United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado River Valley Field Office
2300 River Frontage Road
Silt, Colorado 81652

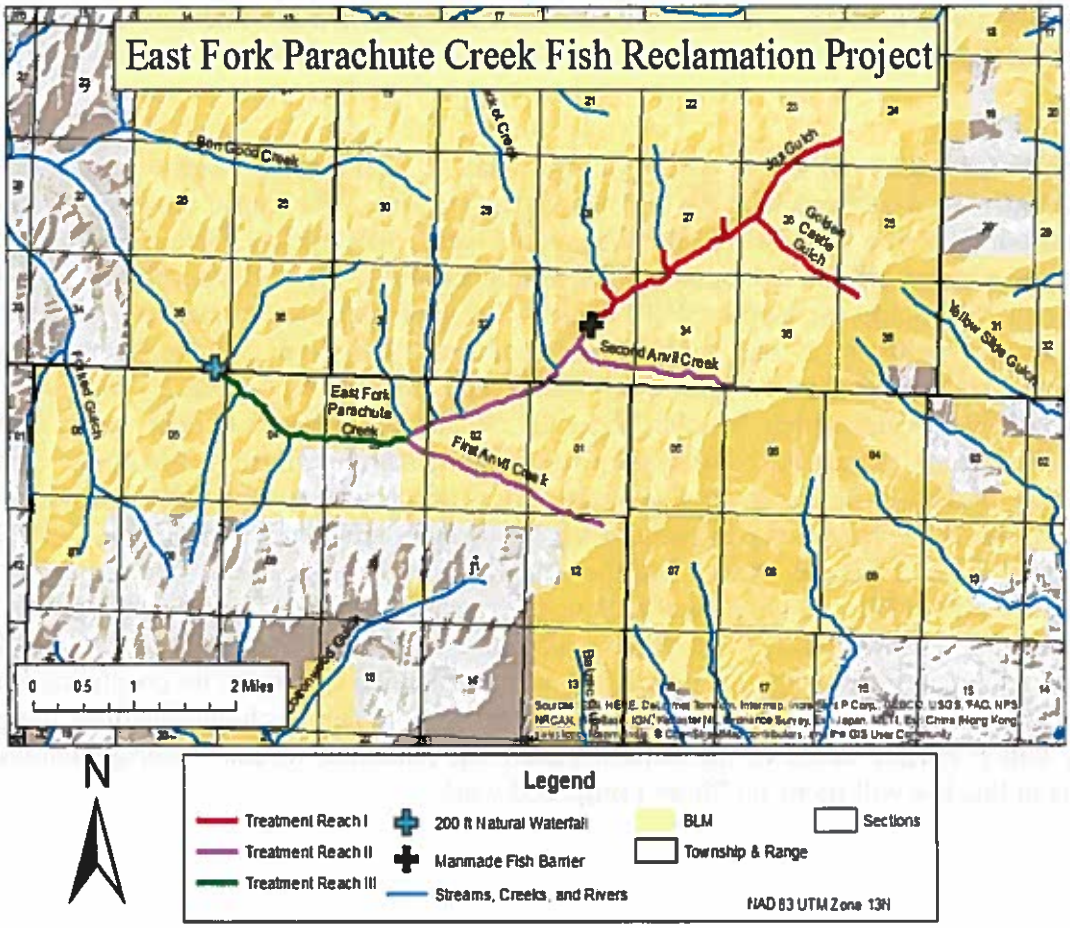
ENVIRONMENTAL ASSESSMENT
DOI-BLM-CO-N040-2014-0062-EA

PROJECT NAME. East Fork Parachute Creek Cutthroat Trout Restoration Project.

PLANNING UNIT. Roan Plateau Area.

LEGAL DESCRIPTION. T5S, R94W, Sections 23, 26, 27, 33, 34 and T6S, R95W, Sections 1, 2, 3, & 4.

Map 1. Project Area.



APPLICANT. Colorado Parks & Wildlife.

PURPOSE AND NEED FOR THE ACTION. The Colorado Parks & Wildlife Department (CPW) and the Bureau of Land Management (BLM) both prioritize management of native fish species in Colorado. Cutthroat trout are the native trout of Colorado and efforts to manage for genetically pure populations is a priority. The genetic status of cutthroat trout in Colorado has been in a state of flux for some time. However, recent genetic and meristics research findings suggest that 6 distinct lineages of cutthroat trout existed in Colorado. Within the project area, research suggests that the locally native cutthroat trout is the Colorado River cutthroat trout (CRCT) – Green Lineage. East Fork Parachute Creek contains a very limited number of genetically pure Colorado River cutthroat trout – Blue Lineage. This lineage is native to the White-Yampa-Green river basin, and was stocked locally in the early 1960's. These fish are a CPW Species of Special Concern, and a BLM Sensitive Species. The watershed is dominated by nonnative brook trout, which were reportedly stocked in headwater beaver ponds in 1973. The BLM and CPW are both signatories to the Range-wide CRCT Conservation Agreement and Strategy (CRCT Conservation Team 2006). The primary goal of these documents is to assure the long-term prosperity of native, genetically pure cutthroat trout within their native range. The chemical treatment of East Fork Parachute Creek watershed and the removal of non-native brook trout will aid in reestablishing an important cutthroat trout population. Brook trout have competitively excluded native cutthroat trout from this watershed and intervention is now needed to restore this species.

INTRODUCTION. CPW proposes to implement a chemical treatment of the East Fork Parachute Creek watershed with the fish toxicant Rotenone. The entire treatment would occur on BLM administered lands within the Colorado River Valley Field Office (CRVFO). The use of any pesticide on BLM lands requires BLM authorization. BLM approval would be through issuance of a pesticide use permit (PUP) to CPW for the application of rotenone on BLM lands. The watershed consists of four primary perennial streams that contain brook trout, East Fork Parachute Creek, First Anvil Creek, JQS Gulch, and Second Anvil Creek. The very lowest portions of First Water Gulch, Second Water Gulch, and Third Water Gulch, within 300 feet of their confluence with East Fork Parachute Creek also contain brook trout. Given the complexity of habitats (numerous beaver ponds), and remoteness of the streams, the project has been broken into three phases. Phase I would reclaim the headwaters including JQS Gulch, Golden Castle Gulch, East Fork Parachute Creek, and the very lowest portions of First Water, Second Water, and Third Water gulches. Phase I will include the mainstem of East Fork Parachute Creek down to the manmade barrier located below the confluence with Third Water Gulch. Phase II would continue reclamation from the manmade barrier to a planned barrier to be constructed near the confluence with Grassy Gulch. Phase III would be to complete reclamation from the planned Grassy Gulch barrier down to the natural East Fork Parachute Creek waterfall feature. The analysis in this EA will focus on Phase I proposed work.

SITE DESCRIPTION. The East Fork Parachute Creek drainage encompasses 40.5 square miles of land (25,940 acres), originating at the headwaters of JQS Gulch and Golden Castle Gulch, at an elevation of approximately 8,880 feet. The stream descends generally in a southwesterly direction over 14.0 miles to its confluence with Parachute Creek (5,790 feet in elevation). The upper 4.0 miles of the East Fork drainage will be the focus of Phase I work. Tributaries within Phase I include the two headwater streams (JQS Gulch and Golden Castle Gulch), as well as East Fork Parachute Creek, First Water Gulch, Second Water Gulch, and Third Water Gulch. The stream reaches are relatively small at the headwaters in JQS Gulch with flow of less than 1.0 cfs. Flow increases moving downstream due to small seeps, springs, and small perennial tributaries. Approximately 0.9 miles downstream from the headwaters of East Fork Parachute Creek, habitat changes from riffle, run, and small pools, to a series of small to large beaver ponds. These ponds are stacked together or connected via small riffle reaches. Approximately 15 ponds exist within the treatment reach, six of which are large (>3 feet tall). Streamside vegetation consists of riparian grasses in the upper portions of JQS Gulch and transitions into dense willows, some sedge and rush, and riparian grasses including red top, meadow barley, and tufted hair grass. Upland benches immediately adjacent to riparian areas are moderately to heavily infested with houndstongue, Canada thistle, and wooly mullein.

Photo. E. F. Parachute Creek in the Phase 1 treatment reach – representative of the large beaver dam complex

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES.

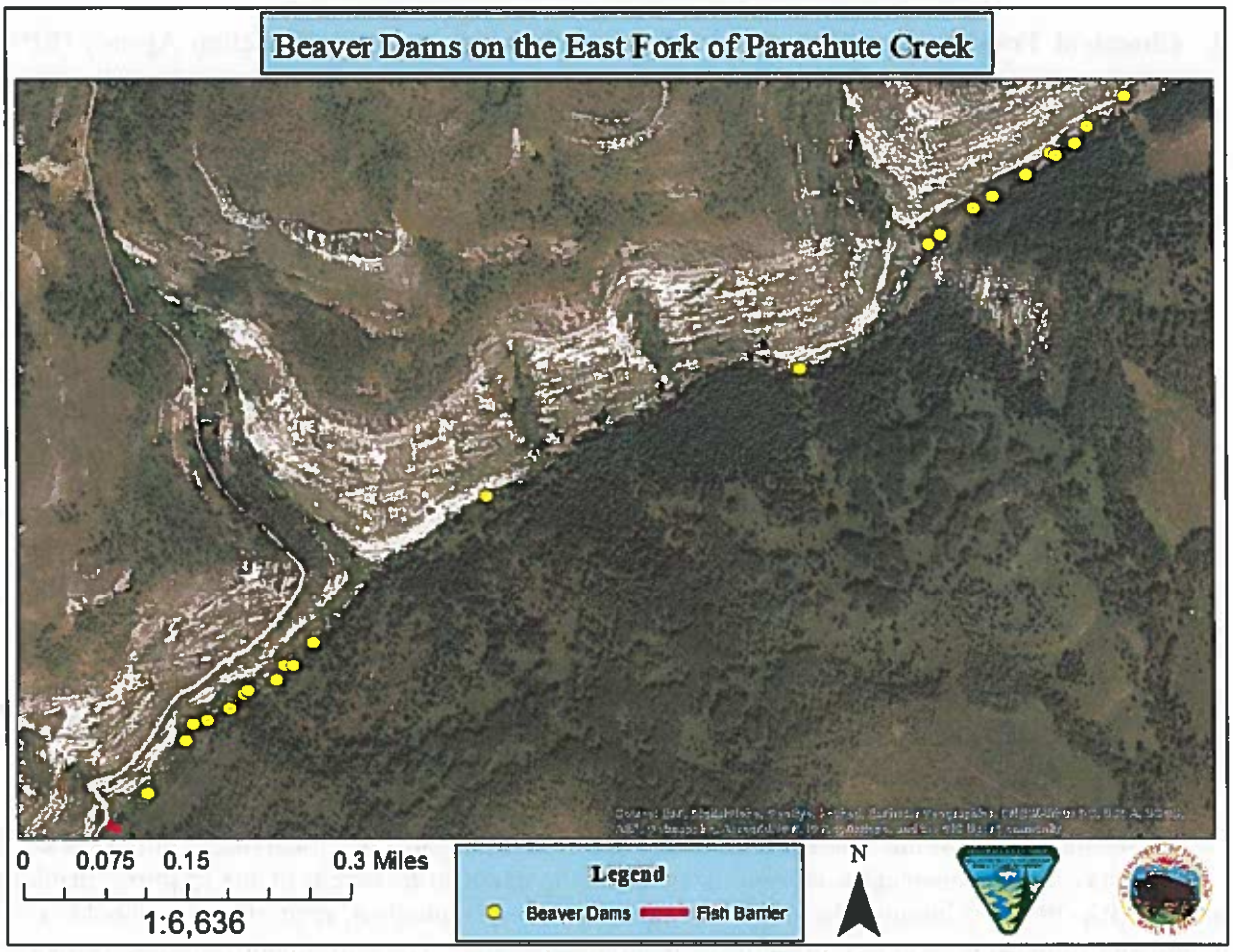
PROPOSED ACTION. The CPW project consists of 5 primary components:

1. Remove beaver from the treatment reach and temporarily convert all beaver pond habitat within the Phase I treatment reach into stream habitat (July – early August).
2. Remove all brook trout with the chemical fish toxicant rotenone within the Phase I treatment reach (week beginning August 11, 2014).
3. Assess the success of chemical treatment via extensive electrofishing and netting (fall 2014 – early summer 2015).
4. Chemically retreat the Phase I treatment reach if necessary (brook trout still found in treatment reach) (fall 2015).
5. Restock the Phase I treatment reach with pure cutthroat trout (2015 – 2017).

The Proposed Action is to issue a Pesticide Use Permit to CPW to apply the fish toxicant rotenone to East Fork Parachute Creek watershed on BLM lands. The CPW follows a detailed standardized protocol for these treatments that is summarized in this Environmental Assessment (EA). The entire Nonnative Fish Control Reclamation Plan (Plan) is located in Appendix A. Also, the BLM would authorize the use of the Roan Cabin Administrative Site as the primary staging/camping area for project personnel, vehicles, and some equipment. Select personnel could be camped at the bottom of BLM road 8010 at the site of the primary detoxification station. The project is currently planned to occur in 3 phases. Phase 1 would reclaim the lower 0.75 miles of JQS Gulch and the upper 2.25 miles of East Fork Parachute Creek including the very lowest portions of First Water, Second Water, and Third Water gulches down to the recently constructed concrete barrier. Phase 2 would be to reclaim the next 2.1 miles of stream and 1 mile of a tributary (Second Anvil Creek) to the area near the confluence with Grassy Gulch within the next 4-6 years. Phase 3 would be the completion of the reclamation from Grassy Gulch downstream 2.2 miles to the East Fork Parachute Creek Falls (a 200 foot natural waterfall barrier) plus an additional 1.0 mile of tributary (First Anvil Creek) within the next 6-8 years.

1. Beaver and Beaver Dams. Beginning in early July, beaver, and beaver structures within the treatment reach will need to be assessed and removed to facilitate a successful chemical reclamation planned for the week beginning August 11, 2014. The Phase I treatment reach contains a total of 25 beaver dams ranging in size from less than 1 foot in height to 5+ feet in height. It is critical to the success of the project to drain beaver pond habitat to facilitate movement and dispersal of the chemical rotenone between drip stations. Because rotenone quickly binds to organic matter, beaver pond habitat with zero or low velocity reduces chemical effectiveness as rotenone will bind to pond sediments. In addition, beaver ponds provide refuge areas of dense vegetation where brook trout can avoid rotenone. Given the series of beaver ponds found in the Phase I treatment reach, draining of the ponds will be essential. The proposed action calls for the breaching of dams via the use of small explosives conducted by qualified USDA Wildlife Service's personnel.

Map 2. Beaver Dam Complexes Within the Phase I Treatment Reach.



Beaver Removal and Dam Breaching. First, beaver would be removed by qualified USDA Wildlife Services personnel via trapping using a variety of trapping techniques. All traps would be carried in by hand and all work would be done by qualified personnel on foot. This would occur one to two weeks prior to chemical treatment. It is anticipated that trapping could take up to one week to remove beaver from the treatment reach. Next, beaver dams in the treatment reach would be breached. This action would entail trained and qualified USDA Wildlife Services personnel using small explosives at 23 of the 25 dams to quickly breach them and effectively move sediments through the system. The two smallest dams would be breached by hand using hand tools. Dam breaching would start at the lowest dam and move successively upstream to the last dam (see map 2), and would occur up to one to two weeks prior to treatment. Breached dams would be checked periodically up to the time of treatment to make sure that any beaver missed during trapping or that might have immigrated into the area from occupied habitat downstream, have not reconstructed dams. Any new beaver activity will be breached by crews on foot using hand tools.

Upon confirmation of successful chemical reclamation, CPW personnel would reintroduce a like number of adult beaver back into the treatment reach. It is also likely that beaver from occupied habitat below the treatment reach will naturally move into the project area.

