Montana Fish, Wildlife & Parks

2300 Lake Elmo Drive
Billings, MT 59105

June 2, 2008

TO: Environmental Quality Council
Director's Office, Dept. of Environmental Quality
Montana Fish, Wildlife & Parks*
- Director's Office
- Parks Division
- Fisheries Division
- Wildlife Division
- Lands Section
- Design & Construction
- Legal Unit
- Regional Supervisors

Mike Volesky, Governor's Office *
Sarah Elliott, Press Agent, Governor's Office*
Montana Historical Society, State Preservation Office
Janet Ellis, Montana Audubon Council
Montana Wildlife Federation
Montana State Library
George Ochenski
Montana Environmental Information Center
Wayne Hirst, Montana State Parks Foundation
FWP Commissioner Shane Colton*
DNRC Area Manager, Southern Land Office
Scott Barndt, USFS, Bozeman; Scott Shuler, USFS, Livingston; Scott Bosee, GYC, Bozeman
Other Local Interested People or Groups
* (Sent electronically)

Ladies and Gentlemen:

A draft Environmental Assessment has been prepared for removing brook trout a 3-acre private pond on an unnamed tributary to the Boulder River, and can be reviewed on the Fish, Wildlife and Parks website at fwp.mt.gov under recent public notices. This removal (using rotenone) would protect a self-sustaining population of rainbow trout in the river that provide a popular sport fishery.

Any questions should be directed to Jeremiah Wood (328-4594) or Jim Darling (247-2961). Written comments should be addressed to the undersigned at 2300 Lake Elmo Drive, Billings MT 59105; or by e-mail to ghammond@mt.gov, by June 30, 2008.

Sincerely,

Gary Hammond
Regional Supervisor

MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

ENVIRONMENTAL ASSESSMENT OF THE CHEMICAL TREATMENT OF THE BOULDER RIVER RANCH POND AND UNNAMED TRIBUTARY TO THE BOULDER RIVER IN PARK COUNTY

PART 1. PROPOSED ACTION DESCRIPTION

A: Type of Proposed Action: The Boulder River Ranch Pond is a 3-acre private trout pond located on an unnamed tributary to the Upper Boulder River (T4S, R12E, S3). The property is currently owned by Hoppertunity Partners, LLC, which is contracting pond improvement work to improve fishing and prevent capture of the pond by the adjacent Boulder River. The ranch pond and unnamed tributary contain a self-sustaining population of brook trout that likely contributes excess brook trout to the Boulder River, threatening the healthy population of rainbow trout that provide a popular sport fishery.

While the pond is drained for improvement work, MFWP proposes to chemically remove brook trout from the pond and unnamed tributary upstream of the pond to prevent further downstream movement of this population into the Boulder River. The landowners will agree to pay for the required chemicals and other supplies, while Montana Fish, Wildlife & Parks (MFWP) will provide personnel to conduct the removal project.

A. Project Goal: Successful elimination of the brook trout population in the Boulder River Ranch Pond and unnamed tributary.

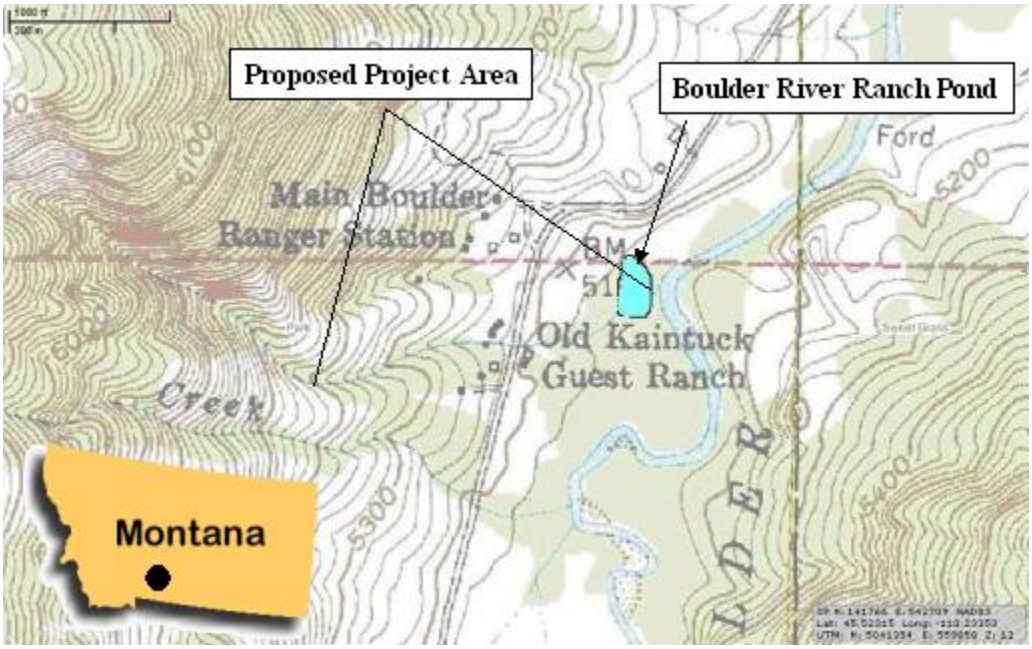
Project Phase	Expected Completion Date
Phase 1. Complete Environmental Assessment for chemical removal of brook trout in private pond and unnamed tributary.	May/08
Public comment period for EA	Jun/08
Obtain necessary permits for chemical treatment	Jul/08
Private pond improvement project will drain pond and repair outflow structure.	
Phase 2. Private pond improvement project will drain pond and repair outflow structure.	Jul/08
Phase 3. FWP will chemically treat pond and unnamed tributary stream while pond is drained.	Aug/08
Phase 4. Begin filling reservoir following treatment.	Aug/08
Phase 5. Conduct follow-up sampling to ensure treatment success.	Sep/08-Oct/08

B. Agency Authority for the Proposed Action: MFWP "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under statute 87-1-702.

