanganate (Marking and Bills 1975). These substances might include algae on a stream bottom, gravel, mud, leaves from trees, and soil. Applicators must be aware of the amount of time necessary for potassium permanganate and the oxidizing compound (rotenone or antimycin) to contact each other to facilitate detoxification. This time can range from 30 to 60 minutes depending on how fast the stream is flowing. Stream flow can be measured with a flow meter so applicators can calculate the distance a stream would flow over time. Potassium permanganate can detoxify these two compounds more quickly if higher concentrations are used. Typically, potassium permanganate is applied in streams at concentrations ranging from 2 to 6 ppm. Potassium permanganate would be used to detoxify rotenone and antimycin applied to streams at designated boundaries below each lake. Detoxification drip stations would be monitored throughout the project until a time when caged fish survive below the treatment boundary for a period of 24 hours.



#### **2.4.1.5 Sentinel Fish**

Sentinel fish cages would be used in concert with potassium permanganate detoxification stations to evaluate the effectiveness of a treatment and to monitor the effectiveness of detoxification measures. Wild cutthroat trout captured from the target streams would be placed in cages at designated locations throughout the lake and stream drainages that are being treated. A surplus of sentinel fish would be kept at these sites in buckets on the shore in the event that first exposed fish die and more fish are needed for the evaluation. If local fish are not available, genetically pure hatchery westslope cutthroat trout would be used for sentinel evaluations.

#### **2.4.2 Project Assessment and Preparation**

Preparations for site-specific implementation would be conducted prior to any treatment. (A minimum of 21 lakes and associated stream segments located on the Flathead National Forest have been proposed for treatment. See appendix C for a detailed description of individual lakes.) Ideally, two to three lakes and the determined amount of each outflow stream would be treated each year over a 10 to 12 year period.

Prior to implementation, the genetic status of lakes would be confirmed through genetic analyses. (Volumetric testing has already been conducted and the amount of piscicide needed has been calculated for the proposed lakes. See figures in appendix C.) On-site assays and current flow measurements would be used to calculate the amount of piscicide and detoxification measures needed for each stream segment. Affected publics would be made aware of treatment times and places.

##### **2.4.2.1 Genetic Testing**

Genetic testing has been conducted on most of the lakes in the sub-basin. Confirmation of hybridization, through genetic analyses, has been the impetus for proposing these lakes for treatment. Genetic testing is conducted at the Wild Trout and Salmon Genetics lab at the University of Montana in Missoula.

Over the years, genetic testing methods have evolved with the growing demands and expanding uses for genetic analyses. The early stages of genetic testing in the South Fork Flathead involved the method of allozyme analyses, which was used by fish managers to identify pure populations for use in developing the state's current westslope cutthroat trout hatchery brood stock. This method was later used to measure the progression of hybridization in select populations in the South Fork Flathead, including many of the lakes and streams listed in this proposal. In recent years, however, the methods of genetic testing have changed as have the management objectives for the South Fork Flathead. These changes have allowed different tests, like the PINE-PCR (Paired Interspersed Nuclear DNA Element--Polymerase Chain Reaction) analysis to be used to detect the presence of non-native genes in a population, rather than the percentage of non-native genes in a population. For the purposes of this project, all of the historic genetic tests and the newer PINE-PCR analyses have been used to determine the presence of non-native genes. Due to changing management objectives--primarily from one designed to increase the percentage of westslope cutthroat genes in a population by stocking



pure cutthroat on a “frequent or annual basis,” to one designed to completely eliminate non-native genes--the PINE-PCR analysis has been an adequate tool for measuring the presence of non-native genes in a population.

In 1986, tests at Upper Three Eagles Lake revealed that it contained Yellowstone cutthroat + westslope cutthroat hybrids (Sage 1993). These tests would be updated to determine whether changes have occurred. Because Upper Three Eagles drains into Lower Three Eagles, it is reasonable to conclude that the fish in the upper lake influence the genome of the fish in the lower lake. However, the lower lake will be sampled one final time to determine its status. Fish angled from Woodward Lake were recently tested and no non-native genes were detected. The lake will be resampled using gillnets in 2004 to confirm this result.

#### **2.4.2.2 Lake and Stream Surveys**

A crew would conduct a pre-treatment survey of each lake to map the number and location of surface water inflows and outflows, measure the flow rates, measure water chemistry and temperature, collect plankton samples, and make an estimate or determination of fish habitat features. Some of these surveys have already occurred. Amphibian surveys have been conducted on each lake and are ongoing. Lake **bathymetry** (depth measurement) and locational data have been collected using a handheld sonar device and a global positioning system (GPS) unit. A number of random depth measurements were recorded at GPS locations. These data were entered into a computer program that uses GPS and depth data to create a Triangulated Integrated Network (TIN) representing the lake volume. The program constructs a three dimensional lake basin as a map and calculates lake volume (see appendix C).

Using this volumetric information, MFWP personnel calculated the proper amount of piscicide needed to remove fish from the lake. The piscicide must be applied at the proper concentration to treat the lake successfully. All calculations and procedures would be double-checked for accuracy by the designated application team prior to formatting the treatment plan for each lake and stream project. The team would then determine the appropriate time for treatment. Most of these projects would be implemented from late September to early November, depending on other, potentially conflicting activities in the area (e.g., spawning seasons, field surveys, and recreation), and weather conditions. Some of the lakes proposed in this project experience low outflow or no outflow during the fall of most years. Conducting treatments at this time would make containment much easier and safer, and would take advantage of lower volume pools. Treatment and detoxification of designated portions of outflow streams would still be required in areas where surface water exists.

Many of the designated streams have been surveyed to gather flow data, water inputs, geologic features, and fish community status. Those that have not yet been thoroughly surveyed would be surveyed in the future, and each stream would be surveyed again prior to any treatment.

Appendix C describes each lake, its associated streams, and the relative presence and distribution of bull trout downstream.



### 2.4.2.3 Pre-Treatment Plan

Before implementing, a treatment plan will be formulated for each specific lake and stream. The project would be separated into six plan categories each identifying personnel responsible for oversight of the plan and activities contained in each plan. The following are examples of activities that would be outlined in each plan.