2. Chemical Treatment. CPW would use the U. S. Environmental Protection Agency (EPA) approved piscicide rotenone to eradicate all fish in the Phase I treatment reach. The action would follow an approved nonnative fish control plan (see Appendix A). Rotenone formulations commonly used by CPW in Fish Reclamation Projects include: CFT LegumineTM, Liquid Rotenone 5.0% Active Ingredient, (EPA Registration No.: 75338-2); Cube Root Rotenone, Wettable Powdered Rotenone 7.4% Active Ingredient, (EPA Registration No.: 655-691), and Prentox Synpren-Fish Toxicant, Liquid 2.5% Active Ingredient, (EPA Registration No.: 655-421). CPW proposes to use CFT LegumineTM, Liquid Rotenone 5.0% Active Ingredient, (EPA Registration No.: 75338-2) for this project. Rotenone was selected as the chemical of choice because of its effectiveness in eradicating fish and its lack of long-term effects on the environment (Sousa et al 1987). Rotenone is a naturally occurring plant derived fish toxicant that is toxic only to fish, some aquatic invertebrates, and some juvenile amphibians. The EPA found it to be non-toxic to humans, other mammals, and birds at the concentrations used to remove fish (EPA 2007). It has been widely used in the United States since the 1950's. CPW has used rotenone successfully in many similar projects and has refined application techniques to minimize adverse side effects to the environment. For more detailed information on rotenone see Appendix A.

Potassium permanganate ($KMnO_4$) would be used by CPW to neutralize rotenone at detoxification stations at the lower terminus of the treatment reach to prevent the movement/effects of rotenone into non-target waters. Potassium permanganate was selected because it is a strong oxidizer that breaks down into potassium, manganese, and water. All are common in nature and have no deleterious environmental effects at the concentrations that would be used for project activities (Finlayson et al. 2000). Potassium permanganate is used as an oxidizing agent in treatment plants to purify drinking water (EPA 1999). Although the oxidation process is not immediate, neutralization should occur within an estimated 0.25 to 0.5 miles of the neutralization site. The equipment required to operate the main detoxification station consists of water tanks, gasoline powered water pumps, constant head delivery valves, and flexible tubing.

Chemical Application. Liquid rotenone would be applied under the supervision of qualified and certified CPW personnel at a rate of 1.0 part per million (ppm). The rotenone would be applied using a combination of small 1 gallon chicken water dispensers with constant flow drip-heads at 5-7 drip stations throughout the Phase 1 project area over a 3 to 24 hour period. Personnel will utilize pressurized backpack sprayers, spraying a diluted solution of the chemical into the stream. Bagged concentrations of time release rotenone may be used at spring sources and standing water locations. Cages of live fish will be placed just upstream of most mainstem drip stations to ensure that rotenone is effective. These live fish (bioassays) will help personnel monitor chemical effectiveness between stations, with all live cage fish expected to die within four to eight hours of chemical treatment. In addition, block nets may be placed up and or downstream of the primary detoxification station to collect dead fish that might otherwise drift downstream and outside of the project area. Phase 1 is proposed to occur during the week of August 11, 2014 with two treatments proposed the first on August 12th and the second on August 13th. A follow-up treatment, if needed, in the late summer or early fall of 2015 would occur should sampling

determine that all brook trout were not removed from the treatment reach. All work would be conducted during daytime hours and up to 25 people would be needed to attend to drip stations, detoxification stations, run backpack sprayers, and monitor overall operations. All chemical treatment work will be done via foot travel as vehicles will be parked along existing roads and equipment hiked in as appropriate.

Flow rates would determine the amount of chemical needed to achieve a rotenone concentration of 1.0 ppm. One-gallon drip stations would be set up and monitored by CPW personnel at appropriate distance intervals, beginning at the starting point on JQS Gulch, and ending above the manmade barrier. Drip stations, similar to a bird feeder dispenser would be placed in the stream on a rock. Additional CPW personnel would use pressurized backpack sprayers to apply a diluted solution of rotenone to select stream segments containing fish that may not be effectively treated by drip stations (side channels, springs, seeps, and undercut banks, etc.). Springs and seeps may also be treated using a small bag of powdered time release rotenone placed at the source to ensure that these sites are effectively treated.

Rotenone would be neutralized by CPW with potassium permanganate at a detoxification station located at the downstream terminus of the treatment reach. A detoxicant/oxidizing solution of potassium permanganate ($KMnO_4$) will be applied at a rate of 2.0-4.0 ppm through a constant head delivery device, while the treatment reach is being treated with rotenone. Stream flow will be measured prior to and during treatment to ensure the accurate delivery of the detoxicant solution. Calculations regarding the volume of potassium permanganate required for use during this project are based upon desired $KMnO_4$ concentration (2.0-4.0 ppm) and stream flow. The primary detoxification station will be established on East Fork Parachute Creek downstream of the constructed fish barrier. Potassium permanganate will be applied within 200 feet of the downstream base of the barrier. The detoxicant generally requires approximately 30 minutes of contact time to fully oxidize rotenone, depending on water temperatures and organic composition of the water and stream channel. A CPW aquatic researcher will be present to monitor rotenone concentrations upstream and downstream of the potassium permanganate application site (primary detoxification station) to ensure that $KMnO_4$ is neutralizing all rotenone. Sentinel fish will also be held in the stream downstream of the detoxification station to ensure that chemical neutralization of rotenone is occurring properly. Additionally, dilution of rotenone by ground water and contributions of additional stream flows from the East Fork tributaries downstream of the primary detoxification station will also assist in further diffusion of any residual rotenone. These tributaries include: Second Anvil Creek, Timber Gulch, Camp Gulch, Grassy Gulch, First Anvil Creek, Spring Gulch, Sheep Trail Hollow, Trail Gulch, Bull Gulch, Ben Good Creek, and Forked Gulch.

Additional potassium permanganate will be available at the emergency detoxification station to ensure adequate chemicals are available in the event of a large thunder storm or accidental rotenone spill. The emergency detoxification station will be located on East Fork Parachute Creek near the confluence with Grassy Gulch, approximately 2.3 stream miles downstream of the constructed fish barrier (primary detoxification station). Access to this station is via the Grassy Gulch road. This detoxification site would only be used in the event of a rotenone spill or thunderstorm as a backup.

All work is anticipated to take up to 5 days to complete including staging, set up, treatment, and clean-up. Drip stations and detoxification stations would be removed. The majority of dead fish will be left in the stream to provide for nutrient recycling following confirmation of complete non-native trout removal.

3. Post-treatment Assessment of Success (Fish Sampling). This involves actions with no authorization needed by BLM. Personnel from CPW and BLM would sample the treatment reach extensively post treatment to look for live fish that may have been missed.

4. Retreatment of Phase I Treatment Reach. Based on the results of fish sampling in component 3 above, the stream could need retreatment in the late summer/early fall of 2015, should live brook trout be found. This would involve reinitiating all of components 1 and 2 addressed above.

5. Post Treatment Restocking of Pure Cutthroat Trout. This involves actions with no authorization needed by BLM. However, coordination amongst CPW, BLM, and USFWS may be warranted to determine what lineage of pure cutthroat trout would be most appropriate to stock into the Phase I treatment reach.

6. Design Features. The following design features would be implemented and included in the BLM authorization:

a. The treatment will be preceded by internal and external notifications and media releases to notify the public of treatment sites and dates and will include the following: news releases in local papers.

b. The treatment area will be placarded to prohibit public access during treatment and for at least three days following treatment.

c. Application of the chemical will be conducted by licensed pesticide applicators in accordance with all applicable regulations and policies, following an approved plan.

d. Transport to the site and storage of chemicals on the site will comply with guidance in the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) (BLM 2007).

e. Two portable restrooms will be rented and brought to the Roan Cabin Administrative Site to accommodate project personnel over the 5 day project. This will alleviate pressure on the limited bathroom facilities located at the cabin.

f. All equipment used during the treatment including nets, drip stations, portable generators, etc. will be cleaned and weed free prior to arriving on site for work to eliminate the potential for introduction of invasive weed species.

g. Explosives used to remove select beaver dams, would require the presence of Upper Colorado River interagency fire personnel equipped with an engine on standby and backpack water sprayers in the unlikely event of a spot fire adjacent to the creek.

Roan Cabin Use. The BLM will authorize use of the Roan Cabin Administrative Site as the primary staging area for personnel and vehicles during the week of August 11, 2014. The facility will serve as the primary sleeping, eating, and off duty restroom area. Tent camping will be allowed within the fenced perimeter and the kitchen and bathroom will be available for personnel use. Two additional portable restrooms will be brought to the site for use during the week.

NO ACTION ALTERNATIVE. Under the No Action alternative, no beaver would be removed from East Fork Parachute Creek, no beaver dams would be breached and no ponds would be drained. A Pesticide Use Permit would not be issued to CPW and no chemical treatment would be authorized on BLM lands within the East Fork Parachute Creek drainage. Nonnative brook trout would continue to dominate the East Fork Parachute Creek watershed and would likely result in the complete extirpation of cutthroat from the watershed.

ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD.

Regulation Change. Eradication of nonnative brook trout within the East Fork Parachute Creek watershed by liberalizing CPW regulations to encourage harvest is not possible, as the stream is currently managed with the most liberal statewide trout regulation. Even with a bag limit of up to 14 fish per day (current regulation), there is simply not enough fishing pressure in this remote, small stream to remove a fraction of the current brook trout population. Additional expenses would not be incurred with an unlimited harvest regulation change, but prospects for success are unrealistic. The projects purpose and need would not be met. The effects of regulation change will not be analyzed in further detail.

Mechanical Removal. Traps and backpack electrofishing could be used to mechanically remove adult brook trout and some brook trout fry. However, due to the complex habitat found throughout the drainage, it would be impossible to remove a significant number of all year classes of brook trout. Electrofishing over several years would not remove all of the brook trout, as demonstrated by past CPW removal efforts. In addition, attempting to remove brook trout by mechanical means would be the most costly alternative due to extensive time and travel commitments as well as salary costs. Large-scale electrofishing removal efforts would also preclude CPW staff from attending to other high priority projects. Because electrofishing would not result in the collection of all nonnative brook trout from the treatment reach, the purpose and need for the project would not be fulfilled. As such, the effects of the non-chemical treatment alternative will not be analyzed in further detail.

Beaver Dam Notching without Beaver Removal Alternative. Under this alternative, beaver would not be trapped from within the treatment reach. Beaver dams would be notched via heavy equipment 1-2 days prior to treatment. This alternative was not analyzed in detail because it is believed that this method would not meet the purpose and need of removing all nonnative brook trout from above the concrete fish barrier. Beaver would rebuild dams too rapidly to keep up

with, resulting in substantial ponded water. This would reduce chemical treatment effectiveness and result in missed fish. Brook trout would persist in the stream. Because this alternative would not meet the purpose and need, it is not analyzed in further detail.

Beaver Pond Draining Using Piping. Under this proposal, beaver would be trapped out of the treatment reach and piping would be used to drain beaver pond habitat. Given the remoteness of the project site, and the number of dams/ponds, this alternative would have low likelihood of success. Piping, would be less impacting, and is known to be successful at easily accessible sites that can be checked daily. However, given the uncertainties for success at these remote locations, this alternative will not be analyzed in detail.

PLAN CONFORMANCE REVIEW. The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5-3, BLM 1617.3):

Name of Plan: Glenwood Springs Resource Area Plan

Date Approved: July 1984, Revised 1988

Decision Number/Page: Planned Management Actions, Page 15

Decision Language: "Fish management emphasis in the resource area is primarily on Colorado River cutthroat trout".

STANDARDS FOR PUBLIC LAND HEALTH. In January 1997, Colorado Bureau of Land Management (BLM) approved the Standards for Public Land Health. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. An abbreviated land health assessment was completed for the Roan Cliffs area in 2013 and determined that some standards were not being met within the project area. An analysis of the effects of the Proposed Action on each standard will be made in the environmental analysis (next section).

Table 1. Standards for Public Land Health.

Standard	Definition/Statement
#1 Upland Soils	Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.
#2 Riparian Systems	Riparian systems associated with both running and standing water, function properly and have the ability to recover from major surface disturbances such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.

#3 Plant and Animal Communities	Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.
#4 Threatened and Endangered Species	Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.
#5 Water Quality	The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a description of the human and natural environmental resources that could be affected by the proposed action and alternatives. In addition, the section presents comparative analyses of the direct and indirect consequences on the affected environment stemming from the implementation of the various actions.

A variety of laws, regulations, and policy directives mandate the evaluation of the effects of a proposed action and alternative(s) on certain environmental elements. Not all programs, resources or uses are present in the area, or if they are present, may not be affected by the proposed action and alternatives (Table 2). Only those elements that are present and potentially affected are described and brought forth for detailed analysis.

Table 2. Programs, Resources, and Uses (Including Supplemental Authorities)	Potentially Affected and Brought Forward for Analysis	
	Yes	No
Access and Transportation		X
Air Quality		X
Areas of Critical Environmental Concern*	X	
Cadastral Survey		X
Cultural Resources	X	
Native American Religious Concerns	X	
Environmental Justice		X
Farmlands, Prime or Unique		X
Fire/Fuels Management		X
Floodplains		X
Forests		X

Geology and Minerals		X
Law Enforcement		X
Livestock Grazing Management	X	
Noise		X
Paleontology		X
Plants: Invasive, Non-native Species (Noxious Weeds)	X	
Plants: Sensitive, Threatened, or Endangered	X	
Plants: Vegetation	X	
Realty Authorizations		X
Recreation	X	
Social and/or Economics		X
Soils	X	
Visual Resources	X	
Wastes, Hazardous or Solid	X	
Water Quality, Surface and Ground	X	
Water Rights		X
Wetlands and Riparian Zones	X	
Wild and Scenic Rivers	X	
Wilderness Study Areas / Wilderness Characteristics	X	
Wildlife: Aquatic / Fisheries	X	
Wildlife: Migratory Birds	X	
Wildlife: Sensitive, Threatened, and Endangered Species	X	
Wildlife: Terrestrial	X	
Other: Human Health	X	

*Relevant and important values may be affected

CULTURAL RESOURCES

AFFECTED ENVIRONMENT.

Three large Class III cultural resource inventories (CRVFO #s 786 and 8396 a & b and SHPO # GF.LM.R194) were conducted for the Naval Oil Shale Reserve in 1973, 1981 and 1996, and include portions that overlap the East Fork Parachute Creek project area. No cultural resources have been located or reported within the proposed treatment reach. Therefore, no "historic properties" are identified as being within the area of the Proposed Action. "Historic properties" are cultural resources that are eligible or potentially eligible for inclusion on the National Register of Historic Places (NRHP).

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. The implementation of the Proposed Action would have no direct impacts to

known "historic properties", as none have been identified in the project's immediate vicinity.

Therefore, the BLM made a determination of "No Historic Properties Affected." This determination was made in accordance with the 2001 revised regulations [36CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16U.S.C 470f), the BLM/State Historic Preservation Officer (SHPO) Programmatic Agreement (1997) and Colorado Protocol (1998)]. As the BLM has determined that the Proposed Action would have no direct impacts to known "historic properties," no formal consultation was initiated with the SHPO.

Although there are no known "historic properties" in the project area, archaeological monitoring of beaver dam removal activities is still recommended and will be conducted by the BLM-CRVFO archaeologist. No ground disturbing activities will begin prior to the archaeologist's arrival. The CRVFO archaeologist will be on site as long as the BLM deems necessary.

In addition to the monitoring, a standard Education/Discovery COA for cultural resource protection would be attached to the Surface Use Conditions of Approval. The importance of this COA should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered during construction operations.

No Action Alternative. Under the No Action alternative, no barrier would be constructed and no impact to known and unknown cultural resources would result.