C. Estimated Commencement Date: Summer 2008.
Estimated Completion Date: Fall 2008

D. Name and Location of the Project: Chemical Treatment Boulder River Ranch Pond and Unnamed Tributary to the Boulder River. Location: T4S, R12E, S3, Park County, south of McLeod (Figure 1).

Figure 1. Map of Boulder River Ranch Pond and Tributary Stream.



E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open Space/Woodlands/Recreation – 3-acre private pond
4. Wetlands/Riparian – 0.25 miles of stream and 3-acre pond
5. Floodplain – 0 acres
6. Irrigated Cropland - 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres
10. Other – 0 acres

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

1. **<u>Summary of the Proposed Action</u>**:

The Boulder River Ranch Pond was constructed about 35 years ago to provide recreational opportunity for users of a guest ranch. Historically, the pond was stocked with rainbow trout, and currently it contains a self-sustaining population of brook trout, which threatens the popular rainbow trout fishery in the Boulder River.

For decades, MFWP has sampled the fish population throughout a one-mile section of the Boulder River adjacent to the Boulder River Ranch Pond. This area of the Boulder, approximately two miles upstream of Natural Bridge, has continually supported a healthy population of large (>13 in) rainbow trout. Recent sampling data in this area, however, have indicated that this population may be threatened by an increase in numbers of small brook trout, which compete with juvenile rainbow trout for food and space, and may threaten the rainbow trout fishery.

The pond and inlet stream present an ideal situation for brook trout removal because the outflow structure in the pond prevents upstream movement of fish from the Boulder River. Therefore, once removed, it is highly unlikely that brook trout will be able to re-colonize this pond and tributary stream.

Mechanical removal of brook trout in small ponds and streams is seldom an effective means of complete population elimination because of the difficulty of capture via these methods. Therefore, MFWP is proposing to eliminate brook trout by chemically removing all fish in the pond and tributary stream using rotenone. After the removal, the landowners may have the option to restock the pond (after obtaining a private pond license) with a MFWP-approved fish species.

Rotenone is a commonly used piscicide that is very effective at killing fish at low concentrations. It is a naturally occurring substance that is derived from tropical plants from the bean family. It kills fish by inhibiting respiration at the cellular level. It enters the fish's body through the gills and goes into the blood stream. The concentrations used to kill fish are low, usually 1 ppm (parts per million or one part rotenone solution to 1,000,000 parts water). Because of the low concentration of rotenone in the water, there is very little risk to human or animal health. At this concentration, a person would have to drink 23,000 gallons of water at one time to have an effect (American Fisheries Society Publication). Rotenone is not readily absorbed through the skin or stomachs of vertebrates or other animals, so there is little risk to wildlife that come in contact with or consume treated waters, or that consume fish killed by it. Invertebrates and larval amphibians are affected by it, but populations have been shown to recover quickly following treatment (see Appendix 1 for more specific information). Rotenone does not affect aquatic plants at fish-killing concentrations. Rotenone also degrades readily in the environment, the rate of which depends on temperature, alkalinity, sunlight and other factors; it rarely persists more than a few weeks. Rotenone also readily binds to soil particles where it is naturally broken down, so the risk of contaminating ground water supplies is minimal (Appendix 1). Studies conducted

adjacent to rotenone-treated waters failed to show the presence of the chemical in the ground water. If needed, it can also be quickly neutralized using potassium permanganate ($KMnO_4$).

The probability that any chemical will escape from the pond into the Boulder River is very low because concurrent pond construction will result in its being drained to its lowest possible level at the time of treatment. It is anticipated that the rotenone applied to the pond will have naturally broken down prior to the pond filling and spilling into the Boulder River. With dilution (because the pond will be filling with non-treated waters), and through the natural, rapid breakdown of the chemical, it is anticipated that the pond will be non-toxic to fish in 2-3 weeks. In case the pond fills faster than expected and the water is not completely detoxified, an emergency detoxification station will be established at the outflow of the pond and $KMnO_4$ will be applied to exiting waters. If the pond fills faster than anticipated, and exiting waters are neutralized, it is very unlikely that any negative effects will be apparent in the Boulder River. Flow rates exiting the pond are less than 1 cfs, and flow rates in the Boulder River in August are typically greater than 100 cfs. Therefore, through the process of dilution alone, excluding the fact that exiting waters would be treated with $KMnO_4$, rotenone will be reduced to sub-toxic levels for fish and other aquatic life. Further, once the treatment of the pond and inlet stream are complete, the inlet stream will be shunted away from the pond directly to the Boulder River (to the extent possible) to slow the filling process.

