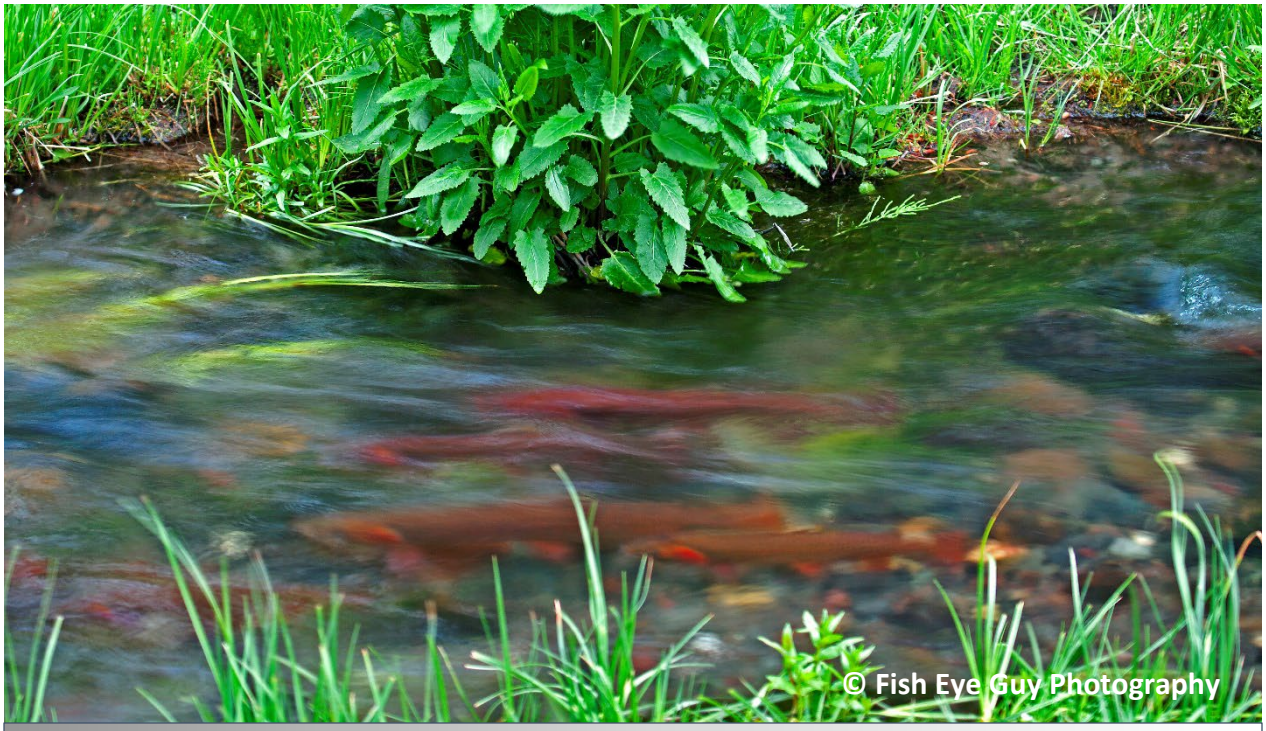
Buffalo Creek Yellowstone Cutthroat Trout Conservation



Reclamation of Buffalo Creek for Yellowstone Cutthroat Trout
Final Environmental Assessment

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1 Executive Summary

Yellowstone cutthroat trout (Figure 1) are a natural treasure and an icon of Yellowstone National Park and the Absaroka-Beartooth Wilderness; however, nonnative rainbow trout in Buffalo Creek threaten the Yellowstone cutthroat trout in legendary streams in the Lamar River watershed. Rainbow trout breed with cutthroat trout yielding fertile hybrids that continue to spread nonnative and harmful genes through a population, and if left unchecked, this hybridization threatens the entire Lamar River population of cutthroat trout found in 352 stream miles in the basin. The Lamar River watershed straddles the boundary of the nation's first park and the Absaroka-Beartooth Wilderness. Watershed level strongholds for Yellowstone cutthroat trout are increasingly rare, and protecting this population is critical in warding off more losses and in securing this species that is emblematic of Yellowstone National Park, is a key component of the natural character of the area and brings great joy to visitors. Conserving these fish is a requirement under state and federal law and is a moral obligation to future generations.

Figure 1. Yellowstone cutthroat trout in their native habitat.

Yellowstone cutthroat trout are native to the Yellowstone River watershed and have outstanding ecological, historical, and recreational value. (See the Yellowstone cutthroat trout story map[1] for background on this Montana native). This stunning fish has declined substantially in distribution and abundance, with nonnative species and habitat degradation being primary drivers of their decline. Rainbow trout are nonnative and have been the biggest cause of loss of Yellowstone cutthroat trout. Climate change is working to further limit suitable

[1] https://mtfwp.maps.arcgis.com/apps/Cascade/index.html?appid=fdf5c7af3413435da2c2190aab5ef9c3

habitat for Yellowstone cutthroat trout, and high elevation strongholds like Yellowstone National Park and the Absaroka Mountains are among the few places Yellowstone cutthroat trout will be able to persist over the next few decades.

This project proposes to remove nonnative rainbow trout from the Buffalo Creek watershed within the Absaroka-Beartooth Wilderness to its confluence with Slough Creek in Yellowstone National Park (Figure 2). Slough Creek is a highly valued Yellowstone cutthroat trout fishery; however, rainbow trout and hybrids have been found with increasing frequency over the past decade. The primary goal of this project is to remove rainbow trout from the Buffalo Creek watershed, which would protect the genetic integrity of Yellowstone cutthroat trout in the Lamar River basin while improving the natural quality of wilderness character. Native Yellowstone cutthroat trout in the Nation's first national park are a national treasure with immeasurable ecological, historical, and recreational value. Conserving Yellowstone cutthroat trout would secure part of Yellowstone National Park's natural legacy and allow future generations to experience part of the genuine Yellowstone experience.

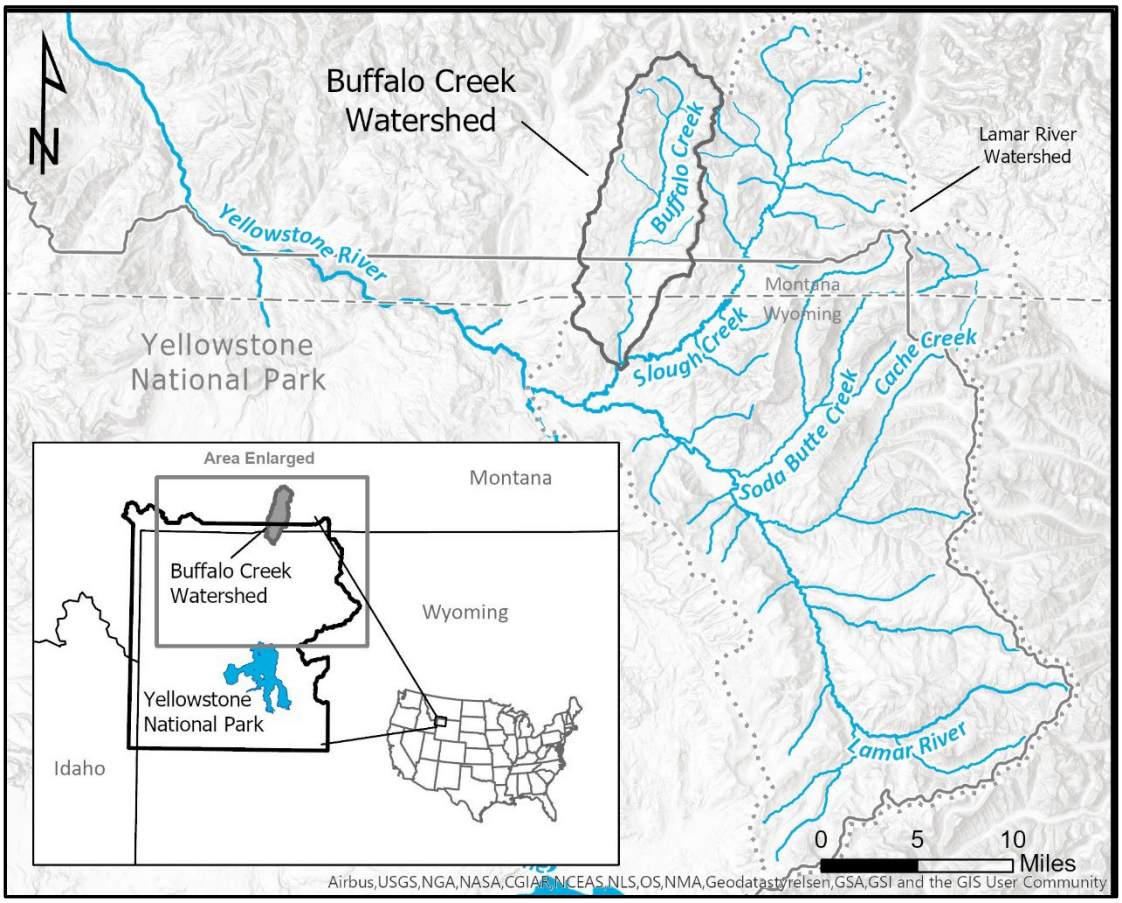

Figure 2. Map of Buffalo Creek within the Lamar River watershed.

A secondary benefit of the proposed action is that it would establish a secure population of nonhybridized Yellowstone cutthroat trout in Buffalo Creek. Climate change is constricting the amount of habitat suitable for Yellowstone cutthroat trout within their historic range. The project area is at high elevation and predicted to remain thermally suitable for Yellowstone cutthroat trout for the foreseeable future.

Rainbow trout would be removed using a formulation of rotenone that targets fish and can kill some invertebrates; however, its toxicity is short-lived. Aquatic invertebrate populations recover typically within a year after treatment. The rotenone formulation is safe for terrestrial wildlife and humans. Deactivation of rotenone at the downstream end of the project area would limit the spatial extent of affected waters.

This project would be a collaboration among Montana Fish, Wildlife & Parks (FWP), the Forest Service, and the National Park Service (NPS). The project is consistent with each agency's established strategies for conserving Yellowstone cutthroat trout and their legal obligations to conserve native trout. These agencies regularly collaborate on projects that conserve native trout. Consultation with the Montana Natural Heritage Program on environmental tolerances of certain species and obtaining permits to release piscicide from the Montana Department of Environmental Quality and the U.S. Forest Service are required components of piscicide projects, with the piscicide use permit issued by the U.S. Forest Service being required for releasing rotenone in designated wilderness.

The Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA) require state and federal agencies to engage the public, develop a range of alternatives, and to consider the environmental, social, cultural, and economic effects of proposed actions. This Environmental Assessment (EA) considers the potential consequences of three alternatives to restore Yellowstone cutthroat trout to Buffalo Creek and eliminate a source of nonnative rainbow trout genes within the Lamar River watershed. This EA evaluates three alternatives:

1. Removal of rainbow trout using rotenone and establishing a secure population of Yellowstone cutthroat trout within the Buffalo Creek watershed.
2. No Action
3. Removal of rainbow trout and leaving the watershed fishless

Three other alternatives were considered but rejected, as they would not meet the project's primary goal of eradication of rainbow trout in the project area.

- Mechanical removal using electrofishing and nets

- Angling
- Piscicide application without motorized equipment

Alternative 1 is the proposed action. It would have short-term, minor effects on wildlife, wilderness character, recreation, and vegetation. This alternative would be highly beneficial to Yellowstone cutthroat trout within the Lamar River watershed, as rainbow trout present the biggest risk to this world-renowned fishery. The project would contribute considerably to the persistence of Yellowstone cutthroat trout in America's first national park and the Absaroka-Beartooth Wilderness. These actions would improve the natural quality of wilderness character degraded by a nonnative species.

Scoping and Public Involvement

FWP published the draft Buffalo Creek Yellowstone cutthroat trout conservation EA on March 18th, 2021, initiating a 34-day public comment period with scoping notices in the Billings Gazette, Helena Independent Record, Bozeman Daily Chronicle, state-wide press release, and on its web page. The CGNF published a legal notice in the Bozeman Daily Chronicle on March 23, 2021 initiating a parallel 30-day comment period for the Forest Service. This public scoping notice was posted on the Custer Gallatin National Forest webpage (Schedule of Proposed Actions) starting April 2021 along with a link to the draft EA. The Forest Service received 47 independent and unique comment letters for the Buffalo Creek Project. An additional 14,743 comments were received via a form letter from Wilderness Watch. These public comments were used to identify issues that were addressed in preparation of the MRDG and this final EA.

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1 PROPOSED ACTION and BACKGROUND

1.1 *Background and Need*

This project is a native fish conservation project designed to remove the immediate threat nonnative rainbow trout pose to Yellowstone cutthroat trout in the Lamar River watershed within Yellowstone National Park while improving the natural quality of wilderness character (Figure 3). Yellowstone cutthroat trout are integral to the natural character of these wildlands; however, a population of nonnative rainbow trout in Buffalo Creek (Heim 2019), and the resulting hybridization threatens Yellowstone cutthroat trout throughout the entire Lamar River watershed, which encompasses over 350 miles of stream. Removing rainbow trout using rotenone would eliminate the primary source of hybridization in the Lamar River watershed. Yellowstone cutthroat trout would be translocated to the treatment area using the best available source of fish.

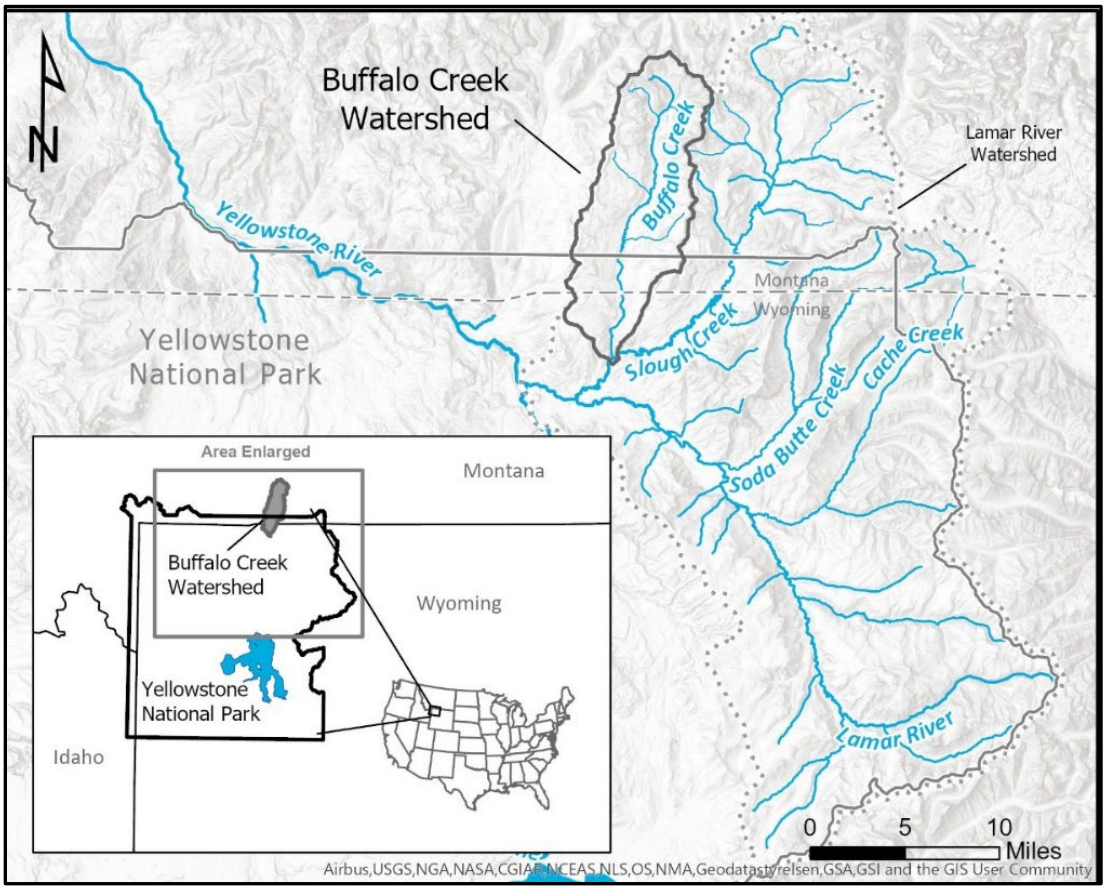

Figure 3. Buffalo Creek project area within the Lamar River watershed.

The project would also establish a secure population of Yellowstone cutthroat trout within an area in Montana that will remain cold enough to support Yellowstone cutthroat trout despite our warming climate (Isaak et al. 2017). Climate change is shrinking suitable habitat for

Yellowstone cutthroat trout within the historic range, this project would offset losses occurring elsewhere by establishing a protected population of Yellowstone cutthroat trout upstream of a barrier cascade.

This project is a net improvement to the natural quality of wilderness character by removing a nonnative species and replacing it with Yellowstone cutthroat trout, the species native to lower Buffalo Creek and the Greater Yellowstone Ecosystem. The proposed action is necessary to preserve the natural quality of wilderness character in the Buffalo Creek drainage. Removing rainbow trout protects the indigenous aquatic communities and ecological processes and allows us to understand and learn from natural features. To preserve this quality, taking action to correct unnatural conditions even though they were present at the time of wilderness designation is necessary.

Yellowstone cutthroat trout have tremendous ecological, historical, recreational, and economic value (see Yellowstone Cutthroat Trout Story Map for background on this Montana native). Yellowstone cutthroat trout are the top predator in the waters in their historical range and in turn provide sustenance to other iconic species like bald eagles, river otters, osprey, and threatened grizzly bears. Early explorers and settlers exploited this abundant resource, and today, anglers come from around the world to catch native Yellowstone cutthroat trout in Yellowstone National Park and the adjacent wilderness area for an unparalleled back country experience. Yellowstone cutthroat trout embody much of what makes the Absaroka-Beartooth Wilderness and Yellowstone National Park special.

Yellowstone cutthroat trout have declined substantially in distribution and abundance and now occupy 44% of their historically occupied habitat range wide (Figure 4). In Montana, Yellowstone cutthroat trout remain in 33% of their historical range. More loss of occupied habitat is predicted with climate change (Isaak et al. 2017), and nonnative fishes decrease the ability for Yellowstone cutthroat trout to remain in some occupied habitat. Finding secure habitat and protecting the high elevation populations are conservation priorities.

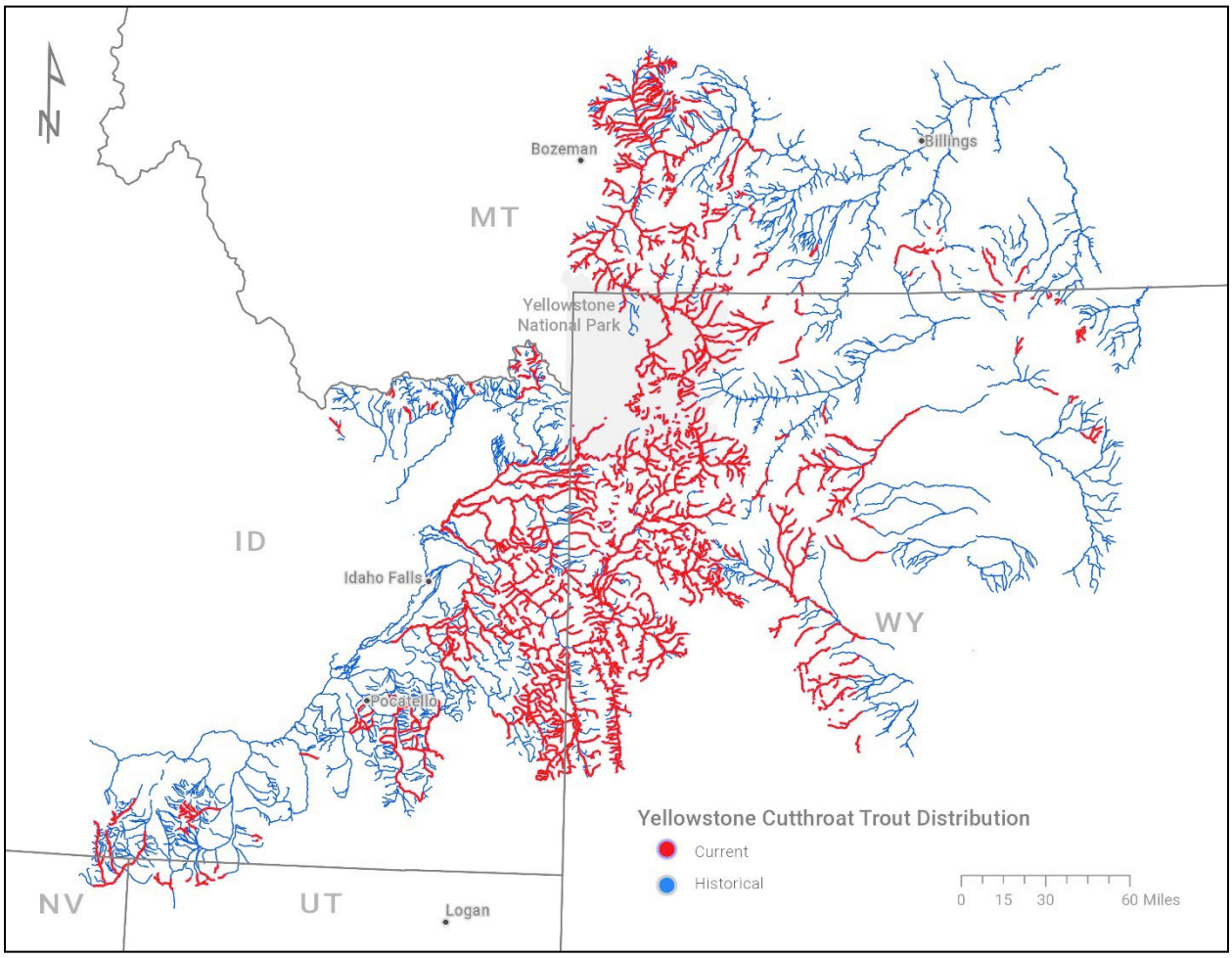

Figure 4. Historical and current range of Yellowstone cutthroat trout.

Nonnative fishes, habitat degradation, stream dewatering, and passage barriers are the major causes of decline of Yellowstone cutthroat trout. The warming climate has added another stressor that is constricting the amount of habitat that will remain suitable for Yellowstone cutthroat trout (Isaak et al. 2015). High elevation refuges like the Buffalo Creek watershed will likely be the last strongholds for many native trout.

Rainbow trout are the biggest contributor to the decline of Yellowstone cutthroat trout (Kruse et al. 2000). Rainbow trout were stocked into Yellowstone cutthroat trout habitat by the millions for several decades. These closely related species readily interbreed, yielding fertile hybrids. Hybridization is especially detrimental, as genes from other species alter the features that make nonhybridized Yellowstone cutthroat trout distinct. The alien genes also greatly decrease the fitness of even slightly hybridized fish (Muhlfeld et al. 2009). The onslaught of rainbow trout into Yellowstone cutthroat trout habitat eventually swamped them out of existence in much of their range.

The Buffalo Creek watershed is presumed to be historically fishless upstream of a barrier cascade near the boundary of Yellowstone National Park; however, Hidden Lake was stocked with rainbow trout in 1932. The progeny of this stocking event are spreading throughout the watershed and have expanded downstream into the Lamar River drainage resulting in presence of rainbow trout and rainbow trout × Yellowstone cutthroat trout hybrids (Heim 2019). Rainbow trout and the hybrids pose a direct threat to Yellowstone cutthroat trout and the natural character of Yellowstone National Park. Yellowstone cutthroat trout would benefit from removal of rainbow trout and continue to swim in their ancestral waters with reduced risk of hybridization. Future generations would experience the restored native species assemblage of Yellowstone National Park and the improved natural quality of the Absaroka-Beartooth Wilderness in the Buffalo Creek drainage.

The Buffalo Creek watershed is an ideal location to establish a secure population of nonhybridized Yellowstone cutthroat trout. A barrier cascade at the boundary of Yellowstone National Park would protect the population from invasion of rainbow trout and hybrids present in Slough Creek. The cascade is at a slope with a drop of 12 feet and is a total barrier to upstream fish migration (Figure 5). Climate Shield data project a 33% decline in thermally suitable YCT habitat across the Lamar River drainage by the year 2080 (Isaak et al. 2017). However, the project location is within an area predicted to be highly resilient to climate change, and 43 streams miles in the watershed have a 90 to 100% probability of remaining thermally suitable for Yellowstone cutthroat trout by 2040, whereas many neighboring waters have a lower probability of remaining suitable for Yellowstone cutthroat trout (Figure 6). The project area would provide 46 miles of fish-bearing stream and a lake upstream of the barrier falls, which would support a large population with potential for diverse life strategies. These characteristics would contribute to resilience of a YCT population against future hybridization, disease, natural disturbance, and climate change threats.

Figure 5. Barrier cascade on Buffalo Creek near the boundary of Yellowstone National Park.

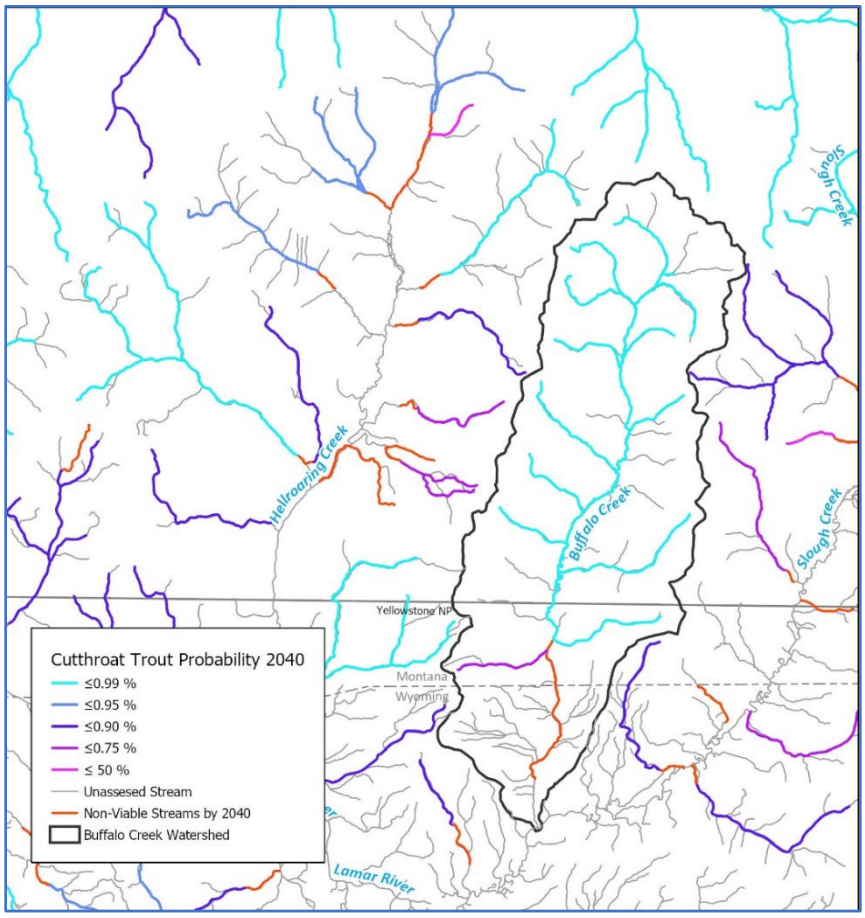

Figure 6. Probability of remaining suitable habitat for Yellowstone cutthroat trout by 2040 (Isaak et al. 2017).

1.2 *Goals of Proposed Action*

The primary goal of the proposed action is to eliminate the source of rainbow trout that are causing increasing hybridization of a population of Yellowstone cutthroat trout that had not shown signs of hybridization until a decade ago (Heim 2019). Eliminating nonnative rainbow trout in the Buffalo Creek watershed would improve the natural quality of wilderness character and protect the Yellowstone cutthroat trout fishery in Slough Creek and the larger Lamar River watershed. Protecting this invaluable resource is among the highest conservation priorities for Yellowstone cutthroat trout in Yellowstone National Park and Montana, and the rate of hybridization calls for quick action.

The secondary goal of the project is to establish a secure population of nonhybridized Yellowstone cutthroat trout in an area that should remain cold enough for Yellowstone cutthroat trout into the foreseeable future. Climate modeling predicts this area will be among increasingly rare areas to protect native Yellowstone cutthroat trout (Figure 6). Translocation of non-hybridized Yellowstone cutthroat trout from the best available source would repopulate

these waters with fish that are locally adapted and do not threaten the Yellowstone cutthroat trout downstream.

1.3 *Montana Fish, Wildlife and Parks Authority for Proposed Action*

The proposed action is consistent with state and federal law, and relevant planning efforts to conserve Yellowstone cutthroat trout within their native range. Montana state law provides FWP with the authority for implementation of fish management and restoration projects (MCA § 87-1-702; § 87-1-201[9][a]). In addition, Montana state law authorizes FWP to manage wildlife, fish, game and nongame animals to prevent the need for listing under the Endangered Species Act, and listed, sensitive, or species that are candidates for listing under the ESA must be managed in manner that assists in the maintenance or recovery of the species (MCA § 87-5-107). In waters where FWP is seeking to remove or control unauthorized species, FWP must endeavor to protect the previously existing fishery and suppress or eradicate the unauthorized species to maintain the existing management objectives for that fishery (ARM 12. 7. 1501[4]). Montana state law also allows the use of chemicals to remove fish (ARM 12. 7. 1503[1][f][ii]).

Planning documents and strategies developed by agencies and collaborating entities also provide official justification for the proposed action (Table 1). These include conservation agreements among stakeholder groups, state and federal laws, and agency plans designed to conserve and protect Yellowstone cutthroat trout within its native range. Combined, these documents define threats to and status of Yellowstone cutthroat trout within its native range, prioritize conservation concerns, and provide guidance on ways to implement projects.

Section 4(d,7) of the Wilderness Act states that “Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several states with respect to wildlife and fish in the national forests. The 2006 *Policies and Guidelines for Fish and Wildlife Management in National Forests and Bureau of Land Management Agencies* is a statement of policy with guidelines intended to provide guidance to state fish and wildlife agencies, Forest Service (FS) and Bureau of Land Management (AFWA et al.) personnel for the management of fish and wildlife populations in wilderness in accordance with the Wilderness Act of 1964 (16 USC 1131-1136). The 2008 *Cooperative Agreement for Fish, Wildlife and Habitat Management on National Forest Wilderness Lands in Montana* provides additional policies and guidelines relevant to state fish and wildlife management authority on Wilderness Lands in Montana.

Table 1. Planning and strategy documents with relevance to conservation of Yellowstone cutthroat trout in Buffalo Creek.

Agency	*Citation*	*Website*
FWP	Yellowstone Cutthroat Trout Conservation Strategy for Montana	http://fwp. mt. gov/fishAndWildlife/management/yellowstoneCT/
FWP	Piscicide policy (FWP 2017)	Internal document
FWP	Statewide Fisheries Management Plan (FWP 2019)	http://fwp. mt. gov/fishAndWildlife/management/fisheries/statewidePlan/
Montana Cutthroat Trout Steering Committee	Memorandum of Understanding and Conservation Agreement for Westslope Trout and Yellowstone Cutthroat Trout in Montana (MCTSC 2007)	http://fwp. mt. gov/fishAndWildlife/management/yellowstoneCT/
Multiple	Memorandum of Agreement for Conservation and Management of Yellowstone Cutthroat Trout among MT, ID, WY, NV, U. S. Forest Service YNP, Grand Teton National Park. (May 2000)	http://www. fws. gov/mountain-prairie/species/fish/yct/archive/Microsoft%20Word%20-%20YCT-MOU. pdf
NPS	Native fish Conservation Plan Environmental Assessment (NPS 2010)	http://parkplanning. nps. gov/document. cfm?parkID=111&projectID=30504&documentID=37967
U. S. Congress	Wilderness Act of 1964	https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/Environ-Cultural/wilderness_act.pdf

The Montana Cutthroat Trout Steering Committee developed a conservation agreement signed by state and federal agencies, conservation organizations, and representative groups for agriculture, mining, and timber harvest (MCTSC 2007). Signatories, which include FWP, the FS, and the NPS, agree to conserve Yellowstone cutthroat trout throughout its historical range.

Conservation goals developed for cutthroat trout in in the MOU include:

- Ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges.
- Maintain the genetic integrity and diversity of nonhybridized populations, as well as the diversity of life history strategies represented by remaining cutthroat trout populations; and
- Protect the ecological, recreational, and economic values associated with cutthroat trout.

Objectives developed to meet conservation goals are consistent with the need for the proposed action. The relevant objectives are as follows:

- Maintain, secure, and/or enhance all cutthroat trout populations designated as conservation populations, especially the nonhybridized components;
- Continue to survey waters to locate additional cutthroat trout populations and determine their distribution, abundance, and status; and
- Seek collaborative opportunities to restore and/or expand populations of cutthroat trout into selected suitable habitats within their historic ranges.

This project meets several goals and objectives of the cutthroat trout conservation agreement and is a priority under the National Park Services *Native Fish Conservation Plan* (NPS 2010). Invasion of rainbow trout into upper Slough Creek was discovered in the 2000s, and rainbow trout hybridization has continued to increase in the Lamar River drainage since then (NPS 2010). Heim (2019) determined that "spatial patterns of invasion point to Buffalo Creek as the single contemporary source of rainbow trout in the (Lamar) watershed." The NPS is addressing spread of rainbow trout genes in Slough Creek through mechanical removal of rainbow trout and hybrids with electrofishing and removal by anglers (NPS 2010). If rainbow trout are not removed, the Buffalo Creek watershed would be a perpetual source of rainbow trout genes bleeding into a highly valued fishery in Yellowstone National Park. Yellowstone cutthroat trout are a key part of the Yellowstone National Park's natural heritage and have rich ecological, historical, recreational, and economic value. Moreover, failing to act would not be consistent with the agreement developed for conservation of cutthroat trout in Montana (MCTSC 2007), and state and federal laws.

1.4 *Forest Service Authority for Proposed Action*

State agencies use piscicide to remove nonnative fish populations and many treatments occur on National Forest System lands in the Northern Region (Region 1). The U.S. Forest Service is signatory to the *Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana* and the *MOU and Conservation Agreement for Westslope and Yellowstone Cutthroat Trout in Montana* (AFWA et al. 2006; MCTSC 2007) which demonstrates a commitment to restoring Yellowstone cutthroat trout populations. A central theme of these MOUs, the Fish and Wildlife Coordination Act (Public Law 85-624), and the Sikes Act (Public Law 93-452) is one of coordination among states and the Forest Service. In the spirit of these agreements and laws, pesticide application consistent with label requirements is considered a state action but is coordinated under the cooperation of the local National Forest and in some cases the Forest Service regional office.

Piscicide projects on National Forest System lands within designated wilderness must comply with the following applicable laws, regulations, policy, and forest plan direction.

Custer Gallatin National Forest Land Management Plan *(Applicable Direction)*

Watershed and Aquatics

Properly functioning watersheds provide suitable conditions for sustainable clean water, healthy stable soils, vegetation growth, forage, aquatic and wildlife habitats, and the ability to withstand high intensity floods. Healthy watersheds contribute to local economies in the planning area including quality lands and water for, but not limited to, hunting, fishing, timber production, irrigation, and ranching.

Desired Conditions

01 Watershed features, including natural disturbance regimes and aquatic or riparian habitats, are well distributed, diverse, and complex. Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbances, including climate change, without long-term, adverse changes to their physical or biological integrity.

03 Habitat and ecological conditions support the persistence of native aquatic and riparian associated plant and animal species.

Goals (FW-GO-WTR)
01 The Custer Gallatin National Forest cooperates with Montana Fish Wildlife and Parks and South Dakota Department of Game, Fish and Parks to reintroduce non-hybridized native fish species in their historic range, introduce in locations the state(s) and the Custer Gallatin agree to for native fish species conservation, and conserve existing populations of native fish.

Objectives (FW-OBJ-WTR)
01 Per decade, complete 600 miles of stream and headwater spring restoration; and 50 acres of lake, pond, and wetland restoration projects across the spectrum of montane and pine savanna habitats, to maintain and enhance aquatic and riparian habits and species to maintain and enhance aquatic and riparian habitats and species.

03 Per decade, progress towards conservation of an at-risk aquatic species is made by completing 5 to 7 projects with design features that restore habitat or populations of such species.

Invasive Species

A species is considered invasive if it meets two criteria: (1) it is a nonnative organism to the ecosystem under consideration, and (2) its introduction causes, or is likely to cause economic or environmental harm, or harm to human, animal, or health (Executive Order 13751, 2016). Invasive species includes all taxa, including plants (such as state and county designated noxious weeds), vertebrates, invertebrates (such as emerald ash borer, non-native mussel larvae), and pathogens (such as blister rust or white-nosed syndrome fungus).

Forest Service invasive species management policy and guidance are provided in Forest Service Manuals 2900 Invasive Species Management, 2070 Vegetation Ecology, 2150 Pesticide Use Management and Coordination, Forest Service National Strategic Framework for Invasive Species Management of 2013, and A National Road Map for Integrated Pest Management (Revised September 2018).

Forest Service policy (FSM 2903) requires determining the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis and, where necessary, provide for alternatives or mitigation measures to reduce or eliminate that risk before project approval.

Desired Conditions (FW-DC-INV)

***01** Non-infested areas remain free of invasive species. Where invasive species occur, their range is reduced where possible, or at a minimum, they do not expand. Desired nonnative species occur where they do not conflict with native species, and are supported by healthy, functioning ecosystems.*

Goals (FW-GO-INV)

***01** The Custer Gallatin National Forest coordinates and cooperates with Tribes, Federal, State and County agencies, non-government organizations, permittees, and adjacent landowners to support integrated pest management including invasive species prevention, early detection and rapid response, control and containment, restoration and rehabilitation, and inventory and monitoring activities.*

***02** The Custer Gallatin National Forest coordinates with Tribes, and State or County agencies to support implementation and enforcement of regulations, permits, plans, and guidance on invasive species management across the national forest, including but not limited to:*

a. State regulations and protocols related to prevention and control of aquatic and terrestrial invasive species (including noxious weeds);

c. State aquatic invasive species regulations, management plans, disinfecting protocols, fish and wildlife management plans, early detection, and rapid response plans, or other statewide or region-wide invasive species management plans;

03 *The Custer Gallatin National Forest participates in agreements and memorandums of understanding with Tribes, other Federal, State or County agencies, non-government organizations, and other partner organizations to address invasive species issues. Collaborative efforts such as "cooperative weed management areas," "cooperative invasive species management areas," or similar collaborative partnerships support invasive species management across the landscape.*

Standards (FW-STD-INV)

01 *Decisions authorizing the use of chemicals shall outline protection measures for treatment, and measures to minimize contamination of water resources and injury to non-target desired plants and animals, including at-risk species.*

02 *Invasive species treatments in or near at-risk-species populations shall use methods that are not detrimental to the long-term persistence of the species.*

03 *Forest Service employees and agency-authorized personnel shall use standard operational procedures, National Best Management Program practices and other agency requirements to minimize invasive species establishment and spread through contaminated vehicles, equipment, personnel, or materials (including plants, wood, plant/wood products, water, soil, rock, sand, gravel, mulch, seeds, grain, hay, straw, or other materials).*

04 *Forest Service employees and agency-authorized personnel, shall use best management practices and Federal and State agency guidance to inspect and clean equipment (including boats, rafts, waders, and boots, drafting equipment, water tenders, helicopter buckets, etc.) before use in a water body or when moving between watersheds or water sources to reduce the potential for the introduction of aquatic invasive species, including aquatic pathogens.*

Wildlife

Standards (FW-STD-WL)

01 A food and attractant storage special order shall apply to the Absaroka Beartooth Mountains; Bridger, Bangtail, and Crazy Mountains; Madison, Henrys Lake, and Gallatin Mountains, and Pryor Mountains Geographic Areas.

Big Game (Deer, Elk and Moose)

Guidelines (FW-GDL-WLBG)

02 To avoid stressing wildlife when energy demands are high, management activities should be located and scheduled to minimize disturbance of wild ungulates on winter ranges during the winter and in known calving, fawning, lambing, or kidding areas during the reproductive season. Exceptions may occur when needed for protection of other resources as mandated by law, regulation, or policy. In such cases, management activities should be concentrated in time or space to reduce impacts to wild ungulates.

Grizzly Bear (WLGB)

Standards (FW-STD-WLGB)

01 Inside the recovery zone/primary conservation area, management actions shall not reduce the percent of secure habitat in each bear management subunit below 1998 baseline levels. For subunits identified in the 2007 Conservation Strategy as needing improvement above 1998 levels (Gallatin #3, Henrys Lake #2, and Madison #2), management actions shall not reduce the percent of secure habitat below levels attained from full implementation of the 2006 Gallatin National Forest Travel Management Plan. See glossary: baseline levels for grizzly bears, and plan appendix F for secure habitat values. Management actions that result in temporary or permanent reduction of secure habitat below the applicable baseline are allowed so long as they follow the application rules listed in standards FW-STD-WLGB 02 and 03 below.

03 Temporary Changes in Secure Habitat. Inside the recovery zone/primary conservation area, project activities shall meet the following conditions for temporary reductions in secure habitat below baseline:

a. Only one project affecting secure habitat below baseline values may be active within a given bear management subunit at any one time.

b. Total acreage of secure habitat below baseline values within a given bear management unit shall not exceed 1 percent of the acreage in the largest subunit within that bear management unit. The acreage of a project that counts against the 1

percent limit (for example the amount of secure habitat affected) is measured as the acreage within the 500-meter buffer around any temporary motorized access route or low-level helicopter flight line that intrudes into existing secure habitat.

Guidelines (FW-GDL-WLGB)

01 *Temporary Changes in Secure Habitat.* To minimize human disturbance and associated displacement of grizzly bears, project activities should meet the following conditions for temporary reductions in secure habitat below baseline inside the recovery zone/primary conservation area:

a. Project activities should be concentrated in space and time to minimize disturbance.

Suitability (FW-SUIT-WLGB)

01 Where otherwise allowed (such as outside of designated wilderness), secure habitat inside the recovery zone/primary conservation area is suitable for the following activities:

a. Activities that do not require route construction or reconstruction, re-opening of a previously closed road, or recurring low-level helicopter flight lines.

b. Helicopter use for short term (no more than 2 days in the duration of a project), or at higher elevations (at least 500 meters above ground level with no landing). Aircraft used in emergency firefighting are allowed.

e. Project activities (such as temporary road construction and maintenance, or use of recurring low-level helicopter flights) that occurs entirely during the grizzly bear denning season.

Designated Wilderness (DWA)

Introduction

The Wilderness Act of 1964 established a system of wilderness areas across the United States. These areas are to be administered for the use and enjoyment of the American people and for the preservation of their wilderness character. In addition to the Wilderness Act, the Forest Service provides direction for the management of wilderness through Forest Service Manual 2320.

Management actions are required to meet minimum requirements for the administration of the areas as wilderness and to have the least impact to wilderness character. The use of a minimum requirement analysis is required for any action that includes a prohibited use as described in section 4(C) of the Wilderness Act, or for other actions that may impair wilderness character. Ecosystem restoration projects may be allowed if they preserve wilderness character. This includes compliance with a minimum requirement analysis in conjunction with the Framework for Evaluating Ecological Intervention to determine the project is the minimum necessary for the administration of the area as wilderness.

Standards (FW-STD-DWA)

04 Building a campfire shall not be authorized in areas displayed in plan appendix B map titled "Wilderness Campfire Restricted Areas."

07 Group sizes in excess of 15 people the Absaroka-Beartooth and Lee Metcalf Wilderness Areas shall not be authorized.

14 Administrative authorizations for use of motor vehicles, motorized equipment, or mechanical transport shall be limited to the minimum necessary for the purpose of wilderness or human health and safety.