NATIVE AMERICAN RELIGIOUS CONCERNS

AFFECTED ENVIRONMENT.

The Proposed Action is located within an area identified by the Ute Tribes as part of their ancestral homeland. A number of Class III cultural resource inventories (see section on Cultural Resources) were conducted for a variety of oil & gas related projects in the Proposed Action's vicinity to determine if any areas were known to be culturally sensitive to Native Americans. No sensitive areas were identified or are currently known in the proposed project area.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. American Indian religious concerns are legislatively considered under several acts and Executive Orders, namely the American Indian Religious Freedom Act of 1978 (PL 95-341), the Native American Graves Environmental Assessment Protection and Repatriation Act of 1990 (PL 101-601), and Executive Order 13007 (1996; Indian Sacred Sites). In summary, these require, in concert with other provisions such as those found in the NHPA and ARPA, that the federal government carefully and proactively take into consideration traditional and religious Native American culture and life and ensure, to the degree possible, that access to sacred sites, the treatment of human remains, the possession of sacred items, the conduct of traditional religious practices, and the preservation of important cultural properties are considered and not unduly infringed upon. In some cases, these concerns are directly related to "historic properties"

and "archaeological resources". In some cases elements of the landscape without archaeological or other human material remains may be involved. Identification of these concerns is normally completed during the land use planning efforts, reference to existing studies, or via direct consultation. At present, no Native American concerns are known within the project area and none was identified during the inventories. If new data are disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

Although the Proposed Action would have no direct impacts, short-term access and personnel in the vicinity of the proposed project could indirectly impact unknown Native American resources ranging from illegal collection to vandalism.

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the agency Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. Staff and contractors will be notified of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard Education/Discovery COA for the protection of Native American values would be attached to the APDs (Appendix A). The importance of these COAs should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered. The proponent and contractors should also be aware of requirements under the NAGPRA.

No Action Alternative. Under the No Action alternative, no barrier would be constructed and no impact to known and unknown cultural resources would result.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

Affected Environment.

There are currently no designated ACECs within the project area. However, an ACEC report identifying the relevant and important values (R&I) present within the area was completed in August, 2002 (BLM 2002). Three R&I values were identified within the East Fork Parachute Creek drainage: 1) a pure strain of resident cutthroat trout, 2) high scenic values associated with the East Fork Parachute Creek canyon and waterfall, and 3) several significant plant communities.

The pure strain of cutthroat trout within East Fork Parachute Creek has been nearly eliminated in the last few decades due to competition with nonnative brook trout. Cutthroat trout are not able to successfully compete and the stream is now almost exclusively dominated by brook trout. The lower portion of East Fork Parachute Creek downstream of the project area is visually dramatic as the creek gradually becomes more deeply incised until it cascades over a 200-ft high

waterfall into a narrow box canyon bounded by vertical cliffs. The third R&I value found in the project area and downstream are three rare or exemplary plant communities. The first is the unique wetland seeps that support the rare hanging garden sullivantia. This is a rare plant that grows along East Fork Parachute Creek and its larger tributaries on exposed Green River shale cliff bands that contain small seeps or springs. The other two significant plant communities are the Colorado blue spruce/red-osier dogwood (*Picea pungens/Cornus sericea*) and the boxelder/narrowleaf cottonwood/red-osier dogwood (*Acer negundo/Populus angustifolia/Cornus sericea*) riparian woodlands that are found in lower East Fork Parachute Creek downstream of the project area.

Environmental Consequences.

Proposed Action. The fish R&I value, cutthroat trout, would be enhanced by the proposed action as nonnative brook trout would be removed from the stream reach to facilitate the stocking of native cutthroat trout. This is the desired species for the area. Following removal of the nonnative fish, cutthroat trout are expected to be able to maintain a viable, reproducing population within the project area.

The waterfall and the deeply incised canyon in lower East Fork Parachute Creek which met the R&I criteria for scenic values should be unaffected by the Proposed Action. This portion of East Fork Parachute Creek is more than 4 miles below the project area and the sequential breaching of the dams from the lowest dam moving upstream would allow sediments to move effectively through the system and allow woody debris to settle out before reaching this lower segment of the drainage. Short-term impacts would last approximately one-to-two years as the proposed action calls for the reintroduction of beaver back into the treatment reach upon documentation of a successful chemical treatment. The project would not create any long-term surface disturbance that would attract attention or dominate the landscape.

The botanical R&I values, and the hanging garden sullivantia in particular, could be slightly impacted by the breaching of beaver dams. It is possible that the short-term pulse of sediment, woody debris and high water flows through East Fork Parachute Creek could temporarily bury or scour some of the hanging gardens. Human-induced draining of the beaver dams would mimic a natural flooding event that could temporarily breach a beaver dam under natural conditions. Effects would likely be short-term and any impacted plant populations would be expected to recover quickly. The proposed action would not affect the subsurface hydrology of the watershed that creates the seeps that support the hanging garden sullivantia, so there should be no long-term direct or indirect impacts to these species. The other two significant riparian plant communities are more than 3 miles downstream of the project area and below the concrete fish barrier near the mouth of Third Water Creek. The concrete fish barrier would be expected to capture most of the sediment and attenuate the high flows following breaching of the dams. As a result, there would be no impacts to these riparian plant communities.

No Action Alternative. Under the No Action alternative, no breaching of beaver dams and no chemical treatment with rotenone would be authorized on East Fork Parachute Creek. No impacts to or enhancements of ACEC-related Relevant and Important values would result.

SOILS

AFFECTED ENVIRONMENT.

The project site is entirely within wetted stream segments and thus, very limited upland soils will be affected by the proposed action. However, according to the *Soil Survey of Rifle Area, Colorado, Parts of Garfield and Mesa Counties* (NRCS 1985), the proposed treatment would occur on the soil map unit Rock outcrop-Torriorthents complex. This soil map unit consists of bedrock and soils of variable depth occurring on slopes of 50 to 80 percent (NRCS 2014). The majority of the complex is rock outcrop which consists primarily of Green River shale. The remainder of the complex is Torriorthents, which are shallow to moderately deep; clayey to loamy soils containing gravel, cobbles, and stones (NRCS 1985). Surface runoff is rapid to very rapid and erosion hazard is moderate to severe (NRCS 1985).

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Rotenone is mobile to moderately mobile in soil and sediment. The leaching distance of rotenone is only 2 cm in most types of soils. Rotenone would be applied directly to the stream, so there would be little contact with soils. When released in water, rotenone generally degrades quickly through abiotic (dydrolytic and photolytic) mechanisms. The half-life in both of these environments is between 1 and 3 days. Nearly all of the toxicity of the compound is lost in 5 to 6 days of spring sunlight or 2 to 3 days of summer sunlight (EXTONET, Accessed March 2014). At the same time, rotenone breaks down quickly into temporary residues that would not persist as pollutants of soils. Ultimately rotenone breaks down into carbon dioxide and water. It does not readily leach from soil, and would not be a groundwater pollutant. Given that the project is proposed to occur during late summer (August), little to no short or long term impacts to soils would occur. No indirect or cumulative impacts to soils are anticipated from the proposed action.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized on East Fork Parachute Creek. No impacts to soils would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 1 FOR SOILS.

Based on the Roan Cliffs Land Health Assessments, BLM staff concluded that upland soils in the project area are meeting Standard 1 (BLM 1999 and 2014). Implementation of the proposed action is not anticipated to degrade soil health from current conditions.

VISUAL RESOURCES

Affected Environment.

The Proposed Action would take place on BLM lands on top of the Roan Plateau located within the headwaters of the East Fork Parachute Creek watershed. The East Fork Parachute Creek

project area is characterized by a large directional drainage that runs from the east to the southwest becoming more incised and dramatic as it proceeds to the west as the cliff walls become more pronounced. Several small tributaries flow into the East Fork Parachute Creek from the north and the southeast. Vegetation consists of riparian grasses in the upper reaches that transition in dense willows, sedges, rushes, and riparian grasses further downstream. The vegetation along the upland benches immediately adjacent to the riparian areas is dominated by weeds. The project area is not easily accessible and has very few visitors/casual observers or human modifications.

The main East Fork Parachute Creek drainage inventoried as VRI Class III with the tributaries inventorying as VRI Class IV (BLM 2014). VRI classes represent the relative value of the visual resources with Classes I and II being the most valued; Class III representing a moderate value; and class IV being of least value. Inventory classes are informational and provide the baseline for considering visual values in the resource management planning processes. Visual resource management (VRM) classes and visual management objectives are established for each class in resource management plans to support resource and resource use allocation decisions.

The VRI classes are indicative of existing visual values. The corresponding VRM classes to VRI Class III and Class IV is VRM Class III and IV, as defined in the BLM's Manual H-8410-1 – Visual Resource Inventory (BLM 1986). The objectives of these two classes are used as the basis for this analysis and are described below.

- The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- The objective of VRM Class IV is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of the viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Environmental Consequences.

Proposed Action. The proposed action calls for the breaching of all beaver dams within the treatment reach within East Fork Parachute Creek. The majority of the dams would be removed using small explosives. The dam breaches would be localized in areas of the dams where there is less vegetation and the breaches would only be at a scale large enough to produce water flow. The beaver dams would not be breached simultaneously, but would be breached from the lowest dam moving sequentially upstream. This would allow the sediments to move effectively through the system and allow woody debris to settle.

All surface disturbing activities associated with the Proposed Action occur in VRI Class III areas. Immediate visual impacts would include flying debris at the time of the explosive blast, erosion, silting of the stream, and increased stream flow. However, breaching would look natural to the casual observer as the results would mimic natural disturbance associated with beaver dam breaching that occurs during seasonal high stream flow events. Beaver dams are temporary structures that sit within the waterway, and they are not part of the permanent waterway (the bed and banks of the stream). They come and go on the landscape with relative frequency. Short-term impacts would be approximately one year as the proposed action calls for the reintroduction of beaver back into the treatment reach upon documentation of a successful chemical treatment.

Over the long-term the Proposed Action would be consistent with the VRM Class III objective descriptions and not change the VRI because the beaver dam breaching would be localized and would not create any long-term surface disturbance that would: (1) attract attention of a casual observer, (2) dominate the landscape or (3) impact the predominant natural and geologic features of the drainage. The existing character of the creek would quickly mend because beaver would be reintroduced or would reoccupy the area and re-establish dams within the treatment reach one year post treatment completion. Vegetation would also begin to resprout and recolonize around the breached dams.

The Proposed Action would also be consistent with VRM Class IV objective descriptions and not change the VRI because there would be no surface disturbance in areas that inventoried as VRI Class IV.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP on East Fork Parachute Creek and no beaver dams would be breached. No impacts to visual resources would result.

VEGETATION

AFFECTED ENVIRONMENT.

Vegetation at and adjacent to the project site includes several willow species (*Salix drummondii* and *Salix monticola*), sedges (*Carex spp.*), and riparian grasses including redtop (*Agrostis gigantea*), tufted hairgrass (*Deschampsia cespitosa*), and meadow barley (*Hordeum brachyantherum*). Uplands next to the creek include mixed mountain shrublands, and subalpine fir (*Abies lasiocarpa*) with upland grass species including needlegrasses (*Achnatherum nelsonii* and *Achnatherum lettermanii*), Indian ricegrass (*Achnatherum hymenoides*), and mountain brome (*Bromus marginatus*). Common forbs include Indian paintbrush (*Castilleja* spp.), western coneflower (*Rudbeckia occidentalis* var. *montana*) and the noxious weeds houndstongue (*Hieracium cynoglossoides*), and Canada thistle (*Cirsium arvense*).

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. The proposed action would result in the breaching and draining of beaver

ponds by the use of small explosives. Draining via this method could result in limited disconnection of riparian vegetation on pond margins to the wetted stream. It is likely that ground water is sufficient to maintain willow and other riparian species. There is the potential that invasive weedy species present in the area including houndstongue and Canada thistle could invade drained pond margins thereby expanding weed infestations. This would be limited and upon completion it is anticipated that reintroduced beaver would repair dams and re-flood areas. It is also likely that dam breaching via the proposed method would result in small amounts of riparian vegetation near the dam site being impacted. This could cause mechanical damage to select willows and other riparian species. Damaged riparian vegetation would be expected to begin to resprout and/or recolonize within one year following completion of the Proposed Action.

No Action Alternative. Under the No Action alternative, no physical disturbance to beaver dams would occur and no Rotenone would be applied in East Fork Parachute Creek. No impacts to vegetation would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 3 FOR HEALTHY PLANT COMMUNITIES.

Based on the Roan Cliffs Abbreviated Land Health Assessment, BLM staff concluded that the condition of vegetation on upland terraces adjacent to the riparian zone in Upper East Fork Parachute Creek and Upper JQS Gulch was not meeting Standard 3 (BLM 2014). Causal factors were primarily impacts from livestock grazing and prevalence of noxious weeds. Implementation of the proposed action is not anticipated to have any long-term impacts on vegetative health within the project area.

INVASIVE, NON-NATIVE SPECIES

AFFECTED ENVIRONMENT.

To date, limited weed mapping has occurred on the Roan Plateau. Observations by various BLM specialists have provided most of the information on weed distribution. Within the project area, houndstongue (*Cynoglossum officinale*) is the most prevalent weed. It occurs along most of the drainages within the project area and is scattered in the uplands adjacent to the project site. Biennial thistles including bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), and plumeless thistle (*Carduus acanthoides*), are frequently found in the uplands and drainages. Canada thistle (*Breea arvense*) occurs along almost every riparian reach, sometimes in dense populations, and both Canada thistle and houndstongue occur along most roads on top of the plateau. JQS Gulch and East Fork Parachute Creek within the treatment reach contains large amounts of houndstongue and Canada thistle along the creek and in the uplands adjacent to the creek.

In addition to the noxious weeds discussed above, the fish species brook trout (*Salvelinus fontinalis*) found in East Fork Parachute Creek drainage is a nonnative invasive trout species. The species is the focus of the project as eradication of this fish species is the primary proposed action. Effects to brook trout are discussed in the Aquatic Wildlife section.

Environmental Consequences.

Proposed Action. Where beaver dams are breached or removed and water is drained, it is likely that houndstongue and Canada thistle would increase at these sites. However, beaver reestablishment in the drainage post treatment would limit weed spread as ponds would redevelop and drown out weeds. In areas where beaver dams would not be rebuilt it is unlikely that weeds would become permanently established as these areas would likely experience high spring flow events each year which would scour accumulated sediments and any poorly rooted vegetation (existing weeds) that may be present. Personnel working along the creek could provide a means of weed seed dispersal particularly given that the identified weed species are already present in high densities in the surrounding area. However, this would be minimal given current densities of weeds. Additionally, vehicles and equipment could introduce and spread noxious and invasive weed seeds. This however would be limited given that all equipment would be cleaned and inspected prior to coming onsite (Design Feature #6).

Separate from this action is the treatment of identified weeds within the project area. This work will help to reduce weed infestations associated with this project. Post-construction weed monitoring and treatments would be conducted for three years following treatment. Any Colorado-listed noxious weeds would be promptly treated and controlled according to the appropriate timing for each particular weed species. Staging of vehicles and equipment would try to avoid weed-infested areas.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within JQS Gulch or East Fork Parachute Creek. The elimination of brook trout, a nonnative/invasive fish species, would not occur and the stream reach would not be reclaimed to facilitate stocking of native cutthroat trout.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES - PLANT SPECIES

Affected Environment.

The Endangered Species Act (ESA), as amended (16 U.S.C. 1531-1534) mandates the protection of species listed as threatened or endangered of extinction and the habitats on which they depend. Section 7 of the ESA clarifies the responsibility of federal agencies to utilize their authorities to carry out programs for the conservation of listed species. In addition, federal agencies must consult with the U.S. Fish and Wildlife Service (Service) to ensure that any action authorized, funded or carried out by the agency is "...not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species...". In accordance with *BLM Manual 6840*, the goal of management for BLM sensitive species is to prevent a trend toward federal listing or loss of viability for these species. In addition, BLM manages significant plant communities to protect their habitat and viability. Significant plant communities are defined below.