All label requirements for rotenone application to ponds and streams will be followed along with the regulations set forth by the Montana Department of Agriculture. Only certified applicators and trained operators will be allowed to assist in the chemical treatment of the reservoir. At low pool, the quantity of water (acre-feet) in the pond will be calculated to determine the correct amount of rotenone to apply to reach a concentration of up to 1-5 parts per million (ppm). According to the product label, this range in concentration of rotenone should produce a successful fish kill. Normal treatments require only 1 ppm to successfully kill salmonid fishes; however, it is possible that a higher concentration of rotenone will be required to produce a complete fish kill because of absorption by the rich organic material and thick vegetation in the pond. The fish kill will be monitored during the treatment using gill nets. If 1 ppm is not sufficient to produce a 100% fish kill, the concentration of rotenone will be incrementally increased. The formulation that will be used is CFT Legumine (5% active ingredient).

Upon treatment, the concentration of rotenone in the pond will be monitored using sentinel fish placed in nets in the pond. The sentinel fish will be age-0 Yellowstone cutthroat trout from the Yellowstone River Trout Hatcher in Big Timber. Fish are among the aquatic organisms most sensitive to rotenone and, therefore, are an excellent indicator of its presence or absence in the water. No treated water will be allowed to leave the pond until sentinel fish can survive for at least 8 hours, indicating that the rotenone has broken down to non-toxic levels. If the application of $KMnO_4$ to exiting waters is required, it will be applied at a concentration of 3-5 ppm. Gill nets will be set after treatment to monitor for the presence of live fish.

To kill fish that may attempt to avoid the poison by entering the tributary stream, and to kill any resident fish in the unnamed tributary stream, a rotenone drip station will be placed at the farthest upstream extent that is passable to fish. It will be dripped at a constant rate to produce a concentration of 1.0 ppm in the stream in accordance with the rotenone label. A cage of sentinel

fish will be placed at the inlet of the pond to ensure the rotenone in the stream is still at fish-killing concentrations. If the rotenone is naturally broken down before it reaches the pond, a second drip station will be established on the stream. These drip stations will be maintained for a maximum of 8 h. In addition, a drip station located at the inlet of the pond will be maintained for a minimum of 24 h to allow sufficient time for thorough mixing of the chemical applied to the pond.

We anticipate that a single treatment will eradicate brook trout from the pond and tributary stream. In other systems, however, a second treatment has been used when the first failed to produce a 100% fish kill. After the treatment is complete, nets will be set to check for the presence of brook trout. If some survived, a second treatment using the same procedures may be warranted.

2. Purpose and Need for the Proposed Action:

The purpose of the project is to remove a self-sustaining population of brook trout that may threaten the popular Boulder River rainbow trout fishery. Fish sampling in the Boulder River indicates that brook trout numbers have increased in recent years. This change in abundance could be detrimental to the rainbow trout population due to increased competition for food and space.

Where found with other trout species in the Boulder River and similar systems, brook trout tend to dominate. These areas can often provide high-density source of brook trout that can migrate to larger habitats. Brook trout seldom grow to sizes large enough in the Boulder River to be considered a sport fish. Therefore, removing them from small tributary streams will help to ensure that a fishery dominated by small brook trout does not replace the popular fishery for large rainbow trout.

3. Benefits of the Project:

The successful removal of brook trout from the Boulder River Ranch Pond and unnamed tributary will ensure that this area is no longer a source of brook trout for the main Boulder River, and will help prevent brook trout from becoming dominant in this reach.

G. Other Local, State or Federal agencies with overlapping jurisdiction.

Montana Department of Agriculture
Montana Department of Environmental Quality
U.S. Army Corps of Engineers
Park County Conservation District

H. Agencies Consulted During the Preparation of the EA

Montana Department of Environmental Quality. John Wadhams, Helena, MT.
Montana Department of Agriculture

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. WATER Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?			X		YES	2f
g. Changes in the quantity of groundwater?		X				

2. WATER (continued) Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
h. Increase in risk of contamination of surface or groundwater?			X		YES	see 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		YES	see 2a

Comment 2a. Rotenone is commonly used in agriculture and home gardening as well as being an effective fish toxicant. It is relatively inexpensive, compared to other piscicides, and has been routinely used in lake and pond rehabilitation. Rotenone acts by blocking the ability of tissues to use oxygen. Fish quickly asphyxiate in the presence of fish-killing concentrations of the poison. Rotenone is not a carcinogen, although the carcinogen TCE (trichloroethylene) is a component of some brands of rotenone. Rotenone has a half-life of 14 hours at 24°C and 84 hours at 0°C, meaning that half of the rotenone is degraded and is no longer toxic in that time. As the temperature and sunlight increase, they both speed the rate that it is degraded. Higher alkalinity (>170 ppm) and pH (>9.0) also increase the rate of degradation. Rotenone tends to bind and react with organic molecules rendering it ineffective, so higher concentrations are required in streams and lakes with abundant organic debris. Without detoxification, rotenone will be reduced to non-toxic levels in one to several days in streams, and 2-4 weeks in lakes, due to its degradation and dilution in the aquatic environment.