Suitability (FW-SUIT-DWA)

02 Designated wilderness areas are not suitable for mechanical transport or motorized equipment.

Forest Service Manual

The Forest Service Manual objective for management of fish and wildlife in wilderness (FSM 2323.31) states "protect fish indigenous to the area from human caused conditions that could lead to Federal listing as threatened or endangered." Furthermore, chemical treatment may be used to prepare waters for reestablishment of indigenous, threatened or endangered, or native species, or to correct undesirable conditions caused by human influence (FSM 2323.34f). Proposals for chemical treatments in wilderness are considered and may be authorized by the federal administering agency through application of the Minimum Requirements Decision Guide (MRDG) as outlined in Section E., General Policy (Association of Wildlife and Fish Agencies 2006). Any use of chemical treatments in wilderness requires prior approval by the Regional Forester (FSM 2150).

FSM 2326.1 - Conditions Under Which Use May Be Approved

Allow the use of motorized equipment or mechanical transport only for:

5. To meet minimum needs for protection and administration of the area as wilderness, only as follows:

   a. A delivery or application problem necessary to meet wilderness objectives cannot be resolved within reason through the use of nonmotorized methods.

   b. An essential activity is impossible to accomplish by nonmotorized means because of such factors as time or season limitations, safety, or other material restrictions. The line officer approving the use of motorized equipment, aircraft, or mechanical transport shall specify what uses of that equipment are suitable and would have the least lasting impact to the wilderness resource. Schedule use of this equipment to minimize impact on wilderness visitors.

Endangered Species Act

Under Section 7 of the ESA, each federal agency must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species or critical habitat. A biological assessment (BA) will be completed for this project and submitted to the USFWS for formal consultation. There is expected to be no effect to Canada lynx critical habitat or the proposed threatened whitebark pine as individual tree removal would not occur to a level impacting lynx critical habitat and no 5 needled pines would be removed. The final Forest Service decision for piscicide use in the Absaroka-Beartooth Wilderness would not be signed until concurrence is received from the USFWS.

National Forest Management Act

Sensitive fish and wildlife species on National Forest System Lands are managed under the authority of the National Forest Management Act (NFMA) and are administratively designated by the Regional Forester (FSM 2670.5; USFS 2004). The project area is included in Forest Service Region 1 on the Custer Gallatin National Forest. FSM 2670.22 requires the maintenance of viable populations of native and desired nonnative species and to avoid actions that may cause a species to become threatened or endangered. The NFMA directs the Forest Service to “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives.” [16 U.S.C. 1604{g){3){B)]. Providing ecological conditions to support diversity of native plant and animal species in the project area satisfies the statutory requirements. The Forest Service’s compliance with NFMA is accomplished through application of the Forest plan and the project level requirements are to meet the direction in the Plan. FSM 2672.42

directs the Forest Service to conduct a biological evaluation (BE) to analyze impacts on sensitive species. Sensitive species have been replaced with species of conservation concern under the 2012 Planning Rule. There are no species of conservation concern within the project area.

Executive Order 12962 (June 1995)

Section 1. Federal Agencies shall, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by:

b. identifying recreational fishing opportunities that are limited by water quality and habitat degradation and promoting restoration to support viable, healthy, and where feasible, self-sustaining recreational fisheries….

h. evaluating the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order.

Executive Order 1386 (2001)

This order directs Federal agencies to take certain actions to further implement the Migratory Bird Treaty Act and promote the conservation of migratory bird populations. It requires agencies to avoid or minimize the adverse impact of their actions on migratory birds and ensure that environmental analyses under the National Environmental Policy Act evaluates the effects of proposed Federal actions on such species.

Wilderness Act of 1964

The Wilderness Act of 1964 states that certain uses such as motorized equipment and landing of aircraft are prohibited “except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act.” It is through this provision that ecological intervention in wilderness for this action may be authorized to restore the natural quality of wilderness character.

Forest Service Decision

The U.S. Forest Service will use the analysis presented in this final EA, in addition to the MRDG, to inform its decisions whether to allow the proposed piscicide application and operation of motorized equipment in the Absaroka-Beartooth Wilderness. The remove rainbow trout and

leave fishless alternative was not considered in detail in the wilderness MRDG because it is outside the scope of Forest Service decision. The Wilderness Act specifically acknowledges the role the States have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". While there is no special provision that requires the restocking action to take place, the USFS is further governed by a substantial framework of policy directing the Region how to consider proposed activities within Wilderness. FWP published the draft Buffalo Creek Yellowstone Cutthroat Trout Conservation EA on March 18th, 2021, initiating a 34-day public comment period with scoping notices in the Billings Gazette, Helena Independent Record, Bozeman Chronicle, statewide press release, and on its web page. The CGNF published a legal notice in the Bozeman Daily Chronicle on March 23, 2021 initiating a parallel 30-day comment period for the Forest Service. This project is subject to the pre-decisional objection process described at 36 CFR 218, Subparts A and B. Only those who submitted timely comments in response to this solicitation for public comment and meet the requirements contained in 36 CFR 218.25(a)(3) and (4) will have standing to object during the 45-day pre-decisional objection period.

1.5 *Estimated Commencement Date*

This project is proposed to begin mid-August with plans to be completed within or before the first week of September 2022. Treatment would follow at the same time frame in following years (not to exceed five years) until all rainbow trout are removed unless wildfire or extreme weather result in the need to postpone treatment for a year or more. Follow up monitoring would include electrofishing and sampling for rainbow trout environmental DNA or eDNA, which is DNA present in water samples. Detection of rainbow trout or DNA would guide future actions and could result in a reduced spatial scope of treatment if monitoring shows treatment success varied across the watershed.

1.6 *Consultation*

FWP's piscicide policy (FWP 2017) requires consultation to address the potential cultural, historical, and ecological effects of the project. The project area is within the historical territory of the Crow Nation. FWP's tribal liaison and diversity officer has contacted the Crow Nation and discussed the nature of the project.

The piscicide policy also requires consultation with the Montana Natural Heritage Program if an invertebrate species of concern has been observed in the project area. Their database does not have any observations of invertebrate species of concern; however, the western toad, a species of concern, relies on streams and wetlands for part of its life cycle. According to Bryce Maxell, a herpetologist and program manager for the Montana Natural Heritage Program,

western toads would experience minor if any effects from this project. The effects of rotenone on amphibians is reviewed in detail in the subsection Amphibians. In short, western toads will have undergone metamorphosis by the time the project would be implemented and would not experience acute toxicity. Any tadpoles remaining would probably not survive the winter. Dr. Maxell strongly preferred native Yellowstone cutthroat trout over rainbow trout, as the aquatic community did not coevolve with rainbow trout, which may exert a different predation pressure. As discussed previously, the U.S. Forest Service is consulting with the U.S. Fish and Wildlife Service on ESA listed species.

FWP consulted with Forest Service wilderness managers Jimmy Gaudry and Mellissa Simpson in development of the proposed action. FWP and the Forest Service worked collaboratively to prepare the MRDG, which resulted in the determination of the minimum tool for achieving project objectives while minimizing effects to wilderness character.

2 Alternatives

2.1 *Alternatives Considered*

2.1.1 Alternative 1: Proposed Action

The proposed action would remove the source of rainbow trout genes that pose a threat to Yellowstone cutthroat trout throughout the Lamar River watershed and are degrading the natural quality of the Buffalo Creek drainage in the Absaroka-Beartooth Wilderness. Secondly, the proposed action would establish a secure population of Yellowstone cutthroat trout within the climate shield (Isaak et al. 2015; Isaak et al. 2017).Rotenone is proposed for removal of fish. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the pea family, such as jewel vine (Derris sp.) and lacepod (Lonchocarpus spp.). These plants are native to Australia, Oceania, southern Asia, and South and Central America. Native people have used rotenone for centuries to capture fish for food in areas where these plants are native. Rotenone has been used in fisheries management in North America since the 1930s (Finlayson et al. 2000).

Following removal of rainbow trout from the treatment area, nonhybridized Yellowstone cutthroat trout would be translocated upstream of the barrier. Translocated fish would come from the best available source. Hidden Lake would be restocked with reproductive sized Yellowstone cutthroat trout to reestablish a population. Subsequent stocking would follow in the basin using remote site incubators or egg boxes with fertilized eggs placed in streams throughout the watershed.

Rotenone dissolved in water enters the fish through a thin layer of cells in the gills. This route of entry makes rotenone effective in killing fish at exceptionally low concentrations. Some aquatic invertebrates and gilled amphibians are sensitive to rotenone; however, timing of application and using the lowest effective concentration would minimize the toxicity of rotenone to these nontarget organisms (Finlayson et al. 2010; Vinson et al. 2010; Skorupski 2011). Mammals, birds, and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream, and the concentration of rotenone used in fisheries management does not affect these animals. Rotenone kills fish by interrupting the Krebs cycle in individual cells. The Krebs cycle is the mechanism by which cells turn glucose, proteins, and fat into useable energy. Fish die because their cells are not capable of synthesizing chemicals that energize cells.

Rotenone found in the CFT Legumine product would be applied to streams in the Buffalo Creek watershed in diluted liquid and mixtures of powder rotenone, sand, and gelatin. Drip stations (Figure 7) are the primary mode of application for flowing water, and these release a thin stream of CFT Legumine solution mixed with stream water to achieve the target concentration. CFT Legumine would be applied following the label instructions.

Bioassays would be conducted on caged fish to determine the lowest dose that would meet the project objective of eradication of fish in the project area but minimize effects on nontarget organisms. FWP's piscicide policy requires bioassays to determine the lowest effective concentration (FWP 2017), and researchers recommend using the lowest effective dose to minimize mortality of nontarget organisms (Finlayson et al. 2010; Vinson et al. 2010; Skorupski 2011). Trout are more sensitive to rotenone than most invertebrates and using the lowest effective concentration is a measure to reduce mortality of nontarget organisms.

Figure 7. Drip station delivering thin stream of rotenone formulation mixed with stream water.

Treatment of fish-bearing waters in the Buffalo Creek watershed would take from 12 to 14 days each season to complete and would continue for up to 5 years, although 2-to-3-year treatments are usually effective at eradicating nonnative fish. Piscicide application begins in the headwaters and proceeds stepwise downstream. Pretreatment measurements of water travel time would determine distance between drip stations to ensure toxic concentrations of rotenone would be maintained throughout fish bearing streams.

Lakes in the watershed include Hidden Lake and small companion lake downstream, which is connected to Hidden Lake by a stream channel. Rotenone application in Hidden Lake would be accomplished either through aerial spraying or watercraft, depending on the amount of surface algae present. Typically, by late summer a thick hard algae crust (up to one foot thick) covers much of the lake surface. To achieve a complete fish-kill when the lake is algae covered, gasoline pumps mounted on inflatable watercraft would be used to disperse rotenone throughout the water column of Hidden Lake. Watercraft propelled by a gasoline motor is necessary to break paths through the thick algae.

Beaver dam complexes with approximately 26 acres of ponded water surface connection to streams increase the complexity of the area requiring treatment. These standing waters would be treated by applying diluted liquid rotenone through battery powered venturi systems from small oar-propelled watercraft and with small gasoline engine-powered trash pumps or

sprayed on the water's surface from aircraft. Use of aircraft would negate the need to temporarily breach beaver dams to reduce the amount of water requiring treatment. If the Forest Service were not to authorize aerial spraying, it would be necessary to breach beaver dams. Beavers would repair any disturbance to their dam within a few days. Off-channel ponds and wetlands would be treated with backpack sprayers, by air, or water pumps.

Rotenone would be deactivated near the confluence with Slough Creek in Yellowstone National Park (Figure 5) using potassium permanganate, a strong oxidizer. Untreated flows in the larger Slough Creek would further limit the potential for rotenone to affect fish outside of the project area. Potassium permanganate neutralizes rotenone within thirty minutes of contact time within the stream. The strategy for deactivation varies with size of the project area, presence of connected lakes, and the number of days treatment would take (FWP 2017). The project area would require multiple days of treatment. Deactivation would follow protocols for streams where travel time is greater than 8 hours from the lowermost point of application to the deactivation station. Deactivation at the barrier would following these steps:

Step 1: Place sentinel fish immediately upstream of the deactivation station and at 2-hour travel time intervals upstream

Step 2: Begin monitoring the 4-hour sentinel fish when the rotenone would theoretically arrive at that location based on contemporaneous flow measurements, and every 1 hour afterwards until the theoretical clearing time of rotenone has occurred.

Step 3: If any sentinel fish die or are stressed at any time at the 4-hour station start deactivation immediately.

Step 4: Apply potassium permanganate until the last of the rotenone has theoretically passed the deactivation station, which is calculated as the time of last application of rotenone plus travel time to reach the deactivation station. Stop only after all sentinel fish sentinel fish immediately upstream of the deactivation station survive an additional 4 hours without stress.

Hidden Lake is a nine-acre on-stream lake that flows into a 0.6-acre lake through a short channel. The outlet of the lower lake enters Buffalo Creek at river mile 14.8. FWP's piscicide policy for deactivation for lakes with an outlet where the travel time to the deactivation station is greater than 8 hours from the lowermost point of application requires these steps:

Step 1: Sentinel fish must be placed immediately upstream and at 4 hours travel time upstream from the deactivation station.

Step 2: Begin monitoring the 4-hour sentinel fish when the rotenone would theoretically arrive at that location, and every 1 hour afterwards until the theoretical clearing time of rotenone has occurred.

Step 3: If all sentinel fish at the 4-hour station do not show signs of stress after an additional 8 hours of monitoring, then deactivation can be stopped.

Step 4: If any sentinel fish at the 4-hour station show signs of stress within 8 hours, deactivation must continue operating for a minimum of 24 hours, plus travel time, and stop after all sentinel fish immediately upstream of the deactivation station survive 4 hours without signs of stress.

Buffalo Creek is remote and in grizzly bear habitat, so handling and transporting dead fish would be impractical and unsafe. Dead fish would be left on-site to decay naturally, so their nutrients can contribute to recovery of invertebrate populations within the stream. Terrestrial scavengers contribute to the disappearance of carcasses, and piscicide-treated fish do not present health risks to organisms consuming them. Dead fish usually decay beyond recognition within 1-2 weeks. In the cold waters in the project area, most dead fish would sink, which would make them less detectable to humans. Although most fish would sink in Hidden Lake, wind and wave action could push some carcasses to the shoreline. These fish may be collected and sunk in the lake. Additional fish collection may take place at the downstream end of the treatment zone by Slough Creek campground in Yellowstone National Park.

A mix of helicopter and pack stock would be used to transport equipment, gear, and food to, within, and out of the project area (see 3.2 Designated Wilderness). A helicopter is necessary to transport large metal cages, typically used for backcountry fire camps, to secure rotenone, garbage, and other attractants from grizzly bears. It is also safer to transport large equipment like boats, mixing tanks, and materials like rotenone and gasoline by helicopter than pack stock. These are large awkward stock loads with potential to hit against or get hung up on trailside trees. This can cause chemical spills or leaks and can cause stock animals to spook and become injured. Most personnel would access the project area by hiking or horseback. A helicopter may be used on a limited basis to transport personnel to remote headwater drip sites to prevent them from hiking back to camp after dark in grizzly bear country and on a limited basis may be used to move personnel into and out of the work area in accordance with the MRDG.

Monitoring is an important component of piscicide projects as it allows for evaluation of the effects of the project on aquatic invertebrates and fish, the organisms most likely to be affected by piscicide treatment (Meronek et al. 1996). FWP's piscicide policy requires pre-project planning to include review of the list of all aquatic and terrestrial species. This draft environmental assessment includes review of the potential for nontarget species with special status and the potential for proposed activities to affect these species in 2.1.5 Fish and Wildlife.

FWP's protocols for monitoring aquatic invertebrates includes pretreatment sampling and follows a decision tree to guide the level of sampling and consultation needed to protect invertebrate species of concern (FWP 2017). One year before treatment, planners must review Montana Natural Heritage Program's database (MNHP Animal Species of Concern) to evaluate the potential for invertebrate species of concern to be present in the project area. If no species of concern have been documented in the project area, samples would be collected before treatment at 3 locations in the treatment area and at one control site located outside the treatment area. Samples collected in 2020 provide a pretreatment baseline for Buffalo Creek with Slough Creek providing an untreated control.

The proposed action includes mitigation measures developed through scoping, analysis, and preparation of the wilderness MRDG. These mitigation measures are integral to the proposed action and are accounted for in the evaluation of environmental effects. Mitigative measures address diverse aspects of conducting native fish conservation projects in designated wilderness (Table 2).

Table 2. Design criteria to minimize the environmental impacts of the proposed action.

Element(s) of Selected Alternative	Project Design Criteria
Aquatics	
Rotenone Treatment	To prevent the spread of aquatic invasive species, all equipment that has come in contact with lake, river, or stream water must be decontaminated before deployment on the project. This includes wading boots, waders, rafts, oars, boat, dip nets, buckets, etc. To minimize impacts to amphibians, treatment should occur in August after most larvae have metamorphosed. To facilitate recovery of macroinvertebrates, approximately 14 stream miles and 11 lake acres will remain untreated.
Recreation and Wilderness	
All elements	To prevent impacts to backcountry hunters, treatment should be completed by the commencement of the September 1st mountain goat hunt but must not extend into the September 15th backcountry rifle season. This reduces the number of individuals in the Absaroka-Beartooth Wilderness project area at a given time.
Wilderness	

Element(s) of Selected Alternative	Project Design Criteria
Camping	The following "Leave No Trace" camping methods shall be adhered to: • Avoid camping in fragile places: • Camp, latrines and stock will be kept at least 200 horizontal feet from lakes and streams. • All garbage will be packed or flown out of the project area. . • No campfires unless necessary for crew safety. If any, fire pits will be naturalized. • Dig group latrines for human waste. Cover with dirt, and decomposition will occur naturally. A small Honda EU2200i inverter generator will be used to keep up with the demand of charging batteries for electrofisher, pumps, electric fence, etc. Honda reports a very low noise level of 57 decibels at a rated load, and 48 decibels at a quarter load.
Restocking	Fishless stream reaches upstream from natural barriers shall **not** be restocked. The number of aircraft landings will be minimized by distributing fish via backpack or stock from one of three aircraft landing zones annually.
Personnel Access	The number of landings for personnel access to headwater drip stations will be minimized by picking up crew members outside of wilderness as opposed to picking them up at spike camps in wilderness.
Wildlife	
Camping	To prevent human-bear conflict and comply with the Custer Gallatin National Forest Food Storage order, the following mitigations will be enforced: • All attractants including rotenone, food, non-hay stock feed, and garbage will be stored in bear cages, electric fences, or other IGBC approved storage methods to comply with the food storage order. • Active/occupied spike camps will be attended by a camp manager who will be responsible for morning and evening food storage checks. Unoccupied spike camps with rotenone and other attractants secured in bear proof containers will not require a camp manager until the point in time where camps become occupied. • All sentinel fish shall be stored in certified bear-proof coolers with aeration or in streams within metal bear-proof cages.
Aircraft Operation	To minimize disturbance to wildlife including grizzly bears: • Helicopters will maintain an elevation of greater than 500 meters whenever possible. • Helicopter use shall be restricted to pre-defined flight paths, largely along already used trails, constraining any effects that may occur from high elevation fights.
Rotenone Treatment and Preparatory Work	All personnel must carry and be trained in the use of bear spray. Whenever possible crew members will work in groups. Crews will hike to and from work assignments during daylight hours.

Element(s) of Selected Alternative	Project Design Criteria
Visuals	
Temporary Signing and Flagging	All flagging will be biodegradable to avoid adding plastics to the ecosystem. All flagging will be removed annually. Closure signs shall be removed as soon as soon as project area streams meet rotenone label requirements for signage removal.
Temporary Fish Barriers	Natural materials including logs and rocks will be used to the extent practicable; primitive tools will be used to cut logs; dirt will be rubbed on fresh saw cuts; logs and rocks will be scattered to blend into the surrounding landscape upon project completion; and, irrigation tarp will be green, brown, or black to blend in with the surrounding stream channel and vegetation; irrigation tarp will be removed from the wilderness as soon as the barrier is no longer needed.
Restocking	RSI containers and pipe will be gray, green, brown, or black to minimize visual impacts. RSIs will be removed from the wilderness each year after fry have escaped.

2.1.2 Alternative 2: No Action

Under this alternative the fishery in Buffalo Creek would not be removed. Rainbow trout would remain, and rainbow trout genes would remain a threat to Yellowstone cutthroat trout in Slough Creek and throughout the Lamar River watershed. Yellowstone cutthroat trout would not be planted in the project area. The presence of nonnative rainbow trout throughout the Buffalo Creek drainage would continue to degrade the natural quality of wilderness character.

2.1.3 Alternative 3: Remove Rainbow Trout and Leave Fishless

This alternative would remove rainbow trout as described for the proposed action. The area would be left fishless, which is assumed to be the historical state until rainbow trout were planted in Hidden Lake in 1932. This alternative would remove the threat posed by rainbow trout but eliminate angling in an area where visitors to the Absaroka-Beartooth Wilderness have been able to catch fish since 1932, which pre-dates the Wilderness Act of 1964 and establishment of the Absaroka-Beartooth Wilderness Area in 1978. Moreover, leaving the Buffalo Creek watershed fishless would fail to create a refugia for locally adapted, nonhybridized Yellowstone cutthroat trout that is secure from invasive species, disease, and climate change.

2.2 *Alternatives Considered but Dismissed*

2.2.1 Mechanical Removal of Rainbow Trout

Under this alternative, project partners would attempt to eradicate rainbow trout by removing fish captured using electrofishing. The large spatial extent of fish occupied waters and habitat complexity throughout these streams would make electrofishing an infeasible means of eradicating existing fish populations. The project area has considerable expanses of complex habitat, which would make mechanical removal in these reaches ineffective. A comparison of

mechanical versus chemical removal with emphasis on projects in designated wilderness provides a detailed assessment of both approaches and confirms that mechanical removal would not be effective, would increase trammeling in wilderness, and would have negative consequences for streams and aquatic life (Endicott 2017) .

2.2.2 Angling

Angling is an inefficient means to eradicate fish from streams. The remote nature of the project area would require long hikes into grizzly bear country for a marginal fishing experience when exceptionally high quality fishing is available in the front country. Unlike piscicide, anglers cannot target young-of-the-year fish. Furthermore, many of the tributaries are steep, small streams with abundant deadfall timber that severely limits access to some streams. Insufficient numbers of anglers would fish these waters, given the difficulty in accessing them. Angling would not result in the eradication of rainbow trout which is necessary to protect Yellowstone cutthroat trout in the watershed below the project area.

2.2.3 Rotenone Application Without Motorized Uses

FWP worked closely with the Forest Service through the MRA process to develop the minimum tool for achieving complete rainbow trout eradication in Buffalo Creek. To achieve a complete kill with piscicide, all connected waters (main stem, tributaries, and beaver ponds) in a treatment reach must simultaneously have an effective concentration of rotenone with sufficient exposure time such that there are no refugia where fish can survive. Sunlight, oxygen-rich water, and organic matter detoxify rotenone, and rotenone is only active in flowing water for four to six hours. Through the MRA process it was determined there are no nonmotorized means in existence that could achieve a complete fish kill in Buffalo Creek. Gasoline engine-powered pumps and aircraft are a necessity to dispense rotenone over 25 acres of open water impounded by beaver dams. Some of these beaver ponds are 200 feet across and over six feet deep.

Rotenone application in Hidden Lake must be accomplished through aerial spraying or motorized watercraft, or a combination of both, depending on the amount of surface algae present. Typically, by late summer a thick hard algae crust (up to one foot thick) covers much of the lake surface. The algae crust is so hard that rocks thrown onto it don't fall through! To achieve a complete fish-kill when the lake is algae covered, gasoline pumps mounted on inflatable watercraft would be used to disperse rotenone throughout the water column of Hidden Lake to a depth of over 16 feet. Watercraft would be propelled by a gasoline engine to break paths through the thick algae. A rowboat was unable to conduct a complete bathymetric map of Hidden Lake because it became stuck in the algae mats. Because the rowboat was not able to penetrate the thick algae, it is highly unlikely that electric outboard motors would have enough power to propel watercraft through the thick surface crust.

Application of rotenone using nonmotorized means would not achieve the objective of complete rainbow trout removal required for Yellowstone cutthroat trout conservation in the watershed below the project area and improved natural quality of wilderness character.

3 Environmental Review

3.1 Land Resources

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			1b
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				

Comment 1b: Disruption of Soil

Proposed Action

Ground disturbing activities under the proposed action are limited to group camping at established outfitter camp sites and digging group latrines. Mitigative measures described under the proposed action (Table 2) would minimize the disturbance to soil and promote rapid recovery of disturbed areas.

The following “leave no trace” camping methods would be adhered to:

- Avoid camping in fragile places.
- Camp, latrines and stock would be kept at least 200 horizontal feet from lakes and streams.
- All garbage would be packed or flown out.
- No campfires unless necessary for crew safety. If any, fire pits would be naturalized.
- Dig group latrines for human waste. Cover with dirt, and decomposition would occur naturally.

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. The temporary barriers would be constructed in a steep, rocky, stable channel with little to no potential for lateral erosion or upstream deposition during their use. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

With adherence to mitigation measures (Table 2), the direct and indirect effects of camping, group latrines, and temporary barriers on the physical environment would be low in magnitude and duration and would not be detectable beyond project completion.

No Action Alternative

The no action alternative would not have any effect on land resources.

Leave Fishless Alternative

This alternative would have the same effects on land resources as the proposed action.

Summary of Effects on Land Resources

Effects of evaluated alternatives are similar with none of the examined alternatives having a lasting effect on land resources. Fieldworkers would cause temporary disturbance associated with camping in and traveling through wilderness. Following “leave no trace” practices would make these disturbances short-term and minor. The barriers blocking reinvasion of Hidden Lake would be removed and leave no lasting evidence of their presence. The no action alternative would not affect land resources.

3.2 Water

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				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	see 2af
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?	X	X	X			See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in the modification or destruction of wetlands?		2m				
n. Will the project result in any discharge that will affect federal or state water quality regulations?			X		YES	2n

Comment 2a: Alteration of Surface Water Quality

Proposed Action

The proposed action would intentionally introduce the pesticide CFT Legumine to surface water to remove nonnative rainbow trout. Release of CFT Legumine to surface waters would achieve concentrations within the label requirements. Bioassays conducted before treatment would determine the lowest effective concentration, which is a recommended practice to

protect nontarget species (Vinson et al. 2010; Skorupski 2011). CFT Legumine would be applied by drip stations that release a thin stream of diluted product. The concentration in the stations would be calculated using streamflow data from the previous days. Fieldworkers with backpack sprayers would spray off-channel waters with potential to hold fish. Rotenone mixed with sand and gelatin would be placed at seeps to maintain toxic concentrations of rotenone during the treatment period. Aerial application may be required in some locations to achieve project objectives. Additional application methods may be used if deemed necessary to complete a successful treatment.

Several factors influence rotenone's persistence and toxicity. Warmer water promotes deactivation of rotenone, which has a half-life of 14 hours at 24 °C and 84 hours at 0 °C (Gilderhus et al. 1986; Gilderhus et al. 1988), meaning that half of the rotenone is deactivated and no longer toxic at that time. As temperature and sunlight increase, so does the rate of deactivation of rotenone. Bright sunlight in June deactivated 15 ppb rotenone in 10 cm of water to nontoxic concentrations in 2-3 hours (Brown 2010). Higher alkalinity (>170 mg/L) and pH (>9.0) also increases the rate of deactivation. Rotenone tends to bind to and react with organic molecules, and availability of organic matter substantially decreases the persistence of rotenone (Dawson et al. 1991). Dilution from groundwater upwelling or inflows from untreated tributary streams also contribute to the deactivation of rotenone.

FWP's piscicide policy (FWP 2017) requires deactivation of rotenone in streams and lake outflows using potassium permanganate, a strong oxidizer. Potassium permanganate would minimize exposure beyond the treatment area. Pretreatment monitoring would determine if contributions of groundwater increase flows to the point that additional potassium permanganate would be needed. Breaking down rotenone to a target and nontoxic concentration of 2 to 4 ppb requires continuously mixing the dry crystalline potassium permanganate with stream or lake water. Potassium permanganate deactivates rotenone within 15 to 30 minutes of mixing time with stream water. This reach of stream is the neutralization or deactivation zone. Full deactivation of rotenone requires delivery of potassium permanganate at a rate that maintains a residual concentration of potassium permanganate of 0.5-1.0 ppm after 30 minutes stream travel time. At this point, neither rotenone nor potassium permanganate would be present at toxic concentrations, and any residual would continue to degrade into nontoxic constituents.

In Buffalo Creek, deactivation would be expedited at the confluence with Slough Creek, as the larger volume of fresh water in Slough Creek would substantially dilute rotenone. Potassium permanganate added to deactivate rotenone would also be diluted, and potassium permanganate would be visible in Slough Creek for a short distance.

CFT Legumine is 5% rotenone, and the remaining constituents are inert ingredients used to dissolve and disperse the relatively insoluble rotenone. These inert ingredients do not include the organic solvents used in other formulations. The inert solvents and dispersants have the advantage of having low to no toxicity at the concentrations applied, and they break down rapidly in the environment (Fisher 2007). Many constituents are used in products approved for use products like toothpaste, sunscreen, and eye drops. The low concentrations, general lack of toxicity, and rapid breakdown of the inert ingredients in water does not pose a risk to health or violate water quality standards.

Monitoring the effectiveness of potassium permanganate in deactivating rotenone would occur at the downstream end of the deactivation zone. Maintenance of the target concentration of potassium permanganate of 0.5–1.0 ppm would be determined with a handheld chlorine meter. Caged fish placed at the downstream end of the deactivation zone would provide additional evidence of whether potassium permanganate was successful in deactivating rotenone. Survival of caged fish for 4 hours with no signs of stress indicates rotenone has broken down to nontoxic concentrations. Application of potassium permanganate would continue until the theoretical time, based on contemporaneous flow monitoring, in which all treated water would have passed the barrier, and caged fish placed immediately upstream of the deactivation zone survive for an additional 4 hours.

Dead fish would be present during and after this project. A relatively small proportion of dead fish would be noticeable, as sinking, rapid decomposition, and scavenging by wildlife would contribute to disappearance of killed fish. In lakes, most fish would likely sink. About 70% of fish in treated lakes in Washington did not surface (Bradbury 1986). Cooler water temperatures and greater depths inhibit surfacing of dead fish. In warm water ponds supporting members of the sunfish family, nearly all fish surfaced, except when temperatures were < 58 °F, when most fish sank and decomposed, and cool temperature and depth were attributable for the sinking of dead fish (Parker 1970).

Hidden Lake and its small, unnamed companion lake are at high elevation and likely considerably cooler than 58 °F, especially at the proposed treatment time, when nighttime air temperatures would further cool water temperatures. Therefore, a relatively small proportion of dead fish would be visible, and those fish would decompose and be eaten by scavengers. Decaying fish in rotenone-treated lakes can result in temporary nutrient enrichment and algal blooms. In Washington, 9 of 11 lakes treated with rotenone had an algal bloom shortly after treatment, and an estimated 70% of the phosphorus contributed from dead fish remained in the lake with decomposition of fish (Bradbury 1986). High elevation lakes tend to be nutrient-poor, so nutrients contributed from their decay stimulates phytoplankton production, which promotes rapid recovery of zooplankton and other invertebrates in treated lakes. Rotenone

kills zooplankton, but biomass of zooplankton recovers rapidly following rotenone treatment (Beal and Anderson 1993; Vinson et al. 2010). Algae take up the nutrients released by decaying fish, and zooplankton and other aquatic invertebrates feed on the algae. This rapid recovery of algae and invertebrates restores the food web so ample food is available for fish stocked in the lake.

No Action Alternative

The no action alternative would not have any effect on water quality.

Leave Fishless Alternative

Rotenone would have the same effects on surface water quality as the proposed action. Potassium permanganate would break down within 30 minutes or less of stream travel time. Freshwater from Slough Creek would greatly dilute both chemicals and expedite the deactivation of rotenone.

Comment 2f: Increase in Contamination of Groundwater

Proposed Action

No contamination of groundwater is anticipated from this project. Rotenone-treated water could go subsurface in losing reaches and lakes; however, rotenone binds to the bed sediments, soil, and gravel, and does not persist in groundwater (Engstrom-Heg 1971; Engstrom-Heg et al. 1978; Skaar 2001; Ware 2002). Rotenone moves only 1 inch in most soil types, except sandy soils, where it moves about 3 inches before binding to soils (Hisata 2002). In California, studies of wells in aquifers near to and downstream of rotenone application have never detected rotenone, or any of the organic compounds in formulated products (CDFG 1994). CFT Legumine does not contain the organic compounds used in other formulations of rotenone. The inert solvents and dispersants in CFT Legumine would not contaminate groundwater given their low toxicity and rapid breakdown.

Case studies in Montana have concluded that rotenone does not move measurably in groundwater (FWP unpublished data). At Tetrault Lake, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled 2 and 4 weeks after the lake was treated, despite being downgradient and within the same aquifer as the lake. FWP has sampled wells and groundwater in several piscicide projects that removed fish from ponds, and no rotenone or inert ingredients were detected in ponds ranging from 65 to 200 feet from treated waters. Likewise, rotenone applied to streams has not resulted in contamination of neighboring wells or groundwater. No rotenone was found in domestic and municipal wells adjacent to Soda Butte Creek during treatments in 2015/2016 which were drawing from the same unconfined alluvial-fill aquifer.

The project area is in designated wilderness and Yellowstone National Park. Review of the GWIC database found no wells within the project area, and a domestic well at the Slough Creek campground is upstream of the confluence with Buffalo Creek and would not receive rotenone treated water. The considerable distance to the nearest well and inability of rotenone to move more than a few inches through soils indicates no wells would have potential to receive rotenone due to the proposed action.

No Action

Not implementing the proposed action would have no effect on groundwater.

Leave Fishless Alternative

Under this alternative, the effects on groundwater would be the same as the proposed action.

Comment 2j: Effects on Other Water Users

Proposed Action

Rotenone has been used in organic gardening as a pesticide, so its presence in treated stream water has potential to kill nontarget invertebrates if applied to irrigated fields. The CFT Legumine label has specific requirements for use in streams or lakes used for irrigation that do not apply to treatment in the Buffalo Creek project area. Treated waters flow through designated wilderness and Yellowstone National Park, and no diversions for irrigation or domestic use are present. Therefore, precautions associated with irrigation waters would not apply to this project.

No Action

Not implementing the project would have no effect on other water users.

Leave Fishless Alternative

This alternative would have the same effects as the proposed action.

Comment 2m: Impacts to Floodplains and Wetlands

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

Proposed Action

The proposed action would have no effect on the nation’s floodplains or wetlands. The only activity with potential to affect a floodplain is the construction of the two temporary fish

barriers on the Hidden Lake Outlet stream. The stream channel at the locations where the two barriers would be constructed is steep (approximately 5%-7% slope) and narrow (12' to 14' bank-full width) with no adjacent wetlands. The streambanks are extremely stable and are comprised of cobble and boulders. The log, rock, and irrigation tarp barriers would be less than four feet in height and would back up water for no more than 35 feet. The backwatering effects of these structures would be temporary (less than five years) and localized and would be like those resulting from naturally occurring log jams. Therefore, these temporary barriers would not measurably affect floodplain function or wetlands.

No Action

Not implementing the proposed action would have no effect on floodplains or wetlands.

Leave Fishless Alternative

Under this alternative, the effects on floodplains and wetlands would be the same as the proposed action.

Comment 2n: Relevance to State or Federal Water Quality Standards

Proposed Action

Montana DEQ issues a pesticide general permit on a five-year cycle to FWP that allow FWP to apply piscicides. FWP, and other piscicide applicators, must develop a pesticide discharge management plan as a condition for coverage under the permit. For FWP, the plan consists of procedures and protocols described in FWP's piscicide policy (FWP 2017), the American Fisheries Society's standing operating procedures for rotenone application (Finlayson et al. 2018), annual training, and critical review of projects by FWP's piscicide committee. The project area is within the Absaroka-Beartooth Wilderness, so a piscicide use permit from the U. S. Forest Service is required.

No Action

Under the no action alternative, no changes relating to state or federal water quality standards would occur and no permits would be necessary.

Leave Fishless Alternative

This alternative would have the same permitting requirements as the proposed action and would follow the established protocols for piscicide application (FWP 2017).

Summary of Effects on Water

None of the evaluated alternatives would result in long-term effects on water. The proposed action and leave fishless action would result in short-term toxic concentrations of rotenone in the treatment area and a short reach measuring 30 minutes travel time where rotenone and

potassium permanganate would be mixing and deactivating. Rotenone is effective at killing fish at extremely low concentrations, and it breaks down rapidly through multiple mechanisms. Fish can be returned to treated streams the day after rotenone application has ceased. The no action alternative would have no effect on water.

3.3 Air

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

Comment 3a: Air Pollution

Proposed Action

Application of potassium permanganate at the detox station would require a generator to drive the auger. CFT Legumine would be mixed into Hidden Lake and its smaller companion lake using an outboard motor or sprayed from aircraft. The motors and generators create emissions; however, the odors, gases, and particulates would dissipate rapidly. CFT Legumine applied by air would settle and dissipate rapidly. Fieldworkers would be protected during the brief period of application through use of personal protective equipment. The effects of these emissions would be minor and short-term.

No Action

The no action alternative would not release pollutants to the air.

Leave Fishless Alternative

This alternative would have the same effect on air pollution as the proposed action.

Comment 3b: Objectionable Odors

Proposed Action

CFT Legumine does not use aromatic hydrocarbons as solvents or dispersants used in other formulations and does not have objectionable odors. It has a slight soapy smell that dissipates rapidly.

Exhaust from the motors driving the auger dispensing potassium permanganate at the detox station, boat motors, and helicopters along with mixing CFT Legumine at Hidden Lake could produce mild odors. These odors would be short-lived and dissipate rapidly.

Dead fish could cause objectionable odors, although several factors may limit the duration and intensity of the smell of decaying fish. Scavengers eat fish carcasses, and rotenone-killed fish do not pose a risk to animals scavenging them (see Comment 5c: Changes in the Abundance or Diversity of Nongame Species). The cold waters in treated streams and lakes during a late summer or early fall treatment period at this elevation would promote sinking of dead fish (Parker 1970), and the odor of the decay of sunken fish would not be detectable to humans. Dead fish would decay through microbial action and scavenging by invertebrates and vertebrates. Collection of dead fish by Slough Creek campground would occur during the project to prevent accumulation of fish carcasses that attract bears. Objectionable odors would be minor and last up to 2 weeks.

No Action

Not implementing the project would not create objectionable odors.

Leave Fishless Alternative

This alternative would result in the same conditions as described for the proposed action.

Summary of Effects on Air

No cumulative effects on air are expected from any of the evaluated alternatives. Motorized equipment including helicopters, outboard motors, and the auger dispensing potassium permanganate would release exhaust during the periods of use; however, this exhaust would be isolated and disperse rapidly. The no action alternative would not affect air.

3.4 Vegetation

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

Comment 4a: Changes in Vegetation

Proposed Action

The Buffalo Creek watershed arises in the Absaroka Mountains. Its headwaters originate near 10,000 feet above sea level and the downstream end of the project area is over 7,200 feet above sea level. Fish-bearing waters flow through high gradient, montane reaches surrounded by conifer forests and high elevation valleys with riparian areas of mixed species of shrubs and sedges. Beaver dam complexes form wet sedge meadows. Hidden Lake supports a large wetland, and valley walls near its outlet support an open coniferous forest.

Fieldworkers applying rotenone and conducting other components of the project would trample streamside and lakeside vegetation, which would be a minor and short-term disturbance. Ground cover, shrubs, and trees would be resilient to the brief period of field occupancy and the generally light use associated with rotenone projects. Most plants would be near or in dormancy during the treatment period, so they would be resilient to the short-term and minor trampling.

Horses and pack mules would also be present during field application of rotenone. Livestock would remain on established trails and held in designated animal holding areas within

wilderness and Yellowstone National Park. Pack animals would graze and browse vegetation; however, the duration of the project and confinement of animals to trails and designated corrals would limit the spatial extent of their grazing and browsing.

Rotenone would not affect vegetation in the project area. Rotenone has a long history of use as a pesticide in agriculture and home gardening. Although it is no longer an approved pesticide for organic agriculture, its use on food crops without harming plants is consistent with its lack of toxicity to vegetation.

No Action

Under this alternative, no fieldworkers or livestock would be in the project area, so vegetation would not be trampled, grazed, or browsed beyond that which would happen from recreationalists unrelated to the project.

Leave Fishless Alternative

This alternative would have the same effect on vegetation as the proposed action.

Comment 4c: Effects on Plant Species of Concern

Proposed Action

The Montana Natural Heritage Program lists two plant species within the watershed as species of concern (Table 3). Whitebark pine is a candidate for inclusion for protection under the Endangered Species Act. Whitebark pine occupies subalpine forests and is a dominant species of tree line and krummholz habitats. Krummholz habitats are the wind-swept areas between tree line and alpine tundra, where harsh environments result in stunted, malformed trees. Climate change, pine beetles, and disease have resulted in major declines in whitebark pine across its range. The seeds are an important food source for grizzly bears. Piscicide application would not affect whitebark pine, as whitebark pine are an upland species and rarely associated with streams or lakes. While approximately 15 lodgepole pine trees would be removed to construct the Hidden Lake outlet fish barriers, five-needled pines would not be removed.

Table 3. Plant species of concern in the Buffalo Creek watershed.

Class	*Common Name*	*Scientific Name*	*State Status*	*USFS Status*	*USFWS Status*
Pinopsida	Whitebark pine	*Pinus albicaulus*	S3[1]	Candidate[2]	Candidate
Dicotyledoneae	Many-flowered viguerira	*Viguiera multifora*	S2S3[3]		

S3= Potentially at risk because of limited or potentially declining population numbers, range, even though it may be abundant in some areas
Candidate = Sufficient information on biological status and threats exists to propose to list as threated or endangered
S2S3 = Populations vary in status across Montana, with S2 populations being at risk because of very limited and/or potentially declining population numbers, range, and/or habitat, making it vulnerable to extirpation in the state. S3 populations are potentially at risk, even though they may be abundant in some areas.

The many-flowered viguiera is a perennial flower in the aster family. It occupies aspen woodlands and open slopes. The proposed action would not affect this flower, as it does not occupy stream-adjacent habitats where fieldworkers would have potential to trample or disturb the plant.

No Action

If the proposed action is not implemented these species would be unaffected.

Leave Fishless Alternative

This alternative would have similar but shorter-term effects on vegetation than the proposed action, as fieldworkers would not return to the project area to reestablish a fishery.

Summary of Effects on Vegetation

None of the evaluated alternatives would have long-term effects on vegetation. The proposed action and leave fishless alternative would bring humans and livestock into the project area. Trampling by humans, hoof sheer, and vegetation removal would occur, although these would be short-lived and would heal through natural mechanisms. Planning the project for when many plants are past sensitive reproductive stages would be protective. The no action alternative would have no effects on vegetation.

3.5 Fish and Wildlife

FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X			
i. Will the project introduce or export any species not presently or historically occurring in the receiving location?			X			See 5d

Comment 5b: Changes in Diversity or Abundance of Game Species

Proposed Alternative

This goal of this project is to eliminate the rainbow trout currently occupying waters in the project area and replace them with nonhybridized Yellowstone cutthroat trout. Fish would be temporarily absent from the Buffalo Creek watershed, but Yellowstone cutthroat trout restocked in the streams and lake would recover within 5 years. The effects on the fishery would be short-term and minor, and return of nonhybridized Yellowstone cutthroat trout would mitigate for the short-term absence of fish.

Game species in the project area include white-tailed deer, mule deer, elk, mountain lions, black bears, ruffed grouse, and dusky grouse. The presence of fieldworkers in the project area would result in short-term and minor disturbance to these species. Presence of fieldworkers would be for several days in given treatment reaches for initial stream flow studies. Generally, 1 or 2 people operate a few drip stations and would travel to the stations established the week before. Rotenone treatment would last for several days per treatment reach. Treatment in

subsequent years would be of the same intensity and duration unless monitoring results show areas to be free of fish. Wildlife would be displaced or tolerate presence of humans, depending on species. This disturbance would be short-term and minor.