Table 3 summarizes the 2014 species list from the U. S. Fish and Wildlife Service for Federally listed, proposed, or candidate plant species (USFWS 2014) and the November 2009 Colorado

BLM State Director's Sensitive Species List for BLM sensitive plants (BLM 2009) that may likely occur within the project area or be impacted by the Proposed Action.

Table 3. Special Status Plant Species Potentially Present.

Federally Listed, Proposed or Candidate Plant Species		
Species	**Habitat**	**Potential Habitat Present / Absent**
Colorado hookless cactus (*Sclerocactus glaucus*)	Typically found on rocky hills and alluvial benches in xeric fine-textured soils overlain with cobbles and pebbles. It grows in salt desert shrub and pinyon-juniper communities at elevations ranging from approximately 4,500 to 6,600 feet.	**Absent:** The project area is above the elevational range of this species and no rocky, salt desert shrub habitat is present.
DeBeque phacelia (*Phacelia submutica*)	A rare annual plant restricted to expansive clay soils derived from the Atwell Gulch and Shire Members of the Wasatch Formation in Mesa and Garfield Counties, Colorado. The plant grows on sites that are nearly barren of vegetation.	**Absent:** No exposures of Atwell Gulch or Shire Members of the Wasatch formation present
Parachute penstemon (*Penstemon debilis*)	Endemic to steep, talus slopes on the southern escarpment of the Roan Plateau in Garfield County, Colorado. The plants are found only on the oil-shale rich Parachute Creek Member of the Green River Formation between 8,000 to 9,200 feet in elevation.	**Potential:** The Green River Formation is present within the canyons of East Fork Parachute Creek, but not the specific Parachute Creek Member. No known or expected occurrences of this species.
Ute ladies'-tresses (*Spiranthes diluvialis*)	Habitat for this threatened species is found below 6,500 feet along streams, lakes or in wetland areas with seasonally saturated or subirrigated soils.	**Absent**: The project area is above 8,000 feet, well above the upper elevational range for this species.
BLM Sensitive Plant Species		
Species	**Habitat**	**Potential Habitat Present/Absent**
Cathedral Bluffs meadowrue (*Thalictrum heliophilum*)	Known from 18 occurrences in Garfield, Mesa and Rio Blanco Counties. The meadowrue is a narrowly endemic plant found in dry shale barren communities between 6,200 and 8,800 feet in elevation.	**Potential:** No dry shale barrens present in the immediate project area. No occurrences of this species documented here.
DeBeque milkvetch (*Astragalus debequaeus*)	Found only on the Wasatch Formation in the vicinity of DeBeque and Rulison, Colorado. Plants are common on the Atwell Gulch Member of the Wasatch Formation but are rare elsewhere. Elevations of known populations are between 5,100 and 6,400 feet.	**Absent:** The project area is above the elevational range of this species and has no exposures of the Atwell Gulch Member of Wasatch Formation.

Harrington's penstemon (*Penstemon harringtonii*)	Open sagebrush communities on rocky loam or rocky clay loam soils between the elevations of 6,200 to 10,000 feet.	**Absent:** No known populations or suitable soils exist on the Roan Plateau.
Naturita milkvetch (*Astragalus naturitensis*)	Occurs on sandstone mesas, ledges, crevices, and slopes in pinyon-juniper woodlands at elevations from 5,000 to 7,000 feet. It grows in areas of shallow soils over exposed bedrock. Naturita milkvetch has been found in several locations on the western end of the CRVFO.	**Absent:** Site is above the elevational range of this species and no sandstone rimrock or ledges present
Piceance bladderpod (*Lesquerella parviflora*)	A Colorado endemic known only in Garfield, Mesa, and Rio Blanco Counties. It occurs on shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas at elevations ranging from 6,200 to 8,600 feet.	**Potential:** Shale outcrops of the Green River Formation are present, but no occurrences of Piceance bladderpod have been documented anywhere in East Fork Parachute Creek.
Roan Cliffs blazing star (*Mentzelia rhizomata*)	Found only on steep talus slopes of the Green River Formation in Garfield County. The species occurs on eroding oil shale at elevations from 5,800 to 9,000 feet. In the CRVFO, the Roan Cliffs blazing star is known to occur on talus slopes below the cliffs of the Roan Plateau and along upper Parachute Creek and East Fork Parachute Creek drainage.	**Potential:** This species has been documented along lower East Fork Parachute Creek, but the proposed action should not disturb the talus cliff faces so should not affect this species.

Comprehensive surveys for special status plants were completed in the Roan Plateau area in 1995 and 1996.

Significant Plant Communities. Significant plant communities include communities that are (1) globally rare, (2) rare within Colorado, or (3) substantially unaltered by human activity. The first two categories include plant communities in which the individual species may not be rare, but the particular combination of species is rare or uncommon. The third category includes native plant communities that are relatively undisturbed and contain few non-native species. Three significant plant communities occur either within the project area or downstream of the project area and may be potentially affected by the proposed action. These communities are the hanging garden sullivantia, the Colorado blue spruce/red-osier dogwood, and the Boxelder/narrowleaf cottonwood/red-osier dogwood riparian communities.

Hanging garden sullivantia – A Colorado endemic, this species is restricted to "hanging gardens" with a substrate of Green River Formation shale. These gardens occur where moisture seeps between layers of shale or in proximity to waterfalls. While the species is known from several occurrences in five counties in western Colorado, 62 percent of the occurrences are on the Roan Plateau. This species is most abundant on the East Fork Parachute Creek and its tributaries as well as in Northwater Creek Canyon. These populations appear stable and secure because their relative inaccessibility on steep cliffs protects them from surface disturbances, grazing, and noxious weed invasion. However, any physical disturbance to the cliffs, or changes to the local

hydrological processes that support the species' habitat, could have adverse effects on these populations.

Colorado blue spruce/red-osier dogwood – Approximately one mile above the waterfall in East Fork Parachute Creek, the canyon narrows and the riparian vegetation changes from willow-dominated communities to communities dominated by spruce and fir. The Colorado blue spruce/red-osier dogwood plant community is found in only a handful of riparian areas in Colorado. The community along East Fork Parachute Creek is in good condition.

Boxelder/narrowleaf cottonwood/red-osier dogwood – Below the waterfall, the streambed drops approximately 200 vertical feet and riparian vegetation changes to a more low-elevation community of boxelder, narrowleaf cottonwood, and red-osier dogwood. This community is considered rare on a global and statewide scale. East Fork Parachute Creek contains an excellent example of this rare community type.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Due to the absence of any occupied or suitable habitat for threatened or endangered plant species within the project vicinity, the project would have "No Effect" on any federally listed plant species. Although there is occupied and potential habitat for BLM sensitive plants in the talus slopes along the margins of East Fork Parachute Creek, the draining of the beaver ponds via targeted blasting of the dams is not anticipated to cause physical disturbance of the talus slopes or canyon walls.

The hanging garden sullivantia significant plant community is found along the canyon walls of East Fork Parachute Creek and its tributaries within and below the project area. Breaching of the beaver dams may create a short-term pulse of sediment and high water flows through East Fork Parachute Creek which may temporarily bury or inundate some of the hanging gardens. Draining of the beaver dams would mimic a high run-off or large thunderstorm event that might temporarily breach beaver dams under natural conditions. Effects would be short-term and any impacted plant populations would be expected to recover quickly. The proposed action would not affect the subsurface hydrology of the watershed that creates the seeps that support the hanging garden sullivantia, so there should be no long-term direct or indirect impacts to these species.

The Colorado blue spruce/red-osier dogwood community and the boxelder/narrowleaf cottonwood/red-osier dogwood community are found in lower East Fork Parachute Creek more than 3 miles downstream of the project area. The elevated water flows, sediment loads, and woody debris generated by breaching of the dams should effectively move through the system or be filtered out by the concrete fish barrier prior to reaching these significant plant communities. Inundation or burying of vegetation should be minimal. Effects would be short-term and would be indistinguishable from natural flooding events.

The chemical treatment with Rotenone would have no impacts to any special status plants or significant plant communities.

No Action Alternative. Under the No Action alternative, no physical disturbance to beaver dams would occur and no Rotenone would be applied in East Fork Parachute Creek. No impacts to any special status plants or significant plant communities would result.

Analysis of Public Land Health Standard 4 for Threatened, Endangered, and other Special Status Plants.

A formal land health assessment was conducted on the landscape which includes the project area in 2013. The hanging garden sullivantia significant plant communities were in a healthy and robust condition at all sites sampled. There were no other known special status plants within the project area. Land Health Standard 4 for special status plants was being achieved within the project area and should continue to be achieved with the Proposed Action.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES - AQUATIC WILDLIFE

Affected Environment.

Table 4 summarizes the latest species list (USFWS 2014) from the U. S. Fish and Wildlife Service for Federally listed, proposed, or candidate aquatic wildlife species and Colorado BLM State Director's Sensitive Species List for aquatic species; that may occur within the CRVFO and be impacted by the proposed action. The only species present and affected by the proposed action is Colorado River cutthroat trout.

Table 4. Special Status Aquatic Wildlife Species.

Federally Listed, Proposed or Candidate Aquatic Wildlife Species		
Species	Habitat/Range	Occurrence/ Potentially Impacted
Greenback cutthroat trout *(Oncorhynchus clarkii stomias)*	Federally listed as threatened. The true greenback is the subspecies of cutthroat trout native to the Platte River drainage on the Eastern Slope of Colorado, while the Colorado River cutthroat trout (Green Lineage) is the cutthroat trout native to the project area. Historically found in cold, clear, gravely headwater streams and mountain lakes of the South Platte River system in Colorado and part of Wyoming. Until such time as USFWS makes a call on recent genetics changes in cutthroat trout in CO, the Green Lineage fish are being considered as Threatened. The nearest Green Lineage population is located across the CO River in Beaver Creek and Cache Creek.	Absent /No

Bonytail *(Gila elegans)*	Federally listed as endangered. This large chub is a member of the minnow family found in large, fast-flowing waterways of the Colorado River system. Their current distribution and habitat status are largely unknown due to its rapid decline prior to research into its natural history. The bonytail is extremely rare in Colorado and no self-sustaining population exists. Only one has been captured in the state since 1980.	Absent /No
Colorado pikeminnow (formerly Colorado squawfish) *(Ptychocheilus lucius)*	Federally listed as endangered. Primarily exists in the Green River below the confluence with the Yampa River, the lower Duchesne River in Utah, the Yampa River below Craig, Colo., the White River from Taylor Draw Dam near Rangely downstream to the confluence with the Green River, the Gunnison River in Colorado, and the Colorado River from Palisade, Colo., downstream to Lake Powell. Colorado pikeminnow populations in the upper Colorado River basin are now relatively stable or growing. Designated Critical Habitat includes the Colorado River and its 100-year floodplain west (downstream) from the town of Rifle.	Absent /No
Humpback chub *(Gila cypha)*	Federally listed as endangered. Found in deep, clear to turbid waters of large rivers and reservoirs over mud, sand or gravel. The nearest known population of humpback chub is in the Colorado River at Black Rocks west of Grand Junction.	Absent /No
Razorback sucker *(Xyrauchen texanus)*	Federally listed as endangered. The razorback sucker was once widespread throughout most of the Colorado River Basin from Wyoming to Mexico. In the upper Colorado River Basin, they are now found only in the upper Green River in Utah, the lower Yampa River in Colorado and occasionally in the Colorado River near Grand Junction. Because so few of these fish remain in the wild, biologists have been actively raising them in hatcheries in Utah and Colorado and stocking them in the Colorado River. Designated Critical Habitat for the razorback sucker includes the Colorado River and its 100-year floodplain west (downstream) from the town of Rifle.	Absent /No
Colorado BLM Sensitive Aquatic Species		
Species	Habitat/Range	Occurrence / Potentially Impacted
Northern leopard frog (*Rana pipiens)*	Generally found between 3,500 to 11,000 feet, in wet meadows and in shallow lentic habitats. They require year-round water sources, deep enough to provide ice free refugia in the winter. Within the CRVFO, this species has been documented in locales where quality riparian vegetation exists in conjunction with perennial water sources. Larger populations of this species have been documented northwest of King Mountain within the small drainage that feeds King Mountain (Ligon) Reservoir, June Creek and East Divide Creek south of Silt, Colorado, and in portions of the Rifle Creek watershed north of Rifle, Colorado.	Absent/No

Great Basin spadefoot toad (*Spea intermontana).*	This toad is known to occupy a wide variety of habitat including lowlands, foothills, and shortgrass plain. This species generally inhabits and breeds in seasonal pools and ponds in pinyon-juniper woodland, sagebrush, and semi-desert shrubland habitats, mostly below 6,000 feet in elevation.	Absent /No
Boreal Toad *(Bufo boreas boreas)*	The distribution of the boreal toad is restricted to areas with suitable breeding habitat in spruce-fir forests and alpine meadows generally between 7,500 and 12,000 feet elevation. Breeding habitat includes lakes, marshes, ponds, and bogs with sunny exposures and quiet shallow water. The CRVFO has potential habitat but no known populations.	Absent /No
Bluehead sucker (*Catostomus discobolus*) , Flannelmouth sucker (*Catostomus latipinnis), and* Roundtail chub (*Gila robusta)*	Primarily found in larger rivers but may also be found in smaller tributaries with good connectivity to larger river systems. These fish are endemic to the Colorado River basin and reside within the mainstem Colorado River and its major tributary streams. Given their biology, feeding habits, habitat needs, and niche in the ecosystem, these species can persist in the face of actions that increase sediments to streams and rivers containing these species.	Absent /No
Mountain sucker (*Catostomus platyrhynchus*)	The mountain sucker is found primarily in small, low- mid elevation streams in northwestern Colorado with gravel, sand or mud bottoms. They inhabit undercut banks, eddies, small pools, and areas of moderate current. Young fish prefer backwaters and eddies. A population of mature adults is found in Steamboat Lake. Within the CRVFO, only known occurrence is in Piceance Creek.	Absent /No
Colorado River cutthroat trout (CRCT) (*Oncorhynchus clarkii pleuriticus)*	CRCT are one of three subspecies of native trout found in Colorado. CRCT prefer clear, cool headwaters streams with coarse substrates, well-distributed pools, stable streambanks, and abundant stream cover. CRCT (Blue Lineage) are found in very limited numbers in the treatment reach. CRCT Blue Lineage are native to the White-Yamp river basins, but have been stocked extensively across the state. The native cutthroat to the project vicinity is CRCT Green Lineage, currently considered a Threatened species by USFWS.	Present /Yes

JQS Gulch and East Fork Parachute Creek contain a very small interconnected genetically pure population of Colorado River cutthroat trout – Blue Lineage, a BLM sensitive species. Although residing outside of the historic range of this lineage, genetically pure populations are still of conservation value. None of the other special status aquatic species are within the direct or indirect influence area of the proposed action.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Due to the absence of any occupied or suitable habitat within the project vicinity, and the proposed actions not having any indirect or cumulative effects, the project would have "No Effect" on any federally Threatened, Endangered, or Proposed aquatic species

or their habitats.

The CPW activities as described in the Proposed Action could result in the direct mortality of up to an anticipated 15 individual cutthroat trout. Based on population estimates, it is anticipated that no more than 15 individuals reside in the treatment reach as the stream is currently dominated by nonnative brook trout. Given the small densities of cutthroat remaining in the reach, salvage of cutthroat prior to treatment would be infeasible. Upon successful reclamation, CPW will restock the treated reach above the barrier with appropriate lineage cutthroat trout likely beginning in the spring of 2015 or 2016. This would allow sufficient time for aquatic insects impacted within the treatment reach to recolonize the area from stream reaches below the treatment area to provide a food source for stocked fish.