Rotenone will have only a minor potential impact on water quality below the pond because the outlet structure will be completely closed. Thus, no treated water will escape the pond before being detoxified with $KMnO_4$. Rotenone readily degrades in the environment, and no water will be released from the pond until the chemical has completely broken down. It is anticipated that the rotenone will naturally break down in the pond within 2 to 4 weeks following treatment, but this rate can vary depending on the factors mentioned above. Therefore, the rate of breakdown of the chemical will be monitored using sentinel fish placed in the pond following treatment. Once sentinel fish survive for 8 h in the pond, the treatment will be deemed complete and the rotenone, detoxified. Rotenone has been approved for use in fish removal, and represents no threat to humans at concentrations that are used to kill fish.

Dead fish will be allowed to naturally decompose in the pond. As fish decompose, there may be a temporary increase in the availability of nutrients in the water. This increase should not present a problem for water quality downstream of the pond because it is anticipated that no water will be released from the pond until the treatment is complete, and nutrients will be diluted as it fills. Further, aquatic macrophytes are abundant in the pond and will likely benefit from the increased nutrient levels.

Comment 2f: Changes in groundwater quality: The risk that rotenone will enter and be mobile in groundwater is minimal because it has a strong tendency to adsorb to sediment. Once bound to organic molecules, it becomes inert and breaks down quickly in the environment without detoxification. Tests in areas adjacent to rotenone-treated waters did not show evidence of the chemical moving into groundwater supplies. Even if groundwater contamination did occur, there would be no consequences to human health, because the surface-water concentrations to be used in this project have been shown to have no toxic effect on humans or other mammals (see 2j). The mud and organically enriched bottom of the pond should bind and inactivate the rotenone before it can enter the groundwater.

Comment 2j: Effects on other water users: Bioassays on mammals indicate that the proposed concentration of rotenone will have no effect on mammals, including humans and cattle, that drink the treated water (Schnick 1974). There is no restriction on the label of CFT Legumine stating that treated waters cannont be use for stock purposes. This project is located on private

land. Public access is currently not allowed to the pond or the section of tributary stream being treated. Landowners will be aware of the project and will avoid using these areas during treatment.

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

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

5. FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		NO	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				

5. FISH/WILDLIFE (Cont'd) Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: The objective of this project is to eradicate brook trout from the Boulder River Ranch Pond and unnamed tributary. The removal is considered a minor impact because brook trout are not native Montana and are considered invasive due to their impacts on native fish species, as well as impacts on popular sport fish like rainbow trout.

Comment 5c: There are no documented records of nongame fish species in the reservoir or tributary stream. Because rotenone is an insecticide, it will have impacts on non-game aquatic invertebrates. The predicted effect is a temporary decrease in some invertebrate populations (Bramblett 1998). There is no effect on birds or mammals that are directly exposed to rotenone (including by drinking treated water), or that eat fish killed by fish toxicants (Schnick 1974). Amphibian adults are not affected by rotenone at the proposed concentrations (Bramblett 1998), but sub-adults are affected because they are exclusively aquatic and respire through gills or skin. Delaying treating the pond until mid to late summer, when most amphibian species indigenous to the Boulder River drainage have metamorphosed into air-breathing adults, can mitigate these effects.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Increases in existing noise levels?		X				
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

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

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

Comment 8a: CFT Legumine and most other brands of rotenone solution come in concentrations of 5%. At an application rate of 1-2 ppm, the actual concentration of rotenone in the water is approximately 0.025-0.050 ppm (California Department of Fish and Game 1994). The hazard associated with the short-term exposure to drinking water containing rotenone is very small at this low concentration (0.1 ppm), and with the rapid breakdown and dilution. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight. For example, a 160-pound (72.6 kilogram) person would have to drink, at one sitting, over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management. A 22-pound (10 kilogram) child would have to drink over 1,429 gallons (5,400 liters). An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978), which is equivalent to about 25 mg per liter when consumed as drinking water; this concentration is far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water or our proposed concentration of 0.1 mg per liter.

With respect to long-term exposure to rotenone, no significant risk to humans is anticipated because of the low concentrations at which it is applied (100 ug/L) and the fact that it degrades so quickly. The Environmental Protection Agency (EPA, 1997) has determined that the safe level for chronic (lifetime) exposure to rotenone is 4 ug/L. If we assume that rotenone in our treatment has a half-life of 10 days, then it will take 50 days for the concentration to drop below

4 ug/L. Exposure to hazardous concentrations of rotenone for 50 days is a far shorter period of time than the EPA indicates to elicit chronic effects.

Because the project area is located on private property, which is only occupied seasonally by the landowners, the risk of human exposure will be most apparent for the applicators. Rotenone is a restricted-use pesticide, which the Montana Department of Agriculture regulates through its licensing process. A certified applicator who has successfully met the state requirements for a license will supervise the application to the lake and stream. All who assist in the project will also be trained in the safe handling and application of the piscicide. Chemicals will be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill.

The expected concentration of $KMnO_4$ required to neutralize rotenone will be 3 to 5 mg/L (ppm). The EPA believes the chronic toxicity of $KMnO_4$ breakdown products to be of no health concern because they are naturally occurring and common in surface waters. The safety of $KMnO_4$ is further demonstrated by its routine use in drinking water treatment to achieve oxidation of iron and manganese, oxidation of taste and odor compounds, and control of nuisance organisms such as bacteria and viruses (USEPA 1999).