#### (1) Lake treatment

- application
- materials management
- boat/pump maintenance
- drip stations at lake
- dead fish collection
- amphibian collection

#### (2) Stream treatment

- sentinel fish collection
- sentinel fish monitoring
- drip station spacing
- drip station monitoring
- dead fish collection
- stream flow measure
- amphibian collection

#### (3) Detoxification

- sentinel fish collection
- sentinel fish monitoring
- detox station spacing
- detox station monitoring
- colorimeter monitoring
- dead fish collection
- stream flow measure
- amphibian collection

#### (4) Materials management

- loading/unloading aircraft
- aircraft fuel

#### (5) Transport and safety

- livestock feed & water



- safety equipment
- first aid-humans/horses
- human food & water
- camp(s) maintenance
- trail closure/signing
- spill contingency plan
- emergency responders

(6) Monitoring

- water quality samples
- fish kill evaluation
- containment of treatment
- aquatic insects/plankton
- gill netting
- pre-treatment flow evaluation

The workers assigned to each area of responsibility would be supervised by an area leader who in turn would report to the project commander. The project commander oversees the entire project. Communication would be maintained by radio, telephone, satellite phone, and messenger.

Before treatment, MFWP fisheries biologists would assign personnel to these respective areas, and provide education and training. The pre-treatment plan would contain vital information on the proposed treatment including breaking the treatment area into zones and assigning personnel to their respective zone and area of responsibility.

In determining the dosage of piscicide needed, the project leaders would consider a variety of physical and biological factors; the most important being lake volume, freshwater sources to the lake, pH level, elevation difference to downstream non-target fish populations, and proximity of non-target fish species.

**Rotenone Dosage**

Rotenone dosage is calculated based on a five percent rotenone solution, and is expressed as parts of this liquid formulation per million parts of lake water on a volume basis. One ppm is equivalent to one milligram per liter (1 mg/L). The most common dosages of rotenone formulation used in the lakes treated in Montana range between 1 and 4 ppm, depending on the species and water chemistry. The actual amount of rotenone needed is based on the calculated water volume of the lake (see appendix C). The amount of rotenone needed may be somewhat greater to account for treating freshwater inputs. In theory, rotenone added to freshwater inputs will be discharged into the lake and ultimately add the amount necessary to meet the target concentrations. The rotenone product label recommends using “0.5 to 1 ppm for normal pond use.” Based on assays conducted by MFWP, the target concentration for these lakes and stream segments is 1 ppm (Grisak, et al. 2002).



### **Antimycin Dosage**

The recommended concentrations for lake application of antimycin range from 1 part per billion (ppb) (Derse 1963) to 10 ppb (Gilderhus, et al. 1969), depending on the species of fish. It has been used successfully to remove trout from high altitude lakes in the Mount Massive Wilderness/Rocky Mountain National Park at concentrations of 5 to 8 ppb (Rosenlund and Stevens 1992). The Fish Toxicant Kit Use Direction leaflet that accompanies the product label recommends using 5 to 10 ppb to remove trout. The target concentration for lakes in this proposal is 7.5-8 ppb, and would vary, depending on water chemistry. The amount of antimycin necessary to treat inflow and outflow streams would be determined based on a combination of the label prescriptions and on-site assays.

### **Potassium Permanganate Dosage**

Potassium permanganate dosage is calculated by measuring the amount of organic demand of a stream using a colorimeter instrument, florescent dye, and flow meters to calculate stream discharge. After the amount of stream demand is determined, the appropriate amount necessary to neutralize the piscicide is added.

#### **2.4.2.4 Permitting**

Before treating a lake, MFWP must apply for and secure a 308 Permit from MDEQ. This permit would allow for a short-term exemption from surface water quality standards. MDEQ issues provisions to the permits that ensure the standards of the Water Quality Act would be observed.

- The activity must be conducted in accordance with the application.
- Application of antimycin and rotenone must be in compliance with the product label and in accordance with the provisions of the Montana Pesticide Act (Title 80, Chapter 8, MCA) [ARM 17.30.637(8)].
- Excess pesticides and pesticide containers must not be disposed of in a manner or location where they are likely to pollute state waters [ARM 17.30.637(8)].
- The pesticide must be applied by an applicator licensed by the Montana Department of Agriculture to apply restricted-use pesticides (ARM 4.10.313).
- Representatives of the Department of Environmental Quality (DEQ) must have reasonable access to the application site in order to inspect the site for compliance with the terms of this authorization (75-5-603, MCA).
- Signs must be posted at the trailheads, and the Forest Service's authorized outfitters in the area must be notified about the project. Signs must be in place until the project leader determines the pesticide has completely degraded [75-5- 308(2), MCA].
- Within 90 days after the pesticide application, the MFWP must report the following information to the DEQ: 1) the amount and type of pesticide used, 2) the location where the pesticide was used, 3) the flow and/or volume of water treated in each lake, stream, stream segment, or tributary, 4) the volume of detoxification chemical used in each stream, stream segment, or tributary, and 5) the results of any chemical or biological monitoring performed [75-5-308(2), MCA].



- Since treatments are planned for lakes and the immediate downstream areas, detoxification will be required at locations designated by MFWP as lower project boundaries. However, to monitor the persistence of un-neutralized antimycin and rotenone, sentinel fish must be posted at designated locations based on stream flow times. If sentinel fish at the lowest site show signs of antimycin or rotenone toxicity, a neutralization station must be located as close as possible to the lowest location and be activated if needed. Sentinel fish at the lowest site will be used to monitor the effectiveness of antimycin and rotenone detoxification [75-5- 308(2), MCA].
- Water velocity studies, using accurate instruments, must be performed before the project to determine chemical travel time and chemical application rates [75-5- 308(2), MCA].
- The MFWP must notify MDEQ of its intent to apply pesticides at least seven days prior to the activity and within seven days after completion of the pesticide application.

#### **2.4.2.5 Notifying the Public of Treatment Schedules**

MFWP would notify the public of treatment schedules via newspaper ads and radio public service announcements. BPA would send a letter annually to its mailing list, including the Confederated Salish and Kootenai Tribes, the Blackfeet Nation, and the Kootenai of Idaho.

Outfitters and guides may be impacted economically when wilderness lakes are unavailable for a period of time due to removal of hybrid fish. The FS would work with these groups in advance to find alternative lakes that may be used until the lakes they normally use are fishable again. In addition, outfitters and guides planning to use an area during a scheduled treatment time would be notified and given the choice of using a different location or drainage.