No Action

No changes would occur in the diversity or abundance of game species.

Leave Fishless Alternative

This alternative would have the same effect on terrestrial game species as the proposed action. The project area would be devoid of game fish with removal of rainbow trout, and Yellowstone cutthroat trout would not be introduced to restore game fish.

Comment 5c: Changes in the Abundance or Diversity of Nongame Species

Proposed Action

Fish

Rotenone is highly toxic to fish, and the goal of the project is total eradication of fish within the project area. Rainbow trout are the only species present. The barrier cascade likely blocked Yellowstone cutthroat trout and other members of the native fish assemblage. Often, Yellowstone cutthroat trout are the only species present in headwater streams within their native range. Yellowstone cutthroat trout are better adapted to the cold and relatively sterile conditions in the watershed than rainbow trout, and the project would likely result in greater numbers and larger sizes than the fishery currently provides. Being better leapers, they often are at elevations not accessible to less strong leapers like suckers, mountain whitefish, and Rocky Mountain sculpin. These species are typically absent from mountain streams.

The absence of fish would be short-term, as restocking the lake would occur with catchable-sized Yellowstone cutthroat trout as soon as possible after rotenone deactivates. Translocating fertilized eggs, fingerlings, or fry would result in rapid recovery of stream populations. A larger-scale project in Cherry Creek provides a model to predict recovery of Yellowstone cutthroat trout in Buffalo Creek. This watershed had over 60 miles of stream and a lake that were treated with rotenone and repopulated using remote site incubators housing non-hybridized westslope cutthroat trout eggs. Researchers found recovery of density and sizes of fish compared to the pretreatment levels in 3 to 4 years using similar translocation techniques (Clancey et al. 2019).

Mammals

A diversity of mammals are present in the project area, and the project would result in short-term and minor disturbance associated with presence of fieldworkers. Mammals would also have short-term exposure to rotenone, with ingestion of treated water or fish and

invertebrates killed by rotenone being the primary routes of exposure. See 2.1.2 Water for review of the research on low concentrations of applied rotenone and rapid breakdown of rotenone in the environment.

Wildlife have potential to be exposed through drinking treated water and scavenging rotenone-killed fish and invertebrates. Likely scavengers of dead fish and invertebrates include mink, grizzly bears, black bears, wolves, otters, birds such as ravens, magpies, bald eagles, and golden eagles. The exceptionally low concentrations of rotenone in treated water and its strong tendency to break down and become absorbed to organic matter means wildlife would not receive doses that would be harmful. Species that consume fish or invertebrates of aquatic origin would experience short-term reduction in food availability.

A substantial body of research has explored the acute and chronic toxicity of rotenone and other potential health effects, and exposure to the concentrations in water and dead animals is far lower than concentrations that would be toxic (EPA 2007). Rotenone breaks down rapidly in the digestive tract of mammals (AFS 2002), and potential exposure to rotenone from fish removal projects is far lower than levels shown to result in acute or chronic toxicity. The effective concentration of rotenone for fish removal projects in Montana ranges from 0.025 to 1.0 ppm, which is many times lower than concentrations found to be toxic. For example, a 22-pound dog would have to drink nearly 8,000 gallons of treated water or eat 660,000 pounds of rotenone-killed fish within 24 hours to receive a lethal dose (CDFG 1994). A half-pound mammal would need to eat 12.5 mg of pure rotenone, or drink 66 gallons of treated water within 24 hours to receive a lethal dose (Bradbury 1986).

Dead fish take up to 2 weeks to decay; however, this availability of dead fish would not result in exposure that would cause chronic toxicity, as rotenone has low toxicity when eaten and concentrations in fish tissue would be low and short-lived. In laboratory studies where rotenone was not subjected to environmental conditions that promote its breakdown, animals fed rotenone survived amounts that are far greater than is possible from fish removal treatments. Rats fed 75 ppm per day for over 2 years weighed significantly less than rats not fed rotenone and had smaller litters; however, this exposure did not result in mortality, birth defects, or cancer (Marking 1988). Likewise, dogs fed 200 mg of rotenone daily for 6 months weighed less than dogs not fed rotenone, ate less, and had diarrhea and mild anemia (Marking 1988). For rats and dogs, taste aversion was likely limiting their intake of food and contributing lower weights.

The dose and duration of exposures in these laboratory studies with rats and dogs (Marking 1988) were far greater than field exposure from drinking treated water or eating rotenone-killed fish or invertebrates. In trout streams in Montana, the effective concentration of

rotenone is generally 0.025 to 0.5 mg/L, and application at each drip station lasts 4 to 6 hours. Streams would have concentrations toxic to fish and some invertebrates for up to 48 hours. Rotenone would take longer to break down in lakes, but the concentrations would be orders of magnitude lower than the amounts of rotenone fed to dogs and rats that resulted in minor health effects. Likewise, concentrations in dead fish and invertebrates would be minute and would quickly bind with the organic matter in the dead animal and be rendered nontoxic.

The contrast between the potential field exposure of mammals to the amounts and durations survived by rats and dogs is striking. In streams, rotenone concentrations would likely not exceed 50 ppb for 48 hours, and rotenone would remain in this toxic range in lakes for 2 weeks. Rats fed 75 mg of rotenone a day for 2 years and dogs fed about 200 mg/day for 6 months were not as healthy as animal eating lower doses or no rotenone, but the health effects were relatively minor. Rats and dogs survived and were able to reproduce despite daily exposure to exceptionally high concentrations of rotenone (Marking 1988). This high tolerance provides robust evidence that rotenone applied in fish eradication would not have measurable negative effects on terrestrial wildlife that drink treated water or eat dead fish or invertebrates.

Other toxicological studies provide evidence that the proposed action would not result in chronic health problems for wildlife drinking water or eating fish carcasses. Rotenone exposure has not been shown to result in birth defects (HRI 1982), gene mutations (VanGoetham et al. 1981; BRL 1982), or cancer (Marking 1988). Rats fed diets containing 10 to 1000 ppm of rotenone over 10 days did not experience reproductive dysfunction (Spencer and Sing 1982). This combination of studies indicates rotenone application to eradicate fish poses no threat to wildlife drinking water or eating dead fish or invertebrates.

Eradication of fish and slight to moderate mortality of invertebrates from rotenone treatment would result in short-term and minor reductions in food availability for species that eat fish and invertebrates, with mink and otter being most reliant on an aquatic prey base. These species are highly mobile, so they would be displaced to other areas until the fishery recovered. Moreover, they eat a variety of organisms, and many prey species would not be affected by rotenone treatment. As discussed in Stream-Dwelling Aquatic Invertebrates, aquatic invertebrates recover in biomass within weeks, and invertebrates remain relatively abundant in streams following piscicide treatment, as not all taxa are vulnerable. Moreover, most of these predators can switch food sources, which would make them resilient to a short-term reduction of forage base.

Beaver dams are abundant in the project area (Scrafford et al. 2018), and these may be breached to reduce the amount of standing water to facilitate effectiveness of rotenone

treatment. This disturbance would be short-term and minor. Beavers rapidly repair dams, and water levels would be restored within days after treatment.

Big game, including deer, elk and moose would likely be displaced from project activities due to additional human presence, noise from motorized equipment, and helicopter use. This is expected to only occur during implementation of the project. The surrounding area is comprised of wilderness and provides low disturbance habitat for game to displace into and disturbance from project actions is not expected to have significant impacts on big game.

Birds

Birds have potential to be exposed to rotenone through drinking treated water or scavenging dead fish and invertebrates. Like mammals, birds' digestive tracts rapidly break down rotenone. Furthermore, the concentration of rotenone in waters treated in fish removal projects is far lower than concentrations found to be harmful. A ¼-pound bird, which is smaller than an American crow, would have to drink 100 quarts of treated water or eat more than 40 pounds of rotenone-killed fish within 24 hours for a lethal dose (Finlayson et al. 2000).

Numerous species of bird rely on prey of aquatic origin, and rotenone has potential to temporarily decrease prey species. The goal is total eradication of rainbow trout, so streams and Hidden Lake would not have a food base for fish-eating birds until the population recovers, which typically takes 5 years. Fish-eating birds in the project are include kingfishers, bald eagles, osprey, and some waterfowl. These birds are mobile and can move to more productive feeding grounds until the fishery recovers. Restocking Hidden Lake as soon as rotenone degrades would provide fish for fish-eating birds.

Raptor nests have the possibility of being disturbed by project activities however work occurs outside of nesting seasons and juvenile birds are expected to have fledged the nest.

Invertebrates would be slightly-to-moderately reduced in numbers, but recovery of invertebrate numbers and biomass is rapid (see Stream-Dwelling Aquatic Invertebrates). Timing the project for fall when migrating birds would be in reduced numbers would limit effects on most songbirds that consume adult mayflies, caddisflies, stoneflies, and midges. American dippers eat aquatic invertebrates and do not migrate. This species would have a short-term reduction in forage base. Rapid recovery of biomass, then diversity, would make this a minor and short-term reduction in forage for American dippers. Monitoring in Lower Deer Creek, a stream draining from the north flank of the Beartooth Mountains found American dippers to be abundant one year after piscicide treatment, and numerous newly fledged birds were present (FWP 2021).

Reptiles

Reptiles, especially garter snakes, have potential to be exposed to rotenone-treated water and are among the likely scavengers of dead fish and invertebrates. The low concentration of rotenone in the water and dead fish would not result in toxic exposure to reptiles. Like in mammals and birds, rotenone would break down rapidly in the digestive tract of reptiles. The reptilian gut may be more efficient at breaking down rotenone, as reptiles have capacity to digest bone, hair, and chitinous exoskeletons, all of which are far less degradable than the fragile rotenone molecule.

Amphibians

Amphibians are closely associated with water and have potential to be exposed to rotenone during piscicide treatment. Adult, air-breathing amphibians have low vulnerability to rotenone as applied at fish killing concentrations (Chandler and Marking 1982; Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012), but gill-breathing larvae are vulnerable (Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012). In the laboratory, tadpoles of Columbia spotted frogs and western toads died when exposed to 1.0 ppm of CFT Legumine for 96 hours (Billman et al. 2011). Rotenone killed nearly all Columbia spotted frog tadpoles in a lake in Yellowstone National Park within 24 hours; however, non-gill breathing metamorphs, juveniles and adults survived.

Despite near total mortality of Columbia spotted frog tadpoles during piscicide treatment in High Lake, in the Specimen Creek watershed in Yellowstone National Park, Columbia spotted frog tadpoles were nearly triple pretreatment abundance in the 3 years following piscicide treatment (Billman et al. 2012). The high tolerance of adults to rotenone, the presence of numerous adult age classes, their substantial reproductive potential, lack of fish, and abundance of habitat and forage likely contributed to increased numbers of tadpoles compared to the pretreatment baseline. In contrast, tadpoles returned to pretreatment numbers in fishless wetlands treated with rotenone in a similar watershed in southwest Montana for the 3 years after rotenone treatment (Billman et al. 2012). In the treated lake and wetlands, the effects of rotenone on Columbia spotted frog tadpoles were short-term and minor, as they returned to, or substantially exceeded, pretreatment numbers the following year and maintained those numbers for 3 years. Timing piscicide treatment after frogs have metamorphosed would be a protective measure; however, frogs have great resilience to this type of disturbance and would recover naturally and rapidly if rotenone had any immediate population level effects on tadpoles.

Investigation of the response of amphibians to rotenone projects in 10 alpine lakes in Montana found no significant differences between abundance and species composition of amphibians counted 2 to 4 years before rotenone application and following rotenone application (Fried et

al. 2018). Species shared with the Buffalo Creek project include Columbia spotted frogs and western toads. Rocky Mountain tailed frogs, which retain gills for several years before metamorphosing, were resilient to rotenone treatments, as were long-toed salamanders. This general resilience to rotenone treatment across amphibian taxa suggests amphibians have a general ability to withstand rotenone projects when applied at the lowest effective concentration and after metamorphosis of most gilled species.

Although species and life stages of amphibian may vary in their tolerance to rotenone, research in Norway yielded comparable results to the field studies in Montana (Amekleiv et al. 2015), suggesting a general tolerance of rotenone by frogs and toads in the same genera as Columbia spotted frogs and western toads. The common frog (*Rana temoraria*) and common toad (*Bufo bufo*) were present pretreatment, and eggs, tadpoles, and adults were in the lake the next year, leading the authors to conclude CFT Legumine had little effect on the amphibians in the treated lake.

Hidden Lake, the smaller companion lake, and standing water in wetlands would be treated with rotenone. Research in nearby High Lake (Billman et al. 2012) allows inference on the potential response and recovery of amphibians in the Buffalo Creek watershed. High Lake lies 12 miles to the west of Hidden Lake and is nearly the same latitude. High Lake is about 1,000 feet higher in elevation than Hidden Lake, and this increase in elevation may be enough to make High Lake cooler, a factor that would slow down breakdown of rotenone and delay metamorphosis of amphibians. High Lake was treated in early August, whereas treatment in Hidden Lake would occur sometime in late summer through fall. Therefore, the likelihood that gill-respiring tadpoles would be present in standing waters in the Buffalo Creek watershed is much lower. The sustained resurgence of Columbia spotted frog tadpoles in High Lake indicates that even if mortality of Columbia spotted frogs occurred, they are resilient and would quickly repopulate lakes.

Wetlands with surface connectivity to lakes and streams in the Buffalo Creek would be treated with rotenone, and amphibians may be present. Adults would be resilient because of their mobility and relatively high tolerance to rotenone. If tadpoles are present during treatment, they would experience substantial to near total mortality. The population would be resilient; however, as adults would return to reproduce the following spring. In treated wetlands in southwestern at similar elevation, the number of tadpoles present in treated wetlands returned to pretreatment numbers and remained similarly abundant for three years posttreatment (Billman et al. 2012).

Timing piscicide treatment for late summer through fall, amphibian species present in the project area should be past metamorphosis. If gilled amphibians persist at this late date, they

would likely not survive the winter (Bryce Maxell, MNHP, personal communication). Amphibians have adapted to life at cold, high elevations with resilience to loss of year classes. Many adults remain to repopulate following years when weather does not provide enough time or warmth for frogs to metamorphose, or drought reduces water levels.

Amphibians with potential to be in the project area include boreal chorus frogs, Columbia spotted frogs, and western toads (Table 3). The proposed action timing, habitat use, and behavioral and anatomical adaptations would be protective of these species. Therefore, effects of rotenone application in the Buffalo Creek watershed on amphibians would be short-term and minor.

Boreal chorus frogs breed mostly in more ephemeral waters, and if they have not metamorphosed by the proposed timing of piscicide application, they likely would not be able to by that late date and would not survive the winter (Bryce Maxell, MNHP, personal communication). Adults may be present in wet areas treated with backpack sprayers; however, adult boreal chorus frogs would have low vulnerability to piscicide and be able to leave the project area.

Table 4. Amphibians likely to be in the Buffalo Creek watershed and their conservation status (MNHP 2018).

Common Name	Scientific Name	Gilled Phase Coincide with Proposed Treatment Timing?	Status
Boreal chorus frog	*Pseudacris maculata*	No	G5, S4
Columbia spotted frog	*Rana luteiventris*	Yes, at higher elevations	G4, S4
Western toad	*Anaxyrus boreas*	Yes	G4, S2, sensitive (AFWA et al.)

G5=Globally, the species is common, widespread, and abundant, although it may be rare in parts of its range. The species is not vulnerable in most of its range.
S4= In Montana, the species is apparently secure, although it may be rare in parts of its range, and/or expected to be declining.
G4 = Globally, is apparently secure, although it may be rare in parts of its range, and/or suspected to be declining.
S2 = At risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state.
Sensitive = species for which population viability is a concern as evidenced by a downward trend in population or a significant downward trend in conservation concern designations on individual national forests.

Columbia spotted frogs likely use standing waters for breeding and are often near streams. Research on Columbia spotted frogs indicate they would be resilient to rotenone treatment, as

no or few tadpoles would likely be present during late summer treatment, and the adults withstand rotenone at concentrations applied in fish removal projects (Grisak et al. 2007; Billman et al. 2011; Billman et al. 2012; Fried et al. 2018). Any tadpoles present during the proposed treatment period would be unlikely to survive the winter (Bryce Maxell, MNHP, personal communication). Tadpole production in treated lakes can be considerably higher following rotenone treatment compared to pretreatment (Billman et al. 2012). Columbia spotted frogs are a long-lived and can reach ages of 12 to 14. Having multiple age classes of frogs available to reproduce makes Columbia spotted frogs resilient to loss of a year class, and this species has evolved in harsh environments where periodic loss of year classes from extreme cold or drought occurs (Bryce Maxell, MNHP, personal communication). Piscicide treatment would mimic the types of environmental disturbance Columbia spotted frogs have evolved to withstand.

The MNHP has records of western toads near the project area. Western toads are a species of concern in Montana. Rotenone would be unlikely to harm adult western toads, as they are highly terrestrial as adults, and their impermeable skin protects toads from toxic chemicals. Moreover, adults would be prone to leave water if they encountered rotenone (Maxell and Hokit 1999).

Western toads will breed in streams, but in slower waters off the main channel. Western toads may also breed in wetlands and lakes in the project area. Laboratory investigations confirm the toxicity of rotenone to western toad tadpoles (Billman et al. 2011); however, the presence of numerous older age classes of terrestrial adults, and their high reproductive potential would counteract any mortality of tadpoles. Western toad populations were not decreased following rotenone treatment in 10 alpine lakes in western Montana (Fried et al. 2018). Female western toads in Montana have clutch sizes reaching 20,000 eggs (Maxell et al. 2003), and such large reproductive potential promotes rapid recovery.

Timing application of piscicide in late summer through early fall would be past the period of metamorphosis for western toads. If gilled forms were still present, they would be unlikely to survive the winter, so mortality associated with piscicide would not be additive (Bryce Maxell, MNHP, personal communication). Any effects of rotenone treatment on western toads would be minor and short-term.

Consultation with the senior zoologist at MNHP indicated benefits to amphibians with removal of nonnative fish (Bryce Maxell, MNHP, personal communication). Amphibians coevolved with native fish species, and their populations are likely to benefit from removal of nonnative fish. Nonnative rainbow trout are a potential cause of decline of native amphibians. He supported this project as being beneficial to native fish and amphibians.

Zooplankton

Rotenone has greater initial effects on abundance and diversity of zooplankton than stream-dwelling invertebrates, given the longer period of exposure and their permeable bodies (Vinson et al. 2010). Biomass of zooplankton recovers rapidly; however, zooplankton community composition can take from 1 week to 3 years to return to pretreatment conditions (Beal and Anderson 1993; Vinson et al. 2010). Like stream-dwelling invertebrates, zooplankton have life history strategies that aid in rapid recolonization following disturbance (Havel and Shurin 2004). Recovery of zooplankton varies among tax, with a dramatic bloom of early colonizers in the first few months (Beal and Anderson 1993). Other taxa take longer to recover, but the diversity and abundance can return as quickly as 6 months. The number and diversity of zooplankton increased in Devine Lake in the Bob Marshall Wilderness in Montana following a rotenone treatment (Rumsey et al. 1996). Densities of zooplankton in upper and lower Martin lakes nearly Olney, Montana were similar to pre-rotenone treatment two years after treatment (Schnee 1996). Although rotenone is toxic to zooplankton, field studies confirm the effects are short-term and minor, with populations rebounding first in biomass, then in diversity.

CFT Legumine is being used across continents in native fish conservation, and research in Norway demonstrated rapid recovery using concentrations and duration of CFT Legumine exposure in lakes like what is proposed for this project. In a Norwegian lake, zooplankton were sampled before application of CFT Legumine, immediately after treatment, and 1-year posttreatment (Amekleiv et al. 2015). CFT Legumine had an initial negative effect on zooplankton, with none detected immediately after treatment. The relative abundance of zooplankton changed from pretreatment to 1-year post treatment, with some species comprising a much higher proportion of the zooplankton community posttreatment. In addition, overall abundance of zooplankton increased considerably posttreatment. Rotenone removed common roach (*Rutilus rutilus*), a species of minnow that preys on zooplankton, which was attributed to the population boom of zooplankton.

Zooplankton have multiple ways to recolonize standing waters (Havel and Shurin 2004). Many zooplankton are capable of asexual reproduction, which favors rapid recolonization from existing eggs and zooplankton that survived treatment. Moreover, lakes have a long-term bank of dormant eggs. Wind, animals, and humans disperse dormant eggs from neighboring lakes. In Hidden Lake and its unnamed companion lake, zooplankton communities would likely follow the typical cycle of rapid recolonization of early colonizing species. The zooplankton community would recover in a few months to a few years. The rapid recovery of numbers would reset the food web and provide fertile waters for the return of fish.

As rotenone is toxic to zooplankton, plankton would be sampled before rotenone application and again one year after treatment has been completed. Hidden Lake would have a bank of dormant eggs to jumpstart recovery, and zooplankton would likely recolonize from influx of dormant eggs from neighboring lakes.

Stream-Dwelling Aquatic Invertebrates

Rotenone can result in temporary reduction of gilled aquatic invertebrates in streams, but they are resilient and recover rapidly. Invertebrates that are most sensitive to rotenone also tend to have short life-cycles, which results in the highest rates of recolonization (Cook and Moore 1969; Engstrom-Heg et al. 1978). Although gill-respiring invertebrates are a sensitive group, many are far less sensitive to rotenone than fish (Schnick 1974; Chandler and Marking 1982; Finlayson et al. 2010). Due to their short life cycles (Wallace and Anderson 1996), strong recolonization ability (Williams and Hynes 1976), and generally high reproductive potential (Wallace and Anderson 1996), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996).

Fisheries managers are using CFT Legumine across continents in native fish conservation projects, and these efforts follow protocols equivalent to what is proposed for this project, which allows for generalizations among studies. Practices to limit mortality of nontarget organisms include using the lowest effective concentration to kill fish and limiting the duration of exposure. Consistently, studies of aquatic invertebrates in streams treated with CFT Legumine under current practice show the populations recover within a year (Skorupski 2011; Kjærstad et al. 2015; Bellingan et al. 2019). Mortality associated with rotenone application as proposed for this project is slight to moderate (Skorupski 2011), leaving a substantial proportion of invertebrates unharmed. These survivors reproduce and contribute to recovery of the community.

Treatment with rotenone mimics environmental stressors under which aquatic invertebrates evolved. Streams are prone to periodic disturbance such as floods, wildfire, and extreme drought, and these events can kill or displace invertebrates from reaches of stream. Aquatic invertebrates are adapted to periodic disturbance and have several mechanisms to recolonize depopulated reaches. Combined, these mechanisms result of rapid recovery of aquatic invertebrates affected by rotenone treatment or reduced by natural disturbance.

Aquatic invertebrates have a strong tendency to drift (Townsend and Hildrew 1976; Williams and Hynes 1976; Brittain and Eikeland 1988), which is transport of invertebrates by stream flow. Aquatic invertebrates are adapted to running waters, but they can be dislodged or they may actively drift to avoid predation or find new food patches (Brittain and Eikeland 1988). The importance of drift in dispersal of stream-dwelling invertebrates is an area of extensive study.

Moreover, drift is what makes fly fishing with nymphs possible as a sport, as artificial nymphs mimic naturally drifting invertebrates.

Downstream drift of invertebrates is the major mechanism by which aquatic invertebrates recolonize streams and accounted for over 40% of invertebrates recolonizing experimentally depopulated reaches of stream (Williams and Hynes 1976). Fishless headwater reaches are not treated with rotenone, and these areas have tremendous capacity to contribute high diversity and large numbers of invertebrates (Wipfli and Gregovich 2002; Hollis 2018). The amount of energy contributed from aquatic and terrestrial invertebrates and detritus drifting from 1 kilometer (0.62 miles) of fishless headwaters could support 100-2000 young of the year salmonids (Wipfli and Gregovich 2002). The abundance of aquatic invertebrates drifting from fishless headwater reaches was enough to support 25% of the adult trout in fish-bearing waters (Hollis 2018). In Specimen Creek, which is about 12 miles west of Buffalo Creek, invertebrate drift was considerable, with 15.6 invertebrates drifting per cubic meter per second flow (Skorupski 2011). Although rate of drift varies with numerous factors (Brittain and Eikeland 1988), treated reaches of stream would receive a substantial, continuous supply of invertebrates from untreated headwaters, which would contribute to rapid recovery of invertebrate populations. The short-term reduction and absence of fish would also contribute to recovery of invertebrate populations providing a productive stream when fish are returned to treated streams.

Reproduction by aerial adults is the secondary mechanism aquatic invertebrates use to recolonize streams. Reproduction by winged adults accounted for 28% of invertebrates recolonizing experimentally depopulated reaches of stream (Williams and Hynes 1976). Having a winged adult state that flies upstream to reproduce or disperses from neighboring areas counteracts the constant passive or active drift of larval invertebrates and allows for repopulating reaches following disturbance.

Movement of invertebrates from deeper in the substrate and from downstream are other mechanisms of recolonization. Upstream movement of aquatic organisms is a relatively minor mechanism for recovery (Williams and Hynes 1976) and would likely not be a large contributor to recovery in streams with a downstream barrier. In contrast, invertebrates moving up from deeper in the streambed have better potential to contribute to recovery. Experimentally, this source contributed about 18% of invertebrates recolonizing a depopulated reach (Williams and Hynes 1976). Eggs, pupae, and larvae deeper in the streambed may be resistant to rotenone or not receive lethal concentrations of rotenone, especially in reaches with substantial groundwater contribution, which would dilute rotenone applied at the surface. In rotenone projects in Montana, impressive hatches of invertebrates have been observed the day after a

stream was treated with rotenone indicating substantial numbers of invertebrates are present posttreatment to immediately jumpstart recovery.

Because piscicide has potential to alter abundance and species composition of aquatic invertebrates over the short-term, FWP piscicide policy requires pretreatment sampling of benthic aquatic invertebrates (FWP 2017). The timing and intensity of sample varies with the potential for the project to have adverse effects on invertebrate species of concern and the potential for controversy. Review of the MNHP's species of concern database did not yield records of invertebrate species of concern in the project area.

Review of the MNHP species of concern database and absence of benthic species of concern in samples collected in Buffalo Creek in 2019 place this project in the category 1 benthic invertebrate monitoring protocols (Table 5) (FWP 2017). Samples collected in September 2020 provide a baseline, and no sensitive species of invertebrate were captured. Samples would be collected within a month before application of CFT Legumine in the treatment area and an untreated control in the same stream. Invertebrates would be identified to the lowest practical taxonomic level allowing for calculation of standard metrics of biological integrity such as number of taxa, number and percentages of mayflies, stoneflies, and caddisflies. Samples collected in August 2020 have not been analyzed but would contribute to evaluation of the response and recovery of aquatic invertebrates in the waters in the project area.

Table 5. Benthic macroinvertebrate sampling procedures and protocols for categories 1 and 2.

Category	*Sample Locations*	*Sample Dates*	*Sample gear, sample size*	*Metrics*
1	Control & treatment area (same stream)	• 1-year to 1-month pretreatment • 1-year posttreatment	Travelling kick net (1 sample in each of 3 sites in treatment area and 1 sample in control area)	• Taxa richness • EPT indices • CPUE Identify to lowest practical taxonomic level
2	Control, treatment area, deactivation zone (same stream)	• 1-year pretreatment and no more than 1-month pretreatment • At least 1-month posttreatment, pre-runoff the following spring, and 1-year posttreatment	Use DEQ's current sampling and analysis protocols, including 3 sites in treatment area, control area, and deactivation zone	• Taxa richness • EPT indices • CPUE • Functional feeding group metrics • Habit metrics • Composition metrics • Richness metrics Build a reference collection, have an independent taxonomist identify 10% subset for quality assurance, and identify to lowest practical taxonomic level

No Action

The no action alternative would maintain the existing condition as a nonnative rainbow trout fishery and allow the primary cause of loss of Yellowstone cutthroat trout to reside in a watershed with high conservation value for Yellowstone cutthroat trout. Yellowstone cutthroat trout would not receive the conservation benefit of 46 miles of secure habitat and a connected lake. Moreover, the Buffalo Creek watershed would be a perpetual source of rainbow trout genes, which jeopardizes the Yellowstone cutthroat trout in Slough Creek, which is the focus of mechanical removal efforts. Rainbow trout and hybrids have potential to invade other streams, further putting Yellowstone cutthroat trout at risk.

Invertebrates and amphibians would continue to live in waters with a species they did not coevolve with. Introduced fish may be functionally different predators on invertebrates (Benjamin et al. 2011; Lepori et al. 2012), which could alter the benthic assemblage and riparian-dwelling species. Stocking rainbow trout in fishless lakes has been detrimental to amphibians (Knapp and Matthews 2000), especially in the Sierra Nevada where frogs did not coevolve with nonnative fish. Amphibians present in the project area did coevolve with

Yellowstone cutthroat trout and are present in fish-bearing waters throughout their range. Bryce Maxell, the state zoologist at MNHP, stated he had a strong preference for replacing rainbow trout with native Yellowstone cutthroat trout, as the native assemblage functions better. Leaving rainbow trout in the project area would not reflect the biological integrity or function of the coevolved assemblage of aquatic organisms.

Comment 5d: Introduction of a New Species to an Area

Proposed Action

The cascade at the Yellowstone National Park boundary was likely a total barrier to upstream movement of fish, and these waters were likely fishless before introduction of rainbow trout, at least in recent geologic time. This project would expand the distribution of Yellowstone cutthroat trout within its historical range, but in historically unoccupied habitat. Under the conservation agreement for cutthroat trout (MCTSC 2007), establishing Yellowstone cutthroat trout in previously fishless waters is among conservation priorities when it would not have adverse effects on invertebrates or amphibians. Introduction of rainbow trout into the Buffalo Creek watershed was likely not beneficial to the coevolved assemblage of invertebrates and amphibians they encountered. All species likely to be present coevolved with Yellowstone cutthroat trout. As functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), removal of nonnative rainbow trout and replacing them with the native fish species would benefit the watershed's native invertebrates and amphibians.

No Action

By not implementing the project, nonnative rainbow trout would remain as a threat to Yellowstone cutthroat trout in the waters throughout the Lamar River drainage. Yellowstone cutthroat trout would not benefit from having secure habitat within a cold water refuge (Isaak et al. 2017). Invertebrates and amphibians would continue to face predation pressure they did not evolve with.

Leave Fishless Alternative

The consequences of this alternative would be the same as the proposed action with the exception that fish would not be restocked in the watershed. The lack of fish would eliminate a food source to mammals and birds that eat fish.

Comment 5f: Threatened and Endangered Species and Species of Concern

Proposed Action

Review of the MNHP's database for federally listed species and state animal species of concern found several species (Table 6). FWP analyzed the potential of the project to affect state species of concern. Information on distribution, migration, habitat use included here are from

the field guide information in the MNHP's website (MNHP animal field guide), which includes citations. Biologists with the Forest Service contributed to the analysis on federally listed species.

Table 6. Federally listed species and state species of concern within the project area (MNHP animal field guide).

Class	***Common Name***	***Scientific Name***	***State Status***	***Federal Status***
Insecta	Western glacier stonefly	*Zapada glacier*	S1	Threatened
Bufonidae	Western toad	*Anaxyrus boreas*	S2	
Anatidae	Harlequin duck	*Histrionicus histrionicus*	S2B	
Strigidae	Great gray owl	*Strix nebulosa*	S3	
Picidae	Black-backed woodpecker	*Picoides arcticus*	S3	
Accipitridae	Northern goshawk	*Accipiter gentilis*	S3	
Accipitridae	Golden eagle	*Aquila chrsaetos*	S3	
Accipitridae	Bald eagle	*Haliaeetus leucocephalis*		
Falconidae	Peregrine falcon	*Falco peregrinus*	S3	
Corvidae	Clark's nutcracker	*Nucifraga columbiana*	S3	
Fringillidae	Black rosy finch	*Leucostricte atrata*	S2	
Fringillidae	Cassin's finch	*Haemorhous cassinii*	S3	
Certhiidae	Brown creeper	*Certhia americana*	S3	
Turdidae	Veery	*Catharus fuscescens*	S3B	
Vespertilionidae	Townsend's big-eared bat	*Corynrhinus townsendii*	S3	
Bovidae	Bison	*Bison bison*	S2	
Bovidae	Bighorn sheep	*Ovis canadensis*		
Mustelidae	Wolverine	*Gulo gulo*	S3	
Felidae	Canada lynx	*Lynx canadensis*	S3	Threatened
Canidae	Gray wolf	*Canis lupus*		
Ursidae	Grizzly bear	*Ursos arctos*		Threatened

S2 = at risk because of very limited and/or potentially declining abundance, range, or habitat, making it vulnerable to extirpation in the state.
B=Breeding populations are potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.
S3 =Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas
Sensitive = population viability is a concern on Forest Service lands as evidenced by a significant downward trend in population or habitat capacity.
Threatened = listed as threatened under the Endangered Species Act

The western glacier stonefly (*Zapada glacier)* is the only federally listed threatened aquatic species with range overlap in the project area; however, this species requires high-elevation, fishless, alpine streams linked to glacial meltwater sources. This species was absent from samples collected in 2020, and sampling occurred in fish-bearing waters, which are unsuitable for the western glacier stonefly. Because the type of aquatic habitat required for this species is not present within the

project area and there are no known occurrences of this species in the project area, this analysis does not further consider effects on this species.

Western toads are likely present in the project area. See Amphibians for review of the literature on potential for rotenone projects to affect western toad. In summary, this project would have negligible effect on western toad, as the project would occur after metamorphosis, and western toads have tremendous reproductive capacity, which makes them resilient to short-term disturbance.

The MNHP database has records of several bird species of concern in the project area. Most bird species of concern inhabit terrestrial environments and rely on terrestrial food sources. Fieldworkers in the project area would result in short-term disturbance to these species, although some species are tolerant to presence of humans. Some may drink treated water; however, the exceptionally low toxicity in treated water, and the short duration rotenone remains toxic in the environment would not result in health risks to birds drinking water.

The project area may provide breeding habitat for harlequin duck. This species migrates to mountain streams in the Intermountain West from the Pacific Coast for breeding. Breeding birds arrive in late April to early May, and males leave in June. Females and young depart from late July to early September. Ducklings would be fledged and close to out-migrating during the proposed action period if they had not already left. Fieldworkers would be a short-term disturbance to harlequin ducks if still present. Rotenone could increase the availability of invertebrates through drift of killed invertebrates. Exposure to rotenone through eating invertebrates or drinking water would not present a health risk. These factors would result in short-term and minor disturbance to harlequin ducks and the possible benefit of greater accessibility of rotenone-killed invertebrates.

Golden and bald eagles have potential to scavenge dead fish; however, the low concentration of rotenone in fish tissues, and its rapid breakdown in the environment would not present a health risk to eagles.

Townsend's big-eared bat has potential to be in the project area and is a year-round Montana resident. This species roosts and hibernates in caves or old mines in forested areas. Townsend's big-eared bats eat nocturnal flying insects near foliage of trees and shrubs and specialize on small moths, but also feeds on other flying insects of mostly terrestrial origin. Timing the project for fall would coincide with the natural reduction of emergence of aquatic insects. The Townsend's big-eared bat's preference for invertebrates of terrestrial origin, potential for individuals to be hibernating at this elevation during project area, and relatively

small reduction of emergent invertebrates from aquatic origin would result in short-term and minor effects on Townsend's big-eared bats at most.

Bison are present in grasslands in Yellowstone National Park and adjacent lands, often at high elevation and have potential to be present in the project area during the proposed treatment. The project occurs within the bison tolerance zone. Fieldworkers have potential to temporarily disturb bison during the project implementation, but this would be short-term and minor. Rotenone would not pose a risk to bison drinking rotenone-treated waters. Bison would experience short-term and minor disturbance from this project.

The project area is within habitat likely to be occupied by wolverines. This species has been proposed for inclusion for protection under the endangered species list, and the State of Montana considers it an S3 species that is potentially at risk due to limited or declining numbers, range, or habitat. Wolverines live in alpine tundra, and boreal and mountain coniferous forests. Wolverines are mobile within large home ranges. The presence of fieldworkers may displace them temporarily from a small portion of their home range. Wolverines are opportunistic in their food habits and could eat rotenone-killed fish or drink rotenone-treated water; however, as discussed in Mammals, the low concentrations and short duration of rotenone in the environment would not pose a health concern to wolverines. This project would have minor and short-term disturbance to wolverines, as they would be resilient to human activities in a small portion of their home range for the duration of the project.

The MNHP has two observations of Canada lynx in or near the project watershed from over 20 years ago (MNHP 2018); however, there are few recent or verified observations in this part of the Greater Yellowstone Ecosystem, and no compelling evidence that the area historically or recently supported a resident, breeding lynx population (USFWS 2017). Lynx presence in the proposed project area is likely ephemeral or intermittent and related to occasional dispersing or transient lynx. If present, lynx would stick to Engelmann spruce-subalpine fir communities and remain in or close to dense forest cover and avoid forest openings and meadows. Canada lynx are specialists and prey mostly on snowshoe hare but will switch to red squirrels or grouse when hare populations are limited (USFWS 2017).

The action area includes the Absaroka-Beartooth Wilderness lynx analysis unit, which is located on the southern end of the Absaroka-Beartooth Wilderness adjacent to the northern boundary of Yellowstone National Park (Canfield 2016). Lynx analysis units are intended to provide the fundamental scale at which to evaluate and monitor the effects of management actions on lynx habitat. Although they do not depict actual lynx home ranges, their size generally approximates the area used by an individual lynx. Lynx analysis units should be in contiguous lynx habitat and contain habitat components necessary for year-round use. They are typically

larger on the CGNF than found elsewhere in Montana because the habitat is naturally more fragmented.

A GIS-based model characterized habitat structural stages in the Absaroka-Beartooth Wilderness lynx analysis unit (Canfield 2016). Habitat structural stage definitions follow the Northern Rockies lynx management direction (USFWS 2017). This lynx analysis unit is approximately 160,834 acres (Table 7). Lynx habitat in this lynx analysis unit tends to be concentrated in a mid-elevation band between warmer, drier montane forest near the valley bottoms, and alpine habitat above tree line in the high plateau and mountain peak areas. Approximately 26% of the lynx analysis unit is lynx habitat. Approximately 1.4% of the lynx analysis unit is early stand initiation, 9.2% is stand initiation, 11.4% of the LAU is multi-story habitat which provides both yearlong snowshoe hare habitat and lynx denning habitat, and 4% is in the "other" category which does not provide snowshoe foraging habitat during any season but may provide lynx denning habitat. The remainder of the lynx analysis unit that does not provide lynx habitat, consisting of dry forest types and large open areas of meadow, rock or water.

Table 7: Lynx habitat structural stages within the Absaroka-Beartooth Wilderness lynx analysis units.

LAU and Acres	Potential Lynx Habitat in LAU	Lynx Habitat Structural Stages Acres and Percent of Potential Habitat (%) in LAUs[1]			
		Early Stand Initiation	Stand Initiation	Multi-story[4]	Other[5]
Absaroka-Beartooth Wilderness 160,834	42,370 (26%)	2,372 (5.6%)	14,746 (34.8%)	18,446 (43.5%)	6.805 (16.1%)

[1] Based on the 2007 NRMLD, updated lynx habitat mapping for the Custer Gallatin National Forest in Canfield (2016), and further refinements in the CGNF lynx habitat map (March 21, 2018).

[2] *Early Stand Initiation*: Currently does not provide winter snowshoe hare habitat. Depending on time since disturbance, this stage may provide summer forage.

[3] *Stand Initiation*: Existing winter snowshoe hare habitat. Trees have grown tall enough such that limbs protrude above the snow in winter and are available to snowshoe hares for winter foraging and habitat.

[4] *Multi-story*: Existing yearlong snowshoe hare foraging habitat and lynx denning habitat. Has high horizontal cover created by several age classes of conifers, shrubs, and other trees.

[5] *Other*: Potential denning habitat. Includes stem exclusion (open and closed canopy). Does not provide snowshoe hare foraging habitat during any season. Stands with larger trees and more open canopy cover may provide lynx denning habitat.

Noise associated with human presence, project implementation, and disturbance could displace individual lynx from habitat temporarily if they occur in the area. Lynx are primarily active at night. Activities associated with this project would occur during the day and noise related impacts are expected to be minor and intermittent. Nighttime noise would be limited to field crew activities at designated campsites, which would be spatially discrete and temporary. Any lynx that is displaced from the area because of short-term noise or commotion and would likely return after activities are complete.

Habitat would not be modified by this project. About 15 small diameter lodgepole pine trees may be cut down in the construction of aquatic barriers. This number is negligible and would not result in and significant reduction or modification of available habitat conditions. Actions would not result in any barrier to lynx distribution and movement through the area thereby maintaining connectivity of home ranges. Tree removal within this project in minimal and would not occur at a level that would alter Lynx critical habitat and therefore would have *no effect* on Canada lynx critical habitat.

If present during treatment, individual Canada lynx could be exposed to rotenone treated water; however, the exposure would be of too short a duration and concentration to cause a health risk. Canada lynx would be unlikely to scavenge dead fish.

Based on the combination of rarity of Canada lynx in the project area, their habitat and food preferences, and short duration of disturbance, and lack of cumulative effect, the project would result in negligible effects on Canada lynx. Therefore, the proposed action may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population of the species.

This project occurs within the Boulder-Slough Bear Management unit (BMU) and in the Boulder-Slough 2 subunit which contains designated wilderness and Yellowstone National Park. This subunit provides high quality secure habitat for grizzly bears and is roadless. Currently, the subunit is comprised of 97.7% secure habitat, allowing grizzly bears to use almost all the subunit without being displaced by roads or motorized use. Grizzly bears can be sensitive to helicopter disturbance, potentially resulting in displacement or avoidance of areas.

Although aircraft use over 500 meters is not shown to elicit a response from bears, the project aims to reduce any effects from repeated flights by following a flight path along the hiking trail except to reach remote drop locations. This would constrain activities to predefined areas where some disturbance already occurs and reduce the possibility or repeatedly disturbing the same individuals from multiple areas.

Where helicopters are under 500 meters or land, bears are likely to respond, especially in the wilderness where similar disturbance is unusual. In this project helicopters would carry

equipment, including bear-proof cages for attractant storage, to and from the three camps and Hidden Lake. Landings at the campsites would be minimal (up to 2/day) for mobilization and demobilization of camps and equipment occurring over 4 days with a maximum of 15 landings a year. The helicopter landing, combined with the use of the camp areas are expected to displace bears from the site for the duration of the camps use (up to 8 days). Additional landings to deliver personnel from outside the project area to 5 remote drip sites would occur with one landing at each site over 2 days. Given the lack of residual effects from the landings at remote drip sites, these are expected to have minimal impacts on bear movement or foraging patterns. Additional aerial treatments in Hidden Lake and two meadows are proposed and would occur once per area over two days.

Helicopter use in wilderness can lead to a temporary reduction in secure habitat due to the disturbance caused from landings in an area where such disturbance is abnormal. Given fleeting use of remote drips sites, short-term displacement of bears in the area is not likely to reduce their ability to use habitat. Repeated landing sites at camp and equipment mobilization sites, were considered as short-term impacts to secure habitat. The coupling of a large camping group with helicopter landings is likely to have increased impacts on the ability of bears to use the habitat. These areas were buffered by 500 meters to determine that these actions could result in a 0.5% reduction in secure habitat within the Boulder-Slough 2 Subunit. Additional landings occur in Yellowstone National Park at the Slough Creek transfer station and is already not contributing to secure habitat.

Helicopters would bring fish into the wilderness to re-stock streams and Hidden Lake after rotenone treatment. These uses would occur over 3 days annually including 2-5 landings and aerial stocking. Bears would likely be displaced from the area during this activity but given the short duration of use, these effects are expected to be negligible. The short duration of use and limited number of landings would not be expected to affect secure habitat for grizzly bears.