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

10. PUBLIC SERVICES/TAXES/UTILITIES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____		X				

10. PUBLIC SERVICES/TAXES/UTILITIES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources			X		YES	10e
f. Define projected maintenance costs		X				

Comment 10e: Implementation of this project will be accomplished through a commitment of 8-12 person-days from MFWP, during August and September 2008. The project will be accomplished using funds contributed by the owners of the Boulder River Ranch, Hoppertunity Partners LLC, covering the cost of rotenone and application equipment. Other than personnel time, there will be no additional state cost associated with the chemical removal of fish.

Breakdown of person-days **Activity**	**# people**	**# days**	**Person/days**
Treatment #1	2	2	4
Assessment	1	3	3
Post-project monitoring	2	2	4
Total		7 days	11

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

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

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

Comment 13e: Very little opposition is expected because the outlet to the pond will be closed, and no treated waters will be allowed to go downstream until the chemical has naturally broken down or is detoxified. All landowners in close vicinity will be aware of the project and will receive a copy of this EA. Also, MFWP is treating the pond and tributary stream due to concerns that brook trout threaten the valuable rainbow-trout fishery in the Boulder River. This project does not imply any changes in public access to the project area. The project will benefit both the landowner and the public by removing a source population of brook trout from a tributary to the Boulder River. The landowner has agreed to provide funding for the materials necessary for

project completion. The contribution of public funds via MFWP personnel labor is solely for the purpose of protecting the rainbow trout fishery in the Boulder River, a valuable public resource.

Comment 13g: The following permit will be required:

Fish toxicant permit:
DEQ 308 - Department of Environmental Quality (temporary exemption for water quality standards)

PART III. ALTERNATIVES

Three alternatives were considered during preparation of the Environmental Assessment.

Alternative 1 - No Action.

The predicted consequence of the "No Action" alternative is a high probability that the brook trout population would remain at its current size and continue to contribute to the Boulder River brook trout population. As a result, angler opportunity to catch rainbow trout in the Boulder River may face future declines.

Alternative 2 – Mechanical Removal

This alternative has the same goal as the Proposed Action except that no fish toxicants would be used. Rather, fish would be removed by mechanical means only, including both electrofishing and netting. Electrofishing is inefficient at removing all fish, particularly small fish, thus complete removal of fish would be impossible using electrofishing. Gill- and trap-netting would be effective at reducing adult brook trout numbers in the pond after it was drained. However, netting is ineffective at capturing small juvenile fish. Within a few years of netting, the brook trout population would likely rebound to previous levels. To maintain low numbers of brook trout in the project area, removal efforts would therefore need to be repeated every few years. Removal would require a considerable investment of time and resources by MFWP over the years and would be much more costly in the long run than chemical treatment. Further, this method would not be acceptable to the landowners because it would not be feasible to stock the pond with trout until the brook-trout removal was complete.

Alternative 3 - Proposed Action

The proposed action is to chemically treat the Boulder River Ranch Pond and unnamed tributary stream using rotenone. Because toxicants have been demonstrated to be 100% effective when proper techniques are used, it is anticipated that treatment will result in the complete removal of brook trout from the project area, eliminating the need to revisit the pond and tributary stream to remove brook trout in the future.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit rainbow trout in the Boulder River and maintain a valuable recreational fishery with minimal impact on the physical, biological, and human environment.

B) Public Involvement.

The EA will be posted on the FWP website during the comment period. Neighboring landowners will be contacted. A public meeting will be held if necessary.

C) Duration of the comment period?
Public comment will be accepted June 1, 2008 to June 30, 2008.

D) Name, title, address and telephone number of the Person Responsible for Preparing the EA Document.

Jim Darling, Regional Fisheries Manager
Montana Fish, Wildlife and Parks
2300 Lake Elmo Dr.
Billings, MT 59105
(406) 247-2961

Jeremiah Wood, Regional Fisheries Biologist
Montana Fish, Wildlife and Parks
P.O. Box 27
Fishtail, MT 59028
(406) 328-4594

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Appendix 1

Chapter 5 from

Rotenone Use in Fisheries Management
Administrative and Technical Guidelines Manual

Finlayson et al. 2000

5 ISSUES AND RESPONSES

This section was written with the lay (nontechnical) public in mind with minimal use of technical terminology. It includes its own references for reproduction and distribution to the public independent of the remainder of the manual. The Fish Management Chemicals Subcommittee intends to update this information annually for access on the American Fisheries Society Web site.

5.1 General information

Q. What is rotenone?
A. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family Leguminosae including jewel vine *Derris* spp. and lacepod *Lonchocarpus* spp. Rotenone is very insoluble in water, and other materials can be added to disperse it throughout the water column in deep lakes and flowing waters. Rotenone is used either as a powder from ground-up plant roots (e.g., Pro-Noxfish®) or extracted from the roots and formulated as a liquid (e.g., Nusyn-Noxfish® and Noxfish®). The liquid formulations contain dispersants and emulsifiers (primarily naphthalene, methylnaphthalenes, and xylenes) that add little, if any, toxicity but disperse the rotenone throughout the water.

Q. How does rotenone work?
A. Rotenone does not suffocate fish or interfere with the uptake of oxygen in the blood as was long believed. Instead, it inhibits a biochemical process at the cellular level making it impossible for fish to use the oxygen absorbed in the blood and needed in the release of energy during respiration (Oberg 1967a, 1967b).