The fs would work with these groups in advance

#### **2.4.3 Transportation of Staff, Materials, and Equipment to and from the Proposed Treatment Sites**

Activities associated with this project are planned to comply with rules in designated wilderness areas and areas in the national forest that are set aside for hiking only. A minimum of six crew members would be used for each lake treatment. Crew size would increase with the size and complexity of each proposed lake. An additional number of personnel would be necessary for stream treatment, detoxification, and monitoring, and would vary depending on the size and complexity of each stream. A party size of 15 would not be exceeded within the wilderness. Pack strings would be broken into strings of 10 to 12 animals.

Treating a lake and stream in a remote location requires the conveyance of licensed applicators, the piscicide, potassium permanganate (the neutralizer applied after the piscicide), the equipment to mix and apply the piscicide, and camp materials. The material would be transported to the lake in one of three ways: livestock, helicopter, or fixed-wing aircraft; and equipment and personnel would be transported by hiking, livestock, or helicopter. Access to downstream areas for application and monitoring purposes would be by livestock or hiking. In wilderness areas, personnel and materials could be transported by livestock to all except two lakes--George and Lick Lakes, which have no maintained access trails, but do facilitate angling



by cross-country users. In nonwilderness areas, personnel and materials could be transported by helicopter and, in the case of Handkerchief Lake, by truck. Downstream areas would be accessed at road crossings or by hiking. Single Engine Air Tanker (SEAT) aircraft could be used on nonwilderness lakes to transport and administer a large portion of piscicide to save transportation and application time, and to reduce the number of needed trips. Stock and pack animals are not allowed in the Jewel Basin Hiking Area nor are the trails maintained for such use. Thus, SEAT aircraft are proposed for use in the Jewel Basin.

The method or methods to be used at each lake depends on: (1) the amount and type of needed material, (2) the amount of equipment and required personnel, and (3) applicable land use restrictions.

#### **2.4.3.1 Hiking/Livestock – Wilderness Areas**

The use of livestock is a viable alternative in areas that have an improved trail. In 1994, livestock were successfully used to pack 10 gallons of rotenone, equipment, and personnel into the Bob Marshall Wilderness to remove brook trout from Devine Lake. Based on this action, pack stock could transport materials, personnel, and equipment to all lakes that are proposed for treatment that occur in wilderness areas with the exception of George and Lick Lakes, which do not have maintained trails. Lakes that occur on national forest lands outside of the wilderness (e.g., Jewel Basin Hiking Area and other areas) do not have improved trails that would support livestock use. Livestock are not allowed in Jewel Basin. Trails within Jewel Basin Hiking Area are not maintained to support livestock traffic, and livestock are not permitted.

As an example, the following description illustrates how pack animals would be used to navigate equipment, materials, and personnel in and out of the Pyramid Lake area. Similar logistics would be used for other lakes where only personnel would be able to access a candidate lake using pack stock on a maintained trail.

In this example, Pyramid Lake would be treated with antimycin. Access would be made over Pyramid Pass near the Town of Seeley Lake. The antimycin would be transported by livestock in sealed containers secured in reinforced wooden boxes. Manti tarps would be used to cover the boxes for greater protection during travel. The number of pack animals needed for any given treatment would be determined largely by the quantity of piscicide required to treat the lake, the number of personnel needed, and the time required to be at the site. A single pack animal could carry the 38 units (143 pounds) of antimycin. Pyramid Lake would require a total of 17 pack animals:

- One for the antimycin
- Up to six for the conveyance of people, depending on the mix of personnel riding or hiking in.
- Five for personal equipment, camp supplies, and livestock feed
- Five additional for boat motor, raft, drip stations, and miscellaneous equipment



These 17 animals would be separated into multiple pack strings. Travel from Pyramid trailhead to Pyramid Lake would take about 2.5 hours. This represents the least amount of stock needed for transporting materials.

#### **2.4.3.2 Helicopter – Wilderness and Non-wilderness Areas**

From 1986 to 2000, helicopters (Bell 47, a Bell 206, and a Hughes 500) were used to transport rotenone, personnel, and equipment to treat eight lakes in remote areas in the Flathead Basin. The helicopters that would be used most in this project would include two Bell OH58s and a Hughes 500. Loads of up to 800 pounds can be sling-loaded under these ships. Depending on air temperature and the amount of fuel onboard, the payload may be increased. An electronic cargo hook on each ship allows loads to be set at the worksite without landing. Each ship can transport three passengers per trip. One of the MFWP OH58 helicopters has floatation struts, making water landings possible. Given this capability, loads can be transported to lakes that do not have landing zones. The helicopter can also land on the water to drop off personnel and to pick up loads near the shoreline.

Helicopters have been used to dispense rotenone in small high mountain lakes (AFS 2002). A helicopter spray unit was used to apply rotenone to marshy areas of Rogers Lake, Montana in 1993. Although the project was successful, it has not been considered as a viable application technique since that time because rotor wash at this particular site caused excessive aerosolization of the rotenone and made application unsafe for personnel.

For Wilderness lakes with no trail access, administrative helicopter flights would be used to transport materials, equipment, and some personnel. Other personnel would hike or ride if feasible. Project managers would likely stage flights from the Condon airstrip, or other suitable sites near the Owl Creek trailhead. The helicopter flight protocol for treating wilderness lakes would be the same as that described above, but limited to the transport of materials, equipment, and limited personnel.

Because of the lack of trail access or regulations prohibiting the use of livestock, helicopters would be used to transport materials, personnel, and equipment to all lakes outside the Wilderness with the exception of Handkerchief Lake, which is accessible by vehicle. Flights into the lakes in the Jewel Basin area would be staged from the Ferndale Airport near the town of Bigfork. All materials would be brought to the airstrip by truck.

There are no major safety restrictions for wilderness or non-wilderness flights. However, the FWP OH58 is equipped with floatation struts for water landings and would minimize any potential for ground disturbance. Where possible, efforts would be made to avoid flying over camps and trails (see chapter 3, sections 3.8 Recreational Resources and 3.9 Socioeconomic Impacts).

The amount of weight a helicopter can carry per trip determines, in large part, how many trips would be required. Liquid rotenone is packaged in 30-gallon drums that weigh approximately 284 pounds each. The MFWP would likely use their Bell OH58 helicopters, which can carry two 30-gallon drums. The Montana Department of Natural Resources and Conservation (DNRC) have helicopters (Bell UH1) that may carry as many as seven, 30-gallon drums, at 1,988



pounds per trip. The DNRC ships are designated for first attack fire-suppression, and would be available only if no fires were active. Commercial helicopters would be available, but at a much greater operating expense than that of state-owned ships. Appendix C gives estimates of the amount of piscicide that would be required for each lake.