No Action Alternative. Under the No Action alternative, a PUP would not be issued and no chemical reclamation of East Fork Parachute Creek would occur. The stream would eventually be completely taken over by nonnative brook trout and cutthroat trout would not persist in the system.

Analysis of Public Land Health Standard 4 for Threatened, Endangered, and other Special Status Aquatic Wildlife.

The Roan Cliffs landscape was initially assessed in 1999, with an additional partial land health assessment conducted in 2013. The most recent assessment found mixed results across the Roan Cliffs landscape, with 7 miles of BLM streams meeting Standard 4, 10.5 miles of streams not meeting Standard 4 due to the presence nonnative brook trout, and 2.1 miles not meeting Standard 4 due to poor habitat conditions. Natural flow regimes limited fish occupancy in the remaining 5.5 miles. None of the stream habitat in East Fork Parachute Creek Drainage meets Standard 4, with 7.6 miles limited by nonnative brook trout and 0.3 miles limited by poor habitat conditions. However, the 7.6 miles limited by nonnative species meets the requirements of Indicator Two of Section Four, stating that waters within the East Fork Parachute Creek drainage are suitable and available for recovery of endemic and protected species. The proposed action would be a significant step towards meeting this standard, as the presence of brook trout is the major limiting factor. Future stocking of pure cutthroat trout is planned upon successful reclamation which would result in the meeting of Land Health Standard 4.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES - TERRESTRIAL WILDLIFE

Affected Environment.

Table 5 summarizes the latest species list (USFWS 2014) from the U. S. Fish and Wildlife Service for federally listed, proposed, or candidate terrestrial wildlife species and Colorado BLM State Director's Sensitive Species List (November 2009) for terrestrial species that may occur within the CRVFO and be impacted by the proposed action.

Table 5. Special Status Terrestrial Wildlife Species.

Federally Listed, Proposed or Candidate Terrestrial Wildlife Species		
Species	Information/Range/Habitat Description	Occurrence/ Impacted
Black-footed Ferret (*Mustela nigripes*)	Federally listed as endangered. Black-footed ferrets have ranged statewide but never have been abundant in Colorado. Their habitat included the eastern plains, the mountain parks and the western valleys – grasslands or shrub lands that supported some species of prairie dog, the ferret's primary prey. State and federal biologists have established two major black-footed ferret colonies: one at Coyote Basin (Colorado-Utah border west of Rangely, CO) and another at the BLM's Wolf Creek Management Area southeast of Dinosaur National Monument.	Absent /No
Canada lynx (*Lynx Canadensis)*	Federally listed as threatened. Canada lynx occupy high-latitude or high-elevation coniferous forests characterized by cold, snowy winters and an adequate prey base. In the western US, lynx are associated with mesic forests of lodgepole pine, subalpine fir, Engelmann spruce, and quaking aspen in the upper montane and subalpine zones, generally between 8,000 and 12,000 feet in elevation. Although snowshoe hares (*Lepus americanus*) are the preferred prey, lynx in also feed on mountain cottontails (*Sylvilagus nuttallii*), pine squirrels (*Tamiasciurus hudsonicus*), and blue grouse (*Dendragapus obscurus*). The Forest Service has mapped suitable denning, winter, and other habitat for lynx within the White River and Routt National Forests. The mapped suitable habitat comprises areas known as Lynx Analysis Units (LAUs) that are the approximate the size of a female's home range. Several LAUs include small parcels of BLM lands.	Absent /No
Mexican spotted owl *(Strix occidentalis lucida)*	Federally listed as endangered. This owl nests, roosts, and hunts in mature coniferous forests in canyons and foothills. The key habitat components are old-growth forests with uneven-age stands, high canopy closure, high tree density, fallen logs and snags. The only extant populations in Colorado are in the Pikes Peak and Wet Mountain areas of south-central Colorado and the Mesa Verde area of southwestern Colorado.	Absent /No
Greater Sage-grouse (*Centrocercus urophasianus)*	Candidate for Federal listing. Sage-grouse, as the name implies, are found only in areas where sagebrush is abundant, providing both food and cover. Sage-grouse prefer relatively open sagebrush flats or rolling sagebrush hills. In winter, sagebrush accounts for 100% of the diet for these birds. In addition, it provides important escape cover and protection from the elements. In late winter, males begin to concentrate on traditional strutting grounds or leks. Females arrive at the leks 1-2 weeks later. Leks can occur on a variety of land types or formations (windswept ridges, knolls, areas of flat sagebrush, flat bare openings in the sagebrush. Breeding occurs on the leks and in the adjacent sagebrush, typically from March through May. Females and their chicks remain largely dependent on forbs and insects for food well into early fall. Within the CRVFO sage-grouse are still present in the northeast part of the	Absent /No

	Field Office in the Northern Eagle/Southern Routt population, while small (<500 birds), probably has, or had, a relationship with the larger population in Moffat, Rio Blanco and western Routt counties, and probably with the Middle Park population to the east. (additional information provided below).	
Yellow-billed cuckoo *(Coccyzus americanus)*	Candidate for Federal listing. This secretive species occurs in mature riparian forests of cottonwoods and other large deciduous trees with a well-developed understory of tall riparian shrubs. Western cuckoos breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* sp.). A few sightings of yellow-billed cuckoo have occurred in western Colorado along the Colorado River near Grand Junction.	Absent /No
Uncompahgre fritillary butterfly *(Boloria acrocnema)*	Federally listed as endangered. The butterfly has been verified at only two areas in the San Juan Mountains in Colorado. There is anecdotal evidence of other colonies in the San Juans and southern Sawatch ranges in Colorado. The butterfly exists above treeline on north and east facing slopes in patches of its larval host plant, snow willow. The greatest threat is butterfly collecting. Climatological patterns, disease, parasitism, predation, and trampling of larvae by humans and livestock pose additional threats.	Absent /No
Colorado BLM Sensitive Terrestrial Wildlife Species		
Species	Information/Range/Habitat Description	Occurrence/ Impacted
Townsend's big-eared bat (*Corynorhinus townsendii*) and Fringed myotis (*Myotis thysanodes)*	Occur as scattered populations at moderate elevations on the western slope of Colorado. Habitat associations are not well defined. Both bats will forage over water and along the edge of vegetation for aerial insects. These bats commonly roost in caves, rock crevices, mines, buildings or tree cavities. Both species are widely distributed and usually occur in small groups. Townsend's big-eared bat is not very abundant anywhere in its range. This is attributed to patchy distribution and limited availability of suitable roosting habitat (Gruver, J.C. and D.A. Keinath 2006).	Absent /No
Midget faded rattlesnake *(Crotalus viridis concolor)*	A small, pale-colored subspecies of the common and widespread western rattlesnake. The midget faded rattlesnake is endemic to northwestern Colorado, including western Garfield County. Habitats include sandy and rocky areas in pinyon-juniper and semi-desert shrub.	Absent /No
Northern goshawk (*Accipter gentilis)*	An uncommon resident in mountains. Occasional migrant that may winter at lower elevations. Predominantly uses mature stands of aspen, and ponderosa/ lodgepole pines. Goshawks prey on small-medium sized birds and mammals. It breeds in coniferous deciduous and mixed forests. The nest is typically located on a northerly aspect in a drainage or canyon and is often near a stream. Nest areas contain one or more stands of large, old trees with a dense canopy cover. A goshawk pair occupies its nest area from March until late September. The nest area is the center of all movements and behaviors associated with breeding	Unlikely/No

	from courtship through fledging.	
Goldeneye, Barrow's (*Bucephala islandica)*	This bird is an uncommon winter resident and spring/fall migrant. A few may breed in the northern mountains such as the Flat Tops Wilderness Area. Goldeneye's prefer alkaline-freshwater lakes in parkland areas and to a lesser extent subalpine/alpine lakes/beaver ponds for breeding.	Absent /No
Brewer's sparrow (*Spizella berweri*)	Neotropical migrant that summers in western Colorado mountain parks and spring/fall migrant at lower elevations. A sagebrush shrubland obligate with an apparently secure conservation status in Colorado.	Absent /No
American Peregrine Falcon *(Falco peregrines anatum)*	Rare spring and fall migrant in western valleys. Peregrine falcons inhabit open spaces associated with high cliffs and bluffs overlooking rivers. The falcon nests on high cliffs and forages over nearby woodlands.	Absent /No
Ibis, white-faced (*Plegadis chihi)*	The species inhabits primarily freshwater wetlands, especially cattail (*Typha* spp.) and bulrush (*Scirpus* spp.) marshes. This bird is a very rare, non-breeding, summer migrant to western Colorado valleys and mountain lakes This species feeds in flooded hay meadows, agricultural fields, and estuarine wetlands. This species breeds in isolated colonies in mainly shallow marshes with "islands" of emergent vegetation. This species is more commonly found on the eastern slope of Colorado (e.g. San Luis valley).	Absent /No

The only special status terrestrial species that reside in or near the project area include the Northern goshawk, American peregrine falcon, and greater sage grouse. Peregrine falcons are known to nest on the cliff bands on the edge of the plateau within 1.5 miles of the East Fork Parachute Creek drainage. Northern goshawk habitat is found within the project area as conifer and aspen habitats exist adjacent to the stream reach on north facing slopes. No known nests sites exist in the project vicinity. Greater sage grouse habitat is mapped for a portion of the ridge-tops within 1 mile of the treatment reach. A radio-collared male was detected within 2 miles of the treatment reach in 2010.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Due to the absence of any occupied or suitable habitat within the project vicinity, and the proposed actions not having and indirect or cumulative effects, the project would have "No Effect" on any federally Threatened, Endangered, or Proposed terrestrial species or their habitats.

Within the past few years, Colorado Parks and Wildlife (CPW) has mapped the entire top of the Roan Plateau as general habitat for the greater sage-grouse, based on monitoring of one radio tagged male bird and incidental observations of other individuals. Telemetry data collected by CPW indicate use by one individual of mixed sagebrush-grassland-snowberry habitats along the rim of the Roan Cliffs throughout the summer (May to late August) in 2006. Incidental observations have occurred in the northern part of the planning area, where sagebrush-covered ridges are broader, less dissected, and contiguous with more extensive sagebrush habitat north of the project area in the WRFO.

The small population on the top of the plateau falls within the Parachute-Piceance-Roan population. In this area, virtually all seasonal use takes place on relatively narrow mid-elevation ridges north of the project area, with movement to higher elevations such as the Roan Plateau through the brood-rearing and general summer-use periods. The majority of the summer use by greater sage-grouse would occur on the ridge tops within the mountain sage and missed mountain shrub community and not in the steep drainages such as where the proposed action would take place. Due to this information, the proposed action would have No Effect on greater sage-grouse or their habitats.

Northern goshawk, American peregrine falcon:
The proposed chemical treatment of JQS Gulch and East Fork Parachute Creek to the barrier would have no impacts to any of these bird species, other than it could result in displacement away from the treatment area due to human presence during the treatment. By August, most young birds would have fledged and will be mobile and able to move away from areas of human use, or would have moved out of the area already.

Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds would contain rotenone residues from this use. Exposure to rotenone could occur to select bird species through direct contact, ingestion of treated water, and consumption of aquatic organisms killed by rotenone. Finlayson et al. (2000) found that any wildlife which happens to consume water or dead fish treated with rotenone will not be adversely affected. All birds and mammals have enzymes in the digestive tract that neutralize rotenone. Also, rotenone residues in dead fish are generally very low (<0.1 ppm) and not readily absorbed through the gut of the animal eating fish. Birds and mammals that eat dead fish and drink treated water would not be affected. Finlayson et al. (2000) also found that a bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within a 24-hour period to receive a lethal dose of rotenone. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily. Also after its release, rotenone rarely persists more than a few weeks in the environment. Therefore, there would be no effect to birds and mammals from consuming water treated with rotenone or dead fish containing rotenone. Rotenone would be applied directly to the water's surface. Therefore, the only likely route of exposure to rotenone for terrestrial wildlife would be through consuming water or dead fish treated with rotenone. Because birds and mammals are not adversely affected by consuming water or dead fish treated with rotenone, there will be no further discussion regarding toxicity in this document.

Rotenone "is highly toxic to fish and other aquatic life, but has low toxicity to birds and mammals" (Ling 2003). Ling (2003) also states, "Most mammal species are relatively resistant to rotenone," "rotenone is not easily absorbed in higher animals and does not accumulate in the body," and "Birds and mammals are much less sensitive to rotenone than are fish and aquatic invertebrates and poisoning caused by drinking treated water or eating poisoned fish is extremely unlikely".

No Action Alternative. Under the No Action alternative, a PUP would not be issued and no chemical reclamation of East Fork Parachute Creek would occur. No impacts to any special status terrestrial species or their habitats would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 4 FOR THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS TERRESTRIAL WILDLIFE.

The Roan Cliffs landscape was initially assessed in 1999, with an additional partial land health assessment conducted in 2013. The most recent assessment found that Standard 4 was not met for greater sage grouse, due to a stable or slightly declining population as well as a lack of suitable habitat for recovery. Livestock grazing and nonnative plant species are thought to be the major contributing factors, as both reduce required cover and diversity of native plant species and their associated insect communities. Additionally, Standard 4 was also not met for Brewer's sparrow due to lack of suitable habitat. Standard 4 was met for two species of bat (Townsend's big-eared and fringed myotis) as well the northern goshawk. This is largely because primary habitats for all three species are not thought to exist within the assessment area. The proposed action would not have an impact on Standard 4 for any of the special status terrestrial wildlife species.

MIGRATORY BIRDS

AFFECTED ENVIRONMENT.

BLM Instruction Memorandum No. 2008-050 provides guidance toward meeting the Bureau of Land Management's (BLM) responsibilities under the Migratory Bird Treaty Act (MBTA) and the Executive Order (EO) 13186. The guidance directs Field Offices to promote the maintenance and improvement of habitat quantity and quality. To avoid, reduce or mitigate adverse impacts on the habitats of migratory bird species of conservation concern to the extent feasible, and in a manner consistent with regional or statewide bird conservation priorities.

The MBTA prohibits the "take" of a protected species. Under the Act, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The USFWS interprets "harm" and "kill" to include loss of eggs or nestlings due to abandonment or reduced attentiveness by one or both adults as a result of disturbance by human activity, as well as physical destruction of an occupied nest.

The 1988 amendment to the Fish and Wildlife Conservation Act mandates the USFWS to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973." The "*Birds of Conservation Concern 2008*" (USFWS 2008) is the most recent effort to carry out this mandate. The conservation concerns are the result of population declines - naturally or human-caused, small ranges or population sizes, threats to habitat, or other factors. Although there are general patterns that can be inferred, there is no single reason why any species was on the list. Habitat loss is believed to be the major reason for the declines of many species. When considering potential impacts to migratory birds the impact on habitat, including: 1) the degree of fragmentation/connectivity expected from the proposed project relative to before the proposed project; and 2) the fragmentation/connectivity within and between habitat types (e.g., within nesting habitat or between nesting and feeding habitats. Continued private land

development, surface disturbing actions in key habitats (e.g. riparian areas) and the proliferation of roads, pipelines, powerlines and trails are local factors that reduce habitat quality and quantity for many species.

The Colorado River Valley Field Office (CRVFO) is within the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR). The 2008 list of Birds of Conservation Concern are described in Table 4.

Table 6. 2008 List of Birds of Conservation Concern within the CRVFO.