Q. Why is rotenone used in fish management?
A. Use of rotenone enables fisheries managers to eradicate entire populations and communities of fishes with minimum impact to nontarget wildlife. Following treatment, the desired population of fish is then reestablished in the water body. Although other approaches are useful as control measures, these are only partially effective in eradicating fish. Use of rotenone is the only sampling method that allows for an accurate estimation of standing crop (biomass of a population) of diverse fishes in large water bodies.

Q. Is rotenone a selective pesticide?
A. Although rotenone has some toxicity to all oxygen-breathing animals, it is selective to fish and other gill-breathing organisms at the concentrations used by fish biologists. In general, most common aquatic invertebrates are less sensitive than fish to rotenone. Some of the zooplankton (cladocerans and copepods) are equally sensitive; however, these do have life history stages that can survive the treatment. Snails and clams are quite tolerant. Shad, pike, trout, and salmon are among the most sensitive fish. Sunfish are less sensitive, and catfish are among the most tolerant (Marking and Bills 1976; Chandler and Marking 1982).

5.2 Public health

Q. Are there any public health effects from the use of rotenone?
A. Millions of dollars have been spent on research to determine the safety of rotenone before approval of use from the U.S. Environmental Protection Agency (USEPA). Much of this research has been directed toward potential effects on public health. This research has established that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutations (Biotech Research 1981; Goethem et al. 1981; NAS 1983), or cancer (USEPA 1981b; Tisdel 1985). When used according to label instructions for the control of fish, rotenone poses little, if any, hazard to public health. The USEPA (1981b, 1989b) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment.

Q. What is a lifetime safe exposure level for rotenone?
A. The National Academy of Science (NAS 1983) has suggested a Suggested No-Adverse Response Level (SNARL) for rotenone in drinking water of 0.014 milligrams (mg) rotenone per liter of water (14 parts per billion [ppb]). The California Department of Health Services (memorandum from P. Berteau, California Department of Health Services, to B. Finlayson, California Department of Fish and Game, 26 June 1984) has suggested an Action Level (level of concern) for rotenone in drinking water of 0.004 mg rotenone per liter of water (4 ppb). These proposed life-time, allowable levels for drinking water are based on applying a 1,000-fold safety factor to the chronic feeding study of Ellis et al. (1980). These levels assume a lifetime of exposure to rotenone. For comparison, most rotenone treatments are done within the range of 0.025–0.25 mg rotenone per liter of water (25–250 ppb), and rotenone generally persists for no longer than a few weeks. In addition, rotenone treatments are only infrequently applied to any body of water.

Q. Is there any short-term danger associated with accidentally drinking rotenone-treated water?
A. The hazard associated with drinking water containing rotenone is very small because of the low concentration of rotenone used in the treatment (0.025–0.25 mg of rotenone per liter of water [25–250 ppb]) and the rapid breakdown of rotenone. Estimates on a single lethal dose to humans are 300–500 mg of rotenone per kilogram of body weight (Gleason et al. 1969). Hence, a 160-pound person would have to drink over 87,000 liters (23,000 gallons) of water treated at 0.25 mg of rotenone per liter of

water (highest allowable treatment rate for fish management) at one sitting to receive a lethal dose; similarly, it is extremely unlikely that a 10-kilogram child would drink over 5,400 liters of water. An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978), far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water.

Q. Can rotenone-treated water be used for public consumption or irrigation of crops?

A. Tolerances for rotenone in potable and irrigation water have not been established by USEPA, even though the studies required for setting tolerances have been completed. This does not mean that rotenone concentrations in drinking or irrigation waters will create problems, it just means that the USEPA has not established rotenone tolerances at the time of writing these guidelines. As a result, water containing residues of rotenone cannot be legally allowed for use as a domestic water source or on crops. During the treatment and for the period of time that rotenone residues are present, alternative water sources must be used for domestic and irrigation uses. Depending on initial rotenone concentration and environmental factors (e.g., temperature), this period can vary from 1 to 8 weeks (CDFG 1994; Finlayson and J. Harrington, unpublished data, presented at Chemical Rehabilitation Projects Symposium, Bozeman, Montana, 1991).

Q. Are there any risks to human health from materials in the liquid rotenone formulations?

A. The USEPA (1981b, 1989b) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The California Environmental Protection Agency found that adverse impacts from properly conducted, legal uses of liquid rotenone formulations in prescribed fish management projects were nonexistent or within acceptable levels (memorandum from J. Wells, California Department of Pesticide Regulation, to Finlayson, 3 August 1993). Liquid rotenone contains the carcinogen trichloroethylene (TCE). However, the TCE concentration in water immediately following treatment (less than 0.005 mg TCE per liter of water [5 ppb]) is within the level permissible in drinking water (0.005 mg TCE per liter of water; USEPA 1980b). None of the other materials including xylenes, naphthalene, piperonyl butoxide, and methylnaphthalenes exceed any water quality criteria or guidelines (based on lifetime exposure) set by the USEPA (1980a, 1981a, 1993). Many of these materials in the liquid rotenone formulations (trichloroethylene, naphthalene, and xylene) are the same as those found in fuel oil and are present in waters everywhere because of the frequent use of outboard motors.