A typical application using a helicopter for transport would require six people: one boat operator; two drip station installers; one detox station person; one spot sprayer; and one person to load barrels of rotenone, triple-rinse empty barrels, and load/unload cargo nets for the helicopter pilot. Additional personnel would be necessary to treat larger and more complex lakes and streams.

Table 2-2 below is an example of the round-trip flight sequence into Blackfoot Lake located in the Jewel Basin Hiking Area. Assuming rotenone is applied at one part per million (ppm), Blackfoot Lake would need an estimated 68 gallons and would require an estimated nine flights to execute the treatment procedure (see Table 2-2). All downstream applications and monitoring would be accessed by road and trails in the Graves Creek drainage.

**Table 2-2: Sample helicopter flight plan: sequence, number, and purpose of flights for typical treatment.**

<b>Number of Flights (round-trip)</b>	<b>Purpose</b>
<b>DAY 1</b>	
1	Bring in two crew members.
1	Bring in raft/boat and some equipment.
1	Bring in two, 30-gallon drums of rotenone.
1	Bring in second crew and 8 gallons of rotenone.
1	Remove most equipment and materials.
<b>DAY 2</b>	
2	Remove the remaining equipment.
2	Remove the remaining crew members.

#### **2.4.3.3 Single Engine Aircraft Tanker Airplanes – Non-wilderness Areas**

SEAT airplanes could also be used to transport and apply a portion of the piscicide in non-wilderness areas. M18A and M18B Dromader fixed-wing air tankers with a load capacity of 500 gallons are available for use. They have a wing span of 58 feet and are 33 feet long. These aircraft are sufficiently agile that they can apply rotenone from the air on lakes larger than ten surface acres. To test the safety of using SEAT on these applications, four candidate lakes have been pre-flown. Such use would be evaluated on a lake-by-lake basis to determine whether any additional limitations or obstructions would preclude their use, or to determine if this transport and application method could be used on more lakes than just the four that are proposed.

SEAT aircraft can vary the salvo (release) rate of their payload, and can range from full release in as quickly as two seconds to partial release over multiple passes. Distribution rates are



calculated in standard distribution guidelines developed for fixed-wing fire suppression and fixed-wing crop dusting. In 2002, MFWP tested SEAT aircraft in Fort Benton, Montana to determine their applicability in this project. Based on the results of those tests, MFWP conducted a final test in May 2003 that involved dropping 500 gallons of dyed water on ice covered Clayton Lake (Grisak 2003d). At full salvo, 500 gallons of dyed water covered an area 403 feet long. Although the ideal application would involve spreading this coverage out, these tests prove that SEAT aircraft are highly precise aerial application tools. Factors that influence application can include air speed, altitude, target site, and terrain limitations. Typical drops are conducted at 40-60 feet altitude and 80 knots (90 mph) airspeed. These variables can be manipulated to achieve the desired outcome for an aerial application.

If SEAT aircraft were used, their role would be to administer a large portion of the rotenone to the surface of the lake, while a boat would be used to mix the compound and administer the remaining portion of rotenone at deeper depths. Due to the potential for aerial applications to generate aerosol, ground applicators would be required to wear protective clothing and respirators to guard against exposure.

In order for a commercial pilot to apply rotenone from the air, the operator must be certified to operate agricultural aircraft, and certified to apply economic poisons (pesticides, fertilizer, herbicides).

The May 2003 test proved that SEAT aircraft can transport and apply large liquid loads to remote high altitude lakes.

Since a paved airstrip is required for SEAT aircraft, they would be staged from the Glacier International Airport. The aircraft would be filled with the desired amount of piscicide and flown to the target lake where the piscicide would be administered over a designated number of passes as determined by the size of the lake. The piscicide administered by boat would be transported to the site by helicopter.

In 2002, four lakes that are candidates for SEAT application--Clayton, Black, Pilgrim, and Margaret--were pre-flown by the SEAT pilot and a project fisheries biologist in a Beechcraft Baron to determine any methodological limitations. No limitations were identified. In order to facilitate a safe and precise application, factors such as target size; approach; exit route, landscape; and probable wind currents, strength, and direction were evaluated at each lake. No factors were identified that could limit the success of the proposed application. Immediately prior to the application of piscicide while the plane is loaded, the lakes would be flown twice to test weather conditions and to establish clear communication with ground personnel. An application where SEAT aircraft are employed would only be conducted if the aircraft is able to administer its load. If weather conditions preclude the application from being conducted that day, it would be postponed until weather conditions improved.

According to the SEAT Program Coordinator for the Bureau of Land Management (BLM), the primary cause of retardant aircraft misplacing loads is misdirection by ground personnel. Ground personnel occasionally misdirect pilots, which results in retardant drops being made in unintended areas. A target that is easy to identify, such as a lake, would ensure no misplacement of piscicide during aerial transport and application. Furthermore, pre-application



flyovers would further ensure that SEAT pilots are at the correct location before a load is dropped. Coupled with the flyovers in 2002 and 2003, the SEAT pilot would have flown over each lake at least three times prior to treatment. GPS navigation and communication with ground personnel further ensures proper site delineation.

Based on the information provided by the U.S. Department of Interior (USDOI), Office of Aircraft Services, BLM SEAT Program Coordinators, and independent SEAT aviation contractors regarding the safety record and accuracy of SEAT aircraft, as well as the time-savings for transport and application, SEAT aircraft would be used in combination with a helicopter to transport piscicide to Black, Pilgrim, Margaret, and Clayton Lakes. SEAT aircraft would apply a portion of the piscicide on these lakes in concert with a motorboat.

Because of the larger payload, SEAT aircraft would be used to transport and apply rotenone for the purpose of reducing overall aircraft transport flights, and to expedite applying a large amount of material to some lakes. According to the rotenone label, the directions provide guidance on how to make applications of rotenone to streams and rivers, and ponds, lakes and reservoirs. The label states that the unique nature of every application site could require minor adjustments in the method and rate of application. Should these unique conditions require major deviation from the use directions, a Special Local Need 24(c) registration would be obtained from the Montana Department of Agriculture. Applying pure or lightly diluted formulation with a SEAT aircraft to reduce aircraft transport and application time may constitute a deviation from the use directions. Prior to applying undiluted or slightly diluted rotenone formulation, this label re-write would be obtained; otherwise, label guidelines would be followed under standard application guidelines.