Species	Information/Range/Habitat Description	Occurrences/ Potentially Impacted
Gunnison sage-grouse *(Centrocercus minimus)*	Sagebrush communities for hiding and thermal cover, food, and nesting; open areas with sagebrush stands for leks; sagebrush-grass-forb mix for nesting; wet meadows for rearing chicks. Not found within the CRVFO.	Not Present/No
American bittern *(Botaurus lentiginosus)*	Inhabits marshes and wetlands; ground nester. Summer resident in Colorado.	Not Present/No
Bald eagle *(Haliaeetus leucocephalus)*	Bald eagles were removed from the federal threatened and endangered species list in 2007 but are still protected under the MBTA. Bald eagles occasionally summer in this region but usually winter (mid-Nov. to mid-April) along portions of the Colorado, Eagle and Roaring Fork Rivers and their major tributaries. Large mature cottonwood trees along the rivers and their major tributaries are used as roosting and perching sites, and these waterways provide the main food sources of fish and waterfowl. Upland habitats adjacent to these waterways are used as scavenging areas.	Not Present/No
Ferruginous hawk *(Buteo regalis)*	Open, rolling and/or rugged terrain in grasslands and shrubsteppe communities; also grasslands and cultivated fields; nests on cliffs and rocky outcrops. Fall/winter resident, non-breeding.	Not Present/No
Golden eagle *(Aquila chrysaetos)*	Open country, grasslands, woodlands, and barren areas in hilly or mountainous terrain; nests on rocky outcrops or large trees. Year-round resident, breeding.	Irregular/No
Peregrine falcon *(Falco peregrines)*	Open country near cliff habitat, often near water such as rivers, lakes, and marshes; nests on ledges or holes on cliff faces and crags. Spring/summer resident, breeding.	Irregular in the Anvil Points area/No
Prairie falcon *(Falco mexicanus)*	Open country in mountains, steppe, or prairie; winters in cultivated fields; nests in holes or on ledges on rocky cliffs or embankments. Spring/summer resident, breeding.	Not Present/No
Snowy plover *(Charadrius alexandrinus nivosus/tenuirostris)*	Sparsely vegetated sand flats associated with pickleweed, greasewood, and saltgrass. Spring migrant, non-breeding. Spring migrant, non-breeding.	Not Present/No
Mountain plover *(Charadrius montanus)*	High plain, cultivated fields, desert scrublands, and sagebrush habitats, often in association with heavy grazing, sometimes in association with prairie dog colonies; short	Not Present/No

Species	Information/Range/Habitat Description	Occurrences/ Potentially Impacted
	vegetation.	
Long-billed curlew *(Numenius americanus)*	Lakes and wetlands and adjacent grassland and shrub communities. Spring/fall migrant, non-breeding.	Not Present/No
Burrowing owl *(Athene cunicularia)*	Open grasslands and low shrublands often in association with prairie dog colonies; nests in abandoned burrows created by mammals; short vegetation.	Not Present/No
Lewis's woodpecker *(Melanerpes lewis)*	Open woodland, often logged or burned, including oak, coniferous forest (often ponderosa), riparian woodland, and orchards, less often in pinyon-juniper.	Not Present/No
Willow flycatcher *(Empidonax traillii)*	Riparian and moist, shrubby areas; winters in shrubby openings with short vegetation. Fairly common summer resident in open valleys and mountain parks, breeding.	Possible/No
Gray vireo *(Vireo vicinior)*	Uncommon summer resident (primarily Mesa County). In habitats open pinyon-juniper woodlands.	Not Present/No
Pinyon jay *(Gymnorhinus cyanocephalus)*	Common to abundant resident of pinyon-juniper woodlands. Year-round resident that travels broadly in flocks.	Not Present/No
Juniper titmouse *(Baeolophus ridgwayi)*	Pinyon-juniper woodlands, especially juniper; nests in tree cavities. Requires mature tree cavities for nesting and roosting. Year-round resident, breeding.	Not Present/No
Veery *(Catharus fuscescens)*	Dense riparian thickets and hillside brush near streams. Uncommon spring/fall migrant in Eastern Colorado.	Not Present/No
Bendire's thrasher *(Toxostoma bendirei)*	Desert, especially areas of tall vegetation, cholla cactus, creosote bush and yucca, and in juniper woodland Possible summer resident.	Not Present/No
Grace's warbler *(Dendroica graciae)*	Breeds in ponderosa pine forests. Uncommon summer resident in southwest Colorado.	Not Present/No
Grasshopper sparrow *(Ammodramus savannarum)*	Open grasslands and cultivated fields. Uncommon, non-breeding spring migrant in western Colorado and common summer resident in eastern Colorado.	Not Present/No
Chestnut-collared longspur *(Calcarius ornatus)*	Open grasslands and cultivated fields. Uncommon, non-breeding spring migrant in western Colorado and common summer resident in eastern Colorado.	Not Present/No
Black rosy-finch *(Leucosticte atrata)*	Open country including mountain meadows, high deserts, valleys. Breeds/nests in alpine areas near rock piles and cliffs. Irregular to rare winter resident, non-breeding.	Not Present/No
Brown-capped rosy-finch *(Leucosticte australis)*	Summer resident/breeding in alpine meadows, cliffs, and talus and high-elevation parks and valleys. Irregular to rare winter resident in lower mountain areas.	Not Present/No
Cassin's finch *(Carpodacus cassinii).*	Open montane coniferous forests; breeds/ nests in coniferous forests. Year-round resident, breeding.	Not Present/No
Yellow-billed cuckoo	See Threatened, Endangered and Sensitive Species – Terrestrial Wildlife	

Species	Information/Range/Habitat Description	Occurrences/ Potentially Impacted
(Coccyzus americanus)		
Brewer's sparrow *(Spizella breweri)*	See Threatened, Endangered and Sensitive Species – Terrestrial Wildlife	

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. The proposed action would result in minimal ground disturbance and limited noise. All work would be done within 3-5 days via personnel on foot. Work would be done outside of the nesting season for migratory birds and the only potential impacts would be limited displacement of birds from near the stream due to human presence associated with the treatment.

Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds would contain rotenone residues from this use. Exposure to rotenone could occur to select bird species through direct contact, ingestion of treated water, and consumption of aquatic organisms killed by rotenone. Finlayson et al. (2000) found that any wildlife which happens to consume water or dead fish treated with rotenone will not be adversely affected. All birds and mammals have enzymes in the digestive tract that neutralize rotenone. Also, rotenone residues in dead fish are generally very low (<0.1 ppm) and not readily absorbed through the gut of the animal eating fish. Birds and mammals that eat dead fish and drink treated water would not be affected. Finlayson et al. (2000) also found that a bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within a 24-hour period to receive a lethal dose of rotenone. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily. Also after its release, rotenone rarely persists more than a few weeks in the environment. Therefore, there would be no effect to birds and mammals from consuming water treated with rotenone or dead fish containing rotenone. Rotenone would be applied directly to the water's surface. Therefore, the only likely route of exposure to rotenone for terrestrial wildlife would be through consuming water or dead fish treated with rotenone. Because birds and mammals are not adversely affected by consuming water or dead fish treated with rotenone, there will be no further discussion regarding toxicity in this document.

Rotenone "is highly toxic to fish and other aquatic life, but has low toxicity to birds and mammals" (Ling 2003). Ling (2003) also states, "Most mammal species are relatively resistant to rotenone," "rotenone is not easily absorbed in higher animals and does not accumulate in the body," and "Birds and mammals are much less sensitive to rotenone than are fish and aquatic invertebrates and poisoning caused by drinking treated water or eating poisoned fish is extremely unlikely".

It is possible that insectivorous birds could be impacted by a reduction in stream insects due to the chemical treatment. This would be site specific and non-treated areas downstream would still produce bugs. Foraging areas would be altered as birds would have to move in order to find prey. The overall effect for migratory birds is expected to be short-term and negligible.

Therefore, the proposed action may slightly affect individuals but is unlikely to have a measurable impact on species or populations or their viability on a landscape scale.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP on East Fork Parachute Creek. Impacts to some bird species would continue and possibly increase as brook trout would continue to out-compete native cutthroat trout and dominate the stream. The replacement of native cutthroat trout with brook trout would result in an alteration of the stream's food chain and food web which would impact the assemblage, abundance, and diversity of aquatic based food resources for select insect eating bird species.

WILD AND SCENIC RIVERS

AFFECTED ENVIRONMENT.

The proposed treatment is located within the river corridors of East Fork Parachute Creek, First Anvil Creek, Second Anvil Creek, Golden Castle Gulch, and JQS Gulch. All five of these river segments were found eligible for inclusion in the National Wild and Scenic Rivers System under the Roan Plateau Eligibility Report for the National Wild and Scenic Rivers System (2002). These stream segments have tentative classifications of wild, scenic, and recreational. All have met the free-flowing criteria. East Fork of Parachute Creek has outstanding remarkable values (ORVs) of Fish, Botanical/Ecological, and Scenic. The Scenic ORV is for the falls and the canyon to the west. The Fish ORV refers to the native, genetically pure, and naturally reproducing Colorado River cutthroat trout populations and quality habitat necessary to support and sustain Colorado River cutthroat trout. The botanical/ecological ORV is for several indigenous plant communities considered rare or imperiled within Colorado and/or contain hanging garden environments for the endemic hanging garden sullivantia. First Anvil Creek, Golden Castle Gulch, and JQS Gulch have ORVs of fish and botanical/ecological. Second Anvil Creek has an ORV of botanical/ecological.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Section 16(b) of the Wild and Scenic Rivers Act defines free flowing as "existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway." Beaver dams are temporary structures that sit within the waterway, and they are not part of the permanent waterway (the bed and banks of the stream). The Proposed Action would not permanently alter either the bed or banks. The proposed breaching of dams via the use of small blasting devices would not modify the beds and banks of the stream. If some modification inadvertently occurs, it will be temporary in nature, because the stream will rapidly refill that modification with rocks and gravels. BLM Wild and Scenic Rivers Manual, Section 3.6.F specifies: "Construction of minor structures and vegetation management to protect and enhance wildlife and fish habitat should harmonize with the area's largely undeveloped condition and fully protect identified river values." The intent of the Proposed Action is to improve and enhance the fish ORV, and that is planned in a manner such that the project will not modify free-flowing values or tentative classifications.

No long-term effects are expected to water quality, although short term effects are expected. For further analysis, see Water Quality, Surface and Ground.

The Proposed Action will not affect the scenic ORV associated with East Fork Parachute Creek as the Proposed Action is not permanent and does not impact the waterfall or geological formations of the canyon walls and cliffs.

The CPW activities as described in the Proposed Action could result in the direct mortality of up to an anticipated 15 individual cutthroat trout which would temporarily negatively affect the Fish ORV. Upon successful reclamation, CPW will restock the treated reach above the barrier with native cutthroat trout likely beginning in the spring of 2015 or 2016 and therefore improve the Fish ORV in the long term. For further information, see the Special Status Aquatic Species analysis.

Occupied habitat for BLM sensitive plants and several significant plant communities is found in lower East Fork Parachute Creek. Most of these are downstream of the project area and are not expected to be directly or indirectly impacted by the Proposed Action. The hanging garden sullivantia significant plant community is found along the canyon walls of East Fork Parachute Creek and its tributaries within and below the project area. The breaching of the beaver ponds is not anticipated to cause physical disturbance of the canyon walls. Breaching of the beaver dams may create a short-term pulse of sediment and high water flows through East Fork Parachute Creek which may temporarily bury or inundate some of the hanging gardens or woody riparian significant plant communities. This effect would be short-term and any impacted plant populations would be expected to recover quickly. The proposed action would not affect the subsurface hydrology of the watershed that creates the seeps that support the hanging garden sullivantia, so there should be no long-term direct or indirect impacts to these species. The chemical treatment would have no impacts to any special status plants or significant plant communities. Thus, the Proposed Action is not expected to impact the botanical/ecological ORV. For further information, see the Special Status Plant Species analysis.

All chemical treatment work will be done via foot travel as vehicles will be parked along existing roads and equipment hiked in as appropriate.

The Proposed Action would enhance the Fish ORV in the long term, while temporarily negatively effecting the Fish ORV in the short term. Short term effects will also negatively impact water quality, and possible negative impacts from blasting could temporarily effect the stream bank and the botanical/ecological ORV. However, these would be temporary and be resolved naturally.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within JQS Gulch or East Fork Parachute Creek. No impacts to the botanical ORVs would result. The stream would continue to be dominated by nonnative brook trout and the fish ORV may diminish.

WILDERNESS STUDY AREAS / WILDERNESS CHARACTERISTICS

AFFECTED ENVIRONMENT.

The proposed treatment is located in the East Fork Inventory Unit found to contain wilderness characteristics based on the 2014 wilderness characteristics inventory. Portions of the unit (8,330 acres) mostly in lower parts of the East Fork of Parachute Creek drainage and its tributaries have retained natural character and human imprints are substantially unnoticeable. However, eleven separate areas within the unit have noticeable imprints that do detract from naturalness and therefore lacked wilderness character (4,073 acres). Outstanding opportunities for solitude exist in most portions of the East Fork of Parachute Creek drainage and its 11 tributaries. The nature of the drainage's steep walls and dense riparian vegetation and adjoining spruce and aspen stands, allows one to find seclusion and isolation away from the sights and sounds of man. Outstanding opportunities for primitive and unconfined recreation exist in several places in the unit. Two exceptional recreation opportunities exist; 1) viewing the scenic 200 ft. waterfall on the East Fork of Parachute Creek on the western edge of the unit; and 2) fishing in East Fork for native cutthroat and introduced brook trout. Excellent opportunities also exist for other primitive and unconfined types of recreation including: hiking, hunting, wildlife viewing, camping, and sightseeing.

This unit was identified as a "Very Significant" conservation site by the Colorado Natural Heritage Program (CNHP) in 1996. This biologically diverse site hosts 21 elements tracked by the CNHP including: nine significant natural plant communities, one BLM sensitive fish, five rare species of birds, four rare plants, one rare butterfly, and one rare mammal. The unit also contains cliff seeps which support one of the best known populations of the hanging garden sullivantia. Other supplemental values include a 200 ft. high waterfall on East Fork, paleontological resources in the Green River Formation and historic land uses including prehistoric Indian hunting grounds, ranching activities, and related structures from the late 1800's.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. *Naturalness.* The breaching of beaver dams via the use of small explosives will change the appearance of the beaver dams. The area will still look natural as the casual observer will only see breached dams. The beaver dams would look like they were breached from natural high water flow events, and not a man-caused event. Therefore, the effects to naturalness from the dam beaching would be negligible because the stream would still generally appear to have been affected primarily by the forces of nature. Ecological naturalness would be enhanced because native cutthroat would replace the nonnative brook trout.

Solitude. The outstanding opportunity for solitude would not be altered because the proposed action does not result in a change in use. Recreational fishing for native cutthroat trout would replace fishing for nonnative brook trout but it is not anticipated that this change would result in an increase in use.

Primitive Recreation and Supplemental Features. Most importantly, the Proposed Action would

not affect visitors hiking to and viewing the popular scenic waterfall, 4 - 5 miles downstream from the project area. There would be a short term negative effect to visitors seeing dead fish in and along the stream at the project area. However, nutrient recycling should occur quickly as dead fish will provide a food source for other animals and rapidly disappear. See the Recreation analysis for further information.

In summary, the proposed action would have negligible effects to the wilderness characteristics of naturalness, solitude, and primitive recreation and supplemental features. Breaching of dams would mimic natural disturbance and is anticipated to be short-term as the proposed action calls for the placement of beaver back into the stream upon project completion. In addition, beaver will likely move upstream from occupied habitats located downstream of the treatment reach. Beaver would likely rebuild and repair some existing dams and create new ones and the area should look similar to pre project conditions within one year.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within JQS Gulch or East Fork Parachute Creek. There would be no management activity that could impact naturalness. Recreational fishing for brook trout would exist and no overall effect to solitude or primitive and unconfined recreation opportunities would result. The supplemental value of native cutthroat trout would diminish overtime.