Q. Is there any risk to public health from airborne rotenone?

A. No public health effects from rotenone use as a piscicide have been reported. The use of the powder Pro-Noxfish® and the liquid formulation Nusyn-Noxfish® have been monitored for airborne drift into adjacent areas. Airborne rotenone concentrations immediately adjacent to the treatment site, monitored in California during a treatment in 1997, varied from a high of 0.02 ppb rotenone (0.00053 mg of rotenone per cubic meter) immediately after application to nondetectable levels two

weeks later (CARB 1997). The highest levels were approximately 1,000-fold lower than the estimated no observed effect level (NOEL) of 0.43 mg of rotenone per cubic meter of air for a 24-hour period estimated by the California Office of Environmental Health and Hazard Assessment and the California Department of Pesticide Regulation (CARB 1997). In the same monitoring program, TCE was detected only once at a trace amount in air at one spillway. The heavier hydrocarbons (naphthalene and methylnaphthalene) were found at 281 ppb (1.74 mg per cubic meter) in air immediately after treatment and diminished to 1.61 ppb (0.010 mg per cubic meter) in air within two weeks. Individuals can normally detect naphthalene and methylnaphthalene at levels between 40 and 84 ppb in the air. The highest levels of all materials in the 1997 monitoring program were found at a dam spillway because of water turbulence. The highest levels were determined not to be responsible for any health effects (CDPR 1998).

Q. How soon can people safely enter water treated with rotenone?

A. The USEPA (1981b) concluded that there was no reason to restrict the use of rotenone in waters intended for irrigation, livestock (with the possible exception of swine) consumption, and recreational swimming use. The USEPA (1990) ruled that a reentry interval was not needed for persons who swim in waters treated with rotenone based on an assessment of the toxicology data (e.g., skin, oral water intake) and exposure level. The reentry statement on the product labels—"do not swim in rotenone treated water until the application has been completed and all the pesticide has been thoroughly mixed into the water according to labeling instructions"—indicates the safety of rotenone use for fish control. The reason for this slight waiting period is esthetic.

Q. Are people at risk from consuming fish stocked into a recently treated water body?

A. Fish are not stocked into a treated area until all of the toxic effects are gone and rotenone has dissipated. Hence, stocked fish cannot accumulate residues of rotenone from the water. Residues of rotenone in tolerant fish that survive a rotenone treatment won't last for more than several days because the bioaccumulation potential for rotenone is low and the half-life of rotenone in fish is about 1 day (Gingerich and Rach 1985; Gingerich 1986).

Q. Is there any risk to people from consuming fish that have been killed from rotenone?

A. The USEPA has not established guidelines for consuming fish killed with rotenone. Therefore, agencies cannot condone this practice. Additionally, there is a valid concern of risk of salmonella and other bacteriological poisoning from consuming fish that have been dead for a period of time. Fish that end up on land as a result of wave or wind action are no more a threat to public health than fish that die of natural causes.

5.3 Environmental quality

Q. Do dead and decaying fish pose any problems to the recovery of fishing?

A. Most dead fish will sink to the bottom of the treated body of water in several days, decompose, and release nutrients back into the water. These

nutrients will directly stimulate phytoplankton and indirectly stimulate insect and zooplankton production. These organisms are a good food base for fish.

Q. Can the toxic effects of rotenone to fish and other aquatic life be neutralized?

A. In lakes or rivers, if biologists want to neutralize the effects of rotenone, potassium permanganate, an oxidizing agent, can be used. This is added to the water at a minimum 1:1 ratio with the concentration of rotenone applied plus sufficient additional permanganate to satisfy the oxygen demand caused by organic matter that may be present in the treated water. Neutralization of rotenone with permanganate may be impaired at water temperatures of 50°F (10°C) or less (CDFG 1994; AgrEvo, no date).

Q. What is the "pesticide" smell sometimes associated with the use of rotenone?

A. The aromatic smell (like the smell of mothballs) associated with the use of liquid rotenone formulations is likely airborne concentrations (greater than 40 ppb) of naphthalene and methylnaphthalene (CDPR 1998). This smell may last for several days, depending on air and water temperatures and wind direction. These relatively "heavy" organic compounds tend to sink (remain close to the ground) and move downwind.

The California Department of Pesticide Regulation (CDPR 1998) found no health effects from this smell despite complaints.

Q. How long does rotenone persist?

A. The time for natural degradation (neutralization) of rotenone by hydrolysis is governed primarily by temperature. Studies in standing, ice-free waters in California show that rotenone completely degrades within 1 to 8 weeks within the temperature range of 10–20°C (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished); the estimated half-life values for California waters vary from 7.8 to 1.5 days, respectively. Other studies indicate half-life values of 13.9 hours to 10.3 days for water temperatures of 24°C and 5°C, respectively (Gilderhus et al. 1986, 1988). Rotenone dissipates in flowing waters relatively quickly (less than 24 hours) due to dilution and increased rates of hydrolysis (Borriston Laboratories 1983) and photolysis (Cheng et al. 1972; Biospherics 1982). Although rotenone can be found in lake sediments, the levels approximate those found in water, and breakdown of rotenone lags one to two weeks behind water levels. It is uncommon to find rotenone in stream sediments (CDFG 1994).