**2.4.3.4 Summary of Transportation Methods**

Most applications of piscicide would utilize a combination of transportation methods. This combination would result in the most efficient and least time consuming transportation of personnel and equipment with the least impact on the environment and surrounding designated land areas. Table 2-3 below presents the advantages and disadvantages associated with each mode of project transport.

**Table 2-3. Comparison of methods of transportation.**

<b>Method</b>	<b>Advantages</b>	<b>Disadvantages</b>
Hiking/Livestock	-Traditional method consistent with wilderness values. -May be more socially acceptable over other methods.	-May contribute to higher environmental impact to trail and surrounding area, depending on trail conditions and maintenance standards. -More time required to transport. -Requires securely stored materials on site for longer periods of time.



Method	Advantages	Disadvantages
		<ul style="list-style-type: none"> <li>-Longer duration at site.</li> <li>-Potential conflict with other users.</li> <li>-Requires more materials (stock feed, camping gear, etc.).</li> </ul>
Helicopter	<ul style="list-style-type: none"> <li>-Greater time savings.</li> <li>-No disturbance to trails and ground.</li> <li>-Does not require securely stored materials for extended periods of time.</li> <li>-Can access all sites.</li> </ul>	<ul style="list-style-type: none"> <li>-Non-traditional, inconsistent with wilderness values.</li> <li>-May not be as socially acceptable as other methods; e.g., noisy and contrasts with wilderness values.</li> <li>-Short-term impacts from noise.</li> <li>-Less payload than SEAT (requires more flights).</li> <li>-Intrusion within the wilderness and Jewel Basin</li> </ul>
SEAT	<ul style="list-style-type: none"> <li>-Improved time savings.</li> <li>-Minimizes time required for transport and treatment over any other method.</li> <li>-Can transport high volume of material in one trip.</li> <li>-Reduces number of helicopter trips.</li> <li>-High probability of application success.</li> <li>-Does not require storing materials for extended periods of time.</li> <li>-Able to apply large volume of material in short period of time.</li> </ul>	<ul style="list-style-type: none"> <li>-non-traditional, inconsistent with wilderness values</li> <li>-not as socially acceptable as other methods</li> <li>-Public perception that plane may miss target.</li> <li>-Short-term impact from noise.</li> <li>-Intrusion in wilderness area and within Jewel Basin.</li> <li>-Not as agile as helicopter; cannot access every site.</li> </ul>

#### 2.4.4 Treatment

Once at the lake, the crew would need to prepare for the next day’s application. A sample description of lake treatment is provided below.

Prior to conducting a treatment, the public would be advised of the action well in advance. Notices would target the general public, indicating the lifting of harvest limits from each lake and section of stream, and outfitters would be notified in advance so they could plan client activities accordingly. Immediately before the treatment, trailheads would be signed notifying local users



of access restrictions and environmental considerations while recreating in the vicinity of lake and stream treatment areas. Sentinel fish would be collected from the streams. Amphibians also would be collected, if present, for release after the treatment.

#### **2.4.4.1 Day One**

After reaching the site, the respective crews would set up a camp, tend to livestock<sup>2</sup>, and set up for treatment the next morning. Two crewmembers would travel downstream from the lake, with necessary materials to install sentinel fish cages and install a detox station in preparation to dispense potassium permanganate. As a precautionary measure, this crew would monitor the stream during and after treatment to ensure that the water leaving the lake was sufficiently detoxified. These precautions would be taken to ensure that the piscicide did not affect unintended or non-target fish downstream of the lakes. Trailheads would also be posted to notify recreationists that the lake would be temporarily closed for recreational use during the treatment period. A crew would set up drip stations on inflow streams and prepare for treatment the next day.

#### **2.4.4.2 Day Two**

The lake, inflows, and designated downstream sections would be treated with the appropriate piscicide and sentinel cages, drip stations, and detox stations monitored by attendants at each site. The application of piscicide on each lake is intended to be accomplished in a single day, but unforeseen circumstances may necessitate extending this time period briefly. Potassium permanganate would be on hand to administer at intended locations, and to be on hand in other areas in the event of an accidental spill, or in response to unanticipated results.

#### **Application of Rotenone**

Rotenone may be applied only by licensed applicators and in adherence to safety precautions identified on the product label. The project supervisor would be knowledgeable and experienced in state regulatory requirements regarding safe and legal use of the rotenone product and applicator safety. All personnel involved with the rotenone application would have received, before treatment, safety training specific to the formulated rotenone product that would be used. All personnel are required to wear protective equipment to avoid unintended exposure to rotenone.

After the first crew prepared the boat and other necessary equipment, the rotenone would be distributed by motorized boat, using a specialized funnel-and-hose system. The boat would be used to distribute the rotenone around the lake in concentric rings, starting near the shore and then working toward the center. Either a garden hose or pressurized barrel and hose system would be used to distribute rotenone to deeper depths. Motorized pumps may also be used to pump rotenone to deeper depths.

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<sup>2</sup> This step would not apply to those lakes where livestock would not be used for transport.



Meanwhile, the second crew would prepare drip stations to distribute rotenone and potassium permanganate. At fresh-water inlets to the lake, drip stations would administer a known concentration of rotenone. This action would keep the fish from seeking out fresh water sources and thus avoiding exposure to rotenone. Crew members treating the downstream segments would set up drip stations, sentinel fish monitoring stations, and detoxification stations. All stations would be monitored throughout the treatment and detoxification process.

Information gathered from bioassays on westslope cutthroat trout exposed to 1 ppm rotenone indicates that, once rotenone is fully mixed with lake water, 100 percent mortality can be achieved within two hours of exposure (Grisak, et al. 2002).

On-site assays would determine the location and spacing of all monitoring stations.

As the application takes place, the pilot would continue to bring in rotenone and ferry out empty barrels. At the lake, the “loadmaster” would empty cargo nets, load barrels into the boat, load empty barrels into cargo nets, and hook nets to the helicopter. A second loadmaster (at the airstrip) would load cargo nets with full barrels, unload empty barrels, place them on a trailer, and help fuel the helicopter.