Human and stock travel would mostly occur along established trails that bears may already be avoiding or expect human encounters. The size of groups along with pack stings are likely to further displace grizzly bears but these effects would only be temporary during use. Similarly, camps would occur at already established camp locations that bears may already avoid. compliance with the food storage order for food, hygiene products, attractive chemicals, and non-hay stock feed would prevent bears from obtaining attractants and becoming accustomed to human use of the sites. Fieldworkers would make noise while traveling in the wilderness and must carry bear spray to reduce the likelihood of interactions. Working in groups and with motorized equipment would make bears aware of human presence and reduce the chance of negative interactions.

Project work would likely occur in late August or early September. In the Greater Yellowstone Ecosystem, grizzly bears transition to fall feeding patterns beginning in September. During this time, bears preferentially occupy habitats, including riparian areas, that provide high quality

food including berries, big game, and roots. Use during this time may increase the chance of encounters with bears. Given the project work would include motorized equipment along waterways and camps, bears are likely to be displaced from these locations while they are being treated. This displacement would only occur while work is occurring, and bears would be able to return to normal use levels when treatment of those waterways are completed. Additionally, given the surrounding wilderness, ample undisturbed habitat would be available for bear to occupy and find high quality forage. While rotenone treatment may lead to fish carcasses being available to grizzly bears, the low concentration of rotenone would not pose a health risk to grizzly bears.

Lenora Dombro, the Custer Gallatin National Forest wildlife biologist that prepared this analysis has determined that the proposed action is not likely to significantly affect grizzly bears based on the following rational:

- Helicopter use in the wilderness is likely to temporarily displace grizzly bears during landings and uses under 500 meters. These effects are expected to be short lived and grizzly bears would return to normal use patterns when use in the area is completed.
- Helicopter use would be restricted to pre-defined flight paths, largely along already used trails, constraining any effects that may occur from high elevation fights.
- Camps of 20 people and stock have the capacity to displace grizzly bears from the area. However, these camps are at already established locations where grizzly bears are likely used to human use.
- Food and attractants would be stored in bear cages, electric fences, or other IGBC approved storage methods to comply with the food storage order.
- Use of motorized boats and backpack sprayers in the wilderness to treat streams could disturb grizzly bear during use but these effects are expected to only occur during equipment use.
- Fieldworkers would be trained in how to safely work in bear country including following food storage orders and using and carrying bear spray.
- Actions would be constrained in space and time, having reduced effects as the project progresses, leading to temporary and short-term displacement of grizzly bears.
- Grizzly bears that may be displaced from high quality foraging habitat, including riparian areas, would only be displaced for a short period, have available food resources in other surrounding habitat, and foraging is not expected to be significantly impacted.
- Surrounding wilderness provides high quality habitat with little disturbance for displaced bears to utilize until project work has completed.
- Short duration on project work (up to two weeks) would not alter bear use patterns in the area.

The project would be beneficial to Yellowstone cutthroat trout, a species of concern that is currently not in the project area, although the rainbow trout jeopardizes the Yellowstone cutthroat trout in the watershed downstream of the project area. This project would provide substantial habitat within an area predicted to remain suitable for Yellowstone cutthroat trout despite the warming climate. This project would eliminate a source of rainbow trout to Slough Creek and the greater Lamar River watershed. Being in the headwaters of Yellowstone National Park, the Yellowstone cutthroat trout have tremendous ecological and recreational value and are a key component of the natural heritage of America's first national park.

The proposed action would temporarily displace individuals but would not result in a trend toward federal listing or loss of population viability for any potentially affected species within the analysis area. The Custer Gallatin National Forest is preparing a biological assessment to be submitted to the Fish and Wildlife Service and initiate Section 7 consultation based on the selected action for effects to Canada lynx, lynx critical habitat, grizzly bear, and whitebark pine.

No Action

Not implementing the project would have no effect on most of the species of concern in the area, except for western toad and Yellowstone cutthroat trout. Rainbow trout may continue to exert predation pressure on western toads that they did not evolve with. The no action alternative would not displace grizzly bear or lynx that may occur in the area, allowing them to utilize the habitat. Due to the lack of helicopters in the wilderness, secure habitat for grizzly bear would remain the same.

Leave Fishless Alternative

This alternative would have the same effects on species of concern as the proposed action for the duration of the treatment. Fish would not be available to mammals and birds that eat fish. Yellowstone cutthroat trout would not benefit from expansion into secure habitat within a climate shield. Displacement and reduction of secure habitat from helicopter use would be limited to the helicopters utilized in the rotenone treatment of the creeks and be limited to 5 years. This would reduce the number of years that grizzly bear may be displaced from the area from noise from helicopters, pack sticks, motorized use, and human presence. The likelihood of a negative encounter between humans and grizzly bear would be reduced.

Comment 5g: Increase Stress on Wildlife

Proposed Action

Presence of aircraft and fieldworkers would result in short-term disturbance to wildlife and may temporarily displace animals from occupied habitat. Large mammals would have the greatest potential to be disturbed by presence of humans. This disturbance would be short-

term and minor disturbance. Conservation and monitoring often brings fieldworkers and firefighters into remote wilderness, and this project would be similar to other common practices.

No Action

Wildlife would not experience increased stress if the project is not implemented.

Leave Fishless Alternative

This alternative would result in the same potential for stress on wildlife as the proposed action.

Comment 5i: Introduction of Species Not Presently or Historically Present in the Project Area

Proposed Action

The project area was likely historically fishless, with the barrier falls preventing native Yellowstone cutthroat trout from colonizing these waters from downstream. Fish planted in the watershed would come from the best available source following guidance developed to select brood stock for translocation that considers genetics, fish health, and potential effects on donor populations (Shepard et al. 2018).

This project would result in an expansion of occupied habitat within the Yellowstone cutthroat trout's historical range. The conservation agreement for Yellowstone cutthroat trout considers these projects among high priority conservation approaches if introduction does not have a negative effect on species present (MCTSC 2007). Species present in the area coevolved with Yellowstone cutthroat trout elsewhere in their historical ranges. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout. The native assemblage of invertebrates and amphibians present in the project area would likely benefit from the removal of rainbow trout and introduction of Yellowstone cutthroat trout. Nonnative fish are functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), so their elimination would be beneficial. This project would result in the establishment of a coevolved community of fish, invertebrates, and amphibians within the climate shield, which would bring considerable conservation benefit over its existing state.

No Action

Not removing rainbow trout and replacing them with native Yellowstone cutthroat trout in the historically fishless waters would allow rainbow trout to continue to threaten native Yellowstone cutthroat trout in receiving streams. Yellowstone cutthroat trout would not have expanded distribution into secure and thermally suitable habitat.

Leave Fishless Alternative

The leave fishless alternative would not result in establishing a secure population of Yellowstone cutthroat trout within the climate shield, which would result in a lost opportunity to establish a secure population of Yellowstone cutthroat trout. The threats Yellowstone cutthroat trout are complex and real, and not establishing a population within this secured area is contrary to FWP and USFS obligations (MCTSC 2007; Endicott et al. 2013).

Summary of Effects on Fish and Wildlife

Most disturbance associated with the proposed action and leave fishless option would result in short-term disturbance to fish and wildlife. Mitigative actions such as using lowest effective concentration of rotenone and short duration of exposure, deactivating rotenone at the end of the treatment area, planning flight paths to minimize disturbance would result in short-term disturbance of wildlife and nontarget aquatic organisms. Follow up monitoring finds rapid recovery of fish and nontarget aquatic organisms. No long-term effect has been documented for any other species in the over 100 piscicide projects that have been completed in Montana since 1990.

The consequence of the no action alternative would be continued hybridization of an exceptionally high conservation value population of native Yellowstone cutthroat trout in Slough Creek and the larger Lamar River (Heim et al. 2020). Buffalo Creek is the source of hybridization jeopardizing Yellowstone cutthroat trout in the nation's first national park. This irreversible loss of genetic integrity is a dire threat to not only Yellowstone cutthroat trout in the Absaroka-Beartooth Wilderness and Yellowstone National Park, but it increases justification for including Yellowstone cutthroat trout for protection under the Endangered Species Act.

Translocating fish upstream of the barrier falls would be beneficial to Yellowstone cutthroat trout as climate change is constricting suitable habitat, and areas like Buffalo Creek are among the few places within the climate shield, an area projected to remain cold enough for cutthroat trout (Isaak et al. 2015; Isaak et al. 2017). Invertebrates and amphibians with an aquatic life stage present within the treatment area have coevolved with Yellowstone cutthroat trout and share a broad historical range with this species. Translocating Yellowstone cutthroat trout upstream of the barrier falls would not cause harm to populations of aquatic organisms.

3.6 Designated Wilderness

The Wilderness Act of 1964 defines wilderness, describes the purpose for wilderness, and directs the wilderness management agencies to protect wilderness character. To operationalize this definition and link the concept of wilderness character directly to the statutory and tangible stewardship requirements of the Wilderness Act of 1964, an interagency

team identified and defined five tangible “qualities” of wilderness character: untrammeled, natural, undeveloped, outstanding opportunities for solitude or a primitive and unconfined recreation, and other features of value (Landres et al. 2015). When projects are proposed in wilderness, effects to these four wilderness qualities must be assessed and mitigated.

Notably, the Wilderness Act of 1964 also specifically acknowledges the role the states have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act of 1964 provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests”. The Act specifically prohibits several uses, except *“as necessary to meet minimum requirements for the administration of the area for the purpose of this Act.”*

A minimum requirements analysis (MRA) is required by **policy** whenever land managers are considering a use prohibited by Section 4(c) of the Wilderness Act of 1964. The concept of “minimum requirements,” sometimes called “minimum necessary,” was derived from Section 4(c) of the Wilderness Act: “Except as specifically provided for in this Act… and except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act …no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.” FWP and Forest Service wilderness managers cooperatively prepared a minimum requirements decision guide (MRDG) for this proposed action. The MRDG is a process to identify, analyze, and recommend management actions that are the minimum necessary for wilderness administration.

The MRDG analyzed a no action alternative and three action alternatives each with different tools for mobilization of personnel, gear, and equipment in-order to determine the minimum tool necessary for the administration of wilderness. These alternatives included: 1) No action; 2) All aircraft supported alternative; 3) Pack (foot) and stock supported alternative; and 4) Stock and aircraft supported alternative. For each action alternative, the effects of nine component activities on each of the five qualities of wilderness character were analyzed. The nine component activities include: 1) personnel access; 2) temporary project signing and flagging; 3) equipment transportation; 4) camping; 5) preparatory work; 6) lake, pond, and wetland treatment (lentic); 7) stream treatment (lotic); 8) sentinel fish; 9) and restocking. Detailed descriptions of these activities are provided in the Draft MRDG (Appendix A).

The following analysis compares the effects of project component activities on the five qualities of wilderness character under the proposed action, no action, and leave fishless alternatives. For an evaluation of component activities and their effects to wilderness

character, readers should refer to the draft MRDG (APPENDIX A: Minimum Requirement Decision Guide [Draft]).

Spatial boundary: The spatial bounds of this analysis are defined by the portion of the Buffalo Creek sub-watershed located within the Absaroka-Beartooth Wilderness. This analysis area is 26,000 acres in size or 2.7 % of the 944,000-acre Absaroka-Beartooth Wilderness Area.

Temporal boundary: The temporal bounds for this analysis span ten years from the onset of project implementation. This includes a maximum of five years for chemical fish removal and five years for fish restocking. Fish removal and restocking objectives may take less than ten years to achieve, but this analysis assumes the maximum potential project duration. Annual rotenone application activities described below would occur between mid-August and September 15th.

Proposed Action

The *Absaroka-Beartooth Wilderness Character Narrative* under "natural" value identifies that the Absaroka-Beartooth provides important sanctuaries for native aquatic species due to the cold, clean water found there (USFS 2019). Climate change is constricting suitable habitat for Yellowstone cutthroat trout making high elevations important for native fish conservation. The proposed project is intended to improve the natural quality by removing nonnative rainbow trout and replacing them with native Yellowstone cutthroat trout that are both indigenous to the Absaroka-Beartooth Wilderness and native to the lower portions the Buffalo Creek drainage. The natural values identified in the *Absaroka-Beartooth Wilderness Character Narrative* include providing important sanctuaries for native aquatic species which the proposed project is aligned with by removing a non-native aquatic species (rainbow trout) and replacing them with a native species (Yellowstone cutthroat trout).

The proposed action would result in activity in the Absaroka-Beartooth Wilderness Area. The Absaroka-Beartooth Wilderness is managed to maintain "wilderness character," including opportunities for solitude or a primitive and unconfined type of recreation, making "the imprint of man's work less noticeable," protecting indigenous species, and allowing natural processes to regulate ecosystems. Modern civilization and human control that affect ecological systems and processes can compromise wilderness character.

Of the 109 perennial stream miles in the Buffalo Creek sub-watershed, 59.4 (54%) are within the Absaroka-Beartooth Wilderness. Of these, 45.5 stream miles (76.7%) are proposed for rotenone treatment. Of the 59.4 wilderness stream miles, there are 14 stream miles (23%) that would remain untreated and left in the fishless condition due to the presence of natural migration barriers or unsuitable fish habitat. There are 11 lakes in the sub-watershed within the Absaroka-Beartooth Wilderness including Hidden Lake and a small unnamed adjacent lake.

Eleven out of the 22 lake acres (50%) in the Absaroka-Beartooth Wilderness would be treated with rotenone. The untreated stream segments and nine untreated lakes would serve as refugia for gill breathing organisms. In addition, there are two large meadows in the project area with numerous beaver dam complexes impounding approximately 25 acres of water that would require rotenone treatment. Wilderness rotenone treatment is expected to take up to 12 days annually, within a two-week window, in late August and early September for three consecutive years but must not exceed five years. Fish stocking would take up to three days annually for up to five years.

Following is a description of each of the component actions necessary for achieving the objectives of the proposed action.

Personnel Access

There are no roads within the project area on National Forest System Lands. From the Slough Creek trailhead in YNP, it is eight miles by trail to the lower camp site, 13.8 miles to the middle camp site, and 17 miles to the upper camp site. It is over 20 miles on foot from the Slough Creek trailhead to the uppermost rotenone application site in the Buffalo Creek sub-watershed. Most personnel access to and from the project area would be via foot or on horseback. However, a limited number of personnel may be transported into or out of the project area incidental to helicopter flights necessary for equipment and personnel transport to headwater sites.

Personnel would hike or ride horses to 12 headwater drip sites where it is feasible to carry 70 pounds of sentinel fish and treatment equipment on a time frame that does not compromise project success. However, five helicopter landing sites would be used to transport personnel to within close proximity of nine headwater drip sites where hiking or riding from camp would not be feasible from a safety standpoint. To minimize the number of landings in wilderness, personnel would be picked up by helicopter outside of Wilderness and flown directly to headwater drip sites.

Temporary Project Signing & Flagging

To comply with rotenone chemical label instructions, proper signage with required language would be posted at trailheads and key trail intersections. All signs would be removed annually as soon as it has been confirmed that there is no active rotenone in project area waters.

To complete the project, it is required that stream travel time or flow time be tested using dye and marked appropriately so crews can return to 2-hour flow interval locations when treating the streams. It is a common practice along streams to place temporary flagging at every ½-hour

flow interval so personnel can navigate to their assigned drip station location and communicate their location by travel time on a given stream. All flagging would be biodegradable paper flagging to avoid adding plastics to the ecosystem. All flagging would be removed annually.

Equipment Transportation

Rotenone application operations would be supported by three remote field camps (see location descriptions below) and the Buffalo Creek cabin. Forty-five pack stock would be used over four separate days to mobilize over 6,000 pounds of food, gear, and equipment to and from field camps. Helicopters would be used to transport 4,923 pounds of rotenone and treatment equipment to, within, and from the project area. Aerial transport of rotenone and treatment equipment in bear-proof cages is necessary to ensure that it is safe and secure from wildlife and on-site when crews arrive. This would require up to 15 landings on four separate days with a total of 12,446 pounds of gear and equipment airlifted. The total number of landings is not to exceed 45 over the five-year project duration. Airlifting most of the rotenone would reduce potential for chemical spills that would be more likely with stock transport.

Camping

Three spike camps for up to 20 individuals, located at preestablished outfitter campsites, would support daily rotenone application activities. The lower camp would be located near the YNP Boundary, the middle camp would be located at the meadow across from the mouth of Cat Creek, and the upper camp would be located at the meadow near the confluence of East Fork Buffalo Creek and Buffalo Creek. Personnel would camp in personal tents with one wall tent set up at each camp for cooking and conducting daily planning meetings. Rotenone and application equipment would be pre-staged in bear proof containers at each camp. These containers would negate the need for camp managers to supervise rotenone and other attractants at unoccupied spike camps. The upper camp would likely be utilized on project days 1 through 4, the middle camp would be utilized on days 4-8, and the lower camp would be used on days 8-12. Camping would be in accordance with “Leave No Trace” principles as well as the CGNF Food Storage Order.

Preparatory Work

Prior to stream treatments, crews would: 1) dye test all streams to determine 2-hour travel intervals to determine drip station locations; 2) measure stream discharge; and 3) conduct bioassays to determine effective rotenone concentration.

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. Brown, green, or black irrigation tarp would be used to blend with surroundings. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

Lake, Pond, and Wetland Treatment (Lentic)

Aircraft would be used to spray the 25 acres of open water with rotenone in the two large meadows on two separate days. This is because these features are too large (up to 200 feet across), deep, and numerous to be treated solely by hand. To ensure complete coverage of these open water areas, aerial rotenone application would be supplemented with gasoline-powered pumps where necessary and hand-pump backpack sprayers where feasible. Rotenone application in Hidden Lake would be accomplished through aerial spraying or watercraft, or a combination of both, depending on the amount of surface algae present. Typically, by late summer a thick hard algae crust (up to one foot thick) covers much of the lake surface. To achieve a complete fish-kill when the lake is algae covered, gasoline pumps mounted on inflatable watercraft would be used to disperse rotenone throughout the water column of Hidden Lake. Watercraft would be propelled by a gasoline engine to break paths through the thick algae.

Stream Treatment (Lotic)

To remove rainbow trout from faster flowing water, diluted rotenone would be applied using constant flow drip cans spaced at two-hour stream flow travel time intervals (stations). Each station would drip rotenone for four to six hours to ensure that there is sufficient overlap of chemical in time and space. Hand-pump backpack sprayers would be used to apply diluted rotenone to slow moving stream margins, backwaters, and shallow wetlands. Springs and seeps may be treated with Prentox™ 7% powdered rotenone doughball placed by hand. Each day, most personnel would hike from spike camp to their preassigned application locations. However, personnel may be airlifted via helicopter to the most remote headwater drip station assignments as described above in the “personnel access” component. Low gradient meadow reaches of Buffalo Creek with velocity too low for drip can treatment, would be treated with rotenone dispensed from two inflatable row raft retrofitted with battery-powered injector pump systems. A small 2,200-watt Honda™ generator would be used to charge pump batteries because a solar charger would not meet the charging demand for this and other battery-powered equipment.

Sentinel Fish

Live sentinel fish (genetically unaltered YCT from the Big Timber State Fish Hatchery) would be deployed in net bags upstream from each drip station to verify that the concentration and duration of rotenone from upstream drip stations is sufficient to achieve a complete fish kill.

Sentinel fish need to be healthy up until they are intentionally exposed to rotenone. Experience has shown that it can be difficult to keep sentinel fish staged within the project area alive since holding them in streams could prematurely expose them to residual rotenone. Furthermore, sentinel fish staged within the project area may also be attractant for bears. Therefore, sentinel fish supplied to crews via helicopter from the Big Timber hatchery would ensure that any observations of sick or dying sentinel fish are due to intentional rotenone exposure and not some other factor.

To comply with the CGNF Food Storage Order, all sentinel fish would be stored in certified bear-proof coolers with aeration or in streams within metal bear-proof cages. A small 2,200-watt Honda™ generator would be used to charge electrofisher batteries because a solar charger would not meet the charging demand for this and other battery-powered equipment.

Restocking

Restocking with unhybridized YCT would occur only in waters that previously supported fish. At least fourteen stream miles and 11 lake acres in the Absaroka-Beartooth Wilderness would not be restocked and would remain in the fishless condition. Restocking of treated waters would commence once monitoring has demonstrated that rainbow trout have been successfully removed. Restocking would be accomplished on five separate years, using up to 18 total helicopter landings (6 air drops and 12 physical landings). Helicopter delivery from the hatchery to the general stocking area is necessary to ensure a high survival rate of stocked fish. However, once these fish are in the upper, middle, or lower watershed, crews can carry them for up to an hour without significantly decreasing survival. Therefore, stream stocking would be accomplished by utilizing hikers and pack stock, where feasible, to distribute fish to multiple locations from each helicopter landing. As soon as all rainbow trout have been removed from Hidden Lake reproductive-sized (> six inch) YCT would be aerially stocked to reestablish the lake population.

Remote site incubators (RSIs) may be necessary to establish YCT stream populations in the project area. RSIs are used to incubate fish eggs for the purpose of increasing survival, reducing hatchery effects, and imprinting fish on specific streams. RSIs are comprised of a bucket or container with a water intake, filter system, and egg box. RSIs would be placed in-stream or on-

stream banks for 4-6 weeks each year for up to five years. Logistical issues such as timing of hatchery egg production, inability to secure eggs from wild fish, and deep snow in spring may prevent use of RSIs.

In summary, motorized equipment use and aircraft landings for piscicide application would occur for up to 12 days per year over a duration not to exceed five years (Table 7). Experience from other chemical treatments in the region suggests that treatment objectives would likely be met in three years. Fish stocking would occur over five years (not necessarily consecutive) beginning as soon as treatment objectives are met. The total number of aircraft landings over the 10-year duration of the project would not exceed 99. The Wilderness Act considers anything dropped to the ground from an aircraft as a landing. Therefore, aerial spraying and aerial fish stocking without aircraft touch-down contribute to the total number of landings.

Table 7. Summary of helicopter landings over the five-year chemical treatment window and five-year fish stocking plan.

Purpose	**Annual Landings**	**Annual Duration** (within 2-week window)	**Type**	**Total Landings over Project**
Personnel transport to remote headwater sites	5	two flight days	physical landing	15
Sentinel fish delivery to upper and middle camps	4	four flight days	physical landing	12
Equipment transport	15	four flight days	physical landing	45
Aerial spraying	3	two flight days	aerial spray no landing	9
Fish stocking	2-5	1-3 flight days	6 fish drops, 12 physical landings	18
Total				**99**

Direct and Indirect Effects

Proposed Action

The proposed action is to remove non-native rainbow trout and replace them with Yellowstone cutthroat trout that are both indigenous and native to the Absaroka-Beartooth Wilderness. Hidden Lake in the Buffalo Creek drainage was stocked with nonnative rainbow trout in 1932 before the 1978 designation of the Absaroka-Beartooth Wilderness (FWP 2021). The progeny of this stocking event have spread throughout connected waters in the Buffalo Creek drainage. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout in 1932. Recreational fishing opportunities have existed in the Absaroka-Beartooth Wilderness since pre-wilderness designation.

Untrammeled: Wilderness is essentially free from the intentional actions of modern human control or manipulation.

Rotenone treatment is considered a trammeling action because it manipulates an ecological system. Rotenone treatment of lakes, ponds, wetlands, and streams would have short-term negative effects on zooplankton and macroinvertebrate populations. Zooplankton and macroinvertebrate populations recover quickly when rotenone is applied according to label requirements (Prentiss 2013)

Stocking and use of RSIs are also considered trammeling actions. Stocking events would be of low frequency with up to five helicopter flights and landings per year. Duration of helicopter flights into wilderness would be of short duration lasting approximately 10 minutes within wilderness per flight. Installment of RSIs is temporary, they remain in project area streams for 4-6 weeks then are removed from the wilderness each year after fry have emerged. The proposed action would result in a short-term negative effect to the untrammeled quality of wilderness character.

Undeveloped: Wilderness retains its primeval character and influence without permanent improvement or modern human occupation. Structures or installations, or the use of motors or mechanical transport degrade the undeveloped quality.

The proposed use of motorized equipment and mechanical transport would degrade the undeveloped quality. Effects of aircraft operations, gasoline and battery-powered pumps, boat motor, and generator on this quality would range from low-to high intensity during the annual operation period. But the effects to the undeveloped quality would be limited to the annual two-week operation period and would not be measurable or detectable once annual operations have ceased. The intensity of aircraft operations would be highest during the five-year chemical treatment period but would decrease substantially during the five-year stocking period.

Signing and flagging, RSIs, and temporary fish barriers constitute installments and would minimally degrade the undeveloped quality while they are in use. Mitigations include: 1) biodegradable flagging would be used; 2) flagging would be removed by personnel as soon as it is no longer needed to denote drip site locations; 3) closure signs would be removed as soon as soon as project area streams meet rotenone label requirements for signage removal; 4) RSIs would be placed in project streams for 4-6 weeks and would be removed each year after fry have escaped; 5) upon project completion temporary fish barriers would be removed and sites would be rehabilitated to the preexisting condition; 6) RSI materials and irrigation tarp for fish barriers would be green, brown, grey, or black to blend into the surrounding landscape.

The proposed action would result in a short-term negative effect to the Undeveloped quality of wilderness character.

Natural: Wilderness ecological systems are substantially free from the effects of modern civilization. The natural quality is preserved when indigenous species and processes are intact and functional. It is degraded by the effects of modern civilization on the biophysical environment including the presence of nonnative species.

Rotenone treatment would have a short-term negative effect on native macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed (see Stream-Dwelling Aquatic Invertebrates). Over the long-term, rotenone application would improve the natural quality of wilderness character by replacing a nonnative fish species that is not endemic to the Absaroka-Beartooth Wilderness with the native fish species indigenous to the Absaroka-Beartooth Wilderness and lower Buffalo Creek, thus establishing the natural aquatic community of fish, invertebrates, and amphibians that coevolved in the Greater Yellowstone Ecosystem. Species present in the area coevolved with Yellowstone cutthroat trout elsewhere in their historical ranges. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout. The native assemblage of invertebrates and amphibians present in the project area would likely benefit from the removal of rainbow trout and introduction of Yellowstone cutthroat trout. Nonnative fish are functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), so their elimination would be beneficial. This project would result in the establishment of a coevolved community of fish, invertebrates, and amphibians within the climate shield, which would bring considerable conservation benefit over its existing state. The proposed action would result in a short-term negative effect but would result in a net long-term improvement in the natural quality of wilderness character.

Preserving this quality ensures that indigenous species, patterns, and ecological processes are protected and allows us to understand and learn from natural features. To preserve this quality, it may be necessary to take action to correct unnatural conditions even if they were present at the time of designation.

Solitude or Primitive and Unconfined Recreation: Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation. This quality is preserved when visitors experience minimal encounters, observe landscapes without modern human effects, and are not encumbered by regulatory restrictions. This quality is degraded by encounters, indications of civilization, or restrictions on visitor behavior.

The sights and sounds of aircraft operations, gasoline and battery-powered pumps, boat motor, generator, spike camps, and chemical treatment activities would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors to the Buffalo Creek project area could see and hear motorized equipment and increased human activity if they are in close enough proximity. These uses could intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically low use in the Buffalo Creek drainage, the potential for effects to solitude or primitive and unconfined recreation are minimized. The negative effect would likely be moderate to intense, of short duration, with no long-term effect. The intensity of effects to this quality would be highest during the five-year chemical treatment period but would decrease substantially during the five-year stocking period (Table 6).

The proposed action would result in a short-term negative effect to the Solitude or Primitive and Unconfined quality of wilderness character.

Other Features of Value: The proposed action would have no effect on the other features of value quality of wilderness character.

No Action

Under the no action alternative, removal of non-native rainbow trout and stocking of native and indigenous Yellowstone Cutthroat Trout would not occur. The unnatural condition that exists due the presence of non-native rainbow trout would continue in an aquatic community that didn't coevolve with the species. There would be no contribution to the long-term viability of YCT in the Yellowstone Headwaters Subbasin and the overarching conservation goals for the species would not be achieved.

Untrammeled: Non-native rainbow trout would continue to inhabit the streams and lakes. No trammeling associated with this project would occur.

Undeveloped: The no action alternative would have no effect on the Undeveloped quality of wilderness character.

Natural: Buffalo Creek is a cold-water stream with fish length and egg incubation data suggesting that the thermal regime is suboptimum for rainbow trout growth and reproduction. But with climate warming rainbow trout are expected to increase their population density, especially in wilderness stream reaches where density is currently low. Invertebrates and amphibians would continue to live in waters with a species they did not coevolve with. Introduced fish may be functionally different predators on invertebrates (Benjamin et al. 2011; Lepori et al. 2012), which can alter the benthic assemblage and riparian-dwelling species. Thus,

any ecological effects on aquatic macroinvertebrates and riparian dwelling species from human introduction of rainbow trout would persist and increase into perpetuity under this alternative. The natural quality would continue to degrade over time under this alternative.

Solitude or Primitive and Unconfined Recreation: No action would have no effect on the Solitude and Unconfined or Primitive and Unconfined Recreation quality of wilderness character.

Other Features of Value: The no action alternative would have no effect on the other features of value quality of wilderness character.

Leave Fishless Alternative

The component actions of this alternative are identical to the proposed action except that they do not include restocking activities (helicopter stocking or use of RSIs). Once nonnative fish removal objectives have been met, waters would remain fishless. Therefore, the project duration is limited to five years vs ten years for the proposed action. This alternative was not considered in the MRDG in detail because it is outside the scope of Forest Service decision. The Wilderness Act of 1964 specifically acknowledges the role the states have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act of 1964 provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". While there is no special provision that requires the restocking action to take place, the USFS is further governed by a substantial framework of policy directing the region how to consider proposed activities within designated wilderness.

Untrammeled: Component activities are identical to the proposed action except that there would be no stocking activities following chemical treatment or RSIs placed in streams. Rotenone treatment is considered a trammeling action because it constitutes manipulation of an ecological system. Rotenone treatment of lakes, ponds, wetlands, and streams would have short-term negative effects on zooplankton and macroinvertebrate populations. Zooplankton and macroinvertebrate populations recover quickly when rotenone is applied according to label requirements (Prentiss 2013). The leave fishless alternative would result in a short-term negative effect to the untrammeled quality of wilderness character.

Undeveloped: Component activities are identical to the proposed action except that there would be no mechanized transport (helicopter supported fish stocking) or development (RSIs) during the post chemical treatment period. The proposed use of motorized equipment and mechanical transport would degrade the undeveloped quality. Effects of aircraft operations, gasoline and battery-powered pumps, boat motor, and generator on this quality would range

from low-to high intensity during the annual operation period. But the effects to the undeveloped quality would be limited to the annual two-week operation period and would not be measurable or detectable once annual operations have ceased. The intensity of aircraft operations would be highest during the chemical treatment period, which could last from 2 to 5 years.

Signing and flagging constitute installments and would minimally degrade the undeveloped quality while they are in use. Mitigations include: 1) biodegradable flagging would be used; 2) flagging would be removed by personnel as soon as it is no longer needed to denote drip site locations; and 3) closure signs would be removed as soon as soon as project area streams meet rotenone label requirements for signage removal.

The leave fishless alternative would result in a short-term negative effect to the undeveloped quality of wilderness character.

Natural: Rotenone treatment would have a short-term negative effect on native macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed (see Stream-Dwelling Aquatic Invertebrates). Over the long-term, rotenone application would improve the natural quality of wilderness character by removing a non-native fish species.

The leave fishless alternative would result in a short-term negative effect to the natural quality of wilderness character with a net long-term improvement.

Solitude or Primitive and Unconfined Recreation: Effects to this quality are identical to the proposed action except that there would be no mechanized transport (helicopter supported fish stocking) or development (RSIs) during the post chemical treatment period.

the leave fishless alternative would result in a short-term negative effect to the Solitude and Unconfined Recreation quality of wilderness character.

Other Features of Value: The leave fishless alternative would have no effect on the other features of value quality of wilderness character.

4 Human Environment

4.1 Noise and Electrical Effects

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			6a
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				

Comment 6a: Increases in Existing Noise Levels

This project would bring short-term increases in noise from several sources. The increased presence of humans would result in increased noise from talking, walking through the forest, and making their presence known as part of bear safety. Equipment needed for delivery of piscicide to the site and into surface waters would also increase noise. Helicopters would be required to transport materials with an estimated 22 landings over 4 days. Additionally, use of helicopters on a limited basis to transport personnel to remote headwater drip sites would result in up to three more days of increased noise. Mixing CFT Legumine into lakes in the project area would require a gas motor, which would run for up to several days. Rotenone would be applied to the 26 acres of ponded water in wet meadows via aerial spraying over two days or by gasoline powered trash pumps over a duration of up to 6 days.

Comment 6b: Expose People to Nuisance Noise

Proposed Action

Helicopters, boat motors, and the power augers would result in noise that would be reasonably considered a nuisance, especially within designated wilderness. The noise would be of short duration. Noise from helicopters would be the most apparent and travel the farthest. Noise from the boat motor would last up to several days during each treatment. The generator driving the power auger applying potassium permanganate would be running for up to two weeks. The generator and auger would be located upstream from the confluence with Slough Creek, outside the Absaroka-Beartooth Wilderness in Yellowstone National Park and be inaccessible to visitors. Noise from the generator and boat motor would not travel far.

No Action

Not implementing the project would not expose people to noise that would be perceived as a nuisance.

Leave Fishless

Under this alternative, noise effects would be like the fish removal portions of the proposed action, although subsequent disturbance associated with reestablishing a fishery would not occur.

Summary of Effects on Noise and Electrical

The proposed action and the leave fishless option would increase noise in the treatment area for the duration of the treatment and during subsequent Yellowstone cutthroat trout translocations should the proposed action be selected. Helicopters transporting materials as described in the MRDG (Appendix A) would include measures to limit disturbance by minimizing flights and following flight paths that would decrease disturbance to wildlife. The outboard motor propelling the boat dispersing rotenone into Hidden Lake would create noise during treatment. All noise would be of short duration, and planning through the MRDG has resulted in planning for the minimum number of flights required to achieve project goals. Noise would be a short-term disturbance to wildlife and people enjoying wilderness, but no long-term effects would occur past the use of motorized equipment.

4.2 Land Use

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. Conflict with a designated natural area or area of unusual scientific or educational importance?			X			7b
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?	X					7c
d. Adverse effects on or relocation of residences?		X				

Proposed Action

Comment 7b: Conflict with Designated Natural Area

The proposed action project area is within the Absaroka-Beartooth Wilderness and ends within the deactivation zone in a short distance of Slough Creek, which is in Yellowstone National

Park. The project would result in presence of field crews, their camps, and horses and helicopters to transport materials. This disturbance would be short-lived lasting. Press releases and placing signs near stream access points would alert the public to the project. Actions would be limited to the Buffalo Creek watershed, leaving the majority of the Absaroka-Beartooth Wilderness and northern extent of Yellowstone National Park undisturbed.

No Action

Not implementing the project would result in no conflict with designated natural areas.

Leave Fishless Alternative

This alternative would have a lasting effect on land use with permanent removal of fish. Visitors to the Buffalo Creek watershed have had 90 years of fishing opportunity from a fish plant in the 1930s. This date of fish introduction predates the Wilderness Act of 1964 and the designation of the Absaroka-Beartooth Wilderness in 1978. Fishing is popular in Hidden Lake, which has an outfitter's camp nearby, which likely increases use beyond what is predicted under the available angling pressure data maintained by FWP.

Comment 7c: Conflict with Existing Land Use

Proposed Action

Recreation is the primary land use in the project area, and the proposed action would have potential to result in short-term disruption of land uses. The presence of fieldworkers could alter some visitors' enjoyment of the Absaroka-Beartooth Wilderness and adjacent Yellowstone National Park. This alteration would be short-term.

Waters in the project area would be temporarily closed to access while rotenone was active in the water. The CFT Legumine label requires restriction of recreational activities including wading, swimming, boating, and fishing while rotenone is being applied, so treated waters would be closed to public access until rotenone has been deactivated, either naturally or through application of potassium permanganate. Streams would be closed for a minimum of 72 hours. Lakes would be closed until caged fish survived 24 hours within the treated lake or up to 14 days. Signs would be posted at trailheads and access points advising visitors to the closures. Press releases and work with partners would alert backcountry users as to the nature and duration of the project and describe closures.

The proposed timing for the project coincides with part of the general archery season and upland game bird hunting season. Project activity along the stream may displace game species, although this disturbance would be short-term and minor.

A goal of the project is complete eradication of rainbow trout currently occupying the project area, so recreational fishing would be suspended until recovery of the transplanted Yellowstone cutthroat trout. No data on angling use of Buffalo Creek and Hidden Lake are available. Although angler days cannot be quantified, the outfitter's camp near Hidden Lake and easy access to Buffalo Creek for those hiking or on horseback gives anglers opportunities to fish the lake and stream. Stocking the lake with reproductive-aged Yellowstone cutthroat trout soon after rotenone treatment would mitigate for loss of fish in the lake and restore a lake population of fish.

Replacing the existing rainbow trout fishery with locally adapted Yellowstone cutthroat trout would mitigate for the short-term absence of fish in Buffalo Creek and Hidden Lake. Yellowstone cutthroat trout are the trout native to this part of the Greater Yellowstone Ecosystem and are a key component of its biological heritage. Visitors to the Absaroka-Wilderness would have the rare opportunity to catch native Yellowstone cutthroat trout in a spectacular setting. Moreover, this project would protect the Yellowstone cutthroat trout in Slough Creek and the larger Lamar River watershed by removing this source of genetic contamination. The short-term lack of fishing opportunity would bring tremendous conservation and recreational value over the long-term.

No Action

Not implementing the project would result in no changes to existing land uses.

Leave Fishless Alternative

As the project area is within designated wilderness and Yellowstone National Park, recreation is the land use with potential to be affected. The leave fishless alternative would have the same consequences as the proposed action in terms of disruption and closures during the piscicide application. Fishing is an existing land use in the Buffalo Creek watershed and leaving the waters fishless would eliminate this land use.

Summary of Effects on Land Use

The proposed action would have the long-term effects of establishing a secure population of Yellowstone cutthroat trout in Buffalo Creek and eliminating the threat posed by rainbow trout hybridizing with Yellowstone cutthroat trout in waters downstream. Hybridization decreases fitness, which would jeopardize the health of the fishery downstream. The proposed action would provide improved recreational opportunities compared to the current condition while establishing a protected population of Yellowstone cutthroat trout to offset losses elsewhere.

Anglers would no longer have access to rainbow trout in Buffalo Creek if the proposed action or leave fishless option are implemented. Rainbow trout would remain widespread throughout Montana and continue to provide high quality angling in other locations.

4.3 Health Risks and Health Hazards

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

Comment 8a: Risk of Explosion or Release of Hazardous Substances

Proposed Action

The project would entail transporting and handling drums of CFT Legumine and potassium permanganate into the project area. This project would have at least two licensed applicators, who would handle undiluted CFT Legumine and potassium permanganate, and these applicators would bear the primary risk of exposure to hazardous materials. FWP piscicide policy requires one applicator to be independent to serve ensure safety and quality control measures are met (FWP 2017). Applicators require a license issued by the Montana Department of Agriculture and attend weeklong trainings in preparation for the licensing examinations. FWP and partnering agency applicators have many years of experience in implementing rotenone projects.

Applicators would follow the label instructions on safe handling and use of personal protective equipment for CFT Legumine and potassium permanganate. Applicators would supply fieldworkers with diluted CFT Legumine to be dispensed at drip stations, and fieldworkers would wear personal protective equipment when handling dilute product or when in contact with treated waters. Transporting, handling, storing, and applying chemicals according to label specifications would reduce the probability of hazardous exposure or chemical spill.

No Action

Not implementing the action would result in no risk of explosion or release of hazardous substances.

Leave Fishless Alternative

This alternative would result in the same risks are the preferred alternative and would require the same safety practices and use of personal protective equipment.

Comment 8b: Emergency Response Planning

Proposed Action

FWP piscicide policy requires a treatment plan be developed for rotenone projects (FWP 2017). The treatment plan provides the basis for ensuring effective chemical application while protecting health and safety and preventing accidents and spills. The treatment plan lays out a clear chain of command, requirements for training, and delegation of roles and responsibilities. Safety measures include a spill contingency plan, provisions for first aid, and requirements for personal protective equipment. Implementing projects in remote areas requires establishing clear lines of communication among members and ability to communicate with emergency responders. Fieldworkers would maintain communication with handheld radios and would be trained in their use. The plan includes provisions for monitoring and quality control. Implementing this project should not affect existing emergency plans. FWP's implementation plan provides internal risk management and safety provisions to minimize the need of requiring an outside emergency response, so any effects on existing emergency responders would be short-term and minor.

No Action

No emergency response planning would be required if the project is not implemented.

Leave Fishless Alternative

This alternative would require the same emergency response training as the proposed action. As fieldworkers would not be returning to reintroduce fish, the extended risks associated with back country work would not apply.

Comment 8c: Creation of Hazards to Human Health

Proposed Action

This project would result in release of CFT Legumine, a formulation of rotenone, into waters in the project area, and release of potassium permanganate at upstream of the confluence of Buffalo Creek and Slough Creek. The combination of oxidation with potassium permanganate and dilution from untreated flows in Slough Creek would render rotenone nontoxic quickly.

Analysis of risks to human health from exposure to CFT Legumine follows information provided by the EPA (EPA 2007) and a study of the toxicity and persistence of the active and inert ingredients in CFT Legumine (Fisher 2007).

Toxicity evaluations examine acute and chronic toxicity. Acute toxicity is the adverse effect of a highly toxic substance from a single exposure or multiple exposures in a short space of time that result in substantial health risks. Rotenone ranks as having high acute toxicity through oral and inhalation routes of exposure, and low acute toxicity through exposure to skin (EPA 2007).

Several factors would protect the health of workers handling CFT Legumine and prevent harmful exposure to rotenone. The low concentration of rotenone in CFT Legumine is one factor. It comprises 5% of the formulation, or 5 g/L. No one would be handling pure rotenone. Furthermore, the label for CFT Legumine requires applicators to wear a dust/mist respirator, splash safety goggles, impervious gloves, and coveralls. The personal protective equipment would prevent inhalation, ingestion, and dermal exposure. Goggles would protect eyes from contact with CFT Legumine.

Applicators would supply bottles of CFT Legumine to fieldworkers responsible for operating a given drip station or backpack sprayer. Flow measurements taken the day before would determine the amount of CFT Legumine in dispensed bottles required to achieve the target concentrations of rotenone in streams, usually 25 to 50 ppb. The CFT Legumine would be mixed with stream water in drip station cubes or backpack sprayers. Operators handling CFT Legumine would also wear eye protection, a protective mask, and gloves to prevent exposure to the diluted CFT Legumine. In either case, applicators handling undiluted CFT Legumine and operators applying diluted CFT Legumine to surface waters would not be exposed to rotenone at levels that would be acutely toxic, as personal protective equipment would prevent exposure, and accidental exposure would be to low concentrations of rotenone.

Chronic exposure is repeated exposure from ingestion, inhalation, or dermal contact with the target chemical (EPA 2007). Chronic exposure, as defined in toxicity analyses for humans, is about 10% of the life span. Application of piscicide in Buffalo Creek would likely last 5 days, with treatments in 3 subsequent years. Applicators handling undiluted product have potential for brief contact with rotenone for considerably less than 10% of their life span; however, under label requirements they are required to wear personal protective equipment. Protective eyewear, coveralls, gloves, and dust and mist respirators provide ample protection against any contact with rotenone. Likewise, operators dispensing diluted CFT Legumine at drip stations or with backpack sprayers would wear personal protective equipment to prevent exposure.

Exposure to rotenone by eating dead fish is highly unlikely, and streams and lakes would be closed to the public during treatment. Signs posted at trailheads and access areas would inform the public of the presence of dead fish and alert people to not eat dead fish. Microbes work quickly on dead fish, so decay is obvious within a few hours, and these fish would not be appealing to humans looking for a meal. Signs warning the public and rapid onset of decomposition of dead fish would result in extremely low probability that humans would eat rotenone killed fish.