TERRESTRIAL WILDLIFE

AFFECTED ENVIRONMENT.

The proposed action area provides habitat for a variety of terrestrial wildlife including small mammals, carnivores, reptiles, birds, and big game. Example species include cottontail rabbit, coyote, bobcat, mountain lion, mule deer, elk, and various songbirds. Special Status Terrestrial species are addressed in the Threatened, Endangered, and Sensitive Species section. Colorado Parks & Wildlife has identified the following mule deer and elk habitat types in the area: summer range, elk calving, and production areas. Beaver are prevalent in the project area and are a species of interest with regard to the proposed project.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. The CPW activities as described for the Proposed Action could affect terrestrial wildlife through direct disturbance from human presence in treatment areas. Beaver habitat would be altered as part of the project with the breaching of beaver dams via the use of small explosives. Beaver would also be impacted as they would be trapped out of the treatment reach prior to treatment. Trapping and removal of beaver would induce stress and could result in direct mortality to individuals. It is anticipated that beaver would be reintroduced back into the treatment reach upon successful completion of the treatment and restocking of the stream with native cutthroat trout. Beaver are desirable as they create excellent pool/holding habitat for resident trout. Temporary disturbance to other terrestrial species may occur during the week long treatment as human use would increase in the area. This temporary displacement of some

species away from areas of intensive human presence would be short-term.

Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds would contain rotenone residues from this use. Exposure to rotenone could occur to select bird species through direct contact, ingestion of treated water, and consumption of aquatic organisms killed by rotenone. Finlayson et al. (2000) found that any wildlife which happens to consume water or dead fish treated with rotenone will not be adversely affected. All birds and mammals have enzymes in the digestive tract that neutralize rotenone. Also, rotenone residues in dead fish are generally very low (<0.1 ppm) and not readily absorbed through the gut of the animal eating fish. Birds and mammals that eat dead fish and drink treated water would not be affected. Finlayson et al. (2000) also found that a bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within a 24-hour period to receive a lethal dose of rotenone. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily. Also after its release, rotenone rarely persists more than a few weeks in the environment. Therefore, there would be no effect to birds and mammals from consuming water treated with rotenone or dead fish containing rotenone. Rotenone would be applied directly to the water's surface. Therefore, the only likely route of exposure to rotenone for terrestrial wildlife would be through consuming water or dead fish treated with rotenone. Because birds and mammals are not adversely affected by consuming water or dead fish treated with rotenone, there will be no further discussion regarding toxicity in this document.

Rotenone "is highly toxic to fish and other aquatic life, but has low toxicity to birds and mammals" (Ling 2003). Ling (2003) also states, "Most mammal species are relatively resistant to rotenone," "rotenone is not easily absorbed in higher animals and does not accumulate in the body," and "Birds and mammals are much less sensitive to rotenone than are fish and aquatic invertebrates and poisoning caused by drinking treated water or eating poisoned fish is extremely unlikely."

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within the East Fork Parachute Creek drainage. Impacts to some terrestrial mammals and birds would result as brook trout would continue to dominate the stream reach. Brook trout alter the streams food chain and food web which impacts the assemblage, abundance, and diversity of aquatic based food resources for bats, birds, and insectivorous small mammals. No impacts to terrestrial wildlife habitats would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 3 FOR TERRESTRIAL WILDLIFE.

The Roan Cliffs landscape was initially assessed in 1999, with an additional partial land health assessment conducted in 2013. The most recent assessment found the majority of this area (92%) met Standard 3 of the Land Health Assessment. This indicates that healthy, productive terrestrial wildlife communities are diverse, reproductive, resilient to natural fluctuations and ecological processes, and at healthy population levels given available habitat. All four indicators of Standard 3 were met, with only slight detrimental impacts from recreation, livestock grazing, and nonnative plant species. The temporary impacts of the proposed action would be too short in duration and too low in severity to change the current Land Health Standard status. In addition, temporary removal of beaver dams would mimic natural blow outs associated with high flow events.

AQUATIC WILDLIFE

AFFECTED ENVIRONMENT.

The treatment reach in JQS Gulch and East Fork Parachute Creek contains nonnative brook trout (*Salvelineous fontinalis*) as well as aquatic invertebrates. Aquatic invertebrates are aquatic animals without backbones that live on the bottom of freshwater habitats during all or part of their life cycle and that are large enough to be seen with the naked eye. Major groups of macroinvertebrates include arthropods (i.e., crustaceans and insects), mollusks, sponges and nematode worms. The most abundant are typically immature life states (larvae) of aquatic insects such as mayflies, stoneflies, and caddis flies. The benthic macroinvertebrate community or "assemblage" is largely determined by the range of habitat conditions, such as water quality, vegetation structure and bottom substrate. More complex habitats generally support a more diverse assemblage than more uniform habitats. Based on aquatic invertebrate sampling within East Fork Parachute Creek from 2011-2013 the stream is dominated by Diptera (midge and fly larvae), mayflies, and caddis flies. Diversity is limited but productivity is generally good. The treatment reach contains habitat for Woodhouse's toad, and chorus frogs but no amphibians have been noted within the treatment area based on casual observations during several site visits.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Fish (Brook trout). Rotenone is highly toxic to fish. In the aquatic environment, rotenone is readily transmitted across the permeable membranes of the gills. Fish are highly susceptible to low concentrations of rotenone. Potassium permanganate is toxic to gill-breathing organisms at the rate (2 to 6 mg/L) required for neutralization. Application of excess potassium permanganate could adversely affect downstream fish populations; however, as described in the Proposed Action, CPW would avoid and minimize any effects of potassium permanganate on fish populations.

The short-term direct effects of the proposed project, including those activities that would be authorized by the BLM under the Proposed Action, would be the eradication of all fish (primarily brook trout) from treatment area waters, as well as the potential elimination of fish a short-distance downstream from the neutralization stations. Fish would be killed as a result of the toxicity of rotenone, as described in Appendix A. Fish may also be killed for 0.25-0.5 miles (0.4-0.8 km) below the neutralization station from the combined effects of the rotenone and potassium permanganate before mixing of the chemicals and neutralization can occur.

Aquatic invertebrates. The CPW activities as described in the Proposed Action would directly affect aquatic biota in the project area, including aquatic invertebrates. Aquatic invertebrates are less sensitive to rotenone than fish. However, impacts from both rotenone and potassium permanganate may occur and differential effects could occur on different species assemblages. Macroinvertebrates play a key role in aquatic ecosystem function and are an important food source for trout and terrestrial fauna.

In general, benthic macroinvertebrate communities tend to be more tolerant of rotenone than most fishes, but individual macroinvertebrate species have varying ranges of rotenone tolerance

(Engstrom-Heg et al. 1978, Chandler and Marking 1982, Mangum and Madrigal 1999, Finlayson et al. 2010b, Vinson et al. 2010). The sensitivity of individual species and life stages to rotenone appears related to their oxygen uptake process (Engstrom-Heg et al. 1978). Smaller invertebrates appear more sensitive than larger invertebrates, and species that use gills to extract aqueous oxygen are more sensitive than species that obtain oxygen through other means (Vinson et al. 2010). The insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and some Trichoptera (caddisflies) (EPT taxa) are all gill breathers. These EPT taxa are a major component in the trout diet. They are less tolerant to environmental stressors than other aquatic invertebrate groups and have not been found after some rotenone treatments (Mangum and Madrigal 1999). Finlayson et al. (2010a) found that mayflies appeared to be the most susceptible taxa to rotenone. Sensitivity to rotenone can also vary within the same taxonomic order. Whelan (2002) reported that while caddisflies (Trichoptera) had the highest number of species affected by rotenone, many caddisflies were tolerant.

Potassium permanganate is considered toxic to aquatic invertebrates and zooplankton, although there is likely to be a wide tolerance range among various freshwater invertebrates. The mixture of rotenone and potassium permanganate during the neutralization process could adversely affect benthic macroinvertebrates in the neutralization zone, extending approximately 0.25 to 0.5 mile (0.4-0.8 km) below the fish barriers. The macroinvertebrate resources within the neutralization zone would be expected to re-establish within a few months after the neutralization treatment ends. Areas below this point and tributary springs would serve as sources for recolonization. As a result, no taxa are expected to be lost, and re-establishment is expected to occur within a few months, thus resulting in temporary, short-term impacts.

Amphibians. Rotenone is toxic to amphibians but generally less toxic than to fish. Rotenone may be absorbed into both skin and respiratory membranes, but skin may present more of a barrier because it creates a greater distance for the chemical to diffuse across (Fontenot et al. 1994), and a smaller surface area relative to gill structures. Studies suggest that tadpoles and other larval forms of amphibians that utilize gills for respiration are just as sensitive to rotenone as fishes, while adult forms, which no longer utilize gills, are much less susceptible to rotenone. Larval amphibians appear to have resistance roughly equivalent to those of the most tolerant fish species.

Potential direct impacts to amphibians include absorption of rotenone during project implementation. Amphibians in their terrestrial life stage should not be affected by the rotenone treatment; however, those in gill-breathing life stages, if present, would be susceptible. Most amphibians, such as toads, present during a late summer/early autumn treatment would have completed their metamorphosis and would not be affected. Additionally, breeding and rearing habitat for amphibians exists in off channel, fishless areas that would not be treated under the CPW activities as described for the Proposed Action.

While at least some mortality of aquatic stages of amphibians is possible from CPW's rotenone application, several studies have shown that population level effects do not occur to amphibian species during rotenone treatments.

Potential indirect impacts on amphibians include loss of prey species from the rotenone treatment. For example, reductions in emerging aquatic insects could occur, particularly if multiple treatments are required; however, as described above, aquatic insect abundance is expected to recover quickly through drift from untreated upstream areas. Because current populations of non-native trout in the proposed project area could have adverse effects on amphibian populations through predation and competition for prey resources, removal of non-native trout may benefit any amphibians using the

project waters over the long term. Several studies have shown the removal of non-native trout can result in an increase in abundance and diversity of amphibian populations (Hoffman et al. 2004, Vrendenberg 2004, Knapp et al. 2007, Pope 2008). Due to a lack of amphibians within the project area, no impacts are anticipated.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP on Deep Creek. No impacts to brook trout, aquatic invertebrates, or amphibians would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 3 FOR AQUATIC WILDLIFE.

The majority of the treatment reach is meeting Land Health Standard 3 for aquatic species and their habitats. The proposed action would result in the elimination of nonnative brook trout from the treatment reach. Subsequent stocking and establishment of a self-sustaining pure cutthroat trout population would maintain the meeting of this standard. Aquatic habitat would not be permanently altered or impacted by the project in the long term.

WETLANDS & RIPARIAN ZONES

AFFECTED ENVIRONMENT.

The proposed action would occur directly within JQS Gulch, Golden Castle Gulch, East Fork Parachute Creek, and the lower 300 feet of First Water Gulch, Second Water Gulch, and Third Water Gulch. These streams contain a largely healthy riparian community except that the upper portion of East Fork Parachute Creek is degraded as is the upper portion of JQS Gulch and portions of Golden Castle Gulch within the treatment reach. Vegetation consists primarily of dense willow, tufted hairgrass, meadow barley, redtop, Kentucky bluegrass, dandelion, sedge, and in a few areas aspen come close to the stream.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Impacts to riparian vegetation would occur primarily associated with proposed beaver/beaver pond removal. The breaching of beaver dams and draining of beaver ponds to facilitate a successful reclamation would disconnect riparian vegetation on the perimeter of ponds from the perennial water source. This could result in some limited die-off of willows and riparian grasses and sedges. However, impacts would likely be minor as distance to water would still be minimal and willows would still have access to shallow groundwater. The areas devoid of water along the pond margins would provide a niche for invasive weeds to proliferate. It is likely that common weeds of the area including houndstongue and Canada thistle could invade and increase along drained pond margins. However, these impacts are anticipated to be short-term as the intent is to reintroduce beaver back into the system to help maintain desired beaver pond habitat and re-raise the water table to drown out weedy species. Beaver pond complexes are dynamic and vary naturally in abundance, size, and density. Natural blowouts are common and proposed work would expect to mimic natural variation and condition within two years post treatment.

The removal of beaver dams using small explosives could result in some disturbance to adjacent riparian vegetation near the dam. Mechanical damage could occur but would be minimal in scope. These effects would be short-term as beaver dam dismantling would occur over a 2-3 day period and damaged vegetation would expect to rebound to pre-existing conditions within one year post disturbance. However, it is possible that even with beaver reintroduction; some pond areas will not be re-created at the pre-existing site. It is anticipated that riparian vegetation would fill in quickly as the stream adjusts at these sites. Weeds are not likely to establish permanence in the old ponds as spring stream flows would negate their establishment long-term vs. deeply rooted riparian species.

The chemical treatment itself would have very minimal impact to riparian vegetation in the form of human trampling over a 5 day period as personnel set up and monitor drip stations, hike the treatment reach with backpack sprayers, and monitor chemical rates of spread and fish kill efficiency. Human use in the area for up to 5 days could result in some minimal vegetation trampling primarily to riparian grasses and sedges, but impacts would be short-term and largely undetectable.

> ***Mitigation.*** Post treatment monitoring will identify areas of degraded riparian habitat associated with the treatment. In these areas, weed spraying will be done to minimize spread of weeds into new areas.

No Action Alternative. Under the No Action alternative, no beaver dam removal or draining of beaver dams would occur. No chemical treatment with rotenone would be authorized on BLM lands within the East Fork Parachute Creek drainage. No impacts to wetlands and riparian zones would result.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 2 FOR RIPARIAN SYSTEMS.

The proposed action would degrade riparian quality in the short term at the locations impacted by dam breaching and dewatering and by human access points to conduct the work. However these impacts from workers are expected to be short term once the project is completed. Because beaver will be reintroduced to the project area following completion of the proposed action and because of the resiliency of riparian areas to minor impacts, the long term impacts are expected to be negligible. Therefore in the long term Standard 2 is expected to be maintained or improved.

WATER QUALITY, SURFACE AND GROUND

AFFECTED ENVIRONMENT.

The project area includes portions of JQS Gulch, East Fork Parachute Creek, and a couple hundred feet of First Water, Second Water, and Third Water gulches. All streams are perennial and elevation ranges between 8,100 and 8,800 feet with mean elevation estimated to be at 8,300 ft. The State of Colorado has developed *Stream Classifications and Water Quality Standards* that

identify beneficial uses of water and numeric standards used to determine allowable concentrations of water quality parameters (CDPHE 2013). Streams within the proposed action are listed under the Lower Colorado River Basin (Region 11) and have water use classifications described in Table 7.

Table 7. Stream Segment Descriptions.

Stream Segment Description	Classifications	Numeric Standards*
11a. Mainstem of the West Fork of Parachute Creek, including all tributaries, from its source to West Fork Falls. Mainstem of East Fork of Parachute Creek, including all tributaries and wetlands, from a point immediately below the mouth of First Anvil Creek to the east boundary line of S27, T5S, R95W.	Aq Life Cold 1 Recreation N Water Supply Agriculture	T = TVS(CS-I) °C D.O. = 6.0 mg/l D.O.(sp) = 7.0 mg/l pH = 6.5-9.0 *E.coli* = 630/100ml

Aquatic life cold 1 indicates that a stream segment is capable of sustaining a wide variety of cold water biota. Recreation N refers to stream segments in which surface waters are not suitable or intended to become suitable for primary contact recreation uses. Water supply and agriculture refer to stream segments that are suitable or intended to become suitable for potable water supplies and suitable for irrigation or livestock use.