Most of the equipment and materials would be flown out, depending on time, weather, and other conditions; and a small crew would remain at the lake overnight to monitor the treatment.

### **Application of Antimycin**

Prior to the lake treatment, applicators would install drip stations at freshwater inflows; and install drip stations, detoxification stations, and sentinel fish cages in the stream below the lake. The lake application and stream treatment would begin simultaneously.

Application of antimycin begins by administering the compound by boat using an electric bilge pump and a venturi suction mechanism fitted to the outboard motor. In lakes that are greater than 30 feet deep, a pump would be used to administer the compound in deep water using a weighted hose of appropriate length.

Larger lakes would require multiple motorized rafts to ensure the application is completed within one day. Up to date flow data and on-site assays would be used to determine the location and amount of antimycin and potassium permanganate and caged sentinel fish monitoring stations needed. Caged fish would be monitored for 48 hours after the application. Further detoxification monitoring would continue until the caged fish survived a 24 hour time period following the application, after which time, the caged fish would be removed.

#### **2.4.4.3 Day Three and Beyond**

If a prolonged detox station is required, then a small camp would remain behind. Two attendants would monitor the station until caged fish were unaffected by the treatment.

Dead fish would be removed from the lakeshore, taken to deeper water, and sunk. This serves to prevent dead fish from becoming an attractant to predators, improve aesthetics at the site,



and to stimulate primary production in the lake. To the extent possible, with regard to access, dead fish would be removed from the streams over a several day period following the treatment (Parker 1970; Bradbury 1986).

### **Detoxification of Rotenone**

The rotenone product label (Prenfish 1998) indicates that it will detoxify naturally within 1 to 4 weeks depending on water temperature, alkalinity, etc. Lakes that have no outflow are allowed to detoxify naturally over a period of a few days to several weeks at most (Gilderhaus, et al. 1986; Dawson, et al. 1991; Skaar 2001). A variety of factors influence the natural breakdown of rotenone, including water chemistry, water temperature, and sunlight intensity (photolysis). Sufficient amounts of fresh-water inflow reduce the concentration of rotenone to non-lethal levels to fish. Outflow stream water may also be diluted by freshwater inflows from downstream inputs. Additionally, many lakes in the South Fork Flathead drainage commonly experience low or no outflow in the fall. For this project, if a lake has no outflow it may be prioritized in the treatment schedule because containment of the treatment would be easier. In such cases, the outflow stream would still require treatment in order to remove hybrid trout, but the application would begin at the site where surface water appears in the stream bed and continue to the predetermined downstream boundary.

Additionally, rotenone breaks down rapidly in soil and water as it is exposed to light, heat, oxygen, and alkalinity. It does not easily leach from soil because of its ability to readily bind to sediments, nor is it a groundwater pollutant (see Appendix D). Any rotenone that may drain through fissures in the lakes would bind readily to soils and breakdown rapidly, thus avoiding the potential to contaminate downstream water and soil.

Potassium permanganate would be used to detoxify the rotenone at predetermined locations in the stream. Experiments conducted by Engstrom-Heg (1971, 1972, 1976) provide application rates and concentration levels that take into account the effect that water chemistry, water temperature, and biologic uptake have on the compound, as well as the neutralizing effect of stream and lake substrates. Water chemistry is the major factor that influences this process; it would be evaluated at each site to make the necessary adjustments to achieve the proper concentrations. The appropriate amount of potassium permanganate would be calculated using colorimeter instruments, water tracing dye, and stream flow calculations. MFWP tests indicate that stations can be prevented from freezing by installing them in insulated boxes with small pocket fuel heaters. All detox stations would be maintained until caged fish survive downstream of the detoxification site, which may require several days. The average designated length of the eight streams that would be treated with rotenone is 3.9 miles, with a range from 2.23 to 6.09 miles.

To detoxify a rotenone application, project managers would rely on the following:

- No outflow (detoxification will occur in the lake naturally)
- Dilution by downstream freshwater inputs
- Downstream detoxification with potassium permanganate
- Combinations of all of the above methods



## **Detoxification of Antimycin**

The antimycin product label is accompanied by a Fish Toxicant Kit Use Direction leaflet that indicates that antimycin degrades rapidly and naturally, allowing for fish restocking within about one week (Romeo 2002). Antimycin loses much of its toxicity usually within every 200 feet of downstream vertical elevation drop (Tiffan and Bergersen 1996; Romeo 2002). It detoxifies rapidly in stream environments because of the oxidation action created by stream turbulence, interaction with organic substances on the stream bottom, and exposure to sunlight (photolysis). Numerous applicators have described the need to install drip stations within 200-foot elevation intervals to recharge a stream with antimycin. This characteristic makes antimycin a valuable tool when a lake population is targeted and certain downstream populations are not. Non-target fish populations that occur downstream of a lake treated with antimycin may be safeguarded in this manner if the factors most influencing natural detoxification are present.

The Fish Toxicant Kit Use Direction leaflet indicates, potassium permanganate can be applied at 1ppm to detoxify (more potassium permanganate may be needed if the stream has a high permanganate demand). Antimycin can be detoxified rapidly with potassium permanganate administered in small concentrations (Stefferd, et al. 1992; Gilderhus, et al. 1969). Marking and Bills (1975) reported that antimycin exposed to 1 ppm potassium permanganate had a half life of between 7 and 11 minutes and is rapidly detoxified by 1 ppm potassium permanganate in waters of pH 6.5 to 9.5. Berger (1966) reported that 1 ppm potassium permanganate was used to neutralize 10 ppb antimycin. Using a colorimeter to measure potassium permanganate demand of a stream, field tests would be conducted before the application to determine the appropriate level of potassium permanganate to ensure proper detoxification (Engstrom-Heg 1971, 1976). The likely potassium permanganate concentration would be 3 to 6 ppm, which accounts for the organic demand of the stream and the interaction with antimycin itself. Activated charcoal, tree leaves, and iron rich water will also readily bind with antimycin.

Potassium permanganate drip stations would be used to control the downstream boundary of each antimycin treatment. Below each lake proposed for antimycin treatment, a designated amount of stream would be treated to meet the project objectives. The average designated length of the 10 streams that would be treated with antimycin is 2.8 miles, ranges from 0.1 to 4.25 miles.