Although consumption of rotenone fish is unlikely, in the rare event someone ate rotenone-killed fish or fish that left the project area without receiving a lethal dose, this exposure would not result in a health risk. The EPA evaluated the potential dose of rotenone from eating dead fish. In each step of their analysis, they factored safety into their equations to develop a risk analysis that would be highly protective of human health (EPA 2007). The EPA chose safety levels for females 13-49 years old, as a potentially sensitive group (EPA 2007). In determining potential exposure from consuming fish, the EPA used maximum residues in fish tissues killed by rotenone. This concentration is a conservative estimate of potential exposure, as it includes rotenone accumulated in nonpalatable tissues other than muscle tissue, which would not likely be eaten by humans, but may have higher concentrations of rotenone. The EPA concluded that acute dietary exposure from the unlikely occurrence of eating rotenone-killed fish resulted in a dietary risk below their level of concern. Therefore, people eating rotenone-killed fish, despite posted warnings, would not face a health risk.

The EPA developed toxicological endpoints for several types of exposure to rotenone in treated waters and included uncertainty factors to ensure endpoints would be conservative and most protective of human health (EPA 2007). Rotenone projects would result in exposures far below the no observable effects level for acute dietary exposure, chronic dietary exposure, incidental short-term exposure from consumption of rotenone-killed fish, and short, intermediate, and long-term dermal exposure. Personal protective equipment worn by workers would reduce potential for exposure within this margin of safety. Closing public access to the streams and lakes are extra precautionary actions designed to provide added assurance that human health would not be at risk from rotenone projects.

The EPA concluded risks from chronic exposure to rotenone-treated water in streams brought low risk to humans (EPA 2007). Rotenone's rapid breakdown in the environment and deactivation with potassium permanganate would limit the duration rotenone is present in treated waters. The label prohibits use of rotenone near waters diverted for domestic use, and this remote watershed does not provide water for domestic uses.

The requirement that the public be notified of rotenone in treated waters would also protect human health for the short duration it is present in streams and lakes. Notifying the public through local papers, public meetings, and placing signs at trailheads and access points would alert the public to the presence of rotenone in treated water. A designated public relations person would be on-site to inform recreationalists of piscicide treatment, educate them about its use, and should prevent exposure to rotenone.

The temporary closure of waters to recreational uses is an added safety measure to protect human health. At application concentrations of less than 90 ppb of CFT Legumine, rotenone does not pose a threat to humans engaged in recreational activities after it is applied to water and has been mixed (EPA 2007). By comparison, concentrations of rotenone typical of fish removal projects in similar areas involving trout is unlikely to exceed 90 ppb for more than 48 hours and may never achieve this concentration in much of the project area. When the application level is lower than 90 ppb, signs may be removed, and the closure lifted immediately after the application is complete. For stream treatments exceeding the 90-ppb level, signs can be removed following a 24-hour bioassay demonstrating survival of fish, analytical chemistry showing less than 90 ppb rotenone, or 72 hours, whichever is less. For standing water treatments over 90 ppb, signs must remain posted for up to 14 days unless fish do not die during a 24-hour bioassay or rotenone is measured to be less than 90 ppb in the water.

The inert ingredients in CFT Legumine would not pose a threat to human health (Fisher 2007). Inert ingredients are primarily solvents and dispersants needed to dissolve and disperse the relatively insoluble rotenone. The emulsifier Fennedefo^{99}™ comprises the bulk of the inert ingredients in CFT Legumine. This inert additive is a formulation of fatty acids, resin acids, and polyethylene glycols, which are common constituents in soaps, and other consumer products such as soft drinks, toothpaste, eye drops and suntan lotions. Its concentration in treated waters would be 2 ppm, which is many orders of magnitude lower than concentrations that are toxic, and it breaks down rapidly in the environment. Other trace constituents were organic compounds used in the extraction of rotenone from the plant material and were at minute concentrations and would be undetectable in streams or lakes and far below toxic concentrations. In contrast, Prenfish and other formulations of rotenone use organic solvents to dissolve and disperse rotenone, and CFT Legumine does not contain these chemicals except in trace amounts. The low toxicity and concentration of inert ingredients, combined with the rapid breakdown in the environment, would not pose a threat to human health or the environment.

The solvent n-methylpyrrolidone comprised 10% of CFT Legumine, and its concentration in treated waters would be around 2 ppm. The label for n-methylpyrrolidone provided toxicity

information that confirms Fisher's assertion that this chemical would not be toxic as applied in piscicide projects (Fisher 2007). Mice exposed to 1,000 ppm/day for 3 months showed no adverse effects. The combination of its exceptionally low concentration in treated water and its rapid breakdown in the environment mean n-methylpyrrolidone would not present a threat to human health or the environment.

Concern over a potential link between rotenone and Parkinson's disease often emerges with piscicide projects. Research into the links between rotenone and Parkinson's disease include laboratory studies intended to induce Parkinson's-like symptoms in laboratory animals as a tool for neuroscientists to understand the mechanism of Parkinson's disease (Betarbet et al. 2001; Johnson and Bobrovskaya 2014), epidemiological studies of Parkinson's disease in farmworkers (Kamel et al. 2007; Tanner et al. 2011) and laboratory studies evaluating risks associated with inhalation of rotenone powder (Rojo et al. 2007).

These studies aimed at creating Parkinson's like lesions as a tool for neuroscientists to study the disease do not provide a relevant model for field exposure during piscicide treatments (Betarbet et al. 2001; Johnson and Bobrovskaya 2014). These studies entailed continuous injection of high concentrations of rotenone into the bloodstream, often with a chemical carrier to facilitate absorption, into tissues for long durations. Such studies differ substantially from piscicide projects in terms of dose, duration, and mode of delivery and are not relevant to this project.

Epidemiological studies have proposed a link between pesticide use in general and Parkinson's disease; however, definitive evidence of a causal link between rotenone exposure and Parkinson's disease has not been found, as results of epidemiological studies have been highly variable (Guenther et al. 2011). A widely cited study reported a positive correlation between agricultural use of rotenone with Parkinson's disease (Tanner et al. 2011); however, review of methodologies and assumptions in these studies demonstrates the difficulties in using epidemiological data in hazard identification (Raffaele et al. 2011). These after the fact studies cannot assess variability in rotenone formulations, dose, frequency of exposure, and whether workers used personal protective equipment. Moreover, exposure to other pesticides is a complicating factor, as farm workers usually have exposure to multiple pesticides.

Review of numerous studies evaluating exposure to rotenone as a risk factor for piscicide reveal conflicting results. Studies have found no correlations between pesticide exposure and Parkinson's disease (Guenther et al. 2011). Others have found correlations between pesticide exposure and Parkinson's disease (Hubble et al. 1993; C L Lai et al. 2002; Tanner et al. 2011), and some have found it difficult to determine which pesticide or pesticide class is implicated (Engel et al. 2001).

Epidemiological studies of pesticide exposure and risk of developing Parkinson's disease have numerous limitations that prevent identifying a definitive link between rotenone exposure and Parkinson's disease. These studies had numerous factors that limit the ability to confirm exposure to rotenone causes Parkinson's disease (Raffaele et al. 2011). Factors that do not allow for identifying rotenone as a health hazard is the variability of results among studies, the potential for misidentification of pesticide exposure scenarios, and questionnaire subjectivity (Raffaele et al. 2011). Parkinson's disease may have multiple causal factors, such as age, genetics, and other environmental exposures, which makes attributing Parkinson's disease to rotenone exposure unsupportable (Raffaele et al. 2011). The numerous deficiencies identified in the study evaluating risks of exposure of farmworkers to rotenone and paraquat (Tanner et al. 2011) were identified as confounding factors that limited certainty in the findings (Raffaele et al. 2011). Tanner et al. (2011) provided no information on the formulations of rotenone used, the frequency and dose farmworkers were exposed to, and whether they wore protective equipment. This deficiency in reporting limits the inference that can be drawn from the study. Moreover, farmworkers usually have exposure to multiple pesticides, which confounds efforts to link neurological disease to exposure to rotenone.

Application of rotenone in fish management projects is dissimilar to past application in agriculture, so these studies are not relevant to fish removal projects when conducted according to label requirements. CFT Legumine does not come in powder form, so it does not become airborne. The concentration of rotenone required to achieve a fish kill is minute, whereas the rate of application in agriculture is unknown. Finally, personnel handling rotenone wear protective equipment that prevents or minimizes exposure through inhalation, ingestion, and contact with skin. With use of personal protection equipment exposure during application does not resemble exposure likely experienced by farmworkers, who may have not been wearing protective equipment and had greater potential for exposure to multiple pesticides.

No Action

Under the no action alternative, no chemicals would be released to surface waters.

Leave Fishless Alternative

Implementing the piscicide application portion of the project would result in the same risks to human health and require the same safety measures.

Summary of Effects on Human Health

The proposed action and leave fishless alternative would expose fieldworkers to 5% rotenone formulating or far more diluted concentrations in treated waters. Fieldworkers working the deactivation station could be exposed to potassium permanganate, a strong oxidizer with an explosion risk if mixed with organic chemicals. By following protocols and policies that require

safe transport and handling of rotenone and use of personal protective equipment, fieldworkers would not be exposed to toxic concentrations of rotenone and no long-term health risks are associated with application of rotenone in fish removal projects.

Signs, temporary closures, and the low concentration and rapid breakdown of rotenone would prevent the public from being exposed to rotenone or potassium permanganate. No risks to public health would result from implementation of the proposed action or the leave fishless option.

The no action alternative would not affect human health.

4.4 Community Impact

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				

Summary of Effects on the Community

None of the alternatives would have cumulative effects on the community.

4.5 Public Services/Taxes/Utilities

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

4.5.1 Cumulative Effects on Public Services/Taxes/Utilities

None of the three alternatives analyzed would have cumulative effects on public services, taxes, or utilities.

4.6 Aesthetics and Recreation

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

Comment 11c: Alter Quality or Quantity of Recreation and Tourism Opportunities and Settings

Proposed Action

Removal of fish using CFT Legumine would result in temporary loss of angling at Hidden Lake and in streams within the project area. Reproductively mature Yellowstone cutthroat trout would be stocked in Hidden Lake after rotenone has degraded to restore the ecological function of a fish-bearing lake, which currently provides recreational fishing. Yellowstone cutthroat trout would be stocked in streams in the Buffalo Creek watershed. The stream-dwelling populations would take up to 5 years to provide quality angling, but recovery can occur within 3 years (Clancey et al. 2009). The presence of work crews may affect hunters leading up to the goat, elk, and deer fall hunts. The current plan is to have crews away from typical goat hunting areas before September 1st and out of the basin before September 15th.

Restrictions to water resources would be implemented following label requirements of CFT Legumine. Signs would be posted at trailheads providing contact information and project timelines.

No Action

Recreation would remain unchanged if the project is not implemented.

Leave Fishless Alternative

This alternative would lead to permanent removal of fish, which would eliminate a recreational use that visitors to the Buffalo Creek watershed for 90 years.

Summary of Effects on Aesthetics or Recreation

Recreation and tourism are main human uses of the Absaroka-Beartooth Wilderness and Yellowstone National Park within fishing, hiking, backpacking being common uses in both areas. The Absaroka-Beartooth Wilderness is a popular area for hunting. No cumulative effects are expected for most uses; however, fishing could be profoundly negatively affected under the no action alternative.

Rainbow trout hybrids are spreading from Buffalo Creek into Slough Creek. Hybridization jeopardizes the population of Yellowstone cutthroat trout (Kruse et al. 2000; Muhlfeld et al. 2009), which has inherent value as the native trout, but also is a highly sought game species. Anglers travel from across the globe to fish these waters. Yellowstone cutthroat trout are not only key to the biodiversity of the Greater Yellowstone Ecosystem, but they provide an increasingly rare opportunity to catch cutthroat trout in a beautiful setting.

4.7 Cultural and Historic Resources

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

Comment 12c: Effects on Existing Religious or Sacred Uses of a Site or Area

Proposed Action

The project area is in the ancestral land of the Crow Nation. Under state policy, FWP's tribal liaison and diversity officer contacted the Crown Nation and provided copy of the draft EA. Recorded and unrecorded cultural and historic sites occur in the project area including the Buffalo Creek administrative cabin. There are no ground disturbing activities proposed other than excavation of group latrines at existing outfitter camp sites. There are no known cultural/archaeological sites at these outfitter camp sites. Therefore, the proposed action would not adversely affect listed or eligible National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historic resources.

No Action

Not implementing the project would have no effect on cultural or historic resources.

Leave Fishless Alternative

This alternative would have a similar effect on cultural resources as the proposed action.

Summary of Effects on Cultural or Historical Resources

No cumulative effects on cultural or historical resources would be likely under any alternative.

5 Cumulative Effects

Hiking, camping, trail maintenance, hunting, fishing, fish and wildlife monitoring, and guiding and outfitting constitute past, present, and reasonably foreseeable actions occurring in the analysis area that may be considered for potential cumulative effects to the physical environment, designated wilderness, and the human environment. The baseline condition includes relatively low summer use for each of these activities in the Buffalo Creek drainage relative to other areas of the Absaroka-Beartooth Wilderness. Fall hunting and associated camping constitute the highest uses in the project area.

Proposed Action

The timing of the proposed action in late summer and early fall, before the September 15th big game season, reduces the potential for cumulative effects to wilderness character with big game hunting and associated camping activities. Given the remote location of the project area, it is unlikely that restocking with YCT would result in a measurable increase in fishing. The proposed action utilizes the tools necessary to ensure the achievement of project objectives. Therefore, future chemical treatment and fish stocking activities beyond those proposed are not reasonably foreseeable. In summary, there would not be sufficient activity from present or reasonably foreseeable actions during the mid-August to mid-September project

implementation window to cumulatively effect the physical environment, designated wilderness, or the human environment.

No Action

This alternative has no potential for cumulative effects with past, present, and reasonably foreseeable actions.

Leave Fishless Alternative

The timing of the proposed action in late summer and early fall before the September 15th, big game season eliminates the potential for cumulative effects to wilderness character with big game hunting and related camping. Given the remote location of the project area, it is unlikely that leaving fishless would result in a substantial decrease in fishing pressure. The greatest decrease would be from guided/outfitted fishing trips. The proposed action utilizes the tools necessary to ensure the achievement of project objectives. Therefore, future chemical treatment activities beyond those proposed are not reasonably foreseeable.

6 Finding of No Significant Impact

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				Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13f
g. List any federal or state permits required.						13g

Comments 13e and 13f: Significant Impacts on Environment and Potential for Organized Opposition

Proposed Action

The use of rotenone and motorized equipment in designated wilderness can generate controversy from some people. The project is in designated wilderness and is the headwaters of Yellowstone National Park, so public interest may be considerable. Public outreach and informational programs can educate the public on the use of rotenone. Public comment on FWP's first release of this EA garnered opposition from a conservation NGO, and this group solicited comment on its website resulting in several thousand letters of opposition. Response to these comments will be available in decision notices issued by FWP and the CGNF.

No Action

Not implementing the project would not generate any direct opposition from the public. Not securing a population of Yellowstone cutthroat trout may garner opposition in the future, if it is perceived as a failure on the part of the state and federal agencies to abide by the MOU for cutthroat trout in Montana (MCTSC 2007). Yellowstone cutthroat trout would not benefit from establishment of a secure population.

Leave Fishless Alternative

This alternative brings the same potential for opposition associated with rotenone projects are the proposed action. In addition, opposition from outfitters, guides, and recreationalists who fish in the watershed could garner opposition.

Comment 13g: Required Federal or State Permits

Proposed Action

- MDEQ Pesticide General Permit
- Pesticide Use Permit for applying rotenone in designated wilderness
- Completion of the Minimum Requirement Decision Guide

No Action

Not implementing the project would result in no need to obtain permits or prepare a minimum requirements decision guide.

Leave Fishless Alternative

The piscicide portion of the project would require the same state and federal permits as the proposed action.

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Appendix A Minimum Requirement Decision Guide (Draft)

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKBOOK (Ver. 6/29/17)

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: **Buffalo Creek Yellowstone Cutthroat Trout Conservation Project**

MRDG Step 1: Determination

Determine if Administrative Action is Necessary

Description of the Situation
What is the situation that may prompt administrative action?

The 1964 Wilderness Act defines wilderness, describes the purpose for wilderness, and directs the wilderness management agencies to protect wilderness character. Wilderness character is not defined in the 1964 Wilderness Act, so to provide stewardship guidance to fulfill the Wilderness Act's legal mandate, an interagency team (Keeping It Wild 2, 2015) defined it: "Wilderness character is a holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal

experiences in natural environments generally free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature. Taken together, these tangible and intangible values define wilderness character and distinguish wilderness from other all land". To operationalize this definition and link the concept of wilderness character directly to the statutory and tangible stewardship requirements of the 1964 Wilderness Act, the interagency team (Keeping It Wild 2, 2015) identified and defined five tangible "qualities" of wilderness character: untrammeled, natural, undeveloped, outstanding opportunities for solitude or a primitive and unconfined recreation, and other features of value. When projects are proposed in wilderness, affects to these four wilderness qualities must be assessed and mitigated. It is important to note that the Wilderness Act also specifically acknowledges the role the States have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". The Forest Service and Montana Fish, Wildlife and Parks acknowledge that each agency has important management responsibilities relating to fish and wildlife resources in wilderness and will endeavor to work cooperatively to fulfill these responsibilities while protecting wilderness character. In 2008, policies and guidelines were developed to serve as the framework for Montana Fish, Wildlife and Parks and Region 1 in the management of fish, wildlife and habitat in designated Wilderness areas administered by National Forests.

The Forest Service and Montana Fish, Wildlife and Parks have collaborated on several Yellowstone Cutthroat Trout restoration projects in the Absaroka-Beartooth Wilderness as part of the overall interagency Yellowstone cutthroat trout conservation effort. There are two components to this project that this MRDG will consider and analyze. The first component of the proposal would eliminate the nonnative rainbow trout in the Absaroka-Beartooth Wilderness. The second component is the evaluation of the state's request on how they implement their restocking efforts.

The 2019 Absaroka-Beartooth Wilderness Character Narrative under "natural" value identifies that the Absaroka-Beartooth provides important sanctuaries for native aquatic species due to the cold, clean water found there. Areas like this are becoming increasingly important in the future due to climate change. The proposed project is intended to improve the natural quality by removing non-native rainbow trout and replacing them with native Yellowstone cutthroat trout that are both indigenous to the Absaroka-Beartooth Wilderness and native to the lower portions the Buffalo Creek drainage. The natural values identified in the 2019 Absaroka-Beartooth Wilderness Character Narrative include providing important sanctuaries for native aquatic species which the proposed project is aligned with by removing a non-native aquatic species (rainbow trout) and replacing them with a native species (Yellowstone cutthroat trout).

Hidden Lake in the Buffalo Creek drainage was stocked with nonnative rainbow trout in 1932 before the 1978 designation of the Absaroka-Beartooth Wilderness (https://myfwp.mt.gov/fishMT/plants/plantreport). The progeny of this stocking event spread throughout connected waters in the Buffalo Creek drainage. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout in 1932. Because nonnative rainbow trout are functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), their removal would benefit the watershed's native invertebrates and amphibians. Species present in the project area coevolved with Yellowstone cutthroat trout elsewhere in their historical ranges, including lower Buffalo Creek. Therefore, this project would result in the establishment of a coevolved community of fish, invertebrates, and amphibians

within the climate shield, and remove a species that did not co-evolve, which would bring considerable conservation benefit over its existing state.

The second element of the proposed action would establish a secure, nonhybridized Yellowstone cutthroat trout population in the Buffalo Creek drainage. Replacing nonnative rainbow trout with non-hybridized native Yellowstone cutthroat trout in Buffalo Creek upstream from the natural barrier falls would result in a 22% increase in secure core Yellowstone cutthroat trout habitat in the Yellowstone Headwaters Subbasin. Thus, this restoration action would make a substantial contribution to the long-term viability of Yellowstone cutthroat trout in the Yellowstone Headwaters Subbasin and the overarching conservation goals for the species.

Yellowstone cutthroat trout populations subjected to competition and hybridization with nonnative fish are at increased risk of extirpation. Protecting and establishing Yellowstone cutthroat trout populations in quality high elevation habitats, including Wilderness, has been identified as essential in meeting the following goals of the Conservation Strategy for Yellowstone Cutthroat Trout in the States of Idaho, Montana, Nevada, Utah, and Wyoming to which the Forest Service is signatory:

"To ensure the persistence of Yellowstone cutthroat trout throughout its broad historical range. Areas that currently support Yellowstone cutthroat trout will be maintained, while other areas will be managed for increased abundance and connectivity of Yellowstone cutthroat trout populations. New populations will be established where ecologically, economically, and socially feasible. The Yellowstone cutthroat trout populations will be managed to preserve genetic integrity and provide adequate numbers and populations for protection and maintenance of intrinsic and recreational values associated with Yellowstone cutthroat trout. The cooperators envision a future where threats to wild Yellowstone cutthroat trout are either eliminated or reduced to the greatest extent possible."

Removing non-native species is one of four physical conservation activities identified in the Conservation Strategy under Strategy 3: Restore or Enhance Yellowstone cutthroat trout Populations. By establishing a non-hybridized Yellowstone cutthroat trout population, secure from nonnative fish in a climate refugia, the proposed action contributes substantially to the long-term viability of Yellowstone cutthroat trout in the Yellowstone Headwaters Subbasin, which includes the Absaroka-Beartooth Wilderness. Refer to the *Buffalo Creek Framework for Evaluating Ecological Intervention* for more information.

Options Outside of Wilderness
Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES	**STOP – DO NOT TAKE ACTION IN WILDERNESS**
☒ NO	**EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

Explain:

No viable options exist outside of Wilderness that would eliminate nonnative rainbow trout and improve the naturalness of the coevolved community of fish, invertebrates, and amphibians within Wilderness.

Valid Existing Rights or Special Provisions of Wilderness Legislation

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☒ YES ☐ NO

Explain:

The Wilderness Act specifically acknowledges the role the States have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". While there is no special provision that requires the proposed action to take place, we are further governed by a substantial framework of policy directing the Region how to consider proposed activities within Wilderness.

A. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

☐ YES ☒ NO

Explain:

While there is a robust framework of policy for the management of fish and wildlife species in Wilderness, there are no laws specifically requiring the implementation of the proposed project within the Buffalo Creek sub-watershed.

B. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character, including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?

UNTRAMMELED

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality.

UNDEVELOPED

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality.

NATURAL

☒ YES ☐ NO

Explain:

Removal of the nonnative rainbow trout population is necessary to preserve (improve) the natural quality of wilderness character that is currently degraded by the presence of a non-native species. Because nonnative rainbow trout are functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), their removal would benefit the watershed's native invertebrates and amphibians. YCT coevolved with each of the native terrestrial and aquatic species currently present in the Buffalo Creek drainage and fill an important ecological niche where they co-occur. State stocking actions to restore YCT, which are both indigenous (present before wilderness designation) and native (endemic and occurring only through natural processes) to the Absaroka-Beartooth Wilderness would repair the unnatural conditions that were present at designation by restoring a natural, coevolved community of fish, invertebrates, and amphibians within the climate shield.

It is necessary to take action to preserve this quality. Preserving this quality ensures that indigenous species, patterns, and ecological processes are protected and allows us to understand and learn from natural features. To preserve this quality, it may be necessary to take action to correct unnatural conditions even if they were present at the time of designation.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. .

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality.

Step 1 Decision
Is administrative action necessary in wilderness?

Decision Criteria

A.	Existing Rights or Special Provisions	☒ YES	☐ NO
B.	Requirements of Other Legislation	☐ YES	☒ NO
C.	Wilderness Character		
	Untrammeled	☐ YES	☒ NO
	Undeveloped	☐ YES	☒ NO
	Natural	☒ YES	☐ NO
	Outstanding Opportunities	☐ YES	☒ NO
	Other Features of Value	☐ YES	☒ NO

Is administrative action necessary in wilderness?

☒ YES **EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG**
☐ NO **STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain:

The 1964 Wilderness Act defines wilderness, describes the purpose for wilderness, and directs the wilderness management agencies to protect wilderness character. It is important to note that the Wilderness Act also specifically acknowledges the role the States have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". The Forest Service and Montana Fish, Wildlife and Parks acknowledge that each agency has important management responsibilities relating to fish and wildlife resources in wilderness and will endeavor to work cooperatively to fulfill these responsibilities while protecting wilderness character.

Removal of the nonnative rainbow trout population is necessary to preserve (improve) the natural quality of wilderness character that is currently degraded by the presence of a non-native species. State stocking actions to restore YCT, which are both indigenous (present before wilderness designation) and native (endemic and occurring only through natural processes) to the Absaroka-Beartooth Wilderness, would repair the unnatural conditions that were present at designation by restoring a natural, coevolved community of fish, invertebrates, and amphibians within the climate shield.

No viable options exist outside of Wilderness that would eliminate nonnative rainbow trout and improve the naturalness of the coevolved community of fish, invertebrates, and amphibians within the Buffalo Fork drainage in the Absaroka-Beartooth Wilderness. It is necessary to take action rather than allowing the existing condition to continue, thereby correcting the existing unnatural conditions that were present at the time of designation.

MRDG Step 2

Determine the Minimum Activity

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☒ YES	**DESCRIBE OTHER DIRECTION BELOW**
☐ NO	**SKIP AHEAD TO TIME CONSTRAINTS BELOW**

Describe Other Direction:

FSM 2320- Wilderness Management

2323.34 - Fisheries Management
Emphasize quality and naturalness in managing fisheries in wilderness

FSM 2323.34a - Stocking Programs
In cooperation with the States, develop fish-stocking programs that meet wilderness management objectives. Recognize the probability of increased visitor use of stocked waters and their full impact and effect on the wilderness resource. Direct practices at achieving quality fishing opportunities. Regional Foresters shall develop with each State a supplement to the State-Forest Service Memorandum of Understanding (FSM 2600) that establishes a stocking policy for each wilderness.

2323.34b - Stocking Methods
Stocking shall normally be done by primitive means, however, Regional Foresters may permit dropping of fish from aircraft for those waters where this practice was established before the area was designated a wilderness. Conduct aerial stocking pre-or post-visitor seasons. Landings are prohibited. Specify mitigation for stocking methods in wilderness implementation schedules.

2323.34c - Stocking Policy
1. Do not stock exotic species of fish in wilderness. The order of preference for stocking fish species is:
   a. Federally listed threatened or endangered, indigenous species.
   b. Indigenous species.
   c. Threatened or endangered native species if species is likely to survive and spawn successfully.
   d. Native species if species is likely to survive and spawn successfully.

2. Stock barren waters only after determining that the scientific and research values of such barren waters will not be eliminated from a wilderness and documenting the desirability of such action in the forest plan.

3. Consider on a case-by-case basis presently unstocked waters that at one time supported an indigenous fish population and that could provide suitable habitat for an indigenous species with unusual wilderness appeal.

2323.34f - Chemical Treatment

Chemical treatment may be used to prepare waters for reestablishment of indigenous, threatened or endangered, or native species, or to correct undesirable conditions caused by human influence. The Regional Forester approves all proposed uses of chemicals in wilderness (FSM 2150).

2323.04c - Regional Forester

Unless specifically reserved to the President (FSM 2323.04a) or the Chief (FSM 2323.04b) or assigned to the Forest Supervisor (FSM 2323.04d) or the District Ranger (FSM 2323.04e), the Regional Forester is responsible for approving all measures that implement FSM direction on the use of other resources in wilderness. Specific responsibilities include but are not limited to:

4. Developing, with the involved State(s), a supplement to the State/Forest Service memorandum of understanding, which will establish fish and wildlife management coordination in wilderness. The joint Forest Service and International Association of Fish and Wildlife Agencies Guidelines will be used to develop compatible management activities (FSH 2309.19).

5. Approving fish control projects.

6. Approving control measures for predators or problem fish and wildlife species.

7. Approving debris clearing on spawning streams for anadromous species.

8. Approving the practice of dropping fish from aircraft, if deemed necessary, in cases where such practice was established before the area became part of the National Wilderness Preservation System.

9. Approving the use of pesticides within wilderness.

2326.1 - Conditions Under Which Use May Be Approved

Allow the use of motorized equipment or mechanical transport only for:

5. To meet minimum needs for protection and administration of the area as wilderness, only as follows:

a. A delivery or application problem necessary to meet wilderness objectives cannot be resolved within reason through the use of nonmotorized methods.

b. An essential activity is impossible to accomplish by nonmotorized means because of such factors as time or season limitations, safety, or other material restrictions.

c. A necessary and continuing program was established around the use of motorized equipment before the unit became a part of the National Wilderness Preservation System, and the continued use of motorized equipment is essential to continuation of the program.

2326.11 - Use of Motorized Equipment by Other Government Agencies

Approve the use of motorized equipment, aircraft, or mechanical transport by other government agencies in National Forest wilderness in the same manner and under the same conditions stipulated for Forest Service use (sec. 2326.1).

Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau of Land Management Wilderness, signed by the FS, BLM, and Association of Fish and Wildlife Agencies (AWFA), June 2006

- State fish and wildlife management activities that do not involve Wilderness Act prohibitions identified above in Section 4(c) or that are expressly authorized under specific wilderness acts are generally exempt from authorizations by the Federal administering agencies. However, there may be activities that do not involve prohibitions under Section 4(c) that may require authorizations, such as certain types of activities proposed to address fire or disease under Section 4(d) of the Act.

- Proposed State fish and wildlife management activities that would involve uses generally prohibited under Section 4(c) of the Wilderness Act will be considered and may be authorized by the Federal administering agency.

- Section 4(d)(7) of the Wilderness Act stipulates that “Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests.” These policies and guidelines should not be construed as diminishing or expanding State jurisdiction and responsibility to manage fish and wildlife.

Cooperative Agreement for Fish, Wildlife, and Habitat Management on National Forest Wilderness Lands in Montana, Signed by Montana Fish, Wldlife, and Parks and US Forest Service Northern Region, June 2006 (consistent with FSM 2323.04c part 4)

- The following actions do not require federal agency approval (if project does not include use of motorized equipment, mechanical transport, landing of aircraft, structures or installations):
    - Fish stocking where established before designation using the method that was established at the time of designation (even if that method involved motorized equipment or mechanical transport).

    - Changes in fish species stocked in areas where stocking was established before designation.

- Chemical treatment may be necessary to prepare waters for the reestablishment of indigenous fish species, consistent with approved wilderness management plans, to conserve or recover Federally listed, threatened or endangered species, or to correct undesirable conditions resulting from human activity. Proposals for chemical treatments will be considered and may be authorized by the Federal administering agency through application of the MRDP as outlined in Section E., General Policy. Any use of chemical treatments in wilderness require prior approval by the Federal administering agency.

- Selected species for stocking will be determined by the State agency in close cooperation and coordination with the Federal land management agency. In order of preference for stocking fish species is (a) Federal threatened or endangered species, and (b) indigenous species. Numbers and size of fish and time of stocking will be determined by the State in coordination with Federal agencies.

- Proposals for fish stocking that would involve uses generally prohibited under Section 4(c) of the Wilderness Act will be considered and may be authorized by the Federal administering agency through application of the MRDP as outlined in Section E., General Policy.

In a *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* (July 2008) signatories agreed to the following goals and objectives:

Goals

The management goals for cutthroat trout in Montana are to: 1) ensure the long-term, self-sustaining persistence of each subspecies distributed across their historical ranges as identified in recent status reviews (Shepard et al. 2003; Shepard et al. 2005; May et al. 2003), 2) maintain the genetic integrity and diversity of non-introgressed populations, as well as the diversity of life histories, represented by remaining cutthroat trout populations, and 3) protect the ecological, recreational, and economic values associated with each subspecies.

Objectives

The following objectives will be required to attain the goals of this Agreement for cutthroat trout in Montana:

Objective 1. Maintain, secure, and/or enhance all cutthroat trout populations designated as conservation populations, especially the non-hybridized components.

Objective 3. Seek collaborative opportunities to restore and/or expand populations of each cutthroat trout subspecies into selected suitable habitats within their respective historical ranges.

This proposed project was identified by the *Upper Yellowstone Geographic Management Unit Yellowstone Cutthroat Trout Working* group as the second highest priority next to the ongoing Yellowstone Lake, lake trout suppression program.

Time Constraints
What, if any, are the time constraints that may affect the action?

Avoidance Periods (approximate dates)

October 15-June 15 – Weather (icing and high flows)
July 1-August 1 – Columbia spotted frog tadpoles
June 1-August 15-incubation period for rainbow trout eggs and fry
September 1st- Backcountry Mountain Goat Season Start
September 15-October 23 - Backcountry Rifle Big Game Season
October 24-November 29 – General Rifle Big Game Season

To be most effective, rotenone treatment should occur in late August after rainbow trout fry have emerged from gravel. To minimize impacts to amphibians, treatment should occur in August after larvae have metamorphosed. To prevent impacts to backcountry hunters, treatment should be completed by the commencement of the September 1st mountain goat hunt but must not extend into the September 15th backcountry rifle season. Therefore, the project would occur between August 16th and September 14th, but an attempt would be made to complete activities before September 1st.

Components of the Action
What are the discrete components or phases of the action?

Component X:	*Example: Transportation of personnel to the project site*
Component 1:	Personnel Access
Component 2:	Temporary Project Signing & Flagging
Component 3:	Equipment Transportation
Component 4:	Camping
Component 5:	Preparatory Work
Component 6:	Lake, Pond, and Wetland Treatment (Lentic)
Component 7:	Stream Treatment (Lotic)
Component 8:	Sentinel Fish
Component 9:	Restocking

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

MRDG Step 2: Alternatives

Alternative 1: No Action

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Under the no action alternative, removal of non-native rainbow trout and stocking of native and indigenous Yellowstone Cutthroat Trout would not occur. The unnatural condition that exists due the presence of non-native rainbow trout would continue in an aquatic community that didn't coevolve with the species. There would be no contribution to the long-term viability of YCT in the Yellowstone Headwaters Subbasin and the overarching conservation goals for the species would not be achieved.

Component Activities
How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	No Component Activities associated with the No Action Alternative.	

UNTRAMMELED

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No Component Activities associated with the No Action Alternative.	☐	☐	☒

Total Number of Effects	0	0	NE
Untrammeled Total Rating			

Explain:

Non-native rainbow trout would continue to inhabit the streams and lakes. No trammeling associated with this project would occur.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No Component Activities associated with the No Action Alternative.	☐	☐	☒
Total Number of Effects		0	0	NE
Undeveloped Total Rating		**0**		

Explain:

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No Component Activities associated with the No Action Alternative.	☐	☒	☐
Total Number of Effects		0	-1	NE
Natural Total Rating		**-1**		

Explain:

Buffalo Creek is a cold-water stream with fish length and egg incubation data suggesting that the thermal regime is suboptimum for rainbow trout growth and reproduction. But with climate warming rainbow trout are expected to increase their population density, especially in stream reaches where density is currently low. Invertebrates and amphibians would continue to live in waters with a species they did not coevolve with. Introduced fish may be functionally different predators on invertebrates (Benjamin et al. 2011; Lepori et al. 2012), which can alter the benthic assemblage and riparian-dwelling species. Thus, any ecological effects on aquatic macroinvertebrates and riparian dwelling species from human

introduction of rainbow trout would persist and increase into perpetuity under this alternative. The natural quality would continue to degrade over time under this alternative.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No Component Activities associated with the No Action Alternative.	☐	☐	☒
Total Number of Effects		0	0	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**0**		

Explain:

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No Component Activities associated with the No Action Alternative.	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		**0**		

Explain:

Wilderness Character	
Summary Ratings for Alternative 1	
Untrammeled	0
Undeveloped	0
Natural	-1
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	**-1**

MRDG Step 2: Alternatives

Alternative 2: Aircraft Supported Alternative

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Alternative 2. Aircraft Supported Alternative

Objective
CFT Legumine, a pesticide with the active ingredient rotenone, which affects only aquatic gill breathing organisms at the concentrations proposed, would be used to remove all non-native rainbow trout from all connected fish-bearing waters of the Buffalo Creek Sub-watershed. A natural bedrock cascade fish barrier, located 0.9 mile downstream from the Yellowstone National Park boundary would prevent any nonnative rainbow trout or hybrids from reinvading Absaroka-Beartooth Wilderness waters in the Buffalo Creek Subwatershed. All connected waters upstream from the YNP fish barrier are thought to be fishless before the stocking of Hidden Lake with nonnative rainbow trout in 1932; 46 years before the 1978 designation of the Absaroka-Beartooth Wilderness. This project is a collaborative effort among the US Forest Service (Custer Gallatin National Forest), Montana Fish Wildlife and Parks, and National Park Service (Yellowstone National Park).

Where?
Of the 109 perennial stream miles in the Buffalo Creek Subwatershed, 59.4 (54%) are within the Absaroka-Beartooth Wilderness. Of these, 45.5 stream miles (76.7%) are proposed for rotenone treatment (Figure 1). Of the 59.4 wilderness stream miles, there are 13.9 stream miles (23%) that would remain untreated and left in the historically fishless condition due to the presence of natural migration barriers or unsuitable fish habitat (Figure 2). There are 11 lakes in the Subwatershed within the Absaroka-Beartooth Wilderness including Hidden Lake and a small unnamed adjacent lake. Eleven out of the 22 lake acres (50%) in the Absaroka-Beartooth Wilderness would be treated with rotenone. The untreated stream segments and nine untreated lakes would serve as refugia for gill breathing organisms. In addition, there are two large meadows in the project area with numerous beaver dam complexes impounding approximately 25 acres of water that would require rotenone treatment.

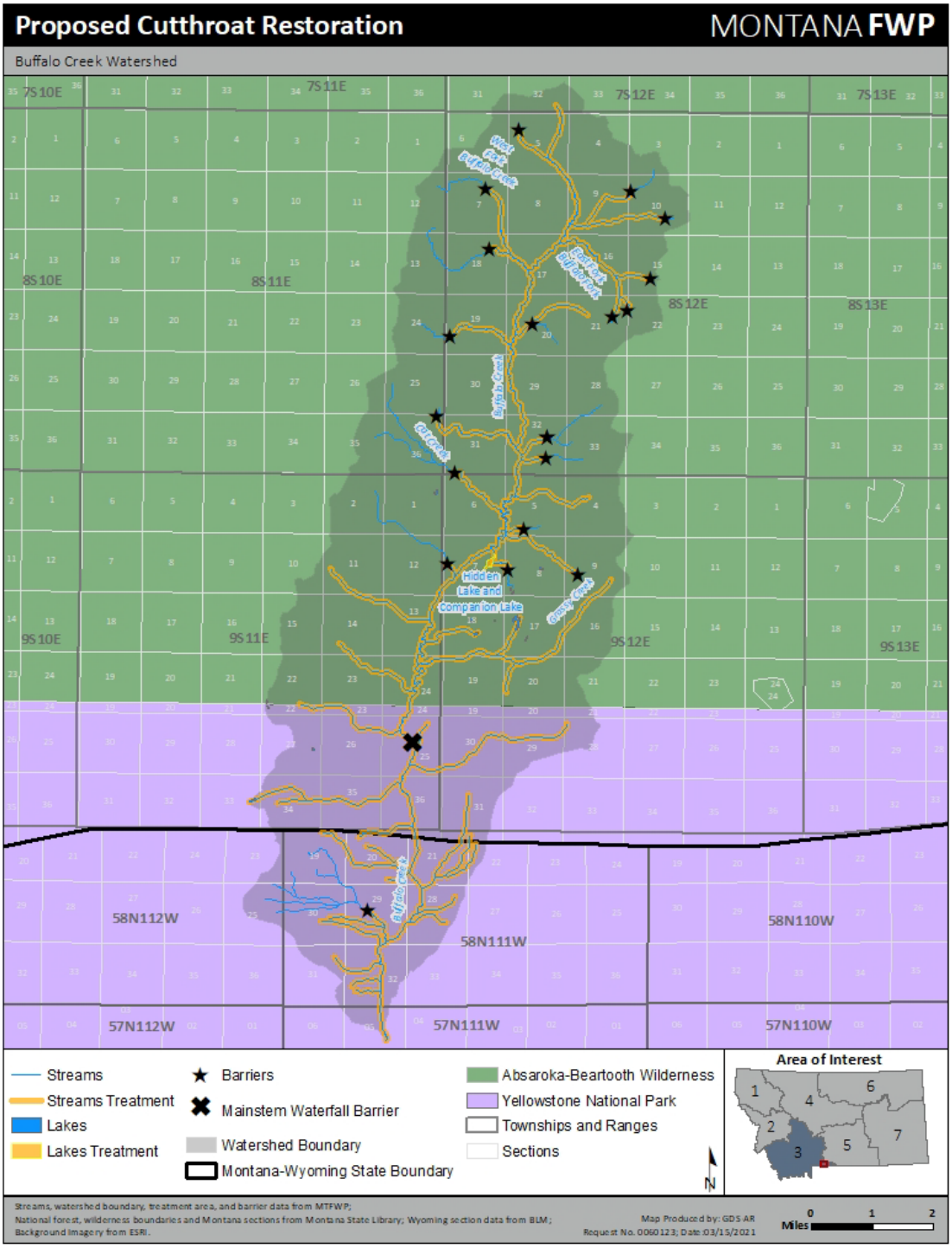

Figure 8. Project area map depicting streams and lakes for proposed rotenone treatment (orange), relative to untreated waters (blue), and natural fish barriers (black stars = tributaries and x = main stem).

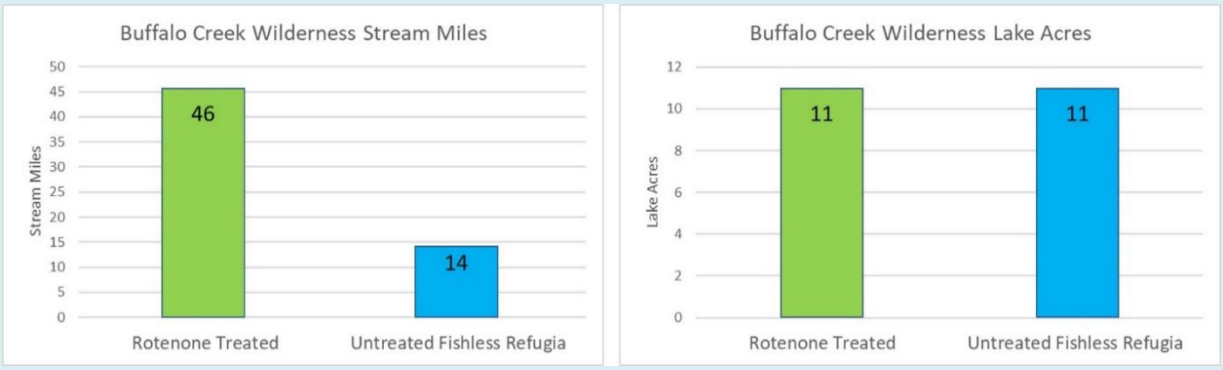

Figure 2. Comparison of proposed treated and untreated stream miles (left) and lake acres (Morelli et al.) in the Absaroka-Beartooth Wilderness (common to all action alternatives).

When?

Rotenone treatment would occur as early as August of 2022. The duration of rotenone treatment would be from two to five years (depending on monitoring results) at an intensity of up to two weeks per year in late August or early September. Monitoring would continue for a minimum of three years following treatment. Monitoring would dictate the duration and intensity of treatment activities. It is anticipated that headwater treatments and associated flights would no longer be required after year three with possibility that spot treatments would be needed in years four and five. Restocking lakes and streams would commence once monitoring indicates that all rainbow trout have been successfully removed and would occur for at least three years but up to five years. Restocking of Hidden Lake would require up to two days per year and stream restocking would take up to three days per year.

How?

The Aircraft Supported Alternative would rely exclusively on helicopter to transport 6,629 pounds of equipment and supplies to, within, and out of the project area. This would include large metal bear proof containers to secure all attractants (rotenone, food, and garbage). Helicopters would also transport 1,873 pounds of gear and food between camps. This alternative utilizes aerial spraying to most efficiently and effectively treat the 25 acres of impounded water in the meadow beaver dam complexes and the two lakes. The efficiency of aerial spraying would negate the need to breach beaver dams. With the efficiencies gained from aircraft support, it is estimated that rotenone application could be implemented in seven days.