Q. How long do the materials other than rotenone persist from liquid formulation treatments?

A. Researchers in California have found other organic compounds associated with the use of the liquid formulation Nusyn-Noxfish® (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished). These include the volatile organic compounds (VOC) [xylene, trichlorethylene (TCE), toluene, and trimethylbenzene] and the semivolatile organic compounds (semiVOC) [piperonyl butoxide (PBO), naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene] (Table 5.1). With the exception of PBO, the other organic compounds disappear before rotenone dissipates, typically within 1 to 3 weeks. Piperonyl butoxide, which is the other active ingredient (synergist) in Nusyn-Noxfish®, is relatively stable; photolysis does not contribute significantly to its degradation

(Friedman and Epstein 1970). Piperonyl butoxide has persisted in deep lake waters at low temperatures (below 10°C) for approximately nine months. The VOC's do not accumulate in the sediment, and only naphthalene and the methyl naphthalenes temporarily (less than 8 weeks) accumulate in the sediments (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished).

Table 5.1. Persistence of rotenone and other organic compounds in water and sediment impoundments treated with 2 ppm rotenone formulation.

Compound	Initial water concentration (parts per billion)	Water persistence	Initial sediment concentration (parts per billion)	Sediment persistence
Rotenone	50	<8 weeks	522	<8 weeks
Trichloroethylene	1.4	<2 weeks	ND*	
Xylene	3.4	<2 weeks	ND	
Trimethylbenzene	0.68	<2 weeks	ND	
Naphthalene	140	<3 weeks	146	<8 weeks
1-m-naphthalene	150	<3 weeks	150	<4 weeks
2-m-naphthalene	340	<3 weeks	310	<4 weeks
Toluene	1.2	<2 weeks	ND	
Piperonyl Butoxide	30	<9 months	ND	

*ND=below detection limits

Q. Does the synergist piperonyl butoxide used in some formulations pose an environmental risk?

A. No, piperonyl butoxide has little toxicity to fish and wildlife and is not a risk to humans at the concentrations used in fish management (Roussel Bio Corporation, no date).

Q. Is rotenone likely to enter groundwater and pollute water supplies?

A. The ability of rotenone to move through soil is low to slight. Rotenone moves only 2 cm (<1 inch) in most types of soils. An exception would be in sandy soils where the movement is about 8 cm (slightly more than 3 inches). Rotenone is strongly bound to organic matter in soil so it is unlikely that rotenone would enter groundwater (Dawson et al. 1991). The other compounds in the liquid formulation Nusyn-Noxfish® have not been detected in groundwaters (CDFG 1994; Siepmann and Finlayson 1999; Finlayson and Harrington, unpublished).

Q. Are there any degradation products from rotenone that can cause environmental problems?

A. The metabolite of rotenone, rotenolone, persists longer than rotenone, especially in cold, alpine lakes (Finlayson and Harrington, unpublished). Rotenolone has been detected for as long as 6 weeks in cool water temperatures (<10°C) at high elevations (>8,000 feet). In part, this situation occurs because rotenone may be more susceptible to photolysis than rotenolone. However, studies have indicated that rotenolone is approximately one-tenth as lethal as rotenone (CDFG 1991a). In those rare cases of rotenolone persistence, fish stocking would be delayed until both rotenone and rotenolone residues have declined to nondetectable (<2 ppb) levels to err on the side of safety.

5.4 Fish and Wildlife

Q. Does rotenone affect all aquatic animals the same?

A. No. Fish are more susceptible. All animals including fish, insects, birds, and mammals have natural enzymes in the digestive tract that neutralize

rotenone, and the gastrointestinal absorption of rotenone is inefficient. However, fish (and some forms of amphibians and aquatic invertebrates) are more susceptible because rotenone is readily absorbed directly into their blood through their gills (non-oral route) and thus, digestive enzymes cannot neutralize it. Contrary to common belief, the other ingredients in Noxfish® and Nusyn-Noxfish® impart no toxicity to fish, insects, birds, or mammals (CDFG 1994). Rotenone residues in dead fish are generally very low (<0.1 ppm), unstable like those in water, and not readily absorbed through the gut of the animal eating fish.

Q. Will wildlife that eat dead fish and drink treated water be affected?

A. For the reasons listed above, birds and mammals that eat dead fish and drink treated water will not be affected. A bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within 24 hours to receive a lethal dose. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily; thus, a safety factor of 1,000- to 10,000-fold exists for birds and mammals. No latent or continuing toxicity is expected since under normal conditions rotenone will not persist for more than a few weeks (CDFG 1994).

Q. Will wildlife species be affected by the loss of their food supply following a rotenone treatment?

A. During recent treatments in California, fish-eating birds (i.e., herons and sea gulls) and mammals (i.e., raccoons) were found foraging on dying and recently dead fish for several days following treatment (CDFG 1994). Following this abundance of dead fish, a temporary reduction in food supplies for fish- or invertebrate-eating birds and mammals will result until the fish and invertebrates are restored. There is no indication that this temporary reduction results in any significant impacts to most bird or mammal populations because most animals can utilize other water bodies and sources for food. However, the temporary loss in food resources for sensitive animals during mating may cause unavoidable impacts. California has mitigated an impact to nesting bald eagles during mating by removing their eggs from the nest to an approved eagle recovery program out of the area (CDFG 1991b). Likewise, Michigan has mitigated the impacts to loons by delaying treatments until chicks have fledged.

Q. Is it safe for livestock to drink from rotenone-treated waters?

A. Rotenone was used for many years to control grubs on the backs of dairy and beef cattle. The USEPA (1981b) has stated that there is no need to restrict livestock consumption of treated waters. However, swine are more sensitive to rotenone than cattle (Thomson 1985).

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