### **2.4.5 Follow-Up**

#### **Post treatment plan**

Immediately after the lake is treated, evaluations would be made to determine the success of a treatment. As early as possible, during the following spring and summer, a survey would be conducted at each lake. The survey would include setting gill nets; monitoring caged fish to determine water quality and restocking conditions; and, if possible, the evaluation of the status of non-target organisms like plankton, amphibians, and aquatic insects. If live fish remain in the lake, a determination would be made whether to implement a second treatment.



### **2.4.5.1 Reports**

A certified applicator is required to record each treatment and submit a Montana Department of Agriculture Record of Application report every five years. The report describes, among other things: the type and amount of piscicide applied; the area treated; application rate; equipment used; possibility of a complete kill; water conditions at the time of treatment; and detoxification measures, if any are used. This reporting standard would be maintained throughout the project.

### **2.4.5.2 Amphibian Monitoring**

Substantial evidence collected from past rotenone treatments in the Flathead Basin indicates rotenone would have no long-term adverse impacts on amphibians in the project area. Laboratory tests conducted by MFWP indicate that antimycin would not have a negative effect on amphibians at the levels prescribed to kill fish. Substantial literature supports these evaluations and tests. However, if the application of either compound shows any anomalous effects on local amphibian populations, MFWP would mitigate these impacts by replacing amphibians that may be impacted. This could be accomplished by transplanting egg masses and young and/or adult amphibians from adjacent populations. A follow-up survey for two years after the treatment would be used to confirm whether amphibians were present within treated areas, and whether they would need to be replaced in any given location. Additionally, tailed frogs could be collected from some streams prior to treatment at the location of drip stations and monitoring stations, and replaced following the treatment.

The following was added by the FEIS:

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, whichever 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.

#### **2.4.6 Restocking**

Restocking the lakes is not an action funded by BPA, but rather is the sole responsibility of MFWP. Restocking is discussed in this document because it is related, in part, to the actions proposed for funding by BPA.

In compliance with the piscicide product labels and supplemental label information, caged fish must survive for 48 hours in antimycin treated water before restocking occurs. The antimycin Fish Toxicant Kit Use Direction leaflet states that antimycin naturally degrades to the point where fish can be restocked within about one week. The rotenone label states that caged fish must survive 24 hours in rotenone treated water before restocking, and recommends waiting two to four weeks after the treatment before testing for restocking. Although the antimycin label



supplement recommends using fingerling rainbow trout or fingerling bluegills as sentinel fish, these species are non-native to the project area and using them would present a risk of unintentional introduction if an accidental escapement occurred. For this reason, cutthroat trout from the area or genetically pure westslope cutthroat trout would be used as sentinel fish to determine when stocking can take place.

Historic fish stocking in South Fork Flathead lakes developed new fish populations in many cases, or supplemented existing populations for recreational use. Stocking has continued for various management and conservation measures from the 1920s to the present. Although both of the selected piscicides are highly effective at removing undesirable fish species, there have been instances where isolated fish have survived piscicide treatment by inhabiting undetected ground water inflows. To ensure the complete removal of hybrid fish from the system, continued fish stocking with genetically pure westslope cutthroat trout will dominate the lake and stream environments, thus keeping any potential surviving hybrids from re-establishing a population. Post-treatment stocking would begin immediately in the July following treatment, and would occur annually until a population is firmly established. Post treatment stocking is an integral component in all alternatives involving eradication and suppression. A variety of age classes would be stocked in many of the lakes to expedite restoring the fishery.

Once the population is established, it would be monitored to determine if continued stocking is necessary. Factors that influence continued stocking include the level of natural reproduction and angler harvest. Some lakes have adequate habitat for natural reproduction and may not require maintenance stocking, thus dramatically reducing the frequency of stocking from current levels. In this case, certain lakes could be managed as self-sustaining fisheries. Other lakes would require maintenance stocking to sustain angling quality and population viability.

Restocking pure westslope cutthroat trout in the lakes would establish pure cutthroat populations and ensure their domination over any remaining hybrid fish populations. It would also provide genetically pure fish to seed downstream creeks, and would greatly reduce the temptation for illegal introductions of non-native fish. Rather than relying solely on downstream drift from lakes, restocking streams would expedite the restoration of a viable fish population. MFWP would continue to manage the lake fisheries so as to safeguard the westslope cutthroat trout populations in the South Fork and maintain quality angling opportunities.

It is important to recognize that there is no proposal to impact these segments of the environment or socioeconomics through a “no restocking” option. The only change in fish stocking from the present level would be through the reduction in the number of fish stocked and frequency of stocking at some lakes. This action could be perceived as a benefit by reducing the number of flights and pack trips necessary to maintain the westslope cutthroat trout, area wilderness values, established socioeconomic practices, and angling opportunities and qualities.

The following was added by the FEIS:

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 catchablesized 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.

#### **2.4.6.1 Compliance**

MFWP would comply with the ESA and the Wilderness Act for all restocking activities, including monitoring for the presence of any listed species in the area.

Additionally, MFWP would comply with the guidelines established in the Fish, Wildlife, and Habitat Management Framework for the Bob Marshall Wilderness Complex (BMWC); Memorandum of Understanding and Fish and Wildlife Management Addendum (FS and MFWP 1995). Per this management agreement, MFWP would work jointly with the FS in determining time of stocking, and would notify the FS of fish stocking schedules and numbers and species of fish to be stocked, and would adhere to other guidelines established in this document (FS and MFWP 1995).

#### **2.4.6.2 Restocking Decisions**

Once the lakes and designated portions of the streams are depopulated of fish there will be an opportunity to either restock the lakes or leave them fishless. The decision whether or not to restock them lies solely with MFWP. Historically, MFWP has stocked these lakes. One of MFWP's responsibilities is to maintain cutthroat recreational fishing in these areas. If MFWP does not restock all treated lakes, it is likely that unauthorized, illegal stocking would occur as it has in the past. This could result in the introduction of another non-native species. Decisions would be made pursuant to the BMWC Management Framework Document.



2.4.7 Summary of Proposed Action

Table 2-4. Summary of Alternative B.