Rotenone application would occur in a stepwise fashion progressing from the headwaters of the upper Buffalo Creek Subwatershed downstream to the Yellowstone National Park boundary over the course of approximately seven days (Figures 3, 4). This would require up to 20 personnel per day operating in the Absaroka-Beartooth Wilderness over the duration of the project. On day two through four, the headwaters downstream to the upper meadow would be treated. Rotenone treatment of Hidden Lake, the upper Meadow and connected tributary streams would occur approximately on days four through six (middle treatment). On days seven and eight, rotenone treatment would progress downstream through the lower meadow to fish barrier falls downstream from the Yellowstone National Park boundary (Lower Treatment).

Figure 3. Estimated schedule of rotenone treatment and gear and equipment transport activities under the Aircraft Supported Alternative. Timing and duration of project preparatory work not shown.

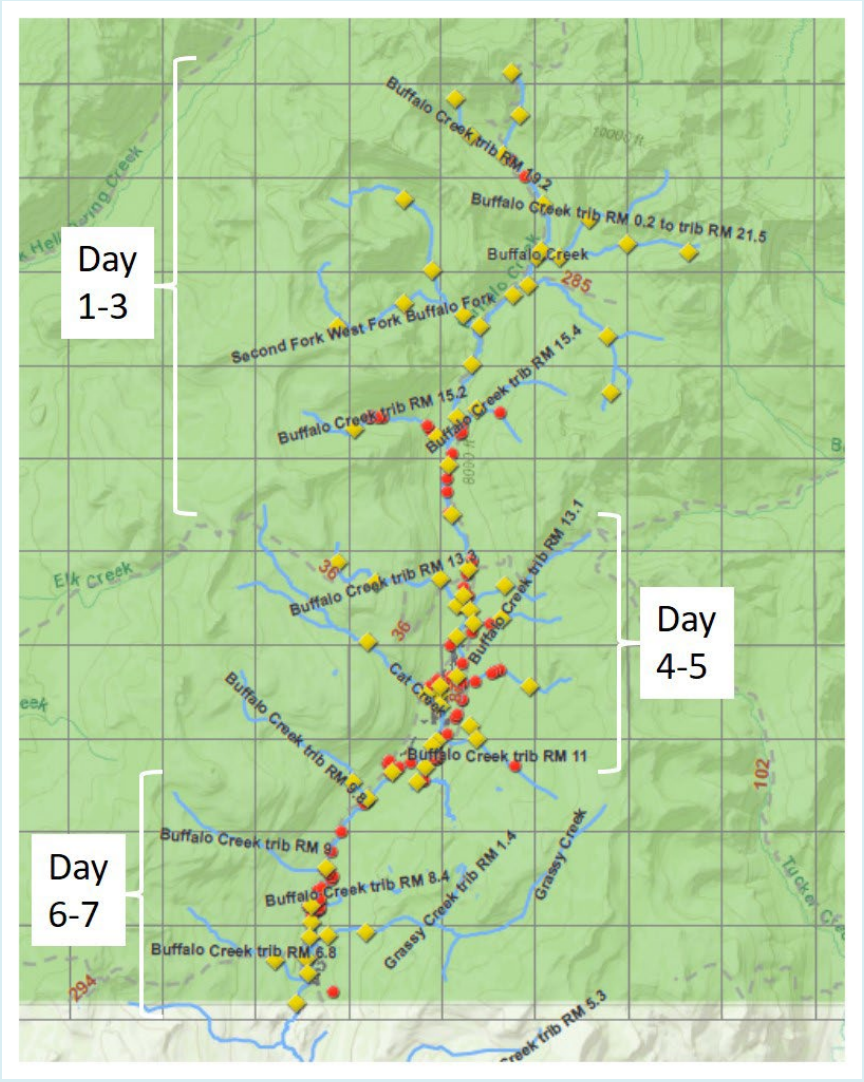

Figure 4. Estimated locations of two-hour travel time drip stations (yellow diamonds) and other sites (red dots) requiring backpack spraying, supplemental drip, or doughball application with brackets indicating treatment days.

Buffalo Creek is remote and in grizzly bear habitat, so handling and transporting dead fish would be impractical and unsafe. Dead fish would be left on-site to decay naturally, so their nutrients can contribute to recovery of invertebrate populations within the stream. Terrestrial

scavengers contribute to the disappearance of carcasses, and piscicide-treated fish do not present health risks to organisms consuming them. Dead fish usually decay beyond recognition within 1-2 weeks. In the cold waters in the project area, most dead fish would sink, which would make them less detectable to humans.

Prohibited Uses:

1) Aircraft landings ≤ 178: personnel access ≤ 28 per treatment year or ≤ 54 total over three years; equipment transport ≤ 22 per treatment year or ≤ 66 over three years; helicopter stocking ≤40 over five years; aerial rotenone application- ≤ 6 per year or ≤ 18 total over three years.
2) Application of approved pesticide
3) Operation of motorized equipment
4) Operation of motorboats
5) Structure Installation (temporary- up to five years)

Personnel Access

Most personnel access to and from the project area would be via foot or on horseback. However, a limited number of personnel may be transported into or out of the project area incidental to those helicopter flights approved for equipment and personnel transport to headwater sites (see below). There are no roads within the project area on National Forest System Lands. From the Slough Creek trailhead in YNP, it is eight miles by trail to the lower camp site, 13.8 miles to the middle camp site, and 17 miles to the upper camp site. It is over 20 miles on foot from the Slough Creek trailhead to the uppermost rotenone application site in the Buffalo Creek Subwatershed.

This alternative proposes up to 12 helicopter landings per day over seven days (up to 18 total) to pick personnel and live sentinel fish up from one of the three spike camps and drop them off at headwater rotenone drip stations. To ensure a complete fish kill, all drip stations must begin applying rotenone at the same time and each drip station must have live sentinel fish placed immediately upstream. No drip stations can commence rotenone application until personnel at headwater drip stations commence their application.

Headwater drip sites are located up to 4.6 miles from their associated spike camps with elevation gain of up to 1,800 vertical feet, many of which have no trail access (Grassy Creek = 4.6 miles, 1,708 feet; Second Fork West Fork = 3 miles 1,260 feet). The amount of gear needed to successfully complete the mission is estimated at 69.9 pounds (See Appendix 1). That includes, pack, food, 17 pounds of water, fish cooler, sentinel fish, buckets, Tyvec™ suit, waders, sprayer, respirator, fish cooler, and personal items. As part of the proposal to minimize helicopter landings related to personnel transport, the following would apply:

- Helicopter personnel transport would occur only for sites with no trail access located at least 1.7 mile from camp with at least 600 feet in elevation gain.
- Personnel transported to headwater drip sites would walk on foot back to camp each day after completion of their assignment. This would allow them to backpack spray, monitor treatment effectiveness, and assist personnel working downstream.

Management Approval: Authorization of up to 18 helicopter landings per year for personnel transport to headwater drip sites. Personnel, flight days not to exceed seven per year with up to 12 landings per day. The total number of personnel landings not to exceed 54 landings over the maximum five-year project duration.

Temporary Project Signing & Flagging

The CFT Legumine label requires restriction of recreational activities including wading, swimming, boating, and fishing while rotenone is being applied, so treated waters would be closed to public access until rotenone has been naturally deactivated. To comply with CFT Legumine label instructions, proper signage with required language would be posted at the Boulder Divide (Trail #99), Slough Creek Divide (Trail #102), Hellroaring Divide (Trail #s 98 and 36) and at the following trailheads: #64 Bear Creek, #627 Mineral Hill/Pine Creek, #84 Palmer Mountain, Slough Creek (YNP), Hellroaring Creek (YNP),#113 & #389 Daisy Pass, and # 32 Main Boulder.

To complete the project, it is required that stream travel time or flow time be tested using dye and marked appropriately so crews can return to 2-hour flow interval locations when treating the streams. It is a common practice along streams to place temporary flagging at every ½-hour flow interval so personnel can navigate to their assigned drip station location and communicate their location by travel time on a given stream. All flagging would be biodegradable paper flagging to avoid adding plastics to the ecosystem. All flagging will be removed annually. GPS coordinates of each 2-hour travel time location will be recorded to assist personnel in navigating to their rotenone drip can site. Upon completion of their assignment, personnel would remove flagging.

Equipment Transportation

Rotenone application operations would be supported by three remote field camps and the Buffalo Fork cabin. The upper camp would be located at the meadow near the confluence of East Fork Buffalo Creek and Buffalo Creek, the middle camp would be located in the meadow across from the mouth of Cat Creek, and the lower camp would be located near the YNP Boundary. Helicopters would be used exclusively to transport 6,532 pounds of equipment, gear, and food to, within, and from the project area. This would require an estimated 21 landings on four separate days with a total of 18,316 pounds of gear and equipment airlifted (Table 1). Airlifting rotenone would reduce potential for chemical spills that could be more likely with stock transport. Aerial transport of treatment equipment in bear-proof cages is necessary to ensure that gear is secure and on site when crews arrive. *See Buffalo Creek Gear Mobilization Plan for detailed list of equipment and weights.*

Day 1 Middle and Upper Camp Mobilization: Prior to commencement of rotenone application, all treatment equipment (4,973 lbs) would be mobilized by a helicopter with 1,500 lb. lift capacity and staged secure from bears at the middle and upper camp sites in 4’ x 4’ x 8’ metal bear proof containers (two per camp). Airlifting treatment equipment and rotenone in large bear cages minimizes the number of helicopter landings and negates the need for personnel to unload, secure, and supervise staged equipment/attractants at unoccupied spike camps. In addition, camping gear and food (1,560 lbs.) would also be transported to the upper camp via helicopter.

Day 4 Upper Camp Demobilization: The two bear boxes and rotenone treatment equipment (1,575 lbs.) would be transported by helicopter from the upper camp site and staged at the lower camp site for use on day seven. Camping gear and food (1,612 lbs.) would be airlifted from the upper camp to support personnel moving to occupy the middle camp. Treatment equipment (boat, motor, pump, rotenone) needed at Hidden Lake would also be sling loaded by helicopter (638 lbs). Garbage, empty rotenone barrels, and other unnecessary bear attractants at the upper camp would be flown out of the wilderness. Personnel on foot would

carry drip cans and backpack sprayers to the middle camp site upon completing the days' rotenone application assignment. Approximately, three personnel would be left to prepare helicopter loads. This would not impact ongoing rotenone treatment operations. These personnel would be responsible for final camp cleanup and inspection to ensure compliance with the Leave No Trace standard.

Day 6 Middle Camp Demobilization: The two bear boxes, bear attractants, and rotenone treatment equipment that would not be needed at the lower camp would be flown from the middle camp site and Hidden Lake out of the wilderness (1,635 lbs.). Any rotenone treatment equipment (left over rotenone, inflatable watercraft, pumps etc.), gear, and food needed for the final two days of the project (2,224 lbs.) would be airlifted by helicopter from the middle camp site to the lower camp site. Personnel on foot, would carry drip cans and backpack sprayers to the lower camp site upon completing the days' rotenone application assignment. Approximately, three personnel would be left to prepare helicopter loads. This would not impact ongoing rotenone treatment operations. These personnel would be responsible for final camp cleanup and inspection to ensure compliance with the Leave No Trace standard.

Day 9 Lower Camp *Demobilization*: All remaining equipment, gear, and attractants (4,010 lbs.) would be airlifted by helicopter out of the project area. Three personnel would be dedicated to sling load preparation and final camp cleanup and inspection.

Weather delays or project implementation delays could affect the timing of helicopter flights. To minimize disturbance to grizzly bear, helicopters would adhere strictly to flight lines preapproved by the USFWS through ESA consultation.

Management Approval: Authorization of up to 21 helicopter landings per treatment year on four separate days to transport gear, equipment, food, and supplies to and from spike camps and staging areas.

Table 8. Summary of 1,500 lb. helicopter loads and landings for equipment mobilization and Demobilization under Alternative 2. Helicopter landings for personnel transport to headwater drip sites and sentinel fish resupply not included.

	Day 1		Day 4		Day 6		Day 9			
Transport Activity	**Loads**	**Landings**	**Loads**	**Landings**	**Loads**	**Landings**	**Loads**	**Landings**	**Total Loads**	**Total Landings**
Upper Camp Mobilization	2.3	3							2.3	3
Middle Camp Mobilization	1.5	2		1					1.5	3
Cabin Mobilization	0.0	1							0.0	1
Hidden Lake Mobilization			0.4	1					0.4	1
Transfer Upper Camp to Middle Camp			1.1	2					1.1	2
Transfer Upper Camp to Lower Camp			1.1	2					1.1	2
Transfer Middle Camp to Lower Camp					1.5	4			1.5	4
Hidden Lake Demobilization					0.4	1			0.4	1
Middle Camp Demobilization					1.1	1			1.1	1
Lower Camp Demobilization							2.7	3	2.7	3
Total	**3.9**	**6**	**2.6**	**6**	**3.0**	**6**	**2.7**	**3**	**12.1**	**21**

Camping

Three spike camps for up to 20 individuals would support daily rotenone application activities. The lower camp would be located near the YNP Boundary, the middle camp would be located in the meadow across from the mouth of Cat Creek, and the upper camp would be located at the meadow near the confluence of East Fork Buffalo Creek and Buffalo Creek (Figure 4). Personnel would camp in personal tents with one wall tent set up at each camp for cooking and conducting planning meetings. Essential rotenone application equipment would be pre-staged in bear proof containers at each camp. These containers would negate the need for camp managers to supervise rotenone and other attractants at unoccupied spike camps. The upper camp would likely be utilized on project days one through four, the middle camp would be utilized on days four through seven, and the lower camp would be used on days seven through nine.

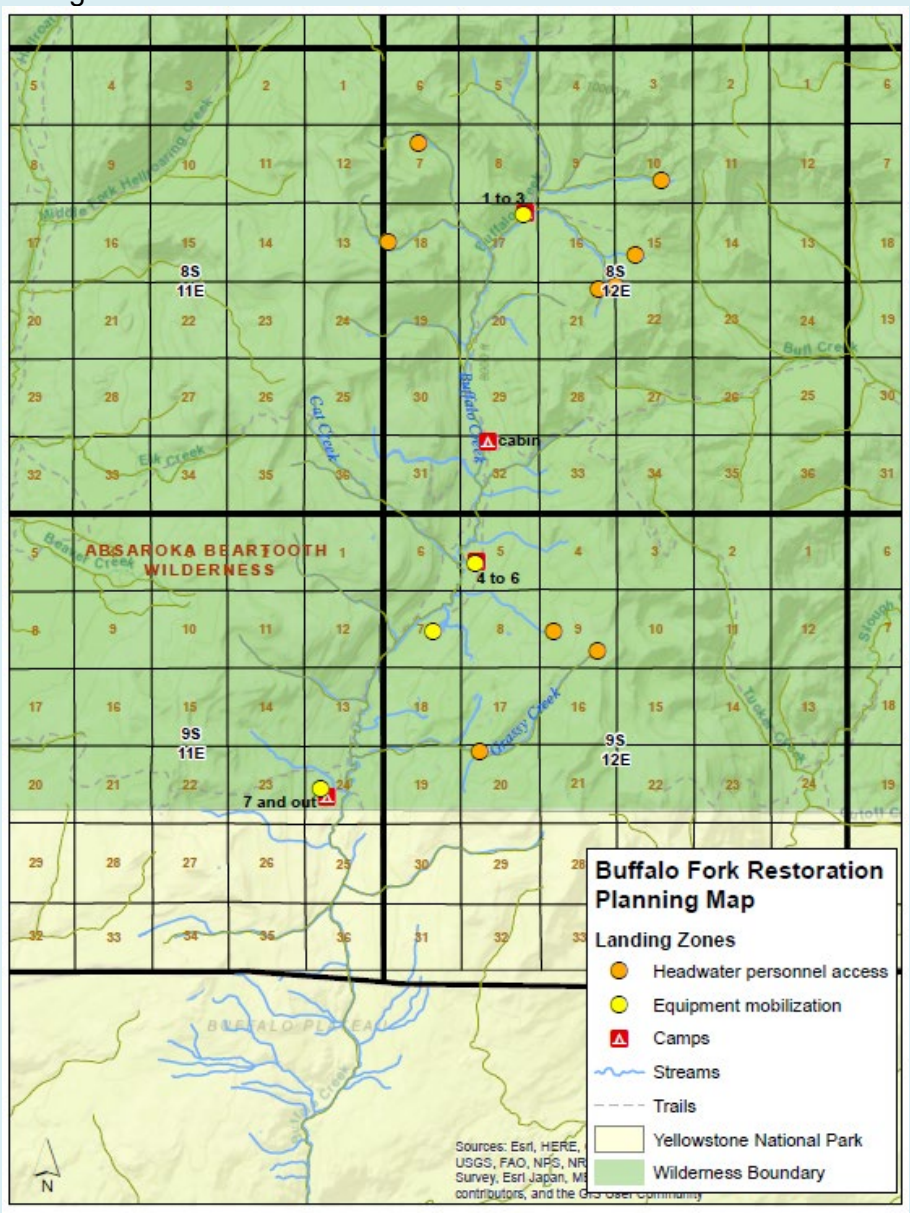

Figure 9. Locations of three proposed spike camps, the Buffalo Fork Cabin, and proposed helicopter landing zones for equipment mobilization and personnel access to remote headwater drip sites.

The following “Leave No Trace” camping methods would be adhered to:

- Avoid camping in fragile places.
- Camp, latrines and stock would be kept at least 200 horizontal feet from lakes and streams.
- All garbage would be flown out.
- No campfires unless necessary for crew safety. If any, fire pits would be naturalized.
- Dig group latrines for human waste. Cover with dirt, and decomposition would occur naturally.

To prevent human-bear conflict and comply with the Custer Gallatin National Forest Food Storage order, the following mitigations would be enforced:

- All attractants including rotenone, food, and garbage would be stored preferably in two large, metal bear -proof containers or behind portable electric fence. Bear proof containers would negate the need for camp managers at unoccupied spike camps. A small 2,200-watt Honda™ generator would be used to charge electric fence batteries because a solar charging system may not keep up with the demand of this and other equipment charging needs (batteries for electrofishers, injector pumps, and sentinel fish air pumps).
- All sentinel fish would be stored in certified bear-proof coolers with aeration or in streams within metal bear-proof cages.
- Active/occupied spike camps would be attended by a camp manager who would be responsible for morning and evening food storage checks. Unoccupied spike camps with rotenone or other attractants secured in bear proof containers would not require a camp manager until the point in time where they become occupied.

Management Approval:

- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness- 2,200-watt Honda™ Generator.
- An exemption to the Absaroka-Beartooth Wilderness 15-person group size limit to allow occupancy of up to 20 crew members.

<u>Preparatory Work</u>

Prior to stream treatments, crews would: 1) dye test all streams to determine 2-hour travel intervals to determine drip station locations; 2) measure stream discharge; and 3) conduct bioassays to determine effective rotenone concentration.

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. Brown, green, or black irrigation tarp would be used to blend with surroundings. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.

- To allow structure installation in the Absaroka-Beartooth Wilderness-up to two hand constructed temporary fish barriers.

Lake, Pond, and Wetland Treatment (Lentic)

Aircraft would be used to aerially spray the 25 acres of open water with rotenone in the two large meadows on two separate days. This is because these features are too large (up to 200 feet across), deep, and numerous to be treated solely by hand. To ensure complete coverage of these open water areas, aerial rotenone application would be supplemented with gasoline-powered pumps where necessary and hand-pump backpack sprayers where feasible. Rotenone application in Hidden Lake would be accomplished through aerial spraying or watercraft, or a combination of both, depending on the amount of surface algae present. Typically, by late summer a thick hard algae crust (up to one foot thick) covers much of the lake surface. To achieve a complete fish-kill when the lake is algae covered, gasoline pumps mounted on inflatable watercraft would be used to disperse rotenone throughout the water column of Hidden Lake. Watercraft would be propelled by a gasoline engine to break paths through the thick algae.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow aerial application of rotenone in the Absaroka-Beartooth Wilderness.
- To allow motorboat operation in Hidden Lake in the Absaroka-Beartooth Wilderness.
- To allow operation of gasoline engine powered trash pumps to disperse rotenone in the Absaroka-Beartooth Wilderness.

Stream Treatment (Lotic)

To remove rainbow trout from faster flowing water, diluted rotenone would be applied using constant flow drip cans spaced at two-hour stream flow travel time intervals (stations). Each station would drip rotenone for four hours to ensure that there is sufficient overlap of chemical in time and space. Hand-pump backpack sprayers would be used to apply diluted rotenone to slow moving stream margins, backwaters, and shallow wetlands. Springs and seeps may be treated with Prentox™ 7% powdered rotenone doughball placed by hand. Each day, most personnel would hike from spike camp to their preassigned application locations. However, personnel may be airlifted via helicopter to the most remote headwater drip station assignments as described above in the “personnel access” component. Low gradient meadow reaches of Buffalo Creek with velocity too low for drip can treatment, would be treated with rotenone dispensed from two inflatable row raft retrofitted with battery-powered injector pump systems. A small 2,200-watt Honda™ generator would be used to charge pump batteries because a solar charger would not meet the charging demand for this and other battery-powered equipment.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow operation of battery-powered injector pump system.
- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness-2,200-watt Honda™ Generator.
- To allow helicopter landings per “Personnel Access” above (≤ 18 annually or ≤ 54 over the project duration).

Sentinel Fish

Live sentinel fish (non-hybridized YCT from the Big Timber State Fish Hatchery) would be deployed in net bags upstream from each drip station to verify that the concentration and duration of rotenone from upstream drip stations is sufficient to achieve a complete fish kill.

Sentinel fish need to be healthy up until they are intentionally exposed to rotenone. Experience has shown that it can be difficult to keep sentinel fish staged within the project area alive since holding them in streams could prematurely expose them to residual rotenone. Furthermore, sentinel fish staged within the project area may also be attractant for bears. Therefore, sentinel fish supplied every other day to crews via helicopter from the Big Timber hatchery would ensure that any observations of sick or dying sentinel fish are due to intentional rotenone exposure and not some other factor. To minimize helicopter landings, sentinel fish drop-offs would be coordinated with the scheduled pick-up of personnel to be transported to headwater drip sites.

In the event that helicopter operations are delayed due to weather, battery powered backpack electrofishers would be present in an attempt to capture rainbow trout for use as sentinel fish. This method is not preferable because live, sentinel rainbow trout can be inadvertently escape into treated waters.

To comply with the CGNF Food Storage Order, all sentinel fish would be stored in certified bear-proof coolers with aeration or in streams within metal bear-proof cages. A small 2,200-watt Honda™ generator would be used to charge electrofisher batteries because a solar charger would not meet the charging demand for this and other battery-powered equipment.

Management Approval:

- Authorization for helicopter landings in the Absaroka-Beartooth Wilderness per “Personnel Access” above.
- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness-2,200-watt Honda™ Generator.

Restocking

Restocking with non-hybridized YCT would occur only in waters that previously supported fish. Fourteen stream miles and 11 lake acres in the Absaroka-Beartooth Wilderness would not be restocked and would remain in the historically fishless condition. Restocking of treated waters would commence once monitoring has demonstrated that rainbow trout have been successfully removed. As soon as all rainbow trout have been removed from Hidden Lake, reproductive-sized (> six inch) YCT would be aerially stocked to reestablish the lake population. This would require up to two helicopter flights per year (one or two days) over two years. Stream stocking of fingerlings would require up to six flights over three days per year for a duration of up to five years. For both lake and stream stocking, fish would be dropped from helicopters with no ground contact. Stream and lake stocking combined would occur on five individual years. Remote site incubators (Dobos et al.)s may be necessary to establish YCT stream populations in the project area. RSIs are used to incubate fish eggs for the purpose of increasing survival, reducing hatchery effects, and imprinting fish on specific streams. RSIs are comprised of a bucket or container with a water intake, filter system, and egg box. RSIs would be placed in-stream or on stream banks for 4-6 weeks each year for up

to five years. Logistical issues such as timing of hatchery egg production, inability to secure eggs from wild fish, and deep snow in spring may prevent use of RSIs.

Table 9. Summary of stocking activities under the aircraft supported alternative. The timing of stocking assumes complete rainbow trout removal in Hidden Lake in project year 2 and complete removal in streams in project year three.

Project Year	1	2	3	4	5	6	7	8	9	10	Total
Duration (Days)	0	1	0	2	2	2	2				**9**
Fish Drops (Hidden Lake)		2				2					4
Fish Drops (Streams)				8	8	6	8				30
Total Drops	**0**	**2**	**0**	**8**	**8**	**8**	**8**				**34**
Stocking Year		Year 1		Year 2	Year 3	Year 4	Year 5				

Management Approval:

- Aerial helicopter stocking (up to eight drops annually, not to exceed 34 landings).
- Authorization of a temporary installment (RSIs) in the Absaroka-Beartooth Wilderness.

Component Activities
How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Personnel Access	See description above.
2	Temporary Project Signing & Flagging	See description above.
3	Equipment Transportation	See description above.
4	Camping	See description above.
5	Preparatory Work	See description above.
6	Lake, Pond, and Wetland Treatment	See description above.
7	Stream Treatment (Lotic)	See description above.
8	Sentinel Fish	See description above.
9	Restocking	See description above.

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☒
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	3	NE
Untrammeled Total Rating		**-3**		

Explain:

6 Short-term Negative Effect: Rotenone treatment of lakes, ponds, and wetlands would have a short-term negative effect on lake zooplankton populations. Research has shown that zooplankton populations recover quickly when label directions are followed.

7 Short-term Negative Effect: Treatment of the streams would have a short-term negative effect on stream macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed.

9 Short-term Negative Effect: Stocking and use of RSIs are considered trammeling actions. Stocking events would be of low frequency (up to eight flights per year) and of short duration (approximately 10 minutes within wilderness per flight). None of the fishless stream reaches upstream from natural barriers would be stocked.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☒	☐
3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☒	☐
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	7	NE
Undeveloped Total Rating		**-7**		

Explain:

1 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Helicopter transport of personnel to remote headwater drip stations would be of limited intensity and duration with up to four landings per day over seven days per year.

2 Short-term Negative Effect: Signing and flagging though only in place for a few weeks per year, constitute installments and would minimally degrade the undeveloped quality. Mitigation: 1) biodegradable flagging would be used; 2) flagging would be removed by personnel as soon as it is no longer needed to denote drip site locations; 3) closure signs would be removed as soon as soon as project area streams meet rotenone label requirements for signage removal.

3 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality.

#4 No Effect: Although large groups will be camped in the Wilderness for a short duration, these camps are located at large established camp sites and will not result in additional development of the landscape.

5 Short-term Negative Effect: Constructing up to two fish barriers on the small Hidden Lake outlet stream would temporarily affect this quality for up to five years. Upon project completion, the two temporary barriers would be removed and the site(s) would be rehabbed to the preexisting condition. Mitigation: 1) Natural materials including logs and rocks would be used to the extent practicable; 2) primitive tools would be used to cut logs; 3) dirt would be rubbed on fresh saw cuts; 4) logs and rocks would be scattered to blend into the surrounding landscape upon project completion; and, 5) irrigation tarp would be green, brown, or black to blend in with the surrounding stream channel and vegetation; 6) irrigation tarp would be removed from the wilderness as soon as the barrier is no longer needed.

6 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Gasoline powered pumps would be used to apply rotenone to lakes, ponds, and wetlands with a motorboat used in Hidden Lake.

#7 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Rotenone would be applied in low gradient stream reaches with battery-powered injector pump systems mounted on watercraft.

9 Short-term Negative Effect: Installment of RSIs in project area streams for 4-6 weeks each year for up to five years. Mitigation: 1) RSI containers and pipe would be gray, green, brown, or black to minimize visual impacts; 2) RSIs would be removed from the wilderness each year after fry have escaped.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☒	☐	☐
7	Stream Treatment (Lotic)	☒	☐	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☒	☐	☐
Total Number of Effects		3	0	NE

Natural Total Rating	+3

Explain:

6 and # 7: Short-term Negative, Long-term Positive Effect- Treatment would have a short-term negative effect on native macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed. Long Term Positive Effect: An introduced nonnative rainbow trout population not endemic to the Absaroka-Beartooth Wilderness would be removed.

9 Long-term Positive Effect: A nonnative species that is not endemic to the Absaroka-Beartooth Wilderness would be replaced with the native species both endemic and indigenous to the Absaroka-Beartooth Wilderness and lower Buffalo Creek for the purpose of establishing a YCT population in the Yellowstone Headwaters Subbasin secure from hybridization, disease, disturbance, and climate change threats.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☒	☐
3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☒	☐
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	7	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-7**		

Explain:

1 Short-term Negative Effect: The sights and sounds of up to 18 helicopter landings annually for personnel transport to headwater dip sites and sentinel fish delivery would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern

civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the personnel helicopter transport is expected to last seven days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect. Finally, the proposed number of personnel (20) exceeds the Absaroka-Beartooth Wilderness regulated group size limit of 15 individuals. Large groups of workers will temporarily detract from the general public's opportunities for solitude or primitive and unconfined recreation.

#2 Short-term Negative Effect: Signage dictating where wilderness users go would result in a short-term negative effect on this quality.

3 Short-term Negative Effect: The sights and sounds of up to 22 helicopter landings for equipment transport would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the personnel helicopter transport is expected to last four days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

4 Short-term Negative Effect: Operation of a generator at spike camps would have a low-level negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. The duration of the noise disturbance would be limited to a few hours per day for up to seven days. Mitigation: A small Honda EU2200i inverter generator would be used. Honda reports a very low noise level of 57 decibels at a rated load, and 48 decibels at a quarter load. For comparison, an average conversation produces noise at around 60 decibels, which means that this inverter generator makes about as much noise as people whispering (30 decibels).

6 Short-term Negative Effect: The sights and sounds of gasoline pumps, a motorboat on Hidden Lake, and aerial spraying would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice motorized equipment and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the duration of motorized use is expected to be up to four days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

7 Short-term Negative Effect: Proposed stream treatment activities (injector pump, human activity, etc.) would have an insignificant, low duration negative effects on wilderness solitude. The battery powered injector pump would only be used on Buffalo Creek for up to four days and would only be audible for a distance of about 50 feet. The project area is lightly visited during the project implementation time period.

#8 This affect is accounted for in #1 Personnel Access because sentinel fish delivery would utilize the same helicopter flights used to transport personnel to headwater drip sites. We did not rate this as a negative since we already accounted for the negative effects of flights in personnel access.

#9 Short-term Negative Effect: The sights and sounds of eight helicopter fish stocking flights per year over the wilderness would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. The negative effect would likely be moderate to intense, of short duration lasting just minutes, with no lasting effect.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☐	☒
7	Stream Treatment (Lotic)	☐	☐	☒
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		**0**		

Explain:

There are no other features of value potentially affected by this project.

Summary Ratings for Alternative 2

Wilderness Character	
Untrammeled	-3
Undeveloped	-7
Natural	+3
Solitude or Primitive & Unconfined Recreation	-7
Other Features of Value	0
Wilderness Character Summary Rating	**-14**

Alternative 3: Pack and Stock Supported Alternative

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

The Pack and Stock Supported Alternative varies from the Aircraft Supported Alternative in that it would rely exclusively on pack stock for gear and equipment transport and would not utilize aircraft for rotenone application or personnel transport to headwater drip stations or fish stocking. The Pack Stock Supported Alternative use electric fence to secure attractants.

As with Alternative 2, rotenone application would occur in a stepwise fashion progressing from the headwaters of the upper Buffalo Creek Subwatershed downstream to the barrier falls located downstream from the Yellowstone National Park boundary. But, without aircraft support, rotenone application is estimated to take 10 days with an additional six days for equipment, gear, and food transport (16 days vs nine days for Alt 2; Figures 5, 6). This would require up to 30 personnel per day operating in the Absaroka-Beartooth Wilderness over the duration of the project. This is 10 more personnel per day for a total of 300 person days vs 140 person days for Alternative 2. On day three through five, the headwaters downstream to the upper meadow would be treated. Rotenone treatment of Hidden Lake, the upper Meadow and connected tributary streams would occur approximately on days seven through ten (middle treatment). On days 12 through 14, rotenone treatment would progress downstream through the lower meadow to the barrier falls in Yellowstone National Park.

Figure 10. Estimated schedule of rotenone treatment and gear and equipment transport activities under the Pack Stock Supported Alternative. Timing and duration of project preparatory work not shown.

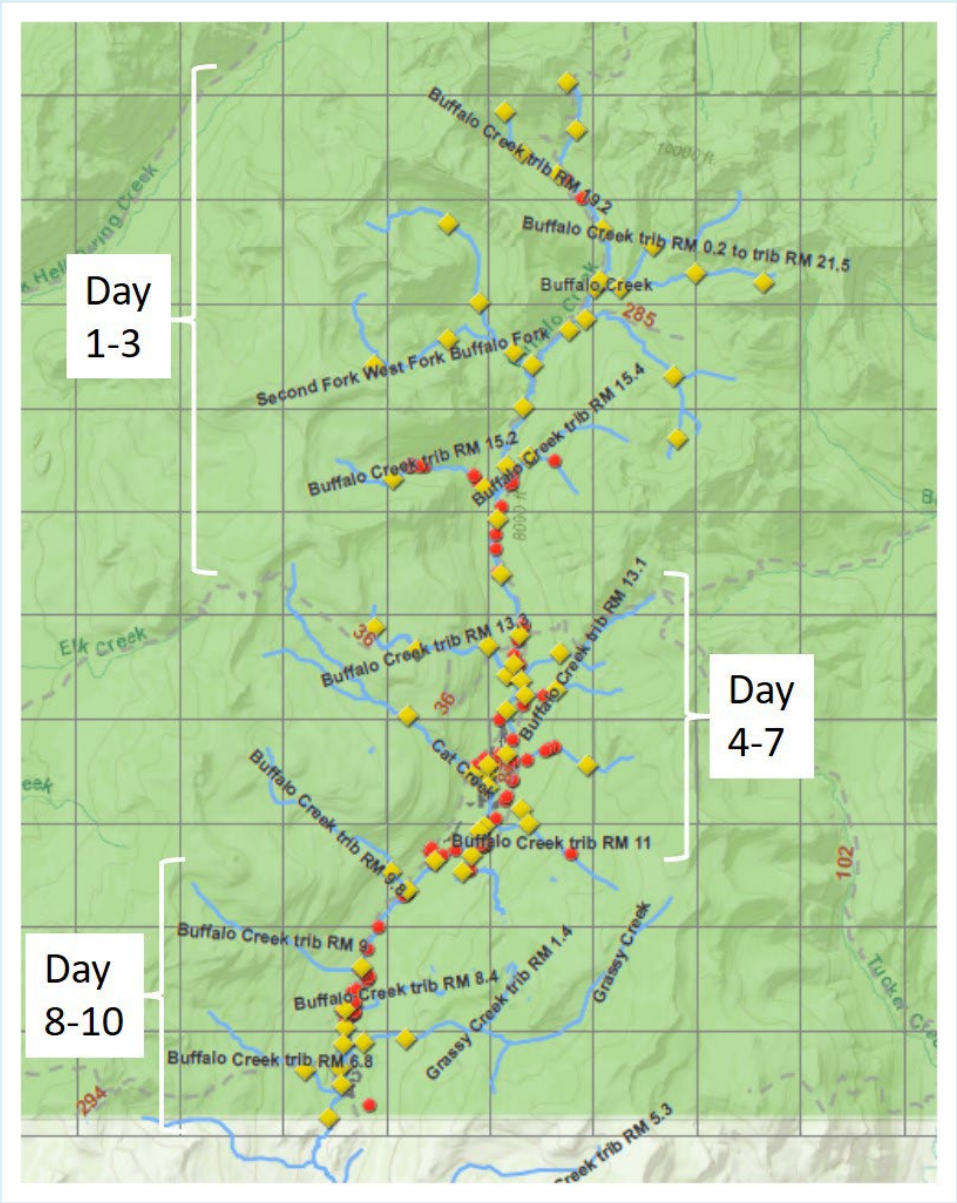

Figure 11. Estimated locations of two-hour travel time drip stations (yellow diamonds) and other sites (red dots) requiring backpack spraying, supplemental drip, or doughball application with brackets indicating treatment days.

Prohibited Uses:

1) Application of approved pesticide (including aerial application)
2) Operation of motorized equipment
3) Operation of motorboats
4) Structure Installation (temporary)

Personnel Access

Personnel access to and from the project area would be on foot or horseback. This alternative varies from the Aircraft Supported Alternative in that it would rely on backpack and horseback to transport live sentinel fish and treatment equipment to the nine remote headwater drip sites instead of utilizing helicopter transport. These remote headwater drip sites have no trail access with most having heavy deadfall from the 1988 wildfire. Each of these sites is at least 1.7 miles from the nearest camp with steep pitches exceeding 20% slope. Some require scrambling with heavy, awkward loads up through steep, rocky chutes that cannot be navigated by pack stock. Each headwater drip site would require 70 pounds of piscicide treatment equipment (32 items; Appendix 1). This includes a two-gallon cooler with live sentinel fish, backpack sprayer, drip can, rotenone, PPE, and safety equipment. To access these sites on foot or via horseback some clearing of 10 miles of new trail (Appendix 2) would need to occur to ensure that personnel and/or stock are able to safely access remote headwater drip sites with live sentinel fish in time to apply a four-hour rotenone drip, backpack spray, and hike out before dark. The necessary trail rehab work would include pulling logs back into the trails after project objectives have been met.

Temporary Project Signing & Flagging

Same as the Aircraft Supported Alternative.

Equipment Transportation

Under the Pack and Stock Supported Alternative, rotenone application operations would be supported by three remote field camps and the Buffalo Fork cabin at the same locations as under the Aircraft Supported Alternative.

Mobilization, transfer between camps, and demobilization of 5,792 pounds of equipment, gear, and food with pack stock is expected to take four more days than by helicopter transport. This is because two additional days would be required for equipment transport to and from the project area and rotenone treatment personnel would be needed to help load and unload 2,392 pounds of gear onto 30 pack animals on day six and 3,004 pounds of gear onto 36 pack animals on day 11. Treatment equipment needed at Hidden Lake (638 pounds) would also be transported by stock on day 6.

The estimated total number of pack stock to complete equipment transportation would be 145 to move a total of 17,636 pounds of equipment, gear, and food (Table 2). This is because each piece of the 5,792 pounds of equipment needs to be moved at least twice. This does not include transport of sentinel fish. *See Buffalo Creek Gear Mobilization Plan for detailed list of equipment and weights.*

Table 2. Summary of 175 lb. pack stock loads for equipment mobilization and demobilization. The number of pack stock accounts for bulky items that require underweight loads. The number of pack stock assumes long strings with one rider to nine pack animals and gear and food for 30 personnel. Sentinel fish delivery not included.

Transport Activity	Day 1 & 2	Day 6	Day 11	Day 15 & 16	Total Loads
Upper Camp Mobilization	29.0				29.0
Middle Camp Mobilization	14.0				14.0
Cabin Mobilization	2.0				2.0
Hidden Lake Mobilization		6.0			6.0
Transfer Upper Camp to Middle Camp		16.0			16.0
Transfer Upper Camp to Lower Camp		8.0			8.0
Transfer Middle Camp to Lower Camp			22.0		22.0
Hidden Lake Demobilization			6.0		6.0
Middle Camp Demobilization			8.0		8.0
Lower Camp Demobilization				34.0	34.0
Total	**45.0**	**30.0**	**36.0**	**34.0**	**145.0**

Camping

This alternative varies from the Aircraft Supported Alternative in that:

- The number of personnel staying at spike camps increases from 20 to 30.
- All garbage would be packed out on stock.
- Electric fences would be used instead of large, metal-bear proof containers to secure rotenone, food, and garbage. This is because the 4'x4'x8' metal-bear proof containers are too large to be packed on stock.

Management Approval:

- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness-2,200-watt Honda™ Generator.
- An exemption to the Absaroka-Beartooth Wilderness 15-person group size limit to allow occupancy of up to 30 crew members.

Preparatory Work

This alternative varies from the Aircraft Supported Alternative in that select beaver dams (those impounding a large volume of water) would be temporarily breached using hand tools to decrease the amount of ponded water requiring rotenone treatment by hand.

Prior to stream treatments crews would: 1) dye test all streams to determine 2-hour travel intervals to determine drip station locations; 2) measure stream discharge; and 3) conduct bioassays to determine effective rotenone concentration.

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. Brown, green, or black irrigation tarp would be used to blend with surroundings. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow structure installation in the Absaroka-Beartooth Wilderness-up to two hand constructed temporary fish barriers.
- To allow modification of beaver dams with hand tools in the Absaroka-Beartooth Wilderness.

Lake, Pond, and Wetland Treatment (Lentic)

This alternative varies from the Aircraft Supported Alternative in that aircraft would not be used to apply rotenone to Hidden Lake and its unnamed adjacent lake or to open water associated with beaver complexes in the two large meadows. Instead, gasoline powered pumps would be used almost exclusively to apply rotenone. Handpump backpack sprayers would be used to apply rotenone to waterbody margins. In Hidden Lake, the gasoline pumps would be mounted on an inflatable watercraft powered by a gasoline outboard motor which is necessary for navigating through the thick algae crust that cover's the lake's surface by late summer.

Collectively, the two large meadows have approximately 42 distinct ponded areas with about 25 surface acres. To achieve a complete fish-kill, it is imperative that no ponded water goes untreated and that off-channel ponds have active rotenone at the same time as connected streams. This would be attempted by operating four gasoline powered trash pumps with hose-lays to spray ponds simultaneously with the treatment of adjacent reaches of main stem Buffalo Creek and adjoining tributary streams. Each trash pump would require a 30-gallon rotenone mixing tank and two personnel to operate. Inflatable row watercraft may be needed to move gear and personnel through deep water areas. It is anticipated that to be effective, rotenone treatment in the two large meadows would require ten additional personnel and three additional days than the Aircraft Supported Alternative. Moving the pumps, hoses, mixing tanks, and watercraft between the 42 ponds, through dense willow vegetation and swampy terrain would be exceedingly difficult, dangerous, and inefficient. The difficulty in effectively treating all ponded water by hand, without aerial application, reduces the potential for successfully removing all nonnative rainbow trout.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow motorboat operation in Hidden Lake in the Absaroka-Beartooth Wilderness.
- To allow operation of gasoline engine powered trash pumps to disperse rotenone in the Absaroka-Beartooth Wilderness.

Stream Treatment (Lotic)

Same as the Aircraft Supported Alternative

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow operation of battery-powered injector pump system.
- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness-2,200-watt Honda™ Generator.

Sentinel Fish

This alternative varies from the Aircraft Supported Alternative in that live sentinel fish would be delivered every other day via pack stock to support project operations. This would require one pack animal and one rider every other day over the 12 days of rotenone treatment (12

stock total). This would reduce the vitality of sentinel fish and could therefore jeopardize project success.

Management Approval:

- To allow operation of motorized equipment in the Absaroka-Beartooth Wilderness-2,200-watt Honda™ Generator.

Restocking

This alternative would rely entirely on pack stock to restock project area lakes and streams over a six-year period. A hatchery truck would drive fish from the Big Timber fish hatchery to the Slough Creek trailhead (3 hours). Fish would be placed into stock packable containers with aerators and loaded onto pack animals. The eight to 20-mile trip on stock would take between four and eight hours. It is expected that long distance pack trips would reduce the survival of small 2-inch juvenile fish stocked in streams. The 15-mile pack trip to Hidden Lake is expected to take five hours and result in some direct mortality of catchable-sized (> 6 inch) YCT as well as reduced survival over time due the stress placed on the fish during transport (4.5 more hours than helicopter stocking). Additional restocking pack trips would be needed to compensate for reduced fish survival and increased mortality as determined through counting dead fish and through population monitoring in Hidden Lake.

Restocking Hidden Lake would require up to 15 pack animals (3 strings), one day per year over a duration of up to five years. Stream stocking of fingerlings would require up to 45 pack animals (5 strings), over three days per year for a duration of up to five years. Stream and lake stocking combined would not exceed a duration of six years.