FS Land Use <sup>1</sup> Designation	Lake Size <sup>2</sup>	Access	Delivery and Application Method	Type of Fish Toxin
Wilderness	S, M, L	System trail	Livestock delivery & motor boat application	Antimycin
Wilderness (Lick & George Lakes)	S, L	No system trail	Helicopter delivery & motor boat application	Antimycin
Non-wilderness	S, M, L	System trail	Helicopter and/or SEAT delivery & motor boat application	Rotenone <sup>3</sup>
Non-wilderness	S, M, L	No system trail	Helicopter and/or SEAT delivery & motor boat application	Rotenone
Non-wilderness (Handkerchief Lake)	L	Road	Truck delivery & motor boat application	Antimycin

<sup>1</sup> Non-wilderness includes lakes on other Forest Service lands, including the Jewel Basin Hiking Area.

<sup>2</sup> (S)mall = Lakes 1-19 acres in extent; (M)edium = Lakes 20-49 acres in extent; (L)arge = Lakes larger than 50 acres.

<sup>3</sup> Wild Cat Lake would be treated with antimycin to protect a downstream bull trout population.



## APPENDIX B Mitigation Action Plan

Resource Category	Implementation plans, monitoring, mitigation	Responsible Agency
<p><b>Pre-Treatment Planning and Monitoring after Treatment</b></p>	<p>A treatment plan will be completed for each lake or stream to be treated. The plan will outline dosage levels and application measures, fish and amphibian collection, safety measures and monitoring of water quality, fish kill, aquatic insects and plankton levels.</p>	<p><b>MFWP</b></p>
	<p>Each January, MFWP and the USFS will meet to review the treatment plan for the upcoming year. The treatment plan will identify the lakes and/or streams slated for treatment in the current year and the lakes or streams being considered for the next year. Access restrictions, outfitter scheduling, monitoring needs, public involvement, and other planning topics will be discussed.</p>	<p><b>MFWP/USFS/BPA</b></p>
<p><b>Fisheries/Aquatic Resources</b></p>	<p>Fisheries will be monitored after the treatment to determine population viability, presence and degree of natural reproduction, genetic purity, angling quality and growth rates of fish. Stocking rates will be determined on a case-by-case basis.</p>	<p><b>MFWP</b></p>
	<p>Fish of catchable size will be stocked in some lakes to restore angling quicker and restore natural reproduction quicker.</p>	<p><b>MFWP</b></p>
	<p>Grayling will be removed from Handkerchief Lake by traps, held in a net pen in Hungry Horse Reservoir, and then restocked after the treatment in order to maintain the quality of the grayling fishery.</p>	<p><b>MFWP</b></p>
	<p>After each treatment the amphibians will be monitored using visual counts</p>	<p><b>MFWP</b></p>



Resource Category	Implementation plans, monitoring, mitigation	Responsible Agency
	<p>of adults, egg masses and tadpoles; plankton will be monitored with Wisconsin nets tows; and insects will be monitored using kick netting and Surber sampling. The results will be used to compare to pretreatment levels.</p> <p>Amphibians will be collected from the lakes and streams pre-treatment, if possible, and released after the treatment. Effects to amphibians will be surveyed 2 years after treatment. If the survey shows unexpected effects to amphibian populations, amphibians impacted will be replaced by transplanting egg masses and young and/or adult amphibians from adjacent populations.</p>	
	<p>Treatments will be conducted in the fall when most amphibians have metamorphosed and move to other habitats, or can withstand or avoid the treatments.</p>	<b>MFWP</b>
	<p>Dead fish, as much as possible, will be collected from lakes and streams and sunk in the lakes or disposed of off site.</p>	<b>MFWP</b>
	<p>Bull trout are not present in any lakes proposed for treatment, but do occur in drainages downstream of some lakes. Antimycin will be used to treat most of these lakes because it can better provide a safe buffer for bull trout populations downstream. Antimycin has been field tested successfully and detoxifies more rapidly in flowing systems. This will allow for greater safeguarding of downstream non-target organisms such as the bull trout.</p> <p>All restocking activities will comply with the ESA, including monitoring for</p>	<b>MFWP</b>



Resource Category	Implementation plans, monitoring, mitigation	Responsible Agency
	listed species in the area.	
<b>Water Quality</b>	<p>Stream water will be tested with a colorimeter prior to treatment to determine organic demand for proper detoxification. Treated water in streams will be detoxified using potassium permanganate.</p> <p>Stream water will be monitored using caged sentinel fish to determine toxicity/neutrality.</p>	<b>MFWP</b>
<b>Soil and Vegetation</b>	Aircraft will be used to transport supplies and materials and in some cases will be used to apply piscicide to some lakes to reduce livestock trampling. No new system trails will be created to implement this project.	<b>MWFP</b>
<b>Land Use and Wilderness</b>	<p>Livestock will be used to transport materials and equipment to most of the wilderness lakes to conform to wilderness values. Project sites that have no system trails will be accessed using aircraft so no new trails will be created as a result of this action.</p> <p>Four-cycle engines will be used in the wilderness portion of the project to minimize air emissions and noise.</p>	<b>MFWP with USFS authorization</b>
<b>Recreation, Public Health, and Socioeconomics</b>	The recreating public (private parties and outfitted parties) will be advised in advance of the action so that they can plan recreation activities. MFWP will inform the public via press releases.	<b>MFWP</b>
	The USFS administers outfitters' permits and will review their planned activities and use patterns to identify any conflicts and possible alternative locations that could be used during the treatment periods.	<b>USFS</b>
	Trailheads will be signed immediately before treatment.	<b>MFWP and USFS</b>
	Aircraft used will avoid flying over camps and trails if possible.	<b>MFWP and USFS</b>



Resource Category	Implementation plans, monitoring, mitigation	Responsible Agency
	The immediate project area will be closed 1-2 weeks during project implementation to minimize hazards to recreationists.	USFS
	Bag limits may be lifted prior to the treatments to allow the public to utilize fish from the lakes.	MFWP
	Treatments will be staggered over 10 years or more to mitigate localized impacts to angling quality and quantity.	MFWP
	Treatments will occur in the fall when angler use is less.	MFWP
	Catchable sized fish will be restocked in some lakes to expedite restoring angling.	MFWP
	Some recreationists will be displaced during implementation.	MFWP
<b>Cultural/Tribal Resources</b>	Tribes will be contacted prior to lake treatment so that site-specific issues may be addressed and tribal members may be notified of short-term disturbances.	BPA
<b>Safety</b>	All personnel involved in the treatment process will be trained to use the specific product and will be required to wear protective equipment to avoid unintended exposure.	MFWP
	The immediate project area will be closed 1-2 weeks during project implementation to minimize hazards to recreationists.	USFS