Component Activities

How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Personnel Access	See Pack Stock Supported Alt description.
2	Temporary Project Signing & Flagging	See Pack Stock Supported Alt description.
3	Equipment Transportation	See Pack Stock Supported Alt description.
4	Camping	See Pack Stock Supported Alt description.
5	Preparatory Work	See Pack Stock Supported Alt description.
6	Lake, Pond, and Wetland Treatment	See Pack Stock Supported Alt description.
7	Stream Treatment (Lotic)	See Pack Stock Supported Alt description.
8	Sentinel Fish	See Pack Stock Supported Alt description.
9	Restocking	See Pack Stock Supported Alt description.

UNTRAMMELED

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	3	NE
Untrammeled Total Rating			**-3**	

Explain:

6 Short-term Negative Effect: Rotenone treatment of lakes, ponds, and wetlands would have a short-term negative effect on lake zooplankton populations. Research has shown that zooplankton populations recover quickly when label directions are followed. Relying on hand operated equipment, instead of aircraft, to treat 25 acres of complex ponded water in dense willow vegetated meadows would reduce the effectiveness of rotenone treatment. This would increase the annual duration of rotenone treatment and decrease the potential for meeting project objectives within five years.

7 Short-term Negative Effect: Treatment of the streams would have a short-term negative effect on native stream macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed.

9 Short-term Negative Effect: Fish stocking is considered a trammeling action. Mitigation: None of the fishless stream reaches upstream from natural barriers would be stocked.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☒	☐
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☒	☐
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	5	NE
Undeveloped Total Rating		**-5**		

Explain:

2 Short-term Negative Effect: Signing and flagging though only in place for a few weeks per year, constitute installments and would minimally degrade the undeveloped quality. Mitigation: 1) biodegradable flagging would be used; 2) flagging would be removed by personnel as soon as it is no longer needed to denote drip site locations; 3) closure signs would be removed as soon as soon as project area streams meet rotenone label requirements for signage removal.

#4 No Effect, although large groups will be camped in the Wilderness for a short duration these camps are located at large established camp sites and will not result in additional development on the landscape.

5 Short-term Negative Effect: Constructing up to two fish barriers on the small Hidden Lake outlet stream would temporarily affect this quality for up to five years. Upon project completion, the two temporary barriers would be removed and the site(s) would be rehabbed to the preexisting condition. Mitigation: 1) Natural materials including logs and rocks would be used to the extent practicable; 2) primitive tools would be used to cut logs; 3) dirt would be rubbed on fresh saw cuts; 4) logs and rocks would be scattered to blend into the surrounding landscape upon project completion; and, 5) irrigation tarp would be green, brown, or black to

blend in with the surrounding stream channel and vegetation; 6) irrigation tarp would be removed from the wilderness as soon as the barrier is no longer needed.

Because this alternative does not utilize aircraft for treating 25 acres of complex beaver pond habitat, it is necessary to temporarily drain beaver ponds by notching beaver dams with hand tools. Modification of beaver dams would temporarily impact the undeveloped quality.

6 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Gasoline powered pumps would be used to apply rotenone to lakes, ponds, and wetlands with a motorboat used in Hidden Lake.

#7 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Rotenone would be applied in low-gradient stream reaches with battery-powered injector pump systems mounted on aircraft.

9 Short-term Negative Effect: Installment of RSIs in project area streams for 4-6 weeks each year for up to five years. Mitigation: 1) RSI containers and pipe would be gray, green, brown, or black to minimize visual impacts; 2) RSIs would be removed from the wilderness each year after fry have escaped.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☒	☐	☐
7	Stream Treatment (Lotic)	☒	☐	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☒	☐	☐
Total Number of Effects		3	2	NE
Natural Total Rating		**+1**		

Explain:

1 Negative Effect: Transporting personnel in the trailless upper regions of the watershed would result in creating user trails where there historically have not been any trails or stock impacts. For a person to hike the 70 pounds of necessary gear or pack stock to carry that load, some trees would need to be cut out to create a safe route as neither person or packstock can currently make the route to the headwaters with the necessary amount of gear over the downfall that is present. A temporary trail would remain in place for up to 3 years and need yearly maintenance. After rotenone application is complete, the trail would be naturalized to the best of the ability of the crew. This naturalizing would be done by moving rocks, logs, and debris into the temporary trail. The path would be closed in a short timeframe although evidence of cut logs would remain for decades.

3 Negative Effect: 145 stock loads is a substantial increase over existing pack stock use and would decrease the Natural quality of the Wilderness. Stock always come with a risk of transporting invasive weeds and the furthered heavy stock traffic at stream crossings is expected to increase erosion of streambanks and sediment delivery to aquatic habitats. This could also widen channels at stream crossings which degrades aquatic habitat as well as stream form and function. In addition, transporting equipment and personnel in the trailless upper regions of the watershed would result in creating user trails where there historically have not been any stock impacts. For sites too steep or rugged for stock to access, some clearing would also be needed to afford safe passage for a human with a 70 lb pack.

6 and # 7: Short-term Negative, Long-term Positive Effect: Treatment would have a short-term negative effect on native macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed. An introduced nonnative rainbow trout population not endemic to the Absaroka-Beartooth Wilderness would be removed thus ensuring that indigenous species assemblages and ecological processes are protected.

9 Long-term Positive Effect: A nonnative species that is not endemic to the Absaroka-Beartooth Wilderness would be replaced with the native fish species both endemic and indigenous to the Absaroka-Beartooth Wilderness and lower Buffalo Creek, thus establishing the natural aquatic community of fish, invertebrates, and amphibians that coevolved in the Greater Yellowstone Ecosystem.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☒	☐
3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☒	☐

5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	7	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-7**		

Explain:

#1 Short-term Negative Effect: The pack and stock supported alternative will need 30 people and many stock in use at camp areas. The group size limit in the ABW is 15 people. Large groups of workers and animals used to transport them will detract from the general public's opportunities for solitude or primitive and unconfined recreation.

#2 Short-term Negative Effect: Signage dictating where wilderness users go would result in a short-term negative effect on this quality.

3 Short-term Negative Effect: The temporary increase in sights and sounds of people and livestock would affect this quality.

4 Short-term Negative Effect: Operation of a generator at spike camps would have a low-level negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. The duration of the noise disturbance would be limited to a few hours per day for up to 12 days (five additional days than the aircraft supported alternative). Mitigation: A small Honda EU2200i inverter generator would be used. Honda reports a very low noise level of 57 decibels at a rated load, and 48 decibels at a quarter load. For comparison, an average conversation produces noise at around 60 decibels, which means that this inverter generator makes about as much noise as people whispering (30 decibels).

6 Short-term Negative Effect: The sights and sounds of gasoline pumps and a motorboat on Hidden Lake would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice motorized equipment and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the duration of motorized use is expected to be up to seven days (three additional days than the aircraft supported alternative), this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

7 Short-term Negative Effect: Proposed stream treatment activities (injector pump, human activity, etc.) would have an insignificant, low duration negative effects on wilderness solitude. The battery powered injector pump would only be used on Buffalo Creek for up to seven days (two additional days than the aircraft supported alternative) and would only be audible for a distance of about 50 feet. The project area is lightly visited during the project implementation time period.

#9 Short-term Negative Effect: The temporary increase in sights and sounds of people and livestock would affect this quality.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☐	☒
7	Stream Treatment (Lotic)	☐	☐	☒
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		**0**		

Explain:

There are no other features of value potentially affected by this project.

Summary Ratings for Alternative 3	
Wilderness Character	
Untrammeled	-3

Undeveloped	-5
Natural	+1
Solitude or Primitive & Unconfined Recreation	-7
Other Features of Value	0
Wilderness Character Summary Rating	**-14**

Alternative 4: Aircraft and Stock Supported Alternative.

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

This alternative varies from the Aircraft Supported Alternative in that it:

1) relies on pack stock for transporting 1,560 pounds of camping gear and food to, within, and out of the project area;
2) utilizes pack stock and human transport of gear where possible without clearing of downed logs to create a temporary trail for transporting personnel and gear to headwater drip sites.
3) decreases the number of aircraft-supported headwater drip sites from nine to five per treatment cycle;
4) relies on packstock or personnel on foot to transport drip cans, unused rotenone, backpack sprayers, and backpack electrofishers from camp one to camp two; and
5) reduces the number of helicopter drops/landings from 34 to 18 by utilizing traditional uses, where feasible, to distribute stocked fish.

Prohibited Uses:

1) Aircraft landings-Total ≤ 99 total: personnel access ≤ five per treatment year or ≤ 15 total over five year project duration; sentinel fish delivery ≤ 4 per treatment year ≤12 total over five year project duration; equipment transport ≤ 15 per treatment year ≤45 total over five year project duration; helicopter stocking ≤ 18 over five years; aerial spraying 3 fuel/chemical cycles ≤ 9 total over five year project duration.
2) Application of approved pesticide
3) Operation of motorized equipment
4) Operation of motorboats
5) Structure Installation (temporary- up to five years)

Personnel Access

Personnel would hike or ride horses to 12 headwater drip sites where it is feasible to carry 70 pounds of sentinel fish and treatment equipment on a time frame that does not compromise project success. Five helicopter landing sites would be used to transport personnel to within close proximity of nine headwater drip sites where hiking or riding from camp would not be feasible from a safety standpoint. Personnel would be picked up by helicopter outside of

Wilderness and flown directly to headwater drip sites rather than landing at wilderness spike camps for personnel pickup. This would decrease the annual number of headwater personnel access landings in wilderness from 18 (aircraft supported alternative) to just 5.

Management Approval: Authorization of up to five helicopter landings per year for personnel transport to headwater drip sites. Personnel, flight days not to exceed five per year with up to four landings per day. The total number of personnel landings not to exceed 15 over the maximum five-year project duration.

Temporary Project Signing & Flagging

Same as Alternative 2

Equipment Transportation

This would require 42 pack stock on four separate days with a total of 6,290 pounds of gear and food moved. (Table 4). This includes pack stock delivery of two five-gallon rotenone barrels to the cabin. All camping gear, food items, and more manageable loads for the packers to haul would be transported by pack stock. Due to the size and volume of the rotenone application equipment, a helicopter would still be utilized to transport this equipment. Alternative 4 is expected to take up to three additional days than Alternative 2 (12 days vs nine days).

Helicopters would be used to transport 4,923 pounds of rotenone and treatment equipment to, within, and from the project area. Aerial transport of treatment equipment in bear-proof cages is necessary to ensure that it is secure and on-site when crews arrive. This would require 15 landings (6 fewer than Alternative 2) on four separate days with a total of 12,446 pounds of gear and equipment airlifted (Table 3). Airlifting most of the rotenone would reduce potential for chemical spills that would be more likely with stock transport. *See Buffalo Creek Gear Mobilization Plan for detailed list of equipment and weights.*

Day 1 Middle and Upper Camp Mobilization: Prior to commencement of rotenone application, all treatment equipment (4,285 lbs.) would be mobilized by a helicopter with 1,500 lb. lift capacity and staged secure from bears at the middle and upper camp sites in 4’ x 4’ x 8’ metal bear proof containers (two per camp). Airlifting treatment equipment and rotenone in large bear cages minimizes the number of helicopter landings and negates the need for personnel to unload, secure, and supervise staged equipment/attractants at unoccupied spike camps. Camping gear and food (1,560 lbs.) would also be transported to the upper camp via nine pack stock and one rider. One pack animal and rider would deliver rotenone to the Buffalo Creek Cabin.

Day 5 Upper Camp Demobilization: Rotenone treatment equipment (1,575 lbs.), garbage, and empty rotenone barrels would be transported in the two bear boxes (4’x4’x 8’ metal cages) by helicopter from the upper camp site and staged at the lower camp site for use on day 7. Camping gear and food (1,560 lbs.) would be transported from the upper camp site to the middle camp via nine pack stock and one rider. Backpack electrofishers, drip cans, and backpack sprayers would be transported from the upper camp to the middle camp by treatment personnel incidental to their daily assignments or by pack stock. An independent helicopter flight would deliver 638 pounds (plus weight of sentinel fish and water) of rotenone

treatment equipment (boat, motor, pump, rotenone, and sentinel fish) to Hidden Lake. If treatment personnel are needed to assist with packing and unpacking their food and gear from stock and securing it, it is anticipated that rotenone application would be interrupted for one day. A few personnel would be responsible for final camp cleanup and inspection to ensure compliance with the Leave No Trace standard.

Day 9 Middle Camp Demobilization: Attractants and rotenone treatment equipment that would not be needed at the lower camp would be flown from the middle camp site and Hidden Lake out of the wilderness (1,635 lbs.) inside the two middle camp bear boxes (4'x4'x 8' metal cages). Any rotenone treatment equipment (left over rotenone, backpack electrofishers, inflatable watercraft, drip cans, backpack sprayers, pumps etc.), needed for the final two days of the project (approximately 1,000 lbs.) would be airlifted by helicopter from the middle camp site to the lower camp site in one of the two bear boxes on this same flight. Camping gear and food (1,560 lbs.) would be carried by nine pack stock (plus one rider) to support personnel moving to occupy the lower camp. A few personnel would be responsible for final camp cleanup and inspection to ensure compliance with the Leave No Trace standard.

Day 12 Lower Camp *Demobilization*: All remaining rotenone treatment equipment (2,450 lbs.) would be airlifted by helicopter out of the project area in the two remaining bear boxes (4'x4'x 8' metal cages). Camping gear and remaining food (<1,560 lbs.) would be carried by nine pack stock (one rider) to the Slough Creek Trailhead. Three personnel would be dedicated to sling load preparation and final camp cleanup and inspection.

Weather delays or project implementation delays could affect the timing of helicopter flights. To minimize disturbance to grizzly bear, helicopters would adhere strictly to flight lines preapproved by the USFWS through the ESA consultation process.

Figure 12. Estimated schedule of rotenone application and gear and equipment transport activities under the Aircraft and Pack Stock Supported Alternative. Timing and duration of project preparatory work not shown.

Table 3. Summary of 1,500 lb. helicopter loads and landings Alternative 4.

	Day 1		Day 5		Day 9		Day 12			
Helicopter Transport Activity	**Loads**	**Landings**	**Loads**	**Landings**	**Loads**	**Landings**	**Loads**	**Landings**	**Loads**	**Total Landings**
Upper Camp Mobilization	1.3	2							1.3	2
Middle Camp Mobilization	1.5	2							1.5	2
Cabin Mobilization									0.0	0
Hidden Lake Mobilization			0.4	1					0.4	1
Transfer Upper Camp to Middle Camp			0 .2	2					0.2	2
Transfer Upper Camp to Lower Camp			1.1	2					1.1	2
Transfer Middle Camp to Lower Camp					0.4	2			0.4	2
Hidden Lake Demobilization							0.4	1	0.4	1
Middle Camp Demobilization					1.1	1			1.1	1
Lower Camp Demobilization							1.6	2	1.6	2
Total	**2.8**	**4**	**1.5**	**5**	**1.5**	**3**	**2.0**	**3**	**7.8**	**15**

Table 4. Summary of 175 lb. pack stock loads for camping gear and food mobilization and demobilization under Alternative 4. The number of pack stock assumes long strings with one rider to nine pack animals, and accounts for gear and food for 20 personnel. Additional stock loads would be needed if personnel are not able to carry drip cans, backpack sprayers, and electrofishers from the upper camp to middle camp.

Stock Transport Activity	**Day 1**	**Day 5**	**Day 9**	**Day 12**	**Total Stock Loads**
Upper Camp Mobilization	10				**10**
Middle Camp Mobilization					**0**
Cabin Mobilization	2				**2**
Hidden Lake Mobilization					**0**
Transfer Upper Camp to Middle Camp		10			**12**
Transfer Upper Camp to Lower Camp					**0**
Transfer Middle Camp to Lower Camp			10		**12**
Hidden Lake Demobilization					**0**
Middle Camp Demobilization					**0**
Lower Camp Demobilization				10	**10**
Total	**12**	**10**	**10**	**10**	**42**

Management Approval: Authorization of up to 15 helicopter landings per year on four separate days to transport rotenone treatment equipment to, within, and out of the project area.

Camping

Same as Alternative 2

Preparatory Work

Same as Alternative 2: Prior to stream treatments, crews would: 1) dye test all streams to determine 2-hour travel intervals to determine drip station locations; 2) measure stream discharge; and 3) conduct bioassays to determine effective rotenone concentration.

To ensure that any nonnative rainbow trout surviving in Buffalo Creek do not recolonize Hidden Lake after rotenone treatment, one or two temporary fish barriers would be constructed on the Hidden Lake outlet stream by hand using on-site logs, rocks, and irrigation tarp. Brown, green, or black irrigation tarp would be used to blend with surroundings. Upon project completion, the barrier(s) would be removed, and the site(s) would be restored to the preexisting condition. Temporary barriers would be in place from two to five years.

Management Approval:

- To allow the use of a registered pesticide in the Absaroka-Beartooth Wilderness.
- To allow structure installation in the Absaroka-Beartooth Wilderness-up to two hand constructed temporary fish barriers.

Lake, Pond, and Wetland Treatment (Lentic)

Same as Alternative 2

Stream Treatment (Lotic)

Same as Alternative 2

Sentinel Fish

Same as Alternative 2 except that helicopters would only transport sentinel fish every other day to the upper and middle camp. Sentinel fish for the lower camp would be delivered by helicopter landing outside of the Absaroka-Beartooth Wilderness. Four landings annually not to exceed 12 over the five-year project duration.

Restocking

This alternative decreases the number of helicopter landings from 34 in alternative 2 to 18 over the five-year restocking period. This is accomplished by utilizing hikers and pack stock, where feasible, to distribute fish to multiple locations from each helicopter landing. Helicopter delivery from the hatchery to the general stocking vicinity is necessary to ensure a high survival rate of stocked fish. However, once these fish are in the upper, middle, or lower watershed, crews can carry them for up to an hour without decreasing survival. The number of landings is further reduced by utilizing a landing zone outside of wilderness to supply fish for distribution with traditional uses in the stream reaches upstream from the Wilderness boundary.

Component Activities
How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Personnel Access	See description above.
2	Temporary Project Signing & Flagging	See description above.
3	Equipment Transportation	See description above.
4	Camping	See description above.
5	Preparatory Work	See description above.
6	Lake, Pond, and Wetland Treatment	See description above.
7	Stream Treatment (Lotic)	See description above.
8	Sentinel Fish	See description above.
9	Restocking	See description above.

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐

8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	3	NE
Untrammeled Total Rating		**-3**		

Explain:

6 Short-term Negative Effect: Rotenone treatment of lakes, ponds, and wetlands would have a short-term negative effect on lake zooplankton populations. Research has shown that zooplankton populations recover quickly when label directions are followed.

7 Short-term Negative Effect: Treatment of the streams would have a short-term negative effect on stream macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed.

9 Short-term Negative Effect: Helicopter stocking and use of RSIs are considering trammeling actions. Helicopter stocking events would be of low frequency (up to eight flights per year) and of short duration (approximately 10 minutes within wilderness per flight). None of the fishless stream reaches upstream from natural barriers would be stocked. Installment of RSIs in project area streams for 4-6 weeks each year for up to five years. Mitigation: 1) RSI containers and pipe would be gray, green, brown, or black to minimize visual impacts; 2) RSIs would be removed from the wilderness each year after fry have escaped.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☒	☐
3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☒	☐
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☒	☐
Total Number of Effects		0	7	NE

Undeveloped Total Rating	-7

Explain:

1 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality for the duration of the project and ceases when completed. Helicopter transport of personnel to remote headwater drip stations would be of limited intensity and duration not to exceed five per year over six days or 15 over the five-year project duration- with three years of possible treatment to ensure successful removal of rainbow trout.

2 Short-term Negative Effect: Signing and flagging though only in place for a few weeks per year, constitute installments and would minimally degrade the undeveloped quality. Mitigation: 1) biodegradable flagging would be used; 2) flagging would be removed by personnel as soon as it is no longer needed to denote drip site locations; 3) closure signs would be removed as soon as soon as project area streams meet rotenone label requirements for signage removal.

3 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality.

5 Short-term Negative Effect: Constructing up to two fish barriers on the small Hidden Lake outlet stream would temporarily affect this quality for up to five years. Upon project completion, the two temporary barriers would be removed and the site(s) would be rehabbed to the preexisting condition. Mitigation: 1) Natural materials including logs and rocks would be used to the extent practicable; 2) primitive tools would be used to cut logs; 3) dirt would be rubbed on fresh saw cuts; 4) logs and rocks would be scattered to blend into the surrounding landscape upon project completion; and 5) irrigation tarp would be green, brown, or black to blend in with the surrounding stream channel and vegetation; 6) irrigation tarp would be removed from the wilderness as soon as the barrier is no longer needed.

6 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Gasoline powered pumps would be used to apply rotenone to lakes, ponds, and wetlands with a motorboat used in Hidden Lake.

#7 Short-term Negative Effect: Use of motor vehicles, motorized equipment, or mechanical transport degrades the undeveloped quality. Rotenone would be applied in low gradient stream reaches with battery-powered injector pump systems mounted on aircraft.

9 Short-term Negative Effect: Installment of RSIs in project area streams for 4-6 weeks each year for up to five years. Mitigation: 1) RSI containers and pipe would be gray, green, brown, or black to minimize visual impacts; 2) RSIs would be removed from the wilderness each year after fry have escaped.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☒	☐	☐
7	Stream Treatment (Lotic)	☒	☐	☐
8	Sentinel Fish	☐	☐	☒
9	Restocking	☒	☐	☐
Total Number of Effects		3	0	NE
Natural Total Rating		**+3**		

Explain:

6 and # 7: Short-term Negative, Long-term Positive Effect: Treatment would have a short-term negative effect on native macroinvertebrates. Research has shown that macroinvertebrate populations recover quickly when label directions are followed. Long-Term Positive: An introduced nonnative rainbow trout population not endemic to the Absaroka-Beartooth Wilderness would be removed, thus ensuring that indigenous species, patterns, and ecological processes are protected.

9 Long-term Positive Effect: A nonnative fish species that is not endemic to the Absaroka-Beartooth Wilderness would be replaced with the native fish species both endemic and indigenous to the Absaroka-Beartooth Wilderness and lower Buffalo Creek, thus establishing the natural aquatic community of fish, invertebrates, and amphibians that coevolved in the Greater Yellowstone Ecosystem.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☒	☐
2	Temporary Project Signing & Flagging	☐	☒	☐

3	Equipment Transportation	☐	☒	☐
4	Camping	☐	☒	☐
5	Preparatory Work	☐	☐	☒
6	Lake, Pond, and Wetland Treatment	☐	☒	☐
7	Stream Treatment (Lotic)	☐	☒	☐
8	Sentinel Fish	☐	☒	☐
9	Restocking	☐	☒	☐
Total Number of Effects		0	7	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-8**		

Explain:

1 Short-term Negative Effect: The sights and sounds of up to 14 helicopter landings (14 fewer than Alternative 2) for personnel transport to headwater dip sites and sentinel fish delivery would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the personnel helicopter transport is expected to last six days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect. Finally, the proposed number of personnel (20) exceeds the Absaroka-Beartooth Wilderness regulated group size limit of 15 individuals.

3 Short-term Negative Effect: The sights and sounds of up to 15 helicopter landings for equipment transport (six fewer than Alternative 2) would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the personnel helicopter transport is expected to last four days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

4 Short-term Negative Effect: Operation of a generator at spike camps would have a low-level negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. The duration of the noise disturbance would be limited to a few hours per day for up to 10 days (three more days than Alternative 2). Mitigation: A small Honda EU2200i inverter generator would be used. Honda reports a very low noise level of 57 decibels at a rated load, and 48 decibels at a quarter load. For comparison, an average conversation produces noise at around 60 decibels, which means that this inverter generator makes about as much noise as people whispering (30 decibels).

6 Short-term Negative Effect: The sights and sounds of gasoline pumps, a motorboat on Hidden Lake, and aerial spraying would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice motorized equipment and this can intrude on their wilderness experience. Because activity is planned for the late summer/early fall when there is historically very little use in the drainage and the duration of motorized use is expected to be up to four days, this effect is reduced but still exists. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

7 Short-term Negative Effect: Proposed stream treatment activities (injector pump, human activity, etc.) would have an insignificant, low duration negative effects on wilderness solitude. The battery powered injector pump would only be used on Buffalo Creek for up to four days and would only be audible for a distance of about 50 feet. The project area is lightly visited during the project implementation time period.

#8 Short-term Negative Effect: The sights and sounds of four sentinel fish delivery flights per year over the wilderness would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. The negative effect would likely be moderate to intense, of short duration, with no lasting effect. Alternative 2 did not have a negative effect rating even though there are many more flights for personnel transport, which includes sentinel fish delivery in Alt 2.Thse negative effects for sentinel fish delivery are capture in the personnel transport line

#9 Short-term Negative Effect: The sights and sounds of eight helicopter fish stocking flights per year over the wilderness would have a negative effect on solitude and the sense of isolation from the sounds and sights of modern civilization. Wilderness visitors would likely notice the helicopter and this can intrude on their wilderness experience. The negative effect would likely be moderate to intense, of short duration, with no lasting effect.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Personnel Access	☐	☐	☒
2	Temporary Project Signing & Flagging	☐	☐	☒
3	Equipment Transportation	☐	☐	☒
4	Camping	☐	☐	☒
5	Preparatory Work	☐	☐	☒

6	Lake, Pond, and Wetland Treatment	☐	☐	☒
7	Stream Treatment (Lotic)	☐	☐	☒
8	Sentinel Fish	☐	☐	☒
9	Restocking	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating			**0**	

Explain:

There are no other features of value potentially affected by this project.

Summary Ratings for Alternative 4

Wilderness Character	
Untrammeled	-3
Undeveloped	-7
Natural	+3
Solitude or Primitive & Unconfined Recreation	-8
Other Features of Value	0
Wilderness Character Summary Rating	**-15**

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed
What alternatives were considered but not analyzed? Why were they not analyzed?

With a project of this complexity and duration, many project components were explored in reaching the minimum tool. The following list include options considered but would have rendered the project non-viable.

Mechanical Removal Alternative: Mechanical Removal Alternative using electrofishing and gillnetting. Even with new eDNA technology, the project objective of complete rainbow trout eradication could not be met with these methods because they have limited effectiveness in deep and complex habitats found within the project area. The large amount of algae in Hidden Lake would quickly clog gill nets making them ineffective at catching fish.

Alternative components discussed but not incorporated into alternatives:

- Non-Motorized Chemical Removal Alternative using oar-craft and hand pump sprayers. A motorboat with gasoline engine is necessary to navigate safely through the thick algae mat of Hidden Lake. There are no nonmotorized methods for effectively applying rotenone to depth and across large open water expanses that exist in the project area.

- Stocking YCT in the 0.9 mile-long reach between the barrier falls and the wilderness boundary was considered but not analyzed because stocked fish often move in a downstream direction and it is uncertain whether they would repopulate the 46 miles of vacant upstream habitat, which is required to meet the project objective of establishing a secure YCT population.

- Overnight camping with sentinel fish: Sentinel fish vitality and survival would be greatly reduced if backpacked for more than a few hours and or held overnight at the headwater drip station. Even if sites could be accessed and gear brought via backpack or stock, spiking crews over night at each headwater drip site is not a viable option because sentinel fish would need to be stored in-stream overnight where they would be susceptible to predation from mink, otters, and bears. On a past project, a bear systematically walked the stream channel during the night, eating and letting loose nearly all fish stored instream. Sentinel fish vitality and survival would be greatly reduced if packed for more than a few hours.

- Chemical removal of rainbow trout and leaving waters fishless. While FWP will evaluate fishless as a standalone alternative, the effects of the rotenone treatment in Wilderness have been fully analyzed in Alternatives 2, 3, and 4 in the MRDG. This alternative was not considered in the MRDG in detail because it is outside the scope of Forest Service decision. The Wilderness Act specifically acknowledges the role the States have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests". While there is no special provision that requires the restocking action to take place, the USFS is further governed by a substantial framework of policy directing the Region how to consider proposed activities within Wilderness.

MRDG Step 2: Alternative Comparison

Alternative 1:	No Action
Alternative 2:	Aircraft Supported Alternative
Alternative 3:	Pack Stock Supported Alternative
Alternative 4:	Aircraft and Pack Stock Supported Alternative

Alternative Comparison

Values are over the project duration unless otherwise specified.

Prohibited Actions	Alternative			
	No Action	**Aircraft**	**Stock**	**Aircraft & Stock**
Use of an EPA Registered Pesticide		☑	☑	☑
Aircraft Landings for Personnel Transport		≤ 84	0	≤ 15
Aircraft Landings for Equipment Transport		≤ 63	0	≤ 45
Aircraft Landings for Sentinel Fish Delivery		Included in Personnel Transport	0	≤ 12
Aerial Rotenone Application		9	0	9
Camp Site Occupancy Exceeding 15 Individuals		20 personnel 7 days (annually)	30 personnel 12 days (annually)	20 personnel 10 days (annually)
Temporary Installations		Fish barriers, flagging, RSIs	Fish barriers, beaver dam notching, flagging, RSIs	Fish barriers, flagging, RSIs
Motorboat Operation in Hidden Lake		☑	☑	☑
Operation of Gasoline Powered Trash Pumps		☑	☑	☑
Operation of Battery-Powered Injector Pump System		☑	☑	☑
Operation of Generator		☑	☑	☑
Aerial Fish Stocking		18	0	18

Wilderness Character	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	+	-	+	-	+	-	+	-
Untrammeled	0	0	0	-3	0	-3	0	-3
Undeveloped	0	0	0	-7	0	-5	0	-7
Natural	0	1	3	0	3	-2	3	0
Solitude/Primitive/Unconfined	0	0	0	-7	0	-7	0	-8
Other Features of Value	0	0	0	0	0	0	0	0
Total Number of Effects	**0**	**1**	**3**	**-17**	**3**	**-17**	**3**	**-18**
Wilderness Character Rating	**-1**		**-14**		**-14**		**-15**	

MRDG Step 2: Determination

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

☐	Alternative 1:	No Action
☐	Alternative 2:	Aircraft Supported Alternative
☐	Alternative 3:	Stock Supported Alternative
☒	Alternative 4:	Aircraft and Stock Supported Alternative

Explain Rationale for Selection:

Summary:
The value of Wilderness and our agency's role in managing these protected areas is not something I take lightly. When I consider the actions we take, I give them deep thought and acknowledge our role in managing fish and wildlife species with our State partners. When evaluating alternatives, I look at the impacts to wilderness character rather than "scores" in the MRDG. I have asked my staff to take a deep and thoughtful analysis of each component of the proposed action to determine the minimum tool necessary to administer the Wilderness. I acknowledge although helicopters and other motorized and mechanized equipment can be disruptive in the short term, the tradeoff and likelihood of success and reduction of impact to resources led me to select Alternative 4.I am confident in our assessment of what is viable for project success. Short-term impacts are isolated to the

Buffalo Creek drainage and areas for dispersed recreation are available throughout the rest of the Absaroka-Beartooth Wilderness during project duration.

Rationale:

I have fully reviewed the No Action and Action Alternatives and am approving Alternative 4, the Aircraft and Stock Supported Alternative for the purpose of improving the natural quality of wilderness character that is degraded by nonnative rainbow trout. The Wilderness Character rating for the three action alternatives varies by one point (-14 and -15). The no action alternative does not meet wilderness management objectives. Alternative 2, the helicopter only alternative, meets wilderness objectives by improving the natural quality, however it has a total of 178 landings, which is not the minimum tool. Alternative 3, the stock support only alternative reduces the amount of motorized and mechanized equipment use, however, it would create new trails on the landscape that could create a lasting effect to the undeveloped character of the area. Alternative 3 also greatly reduces the likelihood of eliminating rainbow trout from the watershed, thus maintaining the unnatural condition of non-native fish in the watershed. Alternative 4, the aircraft and stock supported alternative utilizes 99 landings and is the best combination of maximizing traditional means where possible, while still managing for Wilderness Character and meeting the objectives of the proposed project. Furthermore, these 99 landings would occur over the 10-year implementation timeframe and would be much more limited on any annual basis.

Furthermore, Section 4(d)(7) of the Wilderness Act states, “nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several states with respect to wildlife and fish in the national forest”. This project is initiated under the fish population management jurisdiction of Montana Department of Fish, Wildlife and Parks.

The USFS has the responsibility to manage Wilderness areas for their Wilderness Character. The approved prohibited uses are the minimum necessary to increase the natural quality of Wilderness in the long term. This long-term improvement to Wilderness Character outweighs the short-term negative effects from the five approved prohibited uses: application of an EPA registered pesticide, motorized equipment, motorboats, landing of aircraft (Appendix 3), and temporary installations in Wilderness. The selected alternative maximizes traditional means of transportation when possible and minimizes the amount of prohibited uses for the purpose of administering the Absaroka-Beartooth Wilderness in compliance with the Wilderness Act.

Describe Monitoring & Reporting Requirements:

The number and dates of prohibited uses will be reported to CGNF Recreation and Wilderness Program Manager.

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Approvals

Prohibited Use		Quantity
☒	Motorized Equipment:	Operation of gasoline powered trash pumps and battery powered injection pumps for rotenone dispersal. Operation of small 2,200 watt generator. Up to five years.
☐	Motor Vehicles:	
☒	Motorboats:	The use of an internal combustion outboard motor on Hidden Lake (two to five years).
☒	Landing of Aircraft:	The use of helicopter flights as lined out in alternative 4.
☐	Temporary ~~Roads~~ Trail Access:	
☐	Structures:	
☒	Installations:	Up to two temporary fish barriers on the Hidden Lake outlet stream, remote site incubators, and temporary signing and flagging. Duration: two to five years
☒	Pesticides:	The application of Rotenone (an EPA registered pesticide) per label direction and mitigation disclosed in the EA, DN/FONSI and Regional Office approved Pesticide Use Proposal (PUP).

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance. Refer to agency policies for the following review and decision authorities:

Prepared	Name	Position	
	Clint Sestrich	Absaroka Beartooth Zone Fisheries Biologist	
	Signature		Date

Prepared	Name	Position	
	Adam Washebek	Gardiner District Recreation Staff Officer	
	Signature		Date

Recommended	Name	Position	
	Michael Thom	Gardiner District Ranger	
	Signature		Date

Recommended	Name	Position	
	Melissa Simpson	Recreation, Wilderness, Wild & Scenic Rivers Program Manager	
	Signature		Date

Approval	Name	Position	
	Mary Erickson	Custer Gallatin National Forest Supervisor	
	Signature		Date

MRDG Appendix 1

Headwater Drip/Spray Gear List

Category	Item	Quantity	Weight lbs
Piscicide Application	Pack Frame	1	4.5
Piscicide Application	Pack	1	4
Piscicide Application	Liter Bottle Rotenone	2	4.4
Piscicide Application	5 Gallon Polyethylene Drip Can	1	2.8
Piscicide Application	Stand Pipe	1	0.5
Piscicide Application	Collapsible Bucket	1	0.4
Piscicide Application	Backpack Sprayer	1	10.3
Piscicide Application	Dye Tablets	1	0.1
Piscicide Application	Sentinel Fish Cooler	1	17.7
Piscicide Application	Aerator	1	1
Piscicide Application	Net Bag	1	0.25
Piscicide Application	Graduated Cylinder	1	0.25
Piscicide Application	Drip caps + Spares	1	0.25
PPE	Chest Wader	1	3
PPE	Wading Boot	1	3.5
PPE	Tyvec Suit	1	0.2
PPE	Rubber Gloves	1	0.2
PPE	Safety Glasses	1	0.2
PPE	Respirator	1	1
Safety	1st Aid Kit	1	0.5
Safety	Bear Spray	1	0.93
Safety	Radio	1	1.5
Safety	GPS	1	0.25
Safety	Extra Batteries	1	1
Safety	Headlamp	1	0.2
Personal	Lunch	1	2
Personal	3 Liter Water Bladder	1	7
Personal	Rain Jacket	1	1
Personal	Warm Layer (thermal shirt)	1	1
Total			**69.93**

MRDG Appendix 2

Headwater Drip Site Access

				Hiking Segment Without Trail Only			
Stream	**Trail Distance**	**Hiking Distance From Trail**	**Total Distance from Camp**	**Elevation (ft) Change**	**Avg Gradient**	**Max Gradient**	**Miles Selective Tree Clearing**
West Fork	0.8	1.7	2.5	747.0	9.0	20.0	1.6
Second Fork	0.8	0.9	1.7	387.0	7.0	22.0	0.4
East Fork main	0.0	1.9	1.9	782.0	9.0	25.0	1.9
East Fork Middle	0.0	1.8	1.8	743.0	9.0	26.0	0.4
East Fork North	0.0	1.8	1.8	610.0	8.0	22.0	0.7
Unnamed	0.4	1.7	2.1	1116.0	14.0	41.0	1.7
Silver Creek	1.3	4.5	5.8	1799.0	10.0	31.0	0.7
Grassy Creek Upper	1.3	3.4	4.7	1708.0	10.0	31.0	3.0
Grassy Creek Lower	1.3	1.7	3.0	998.0	11.0	31.0	0.0
Total							**10.2**
Average	**0.6**	**2.2**	**2.8**	**987.8**	**9.7**	**27.7**	**1.1**

MRDG Appendix 3

Summary of aircraft landings under pack stock and aircraft supported alternative (minimum tool)

Purpose	**Annual Landings**	**Annual Duration** (within 2-week window)	**Type**	**Total Landings over Project**
Personnel transport to remote headwater sites	5	two flight days	physical landing	15
Sentinel fish delivery to upper and middle camps	4	four flight days	physical landing	12
Equipment transport	15	four flight days	physical landing	45
Aerial spraying	3	two flight days	aerial spray no landing	9
Fish stocking	2-5	1-3 flight days	6 fish drops, 12 physical landings	18
Total				**99**

Appendix B Custer Gallatin National Forest Response to Comments

Introduction

This appendix provides a summary of public comments received on the Buffalo Creek Yellowstone cutthroat trout project (the project) associated with the draft environmental assessment. Montana Fish, Wildlife & Parks (FWP) and the Custer Gallatin National Forest (CGNF) welcomed public comments on the draft environmental assessment for the project within the Gardiner Ranger District of the Custer Gallatin National Forest, within Gallatin County, Montana. FWP published the draft Buffalo Creek Yellowstone Cutthroat Trout Conservation EA on March 18th, 2021, initiating a 34-day public comment period with scoping notices in the Billings Gazette, Helena Independent Record, Bozeman Daily Chronicle, state-wide press release, and on its web page. Instructions for submitting comments to the Forest Service during the 30-day combined public scoping and comment period were described in the legal notice published in *The Bozeman Chronicle* newspaper (paper of record) on Tuesday, March 23, 2021 and in the draft environmental assessment which was published online at https://fwp.mt.gov/news/public-notices on March 18, 2021 and at https://www.fs.usda.gov/project/?project=59630 on March 23, 2021.

The objectives of the FWP and Forest Service review were as follows:

- Aggregate and summarize public comment themes.
- Identify input for developing the environmental assessment.
- Identify other public concerns relevant to the project.

This appendix captures concern themes identified following the review and assessment of public comments. For additional written comment details not covered under these themes, please refer to the original written comments located on the project webpage: https://cara.ecosystem-management.org/Public//ReadingRoom?Project=59630. FWP released responses to comments they received in their decision notice: https://fwp.mt.gov/public-notices/news/2022/apr/0413-buffalo-creek-yellowstone-cutthroat-trout-conservation-project-ea

Public Comment Overview

During the 30-day combined public scoping and comment period following the March 23, 2021 and publication of the draft environmental assessment, the Forest Service logged and coded 14,678 entries using the Forest Service's comment analysis and response application (CARA). Comment letters received by the Forest Service into the CARA system fell into the following types:

- Entries logged: 14,678
  - Unique letters: 46
  - Duplicate letters: 1,472

- Form letters: 13,160
  - Master forms: 2
  - Form plus: 113

In addition to the 14,678 entries logged into the CARA system, and FWP received 80 separate comments. Regardless of recipient(s) of comments, all were evaluated using content analysis methodology.

8 Content Analysis Methodology

The methodology used for identifying unique concern themes followed this procedure:

- All written public comments submitted by mail, email, or through the comment analysis and response application were read in their entirety.
- All written comments were coded based on specific topics that were used to group similar comments (see sections 1 through 5 below).
- All subgroup themes of written comments were reviewed to identify unique concerns, which were summarized as concern statements.
- All subgroup themes of written comments were categorized by the most appropriate concern statement.
- Quality review of the coding, position, and concern statements was conducted.

Section 1. Process

Theme 1 – An Environmental Impact Statement is Needed or Required

A. Commenters state that an environmental impact statement is needed because of impacts to designated wilderness, wilderness character, aquatic system, motorized trail, impacts to endangered species.

Environmental impact statements are prepared if the proposed project activities are within the classes of action normally requiring an environmental impact statement (36 CFR 220.5) or when the responsible official has determined the proposed action may have a significant effect on the environment as defined by 40 CFR 1508.27. The activities proposed for this project are not within those listed under 36 CFR 220.5. Examples of projects normally requiring an environmental impact statement include but are not limited to:

- Proposals to carry out or to approve aerial application of chemical pesticides on an o*perational basis*.
- Applying chemical insecticides by helicopter on an area infested with spruce budworm to prevent serious resource loss.
- Authorizing the application of herbicides by helicopter on a major utility corridor to control unwanted vegetation.

- Applying herbicides by fixed-wing aircraft on an area to release trees from competing vegetation.
- Proposals that would substantially alter the undeveloped character of an inventoried roadless area or a potential wilderness area, such as:
  - Constructing roads and harvesting timber in an inventoried roadless area where the proposed road and harvest units impact a substantial part of the inventoried roadless area.
  - Constructing or reconstructing water reservoir facilities in a potential wilderness area where flow regimens may be substantially altered.
  - Approving a plan of operations for a mine that would cause considerable surface disturbance in a potential wilderness area.

Based on the environmental assessment and the finding of no significant impact, the responsible official has determined effects to the environment will not raise to the level of significant (finding of no significant impacts, factors number 1-10).

B. Commenters assert that an environmental impact statement is required due to cumulative effects and precedent setting nature of this project.

The cumulative effects analysis in section Cumulative Effects on page 93 of the EA indicates that the proposed action would not have cumulative effects with past, present, or reasonably foreseeable activities. In addition, a summary of projected effects is presented with each category of the natural and human environment within sections 3 Environmental Review and 0 Human Environment. No cumulative effects are expected from implementing alternatives.

C. Commenter emphasizes that this is a "highly controversial project" due to the project location being within designated wilderness.

There are no environmental effects identified that are highly controversial among known experts in the field of fish and wildlife management (See 3.1.5 Fish and Wildlife on pages 41 through 65 for the analysis of effects on fish and wildlife). Fish and wildlife management experts are in agreement over its environmental effects and utility in conserving native fish based on the scientific literature and other projects of similar scope and scale, including those in designated wilderness. Moreover, fisheries scientists across the world are following the same protocols as described here, and they reach the same conclusions that rotenone is essential to native fish conservation and nontarget organisms recover rapidly should they experience any harm. Terrestrial animals are unharmed, and aquatic organisms vary in their susceptibilty to rotenone, but their populations recover rapidly.

Theme 2 – The 30-day Scoping and Comment Period

A. Commenters indicate that the use of the state's assessment does not meet the public scoping and comment period requirements within Forest Service requirements.

The project complied with the required public comment process for proposed projects and activities as described within 36 CFR 218.25.On March 23, 2021, the Forest Service and FWP jointly published a legal notice to solicit comments on a draft environmental assessment for the Buffalo Creek Yellowstone cutthroat trout conservation project. FWP published a legal notice to solicit comments on a draft environmental assessment in *The Bozeman Chronicle*, which initiated a combined 30-day public scoping and comment opportunity ending April 22, 2021. The accompanying notice of proposed action and additional supporting documentation was available online that same day. The legal notice explained that the 30-day period was serving as both scoping and the sole comment period for the project, and that there would not be another opportunity to comment. Forest Service regulations at 36 CFR 218.25(1)(i) states, "Comments on a proposed project or activity to be documented in an environmental assessment shall be accepted for 30 days beginning on the first day after the date of publication of the legal notice." The project complied with this Forest Service regulation.

B. Commenters request extension of the 30-day public comment period.

Forest Service regulations 36 CFR 218.25(iv) do not allow for an extension of the public comment period for a proposed project or activity to be documented with an environmental assessment.

Theme 3 – Decision Authority

A. Commenters state that the State of Montana has no legal authority to manage and administer lands within federal wilderness.

Section 4(d,7) of the Wilderness Act states that "Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several states with respect to wildlife and fish in the national forests. FSM 2323.04c (4.) provides Forest Service policy with respect to Section 4(d,7): "Developing, with the involved state(s), a supplement to the state/Forest Service memorandum of understanding, which will establish fish and wildlife management coordination in wilderness. The joint Forest Service and International Association of Fish and Wildlife Agencies Guidelines will be used to develop compatible management activities (FSH 2309.19)."

The 2006 *Policies and Guidelines for Fish and Wildlife Management in National Forests and Bureau of Land Management Agencies* is a statement of policy with guidelines intended to provide guidance to state fish and wildlife agencies, Forest Service and Bureau of Land Management (AFWA et al. 2006) personnel for the management of fish and wildlife populations in wilderness in accordance with the Wilderness Act of 1964 (16 USC 1131-1136). The 2008 *Cooperative Agreement for Fish, Wildlife and Habitat Management on National*

Forest Wilderness Lands in Montana provides additional policies and guidelines relevant to state fish and wildlife management authority on designated wilderness in Montana.

B. Commenters requesting the Forest Service consider an alternative that results in the least amount of impact to the designated wilderness.

FWP and the Forest Service conducted an alternative development process that was in accordance with the Council on Environmental Quality regulations (46 Federal Register 18026, 36 CFR 220.5, and Forest Service Handbook 1909.15). Alternatives and project design criteria were "developed cooperatively by FWP and the CGNF working incrementally through the minimum requirements analysis (MRA) process." Preparation of the minimum requirements decision guide (MRDG) and development of the minimum tool was a rigorous and iterative process that occurred over one year of collaboration between FWP and FS wilderness specialists.

The draft MRDG (Appendix A) analyzed a no action alternative and three action alternatives each with different tools for mobilization of personnel, gear, and equipment in-order to determine the minimum activity necessary for meeting the objectives of the proposed action (see pages . These alternatives included: 1) no action; 2) all aircraft supported alternative, 3) hiking with stock supported alternative, and 4) stock and aircraft supported alternative. For each action alternative, the effects of nine component activities on each of the five qualities of wilderness character were analyzed. The nine component activities include: 1) personnel access, 2) temporary project signing and flagging, 3) equipment transportation, 4) camping, 5) preparatory work; 6) lake, pond, and wetland treatment ; 7) stream treatment (lotic); 8) sentinel fish; 9) and restocking. Detailed descriptions of these activities are provided in the draft MRDG. The MRDG speaks to components that were not incorporated into alternatives on page 161.

Section 1.8 Alternatives Considered but Dismissed on pages 27 through 28 of the EA describes three alternatives that were considered but dismissed from detailed study and provides rationale for why these alternatives were not included for analysis, with infeasibility and inability to meet conservation objectives cited. The proposed action, no action, and remove rainbow trout and leave fishless alternatives were carried forward for detailed analysis in the environmental assessment with the direct, indirect, and cumulative effects described for each.

Theme 4 – National Environmental Policy Act

A. Commenters state violation of NEPA since the FS has not prepared its own assessment.

NEPA does not dictate that the Forest Service must prepare its own environmental assessment.

B. Commenters indicate that the state's draft EA does not meet the requirements of the NEPA.

The Buffalo Creek Yellowstone cutthroat trout conservation EA was prepared jointly by FWP and the Forest Service to ensure that it is MEPA and NEPA compliant. The EA addresses the 10 points of a finding of no significant impact (FONSI) through an analysis of direct, indirect, and cumulative effects of the proposed action and alternatives on public health and safety, unique

characteristics of the geographic area (the Absaroka-Beartooth Wilderness), the quality of the human environment, cultural and historic resources, and endangered species.

C. Commenter states that the use of a categorical exclusion is illegal for compliance with the NEPA and the Wilderness Act.

The CGNF determined that an environmental assessment is the appropriate tool for determining whether the proposed action would result in significant environmental effects. Therefore, the CGNF will be issuing a decision notice on whether to allow piscicide application in designated wilderness and to approve any prohibited 4(c) actions.

D. Commenter states that direct, indirect, and cumulative effects have not been disclosed, specifically, the effects of introducing Yellowstone Cutthroat into an area where they have not historically been located.

Page 55 of the EA states, "The cascade at the Yellowstone National Park boundary was likely a total barrier to upstream movement of fish, and these waters were likely fishless before introduction of rainbow trout. This project would expand the distribution of Yellowstone cutthroat trout within its historical range, but in historically unoccupied habitat. Under the conservation agreement for cutthroat trout (MCTSC 2007), establishing Yellowstone cutthroat trout in previously fishless waters is among conservation priorities when it would not have adverse effects on invertebrates or amphibians. Introduction of rainbow trout into the Buffalo Creek watershed was likely not beneficial to the coevolved assemblage of invertebrates and amphibians they encountered. All species likely to be present coevolved with Yellowstone cutthroat trout. As functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), removal of nonnative rainbow trout and replacing them with the native fish species would benefit the watershed's native invertebrates and amphibians."

Page 64 of the EA states, "This project would result in an expansion of occupied habitat within the Yellowstone cutthroat trout's historical range. The conservation agreement for Yellowstone cutthroat trout considers these projects among high priority conservation approaches if introduction does not have a negative effect on species present (MCTSC 2007). Species present in the area coevolved with Yellowstone cutthroat trout elsewhere in their historical ranges. Any special condition associated with the fishless state is unknown and was lost with introduction of rainbow trout. The native assemblage of invertebrates and amphibians present in the project area would likely benefit from the removal of rainbow trout and introduction of Yellowstone cutthroat trout. Nonnative fish are functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), so their elimination would be beneficial. This project would result in the establishment of a coevolved community of fish, invertebrates, and amphibians within the climate shield, which would bring considerable conservation benefit over its existing state."

Cumulative effects are addressed on page 93 of the EA and summaries after every category of the natural and human environment evaluated in sections 3 Environmental Review and 4 Human Environment provide additional review. Due to the remote location of the project area, introduction of Yellowstone cutthroat trout would not result in a measurable increase in fishing pressure. Available angler data indicate low fishing pressure within the Absaroka-Beartooth Wilderness (FWP 2021).

E. Commenter assert that the environmental assessment does not justify the use of motorized transportation.

Thorough evaluation of the effects to designated wilderness character of the motorized transportation and mechanized equipment in designated wilderness is provided in the draft MRDG (Appendix A) which finds motorized assistance to be the minimum tool. Rationale for motorized transportation is summarized in sections of the EA with need to transport loads that cannot be packed in with stock being .

Theme 5 – Compliance

A. Commenter state that an MRDG has not been completed.

See Appendix A of this EA for the MRDG.

B. Commenters assert the project in in violation of the Wilderness Act because the project fails to protect the Wilderness, proposes use of motorized equipment and use of poison.

The Wilderness Act of 1964 defines wilderness, describes the purpose for wilderness, and directs the wilderness management agencies to protect wilderness character. To operationalize this definition and link the concept of wilderness character directly to the statutory and tangible stewardship requirements of the Wilderness Act of 1964, the interagency team (Keeping It Wild 2, 2015) identified and defined five tangible "qualities" of wilderness character: untrammeled, natural, undeveloped, outstanding opportunities for solitude or a primitive and unconfined recreation, and other features of value.

When projects are proposed in designated wilderness, effects to these four wilderness qualities must be assessed and mitigated. Notably, the Wilderness Act of 1964 also specifically acknowledges the role the states have in management of fish and wildlife. Section 4(d)(7) of the Wilderness Act provides that "nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several states with respect to wildlife and fish in the national forests". The Wilderness Act of 1964 specifically prohibits several uses, except *"as necessary to meet minimum requirements for the administration of the area for the purpose of this Act."*

Policy requires analysis of minimum requirements analysis (MRA) whenever land managers are considering a use prohibited by Section 4(c) of the Wilderness Act of 1964. The concept of

"minimum requirements," sometimes called "minimum necessary," was derived from Section 4(c) of the Wilderness Act: "Except as specifically provided for in this Act… and except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act …no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area." FWP and Forest Service wilderness managers cooperatively prepared an MRDG for this proposed action. The MRDG is a process to identify, analyze, and recommend management actions that are the minimum necessary for wilderness administration.

C. Commenters indicates the project is not in compliance with FSM 2323.31-.32

The applicable objectives of FSM 2323.31 are focused on providing an environment in designated wilderness where natural processes rather than human actions influence species presence and abundance while protecting indigenous fish and wildlife populations from conditions that could lead to ESA listing. The policy in 2323.32 pertaining to the proposed project states:

- Recognize that states have jurisdiction and responsibilities for the protection and management of wildlife and fish populations in wilderness. Cooperate and work closely with state wildlife and fish authorities in all aspects of wildlife and fish management. Base any Forest Service recommendation to state wildlife and fish agencies on the need for protection and maintenance of the wilderness resource. Recognize wilderness protection needs and identify any needed requirements in coordination efforts and in cooperative agreements with state agencies.
- Wildlife and fish management programs shall be consistent with wilderness values.
- Discourage measures for direct control (other than normal harvest) of wildlife and fish populations.
- Apply *Policies and Guidelines for Fish and Wildlife Management in Wilderness and Primitive Areas* developed jointly by the Forest Service, Bureau of Land Management, and the International Association of Fish and Wildlife Agencies in a practical, reasonable, and uniform manner in all National Forest wilderness units. Use the guidelines as a foundation for or as addendums to state or individual wilderness cooperative agreements.

Human actions resulted in the wide-spread distribution of nonnative rainbow trout in the Buffalo Creek drainage to the detriment of natural processes in the Absaroka-Beartooth Wilderness. Introduction of rainbow trout into the Buffalo Creek watershed was likely not beneficial to the coevolved assemblage of invertebrates and amphibians they encountered. All species likely to be present coevolved with Yellowstone cutthroat trout. As functionally different predators (Benjamin et al. 2011; Lepori et al. 2012), removal of nonnative rainbow trout and

replacing them with the native fish species would benefit the watershed's native invertebrates and amphibians.

Notably, introduced rainbow trout originating from Buffalo Creek in the Absaroka-Beartooth Wilderness are the source of hybridization with native Yellowstone cutthroat trout in proposed wilderness in lower Buffalo Creek, Slough Creek, and the Lamar River in Yellowstone National Park. By removing nonnative rainbow trout and replacing with Yellowstone cutthroat trout, the native fish species that coevolved with the community of organisms in upper Buffalo Creek, the project restores natural ecological processes and protects native Yellowstone cutthroat trout populations in proposed wilderness in Yellowstone National Park from conditions that could lead to ESA listing. It is therefore consistent with the objectives of FSM 2323.31.

The proposed action is compliant with FSM 2323.32 because FWP worked cooperatively through the MRA process with Forest Service wilderness managers to develop the minimum tool for meeting rainbow trout removal objectives that minimizes effects to wilderness character (Appendix A).

Theme 6 – Need for Action

A. Commenters question the proposed fish stocking in areas that have historically been fishless.

Replacing a nonnative species with the species that is native to the Absaroka-Beartooth Wilderness improves the natural quality of wilderness character even though it is not restoring the pre-1932 fishless condition. Nonnative rainbow trout were stocked in Hidden Lake in the Buffalo Creek drainage in 1932 before wilderness designation. Rainbow trout are only native to Montana in the form of the interior redband trout in the Kootenai River drainage in the northwest corner of the state. Unlike the Yellowstone cutthroat, rainbow trout did not coevolve with the full suite of terrestrial and aquatic species and habitat conditions present in Buffalo Creek and the Greater Yellowstone Ecosystem. Yellowstone cutthroat trout are a keystone species in Greater Yellowstone Ecosystem. Commenters asserts the proposed project is not a restoration project because restoration means to "restore" something to its previous condition.

The title of the project accurately represents the goals and objectives of the project which explicitly focuses on conserving biodiversity by preserving the genetic integrity of native Yellowstone cutthroat trout in the Lamar River drainage of our nation's first national park by removing rainbow trout in Buffalo Creek. Furthermore, constriction of suitable habitat due to climate change is a direct threat to Yellowstone cutthroat trout (Isaak et al. 2015). Project goals also promote the persistence of this species in the Yellowstone Headwaters subbasin through the establishment of a secure refuge in upper Buffalo Creek that is secure from hybridization and climate change. These goals and objectives are consistent and compatible with the Wilderness Act of 1964 in that they improve the natural quality of wilderness character which is degraded by a nonnative species.

Section 2. Alternatives

Theme 1 – No Action Alternative

A. General comments stating support of no action alternative and opposition to any action alternative.

Five comments expressed preference for letting nature take its course. There is no response to comments that indicate a preference or vote for a specific alternative, other than thanking the commenter for taking time to express interest in the management of their National Forest System lands. The deciding official has considered these comments in making a decision.

B. General comments stating opposition of the no action alternative.

No comments specifically stated opposition for the no action alternative.

Theme 2 – Proposed Action Alternative

A. General comments stating support of the proposed action alternative.

FWP and the Forest Service collectively received 33 letters of support for the project including a joint support letter from Montana Trout Unlimited. Several letters explicitly stated support for the proposed action. Comments limited to indicating a preference or vote for a specific alternative are thanked for their time and perspective. The deciding official has considered these comments in making a decision.

B. General comments stating general opposition of the proposed action alternative.

FWP and the FS collectively received 93 unique letters opposing the project with the Forest Service receiving 42 unique comments and FWP receiving 51 comments opposing the project. Commenters indicating a preference or vote for a specific alternative are thanked for their time and perspective. The deciding official has considered these comments in making a decision.

C. Comments stating opposition to the proposed action alternative.

Commenters provide the following reasons for their opposition to the proposed action: effects on designated wilderness, use of chemicals, effects on wildlife, and introducing Yellowstone cutthroat trout into an area they have not historically been located.

The environmental assessment details the direct, indirect, and cumulative effects to the above listed resources within section 3. Detailed analysis of the potential for alternatives to affect these stated concerns can be found as follows:

• Designated wilderness	3.6 Designated Wilderness
• Use of chemicals	3.2 Water
• Effects on wildlife	3.5 Fish and Wildlife
• Translocating Yellowstone cutthroat trout into historically fishless waters	3.5 Fish and Wildlife

Effects on wilderness values is further explored in Appendix A Minimum Requirement Decision Guide (Draft) and in 5 Cumulative Effects. Combined, these analyses find the proposed action would result in short-term and minor disturbance to wilderness values, water quality, and wildlife. Yellowstone cutthroat trout are native to the Absaroka-Beartooth Wilderness and placing Yellowstone cutthroat trout upstream of the barrier falls would secure a coevolved assemblage of organisms. Aquatic species present upstream of the barrier have strong dispersal abilities and do not have an evolutionary history of separation from Yellowstone cutthroat trout. This assemblage did not coevolve with rainbow trout.

Theme 3 – No Restocking Alternative

A. General comments stating support of the no restocking alternative.

No commenters specifically stated support for the no restocking alternative; however, 30 comments sent to the Forest Service expressed concern that waters should be left in the historically fishless condition. Commenters indicating a preference or vote for a specific alternative are thanked for their time and perspective. The deciding official has considered these comments in making a decision.

B. General comment stating support for alternative C, as it does not include stocking the fish in an area it doesn't live now.

No commentors specifically stated support for the no restocking alternative. However, 30 comments issued to the Forest Service expressed concern that waters should be left in the historically fishless condition. There is no response to comments that indicate a preference or vote for a specific alternative, other than thanking the commenter for taking time to express interest in the management of their National Forest System lands. The deciding official has considered these comments in making a decision.

C. General comments stating opposition of alternative C.

There is no response to comments that indicate a preference or vote for a specific alternative, other than thanking the commenter for taking time to express interest in the management of their National Forest System lands. The deciding official has considered these comments in making a decision.

Theme 4 – Alternatives Eliminated from Detailed Study

A. Commenters question why electrofishing and netting could be used to remove rainbow trout instead of chemical treatment.

Mechanical removal of rainbow trout using electrofishing and netting was evaluated on page 2.2.1 Mechanical Removal of Rainbow Trout (page 26) of the EA but dismissed from detailed analysis. Electrofishing is not effective in eradicating fish in complex habitats or in large systems. It is also ineffective in deep water and in capturing most juvenile fish. Buffalo Creek contains miles of deep meadow sections that electrofishing would be extremely ineffective.

The amount of effort that would need to occur over 46 miles of rainbow trout inhabited water would be unfeasible for FWP and partners.

B. Commenters question why angling was not an alternative considered in detailed for the removal of rainbow trout in Buffalo Creek and tributaries?

Angling was among the alternatives considered but rejected from further analysis because it would not achieve project goals (see 1.8.2 Angling on page 27). The size, remoteness, roughness of terrain would limit the number of anglers willing to harvest fish. Moreover, many streams supporting rainbow trout are small, steep, and covered with deadfall timber or dense canopy. These streams are difficult to fish, young fish would not be susceptible to angling, and harvest pressure would not be high enough to eradicate rainbow trout from the treatment area.

C. Commenters stated that only the non-motorized alternative should be permitted, and electric motors should be allowed to power boats and pumps for distributing rotenone.

This theme resulted in the addition of a third alternative considered but dismissed from detailed study in the EA (see 1.8.3 Rotenone Application Without Motorized Uses). Moreover, the draft EA and MRDG described the need to transport gear that was too large and unwieldy for pack trains, the extreme remoteness of much of the watershed, and the

Theme 5 – New Alternatives Proposed

A. Commenter request an alternative be analyzed that would lessen environmental impacts to wilderness character (i.e. use of pack stock, hiking, and a base camp for operations).

The Forest Service and FWP conducted an alternative development process that was in accordance with the Council on Environmental Quality regulations (46 Federal Register 18026, 36 CFR 220.5, and Forest Service Handbook 1909.15). Alternatives and project design criteria were “developed incrementally in an open and transparent process.” Development of alternatives has been an iterative process. As more information on environmental conditions became available, additional alternatives were developed.

The Forest Service worked closely with FWP through the MRA process to develop a proposed action that is the minimum tool for successfully completing project objectives while minimizing impacts to wilderness character. In the MRDG, the effects of four alternatives on the five qualities of wilderness character were compared and contrasted between four alternatives: "no action", "aircraft supported alternative", "pack and stock supported alternative", and "aircraft and stock supported alternative."

B. Commenters propose the agencies could use a process known as “swamping” to eliminate planted rainbow trout in the Buffalo Creek drainage.

In 2021, FWP biologists prepared a memo in response to questions about genetic swamping from the FWP commission. This memo provides the following information about effectiveness

of genetic swamping in Buffalo Creek. "Similar considerations were made for Buffalo Creek, but not thoroughly evaluated in the draft EA because project objectives differed from the North Fork Blackfoot project. As Buffalo Creek is a source of rainbow trout genes in the Lamar River basin, the primary objective of the project is to remove rainbow trout genes completely from the drainage. Swamping would take several years of high-density fish stocking in designated wilderness, with a probability of failure due to the size of the drainage and habitat complexity.

Additionally, swamping alone will not meet the desired objective of achieving non-hybridized Yellowstone cutthroat trout in the drainage. Indeed, a major limitation of swamping is that it is purely a dilution treatment especially in the context of hybridization; it is not possible to eliminate nonnative genes in target populations with this management action alone. Rainbow Lakes, in the nearby Boulder River drainage, has been swamped for several years but has been ineffective at reducing hybridization between rainbow trout and Yellowstone cutthroat trout.

8.1 *Section 3. Resources Specific*

Theme 1 – Aquatic Species and Systems

A. Commenter expressed concerns about ground and surface water quality post treatment.

No contamination of groundwater is anticipated from this project (see page 33). Rotenone-treated water could go subsurface in losing reaches and lakes; however, rotenone binds to the bed sediments, soil, and gravel, and does not persist in groundwater (Engstrom-Heg 1971; Engstrom-Heg et al. 1978; Skaar 2001; Ware 2002). Rotenone moves only 1 inch in most soil types, except sandy soils, where it moves about three inches before binding to soils (Hisata 2002). In California, studies of wells in aquifers near to and downstream of rotenone application have never detected rotenone, or any of the organic compounds in formulated products (CDFG 1994).

CFT Legumine does not contain the organic compounds used in other formulations of rotenone. The inert solvents and dispersants in CFT Legumine would not contaminate groundwater given their low toxicity and rapid breakdown. Case studies in Montana have concluded that rotenone does not move measurably in groundwater (FWP unpublished data). At Tetrault Lake, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after the lake was treated, despite being downgradient and within the same aquifer as the lake. FWP has sampled wells and groundwater in several piscicide projects that removed fish from ponds, and no rotenone or inert ingredients were detected in ponds ranging from 65 to 200 feet from treated waters. Likewise, rotenone applied to streams has not resulted in contamination of neighboring wells or groundwater. No rotenone was found in domestic and municipal wells adjacent to Soda

Butte Creek during treatments in 2015/2016 which were drawing from the same unconfined alluvial-fill aquifer.

Deactivation is required under standard operating procedures and policy (Alternative 1: Proposed Action). Rotenone would be deactivated near the confluence with Slough Creek using potassium permanganate, a strong oxidizer. Untreated flows in the larger Slough Creek would further limit the potential for rotenone to affect fish outside of the project area. Potassium permanganate neutralizes rotenone within thirty minutes of contact time within the stream.

The strategy for deactivation varies with size of the project area, presence of connected lakes, and the number of days treatment would take (FWP 2017). The project area would require multiple days of treatment. Deactivation would follow protocols for streams where travel time is greater than 8 hours from the lowermost point of application to the deactivation station.

Deactivation at the barrier would following these steps:

- Place sentinel fish immediately upstream of the deactivation station and at two-hour travel time intervals upstream.
- Begin monitoring the 4-hour sentinel fish when the rotenone would theoretically arrive at that location based on contemporaneous flow measurements, and every 1 hour afterwards until the theoretical clearing time of rotenone has occurred.
- If any sentinel fish die or are stressed at any time at the 4-hour station start deactivation immediately.
- Apply potassium permanganate until the last of the rotenone has theoretically passed the deactivation station, which is calculated as the time of last application of rotenone plus travel time to reach the deactivation station. Stop only after all sentinel fish sentinel fish immediately upstream of the deactivation station survive an additional 4 hours without stress.

Hidden Lake is a nine-acre on-stream lake that flows into a 0.6-acre lake through a short channel. The outlet of the lower lake enters Buffalo Creek at river mile 14.8. FWP's piscicide policy for deactivation for lakes with an outlet where the travel time to the deactivation station is greater than 8 hours from the lowermost point of application requires these steps: Step one: Sentinel fish must be placed immediately upstream and at four hours travel time upstream from the deactivation station.

B. Commenter questions what post treatment water quality monitoring will be conducted?

Monitoring water quality is required under policy (FWP 2017) and includes measures of residual rotenone and potassium permanganate using a handheld chlorimeter that detects potassium permanganate and allows quantification of active rotenone, complemented by use of caged fish to provide direct evidence of presence of toxic concentrations of rotenone or potassium permanganate (see page 23 in the EA under 1.7.1 Alternative 1: Proposed Action). Hydrologically connected wells are likewise monitored for rotenone, potassium permanganate, and breakdown products, but none have been detected in wells during treatment or over following weeks**.** Under standard operating procedures (Finlayson et al. 2018), water quality is monitored at the 30 minute travel time location downstream of the deactivation every 2 to 4 hours beginning at the onset of release of potassium permanganate, which occurs before rotenone reaches the deactivation station and continues until caged fish show no signs of physiological stress from treated water. Fieldworkers are on site monitoring water quality and sentinel fish until rotenone has cleared the stream.

The project detoxification zone in Yellowstone National Park is approximately 30 miles upstream from the closest municipal water source or irrigation diversion. Detoxification and monitoring following FWP protocols will ensure that there is no potential for active rotenone to reach these locations. Even without detoxification, dilution and travel time would detoxify rotenone before reaching these locations.

C. Commenter is an authorized outfitter in the Buffalo Creek drainage and has concerns about the proposed activities impacting safe water for guests, staff, and their stock.

The EA addresses risks to terrestrial animals from exposure to treated water on pages 42 through 54. Treatment concentrations that achieve fish kills are thousands of times lower than concentrations that could harm livestock or terrestrial wildlife. As an extra protective measure, alternative water sources are provided for stock. During treatment, surface waters are temporarily closed to humans, and rotenone breaks down rapidly in the environment through sunlight, dilution, hydrolysis, and uptake by organic matter. For comparison, in nearby Soda Butte Creek streams were reopened to the public the day after 4 days of rotenone treatment ceased, and sentinel fish placed throughout the drainage showed no signs of toxicity. Salvaged Yellowstone cutthroat trout were returned to Soda Butte Creek the day after treatment stopped,

D. Commentors have concerns about the effects of rotenone on nontarget aquatics and terrestrial organisms.

The environmental analysis of effects of rotenone on nontarget aquatic and terrestrial is in 3.5 Fish and Wildlife in the EA. This analysis synthesized nearly 50 relevant publications and consultation with PhD-level experts on several taxa. In general, the low concentration of

rotenone required to kill fish does not pose a threat to terrestrial species, including those that ingest water or rotenone-killed organisms. Nontarget aquatic organisms experience minor to moderate reductions in numbers and diversity, but these populations recovery by the following year. Mature amphibians are resilient to rotenone and timing application post-metamorphosis protects toads and frogs.

According to the EA (3.5 Fish and Wildlife), exposure of mammals, birds, and reptiles "to rotenone may occur through drinking treated water or scavenging dead fish and invertebrates. A substantial body of research has explored the acute and chronic toxicity of rotenone and other potential health effects, and exposure to the concentrations in water and dead animals is far lower than concentrations that would be toxic (EPA 2007). Rotenone breaks down rapidly in the digestive tract of mammals (AFS 2002), and potential exposure to rotenone from fish removal projects is far lower than levels shown to result in acute or chronic toxicity. The effective concentration of rotenone for fish removal projects in Montana ranges from 0.025 to 1.0 ppm, which is many times lower than concentrations found to be toxic. For example, a 22-pound dog would have to drink nearly 8,000 gallons of treated water or eat 660,000 pounds of rotenone-killed fish within 24 hours to receive a lethal dose (CDFG 1994). A half-pound mammal would need to eat 12.5 mg of pure rotenone, or drink 66 gallons of treated water within 24 hours to receive a lethal dose (Bradbury 1986)." Mammals and birds would not be affected by rotenone as applied in the preferred alternative and under FWP policy.

Section Amphibians of the EA discuss potential effects to amphibian species likely present in the project area. These include boreal chorus frogs, Columbia spotted frogs, and western toads. Because rotenone effects only gill breathing organisms, only larval amphibians and not adults would be affected. Rotenone treatment is scheduled to commence in mid-August after which most gill breathing amphibian larvae will have metamorphosed into air breathing juveniles. There could be mortality of some larvae that do not metamorphose prior to rotenone treatment. However, surviving adult and juvenile amphibians would breed in future years ensuring that there are no population level effects.

Rotenone application in the Buffalo Creek watershed would cause mortality to zooplankton and aquatic macroinvertebrates in treated waters. However, numerous studies as well as monitoring of local rotenone projects indicate that these organisms recover rapidly following rotenone application. Larvae drifting downstream from untreated fishless headwater stream reaches as well as upstream colonization from winged adults would contribute to rapid recovery of macroinvertebrate populations. These effects are discussed in the subsection Stream-Dwelling Aquatic Invertebrates.

E. Commenter states that the assessment is inconstant in the amount of stream miles (43, 46, and 47 stream miles).

There are 45.5 stream miles proposed for rotenone treatment in the Buffalo Creek drainage within the Absaroka-Beartooth Wilderness in Montana.

F. Commenter states that the project will breach beaver dams throughout the project area.

This comment was taken under advisement and through the draft MRDG process it was determined that aerial application of rotenone would negate the need to breach beaver dams.

G. The commenter has concerned that the presence of algae in Hidden Lake indicates that the lake is warm, and that dead fish would not sink.

Algae presence is not a reliable indicator of warm water because many algae are adapted to flourish in cold-water environments. Hidden Lake is a high elevation mountain lake fed by springs and remains cold year-round. The density of rainbow trout in Hidden Lake is relatively low and there will not be an abundance of dead fish. The EA on reviews research into fate of fish carcasses in lakes following rotenone treatment, which found fish to sink in colder waters that any dead fish that do not sink and wash ashore would be collected and sunk in the lake. This is achieved by puncturing the swim bladder of dead fish. See page 33 for research into fate of dead fish in rotenone treated lakes.

H. Commenter requests information on other fish species (sculpins, whitefish, or brook trout) and the possible effects of the proposed activities on these species.

The only trout species native to the Yellowstone River drainage is the Yellowstone cutthroat trout, and their evolutionary legacy is one of isolation from other trout species. Sculpin, longnose dace, and mountain suckers are all present in the Lamar River system**.** Sculpin are present in lower Buffalo Creek. These species are not headwater species, so their presence would not be expected in upper Buffalo Creek even in absence of a barrier waterfall. Buffalo Creek is within the native range of Yellowstone cutthroat trout, even though it was fishless when first encountered by Europeans. Over geological time, Yellowstone cutthroat trout could have occupied waters in upstream of the barrier and considering the seismically active nature of the Yellowstone Caldera, an earthquake could restore connectivity at the current waterfall barrier at any time. This connectivity makes the waters in the project area native range for Yellowstone cutthroat trout, but not historically occupied habitat, which uses presence of Europeans, not fish presence over longer times, as the management measure.

I. Commenters requested the ability to harvest more rainbow trout to rotenone treatment.

Although angling would not meet the level of suppression needed (see 1.8.2 Angling), FWP has changed fishing regulations by lifting harvest limits and adding a mandatory kill on rainbow trout in Buffalo Creek and its tributaries. This regulation change will allow for increased angler

opportunity before FWP removal efforts occur and be consistent with Yellowstone National Park fishing regulations in Buffalo Creek and the rest of the Lamar River drainage.

J. Commenters expressed concern over removal of sportfish.

FWP recognizes that rainbow trout are a sportfish in the state of Montana. FWP would not have pursued this project without the end of goal of replacing rainbow trout with self-sustaining Yellowstone cutthroat trout, the native sportfish in this drainage. There will no net loss of sportfishing opportunities with this project.

Left unchecked, rainbow trout will continue to invade the Lamar River from Buffalo Creek and hybridize with Yellowstone cutthroat trout in the Lamar River. Hybrid cutthroat x rainbow trout are generally less fit than pure Yellowstone cutthroat trout (Muhlfeld et al. 2009)). A decrease in fitness in the population would result in fewer fish for anglers. Moreover, anglers are preferentially targeting Yellowstone cutthroat trout by fishing in Slough Creek and the Lamar River. Failing to remove rainbow trout would decrease the overall health of the fishery, the other species that consume fish, and it would reduce the quality of the angling experience.

K. Commenters expressed concern over post-treatment invasion of nonnative fish into the project area.

Only rainbow trout are upstream of the barrier falls near the Yellowstone National Park boundary. FWP plans to restock Hidden Lake with reproductive-age Yellowstone cutthroat trout and restock the creek upstream of the barrier falls with Yellowstone cutthroat trout after the treatment is completed. The barrier falls presents upstream movement of fish, which will secure the population of Yellowstone cutthroat trout upstream of the barrier.

L. Commenters expressed concern over human manipulation of fish populations.

The nonnative rainbow trout population in Buffalo Creek are a result of their introduction into Hidden Lake in 1935 for recreational purposes. Recreational fish introductions were common during this time and little thought was given to the harm to native fish. Native fish restoration and nonnative fish removal projects are key to ensuring native fish survive into the future. The stocking of nonnative rainbow trout has impacted the Lamar River drainage for almost a century. Removing rainbow trout in Buffalo Creek and restoring native Yellowstone cutthroat trout will help restoring the Lamar River watershed closer to original state.

8.1.1 Theme 2 – Wildlife Species

A. Comment asserts that there will be effects to numerous wildlife species and that the EA lacked information on these effects.

The environmental analysis includes a lengthy analysis of the potential for the proposed action and other alternatives to affect wildlife species (3.5 Fish and Wildlife). The primary disturbance to terrestrial species would be presence of humans and motorized assistance during piscicide treatment and during annual translocation efforts. This disturbance would be short-lived and minor.

A commenter wondered how the proposed action would affect elk migration, which was not part of the draft EA. Consultation with Dr. Dan Stahler, wildlife biologist with Yellowstone National Park, and review of Rickbeil et al. (2019) indicates project activities would occur outside of elk migration periods. The proposed implementation period is August 15 through September 15. On average, elk depart from summer range around October 27 and arrive on winter range around November 2. This period of elk movement is outside the period of project implementation, so none of the evaluated alternatives would affect elk migration.

The subsection Birds in the EA discusses effects to fish and macroinvertebrate-eating species. "Numerous species of bird rely on prey of aquatic origin, and rotenone has potential to temporarily decrease prey species. The goal is total eradication of rainbow trout, so streams and Hidden Lake would not have a food base for fish-eating birds until the population recovers, which typically takes 5 years. Fish-eating birds in the project are include kingfishers, bald eagles, osprey, and some waterfowl. These birds are mobile and can move to more productive feeding grounds until the fishery recovers. Restocking Hidden Lake as soon as rotenone degrades would provide fish for fish-eating birds."

Harm to invertebrates would be short-term and minor. "Invertebrates would be slightly-to-moderately reduced in numbers, but recovery of invertebrate numbers and biomass is rapid (see Stream-Dwelling Aquatic Invertebrates). Timing the project for fall when migrating birds would be in reduced numbers would limit effects on most songbirds that consume adult mayflies, caddisflies, stoneflies, and midges (see Birds). American dippers eat aquatic invertebrates and do not migrate. This species would have a short-term reduction in forage base. Rapid recovery of biomass, then diversity, would make this a minor and short-term reduction in forage for American dippers. Monitoring in Lower Deer Creek, a stream draining from the north flank of the Beartooth Mountains found American dippers to be abundant one year after piscicide treatment, numerous newly fledged birds were present, and a previously undetected dipper nest found within the treatment area (FWP 2021)."

Subsection Mammals discusses effects to beavers. "Beaver dams are abundant in the project area (Scrafford et al. 2018), and these may be breached to reduce the amount of standing water to facilitate effectiveness of rotenone treatment. This disturbance would be short-term and minor. Beavers rapidly repair dams, and water levels would be restored within days after

treatment." Under current plans, breaching may be unnecessary. Nevertheless, beavers would be resilient to short-term disturbance and repair breached dams overnight.

Subsection Fish and Wildlife discusses effects to game species. "Game species in the project area include white-tailed deer, mule deer, elk, mountain lions, black bears, ruffed grouse, and dusky grouse. The presence of fieldworkers in the project area would result in short-term and minor disturbance to these species. Presence of fieldworkers would be for several days in given treatment reaches for initial stream flow studies. Generally, 1 or 2 people operate a few drip stations and would travel to the stations established the week before. Rotenone treatment would last for several days per treatment reach. Treatment in subsequent years would be of the same intensity and duration unless monitoring results show areas to be free of fish. Wildlife would be displaced or tolerate presence of humans, depending on species. This disturbance would be short-term and minor."

The section on threatened and endangered animals (Comment 5f: Threatened and Endangered Species and Species of Concern) discusses effects of aircraft on grizzly bears. "Grizzly bears are present in the project area and seen with relative frequency (MNHP 2018). Project activities including aircraft operation and rotenone application by fieldworkers would have potential to disturb or temporarily displace grizzly bears, and conflict between bears and humans would be possible. The proposed action contains mitigation measures to minimize disturbance to grizzly bears. These include:

- Project implementation would proceed from the Buffalo Creek headwaters downstream with rotenone application activities being restricted to a subset of proximal drainages for each operational period.
- Adherence of aircraft to predetermined flight lines approved by the USFWS.
- All attractants including rotenone, food, and garbage would be secured throughout the duration of the project either in bear-proof containers or behind electric fences. . Fieldworkers would be trained in bear country safety practices, such as safe food storage, making noise, and they would carry bear spray. Handling, transporting, and storing dead fish would increase the risk of conflicts with grizzly bears in the remote project area, so fish would be left to decay with the exception for the area around Slough Creek campground. Grizzly bears do not rely on fish at this elevation; however, they would opportunistically scavenge fish carcasses. They would also have potential to be exposed to rotenone-treated water; however, the low concentration and short duration of exposure of rotenone through eating dead fish or drinking treated water would not pose a health risk to grizzly bears. In summary, the short-term presence of fieldworkers and dead fish have potential to result in conflicts with grizzly bears but following bear safety practices would decrease potential for conflicts that would be detrimental to humans or bears."

Subsection Comment 5g: Increase Stress on Wildlife addresses how project activities may stress wildlife "Presence of aircraft and fieldworkers would result in short-term disturbance

to wildlife and may temporarily displace animals from occupied habitat. Large mammals would have the greatest potential to be disturbed by presence of humans. This disturbance would be short-term and minor disturbance. Conservation and monitoring often brings fieldworkers and firefighters into remote wilderness, and this project would be similar to other common practices.

8.1.2 Theme 3 – Stock and Helicopter Use

B. Comments were received stating that the number of helicopter flights and landings were not disclosed within the environmental assessment.

The number of helicopter flights and landings are disclosed in Table 8 of the final EA and in the draft MRDG (Appendix A).

C. Commenters request information on how the determination that use of pack stock would not be safe was made?

In description of the proposed action (1.7.1 Alternative 1: Proposed Action) the draft EA states that, "It is also safer to transport large equipment like boats, mixing tanks, and materials like rotenone and gasoline by helicopter than pack stock." These are large awkward stock loads with potential to hit against or get hung up on trailside trees. The unwieldy nature of the loads can cause chemical spills or leaks and can cause stock animals to spook and become injured.

D. Commenter states that the environmental assessment does not consider the level of impacts and the number of pack stock that would be needed.

Page 59 of the EA states the number of pack stock that would be needed. The MRDG (Appendix 1) compares the effects of a pack and stock supported alternative with the proposed action on the qualities of wilderness character.

8.1.3 Theme 4 – Use of Piscicide

A. Commenter raised concern that rotenone causes Parkinson's disease.

The EA covers concerns over Parkinson's disease and rotenone in 4.3 Health Risks and Health Hazards and reviews numerous studies conducted by neurologists and epidemiologists. Research into the links between rotenone and Parkinson's disease include laboratory studies intended to induce Parkinson's-like symptoms in laboratory animals as a tool for neuroscientists to understand the mechanism of Parkinson's disease (Betarbet et al. 2001; Johnson and Bobrovskaya 2014), epidemiological studies of Parkinson's disease in farmworkers (Kamel et al. 2007; Tanner et al. 2011) and laboratory studies evaluating risks associated with inhalation of rotenone powder (Rojo et al. 2007).

No links have been found between use of rotenone in fish removal projects and Parkinson's disease. The laboratory studies intended to induce Parkinson's-like lesions use exceptionally high levels of rotenone delivered intravenously and continuously to rat brains along with a chemical carrier for weeks. The mode of delivery in no way resembles exposure in fish projects

with minute concentrations of rotenone and use of personal protective equipment. The epidemiological studies are hampered by unclear reporting by farmworkers, lack of quantification of their level of exposure, inadequate identification of the multiple chemical agents farmworkers encounter, and lack of reporting on use of personal protective equipment. Following label requirements for handling and protective gear would protect fieldworkers from being exposed to rotenone through inhalation, ingestion, or dermal routes. The public would be temporarily excluded from treated waters.

B. Commenter raises concerns about wildlife becoming sick or dying due to ingesting rotenone fish carcasses and the duration/extent of piscicide beyond the project area.

The EA includes a lengthy review of literature on toxicity to wildlife relating to eating rotenone-killed fish and invertebrates or drinking treated water (3.5 Fish and Wildlife). The low concentrations needed to kill fish do not pose a health risk to animals and birds exposed to dead fish or treated water. Moreover, rotenone breaks down rapidly in the environment and would be deactivated at the downstream end of the project area to limit the spatial scope of toxic waters.

For reference, the following links specific concerns to the analysis in the EA and provides a summary:

Topic	Section	Summary
Deactivation	1.7.1 Alternative 1: Proposed Action	Potassium permanganate is released at the downstream end of the project area to deactivate rotenone. Deactivation takes 30 minutes travel time. Fresh inflows from the larger Slough Creek will dilute rotenone, which will expedite deactivation. Potassium permanganate likewise breaks down within 30 minutes stream travel time into nontoxic constituents.
Ingesting rotenone by drinking water or eating dead fish or invertebrates	3.5 Fish and Wildlife	A combination of extremely low concentrations of rotenone in water and animal tissues, rapid breakdown of rotenone in the environment, and low toxicity to nontarget animals means ingesting water or carcasses would not harm wildlife. Rotenone is rapidly broken down in the digestive tract of terrestrial animals. Toxicological studies show terrestrial animals to be resilient to

		ingesting extremely high amounts of rotenone for durations of 6 months to 2 years with minor health effects.
Reduction in food availability	3.5 Fish and Wildlife	Rotenone treatment would temporarily eradicate fish from the treatment area, and aquatic invertebrates would experience temporary reductions in numbers. Fish and invertebrate eating birds would have temporarily reduced food availability. These animals are mobile and can move to other places to forage. Aquatic invertebrate numbers return within a few weeks.
Risk of chronic exposure	3.5 Fish and Wildlife	The short life of rotenone in water and its rapid uptake by organic matter makes its presence in the environment short-lived. Combined with the low concentrations required to meet project goals of eradicating rainbow trout, nontarget animals do not face risks from drinking treated water or eating carcasses of rotenone-killed animals.
Effects of nontarget aquatic organisms	3.5 Fish and Wildlife	Gilled amphibians and gill-breathing aquatic invertebrates can be susceptible to rotenone. The EA includes a lengthy analysis of the literature. Timing the project past metamorphosis of amphibians is protective, although being long-lived with high reproductive potential allows amphibians to recover rapidly when rotenone kills tadpoles. Stream and lake-dwelling aquatic invertebrates have multiple methods of recolonizing, as this is the evolutionary legacy of living in harsh environments. All studies show rapid recovery.

8.2 *Section 4 – Overall Comments on the Environmental Assessment*

Theme 1 – Comments Considered Outside the Scope of this Project

A. Commenters ask why the implementation timing is August and not September?

The proposed project implementation is between August 15th and September 15th for the following reasons:

- Stream discharge data collected in August 2018 and 2019 indicate that project area streams are in the low-flow condition during late summer.
- The high elevation of the project area (7,500 feet to 9,000 feet) dictates that implementation occur in mid-August after rainbow trout fry have emerged from redds but before winter conditions and ice cover set in, which can be as early as mid-September.
- To prevent disruption to backcountry hunters during the backcountry rifle season project treatments would be completed by September 15th. Additionally, to avert effects to the backcountry mountain goat hunt, commencing on September 1st, the agencies will strive to complete treatments prior to September 1st.

8.3 *Section 5. Comments Determined to be Outside the Scope of Project*

Theme 1 – Comments Considered Outside the Scope of this Project

A. Commenter states that projects like this are what led the acting Undersecretary of Agriculture to issue a memorandum (2/1/2021) requiring the FS to submit for NRE's review all projects for "[A]ctivities in designated wilderness areas taken pursuant to Sections 4(c) and 4(d) of the Wilderness Act,"

B. Commenter questions why the implementation timing of the Scapegoat EA is for September?

C. Commenter asserts that the way the federal agencies have designed the MRDG process is fatally flawed and leads to unnecessary trammeling.