The State of Colorado has a *303 (d) List of Impaired Waters and Monitoring and Evaluation List* that identifies stream segments that are not currently meeting water quality standards with technology-based controls alone or suspected to have water quality problems (CDPHE 2012). No stream segments within the proposed action are currently on either list. However, recent sampling by the Colorado Department of Public Health and Environment (CDPHE), Division of Water Resources has documented several exceedances of chronic or acute water quality standards for dissolved selenium, dissolved iron, dissolved lead, and dissolved oxygen (Bembenek 2014). Additional data collection and analysis by CDPHE will be necessary to determine the extent of water quality impairments and any implications for future listings of segments on the Monitoring & Evaluation list during the next rulemaking session by the State in June 2014 or subsequent triennial reviews.

There are also numerous springs/seeps scattered throughout the project area that feed the stream network. Some of these groundwater sources are perennial and others are intermittent. Based on the limited water quality data collected, it is assumed that these sources are also meeting State Standards.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Under the CPW activities described in the proposed action, there would be direct short-term effects to water quality relating to the Colorado water quality classification and numeric standards as a result of the CPW chemical treatment with rotenone. The primary direct effect would be to infrequent primary contact recreation, which includes secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing. The

design criteria would be followed to mitigate for human recreational exposure to rotenone and also provide an operating protocol for public notification of treatment area restrictions prior to, during, and following application of rotenone. Rotenone dissipates in flowing waters relatively rapidly (often less than 24 hours) due to dilution and increased rates of hydrolysis and photolysis (Finlayson et al. 2000, Brown 2010).

Rotenone is non-toxic to mammals, including humans. At the concentrations used to kill fish, it has been estimated that a 132-lb person would have to consume over 60,000 liters of treated water at one sitting to receive a lethal dose (Sousa et al, 1987). In addition, extensive testing has not shown rotenone to be carcinogenic (Bradbury 1986). Municipal drinking water supplies have been treated with rotenone in at least seven states including Colorado.

There would be short-term direct effects to water quality relating to the Colorado water quality classification and numeric standard 1 Aquatic Life Cold. The primary direct effect would be the toxicity of rotenone to aquatic organisms including fish and invertebrates. Rotenone dissipates in flowing waters relatively rapidly (often less than 24 hours) due to dilution and increased rates of hydrolysis and photolysis (Finlayson et al. 2000, Brown 2010).

Due to the strong tendency of rotenone to bind with organic soils, sediment, and vegetative matter, it is unlikely to move through most soils into groundwater. In very sandy soils with low organic content there is some potential for leaching, but even then mobility would be limited (EPA 2007). No well-monitoring, associated with rotenone treatments or otherwise, has documented a detection of rotenone or other rotenone metabolites (Finlayson et al. 2000, Turner et al. 2007). In addition, rotenone breaks down quickly into temporary residues that would not persist as pollutants of groundwater. Ultimately rotenone breaks down into carbon dioxide and water.

Other ingredients in liquid rotenone formulations with a potential to affect water quality include petroleum distillates and other compounds such as benzene, xylene, naphthalene, toluene, and trichloroethylene. Risk assessments consider the concentrations that these compounds are applied in piscicide formulations being below levels of human or environmental concern (Turner et al. 2007). However, these hydrocarbon solvents may produce a detectible odor in treated waters. The duration of this water quality effect lasts a just a few days.

Potassium permanganate would be used by CPW to detoxify rotenone at the bottom end of the treatment reach during treatments. Potassium permanganate, a strong oxidizing chemical agent, is often used in water treatment plants and is also used to deactivate rotenone. It has been shown to be toxic to fish and aquatic organisms. Effects are expected to be short term and limited to the vicinity (within 30-minute travel time down current) of the rotenone deactivation area. Potassium permanganate would degrade to nontoxic, common compounds within an hour of application at the concentrations that would be used. The detoxification is not immediate in space but requires a short mixing zone where the potassium permanganate is in contact with and oxidizes the rotenone. Below this mixing zone both fish and aquatic macroinvertebrates would survive (Brown 2010).

Drinking water supplies would not be affected by the use of potassium permanganate, because it

rapidly breaks down into potassium, manganese, and water. In addition, no target streams are used directly as municipal or domestic water sources.

There would not be direct effects to water quality relating to the designation of agricultural uses associated with irrigation water and stock water as a result of the CPW chemical treatment with rotenone. The irrigation water uses are greater than 0.25 miles from the project area. Design criteria include application in accordance with regulations and policy, such as mitigation measures outlined in the EPA rotenone re-registration document (EPA 2006). This would mitigate for irrigation and stock water exposure to rotenone.

Beaver dam breaching using small explosives would result in sediment movement and increased turbidity. Initial breaching of beaver dams will result in sediment movement out of ponds and subsequent high flow events would likely scour residual sediments. Sediments would flush through the treatment reach and would likely be captured at the large pond located above and created by the manmade barrier. Impacts associated with increased suspended sediments and turbidity would be short-term (5 days or less). The proposed action calls for the reintroduction of beaver back into the treatment reach upon documented successful reclamation. This should help to replace beaver pond habitat removed to facilitate the treatment. This should help to stabilize the stream channel and maintain/raise the water table. If sufficient beaver activity post treatment does not occur, then impacts associated with sediment movement through abandoned ponds could be longer-term until such time as the stream channel reaches equilibrium and riparian vegetation establishes. Within the bankfull flow width it is unlikely that weeds or other early increaser vegetation species will establish as spring stream flows will preclude establishment of these weakly rooted species vs deeply rooted riparian vegetation that should reestablish within 1-2 years. Until riparian vegetation reestablishes to levels capable of stabilizing and maintaining the stream banks, there is the potential for some sediment and turbidity impacts should beaver activity not be sufficient post treatment.

Short-term impacts to water quality are expected to last a couple days. As a result of transport, dilution, and the breakdown of rotenone compounds and the other ingredients present in liquid piscicide formulations, long term effects to water quality within and downstream of treated areas are not expected. Any temporary changes in water quality are un-related to the parameters of concerns captured by CDPHE sampling, such as selenium, lead, and iron – which are likely attributable to parent geology and land uses. Thus, no long-term effects are expected to water quality, wetlands, or ground water as a result of activities associated with the proposed action.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within the East Fork Parachute Creek drainage. No impacts to water quality surface or ground would result.

Based on limited land management activities occurring across the project area, it is assumed that cumulative effects to water quality are minor if proper best management practices are implemented.

ANALYSIS OF PUBLIC LAND HEALTH STANDARD 5 FOR WATER QUALITY.

Based on the Roan Cliffs Land Health Assessments, BLM staff concluded that water quality is meeting Standard 5 with problems associated with elevated levels of selenium, iron, lead, and low dissolved oxygen (BLM 1999 and 2014). The water quality impacts from the proposed action would be temporary and low in severity and overall not anticipated to change the current Land Health Standard status.

HAZARDOUS OR SOLID WASTES

AFFECTED ENVIRONMENT.

Hazardous and solid wastes are not a part of the natural environment.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Hazardous and solid wastes are unlikely to be introduced to the environment as a result of the implementation of the proposed action. However, because gasoline pumps would be used at detoxification stations, there is some potential. To minimize impacts all fuel, oil, and other lubricants will be secured in a chase vehicle away from the creek. All equipment will be in proper working condition free of leaks prior to coming onsite. Any leaks noted during work will be fixed as soon as identified outside of the stream channel.

Chemicals used to kill target fish species will be monitored and treated so as to quickly detoxify and would not persist in the environment. Given the design features in the proposed action, harmful environmental impacts would be negated.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP on Deep Creek. No impacts regarding wastes, hazardous or solid would result.

ENVIRONMENTAL JUSTICE

Affected Environment:
The NEPA process requires a review of the environmental justice issues as established by Executive Order 12898 (February 11, 1994). The order established that each Federal agency identify any "disproportionately high and adverse human health or environment effects of its programs, policies, and activities on minority and low-income populations."

Environmental Consequences:

Proposed Action. The proposed action was developed based on the need to protect a federally listed species. No disproportionately high, adverse health or environmental effects have been identified that would impact low income or minority populations as a result of the authorization of the Proposed Action.

No Action Alternative. No disproportionately high, adverse health or environmental effects have been identified that would impact low income or minority populations as a result of the authorization of the No Action Alternative.

RECREATION

AFFECTED ENVIRONMENT.

The main summer recreation activity in the East Fork of Parachute Creek drainage is viewing the scenic 200 ft. waterfall on the western edge of the Roan Plateau. In the fall big game hunting is the primary recreational activity. Excellent opportunities also exist for these other types of recreation including hiking, fishing, wildlife viewing, camping, and sightseeing.

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. The Proposed Action would have no effect on viewing the scenic waterfall or hunting for big game in the fall. Anglers would be impacted for several years until the cuttroat trout population in the East Fork of Parachute Creek is reestablished. However nearby streams, such as Trappers Creek or Northwater Creek, would be optional destinations for anglers.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within JQS Gulch or East Fork Parachute Creek. Outstanding opportunities for recreational fishing for brook trout will continue to improve while outstanding opportunities for recreational fishing of native cutthroat trout would continue to diminish, ending in no overall effect to recreation.

HUMAN HEALTH AND SAFETY

This section addresses potential toxicological impacts on human and ecological health from the proposed use of rotenone as a piscicide to remove target fish. Application of rotenone and potassium permanganate to the environment could result in negative effects on human and ecological health.

Government agencies have conducted substantial research to determine the safety of rotenone for fisheries management applications in the re-registration approval process (Finlayson et al. 2010 and USEPA 2006). The EPA (2006) study found that while risks to terrestrial wildlife and plants were insignificant when rotenone was applied as a piscicide, risks to non-target aquatic organisms could be significant. The Forest Service contracted with Syracuse Environmental Research Associates, Inc. (SERA) to prepare a Human Health and Ecological Risk Assessment (HHERA) for rotenone to help identify exposure issues and potential mitigation measures needed beyond applying the rotenone formulation according to label directions for fisheries management (SERA 2008). The HHERA was used as the primary reference for evaluating the human health and ecological risks of the Proposed Action.

AFFECTED ENVIRONMENT.

The study areas for the analysis of human and ecological health include the waters proposed for treatment located within the headwaters of the East Fork Parachute Creek drainage. ree drainages on the south slope of the Uinta Mountain range. This includes East Fork Parachute Creek, JQS Gulch, Golden Castle Gulch, and the lowest 100 yard of First Water Gulch, Second Water Gulch, and Third Water Gulch. Air, surface water, groundwater, sediments and biota potentially containing rotenone or formulation constituents are considered potential exposure media

Rotenone Toxicity. Rotenone is a naturally occurring chemical obtained from the roots of several tropical and subtropical plant species belonging to the genus *Lonchocarpus* or *Derris*. Liquid formulations of rotenone may contain petroleum hydrocarbons as solvents and emulsifiers to disperse rotenone in water (naphthalene, methylnaphthalenes, xylenes, etc.). The proportion of these carriers varies substantially by formulation, and formulations with synergists generally contain far less petroleum-based carrier products. The Proposed Action involves the use of commercial liquid rotenone formulations including CFT Legumine™ and Prenfish Toxicant® which contain dispersants and emulsifiers (table 11). Powder formulations of rotenone proposed for use in treating lakes are made from ground plant roots. These powdered formulations may contain fillers, but no materials of concern are added. The potential effects on ecological receptors associated with rotenone and other constituents in the proposed formulations are discussed in the Environmental Consequences section below.

Table 8. Inerts contained in end-use liquid formulations of rotenone (from SERA 2008)

Formulation (% of formulation classified as interts)[a]	Name of Inert	Inert % by Weight
CFT Legumine 5% (90% interts)[a]	N-Methylpyrrolidone	9.8 %[c]
	Petroleum distillates, NOS	
	1,2,4-Trimethyl Benzene	0.003%[c]
	Naphalene	0.02551%[c]

a Information taken from MSDS's unless otherwise specified. No hazardous inert ingredients are listed on the MSDSs for powder and pellet formulations.

Potassium Permanganate Toxicity. The neutralization of rotenone would involve the use of potassium permanganate (KMnO4). Potassium permanganate salt, also known as "permanganate of potash," is a strong oxidizing agent used in many industries and laboratories. It is also used as a disinfectant, especially in the treatment process of potable water. It has been used effectively as a neutralizing compound for rotenone treatments for many years (USEPA 2006).

ENVIRONMENTAL CONSEQUENCES.

Proposed Action. Under the Proposed Action, rotenone formulations would be applied to target waters. Liquid rotenone containing associated dispersants and emulsifiers would be dispensed into target flowing waters to remove fish populations.

Liquid piscicide formulations of rotenone including CFT Legumine contain inerts, adjuvants, metabolites, impurities, and contaminants in addition to the active ingredient rotenone. SERA

(2008) examined the potential negative effects of these compounds on humans and concluded that metabolites, a breakdown product of rotenone, did not increase the risk of human health effects associated with the use of rotenone formulations. Similarly, it was concluded that available data indicate the inerts are not present in amounts that would increase the risks associated with the proposed formulations. The limited impact of impurities, such as degeulin and the "other associated resins" are identified in SERA (2008). These non-active ingredients will not be discussed further.

Potential for Public Exposure. The HHERA describes several ways humans may be exposed to rotenone. The highest potential exposure would be to workers from the preparation and application of rotenone. Dermal and inhalation exposure would be the primary routes of exposure for applicators. Oral exposure of humans to rotenone could occur from ingestion of water while swimming, ingestion of treated fish or other organisms. Human exposure could theoretically also result from ingestion of crops that have been irrigated with rotenone-treated water or ingestion of water where rotenone reaches a potable water intake. However, label directions dictate that treated fish not be used as food or feed, and that no use of rotenone should occur within ½ mile (upstream in rivers or streams) of irrigation or potable water intakes. Furthermore, U.S. EPA recommended mitigations to greatly reduce or eliminate exposure to the general public include restricting access for members of the general public to treated areas and the use of potassium permanganate to ensure rotenone is neutralized before it leaves the project area. Following these mitigations would greatly reduce the potential for public exposure to rotenone.

The intended use of rotenone is as a piscicide, a chemical used to remove fish from target waters. The potential effects of rotenone to other groups of animals, including humans when used as a piscicide are discussed here. Rotenone is somewhat selective in context of an aquatic application in that most species of fish are more sensitive to rotenone than are most species of aquatic invertebrates. For humans, there are basically two groups that have the potential to be exposed to rotenone: crews conducting activities associated with the Proposed Action and the general public.

The review of rotenone uses and potential risks associated with these uses completed by the U.S. EPA provides some recommended mitigation measures to reduce risk (SERA 2008). These mitigations include:

- Lowering the maximum application rate from 250 ppb to 200 ppb;
- The use of effective personal protective equipment by workers;
- Restricted access for members of the general public to treated areas;
- The use of potassium permanganate to detoxify rotenone.

Assuming that these recommendations are implemented, the risks associated with the use of rotenone should be minimal. At application rates of the Proposed Action i.e., 50 – 150 ppb, hazard quotients for workers do not exceed the level of concern. As a result of the implementation of the above mitigation measures, members of the general public would not be exposed to significant levels of rotenone.

Human Health Risk Assessment. Concern has been expressed over the potential for exposure to rotenone to cause Parkinson's disease. It is clear that rotenone is neurotoxic, and therefore this is of concern. However, most studies demonstrating that rotenone can induce effects similar to those of Parkinson's disease were conducted using routes of exposure that are not directly relevant to potential human exposures (e.g., intraperitoneal or intravenous injection, direct installation into the brain, and consumption of large volumes of treated water). Additionally, these routes of exposure are not relevant to potential routes of exposure to rotenone that may occur during fisheries treatment projects. For applicators of rotenone during a treatment project, the use of required PPE would significantly reduce, if not eliminate, exposure (Finlayson et al. 2010). For the general public, restricting access to the treatment area until rotenone concentrations degrade to < 40 ppb (as determined by demonstrating the survival of sentinel fish following a 24-hour bioassay) and the use of potassium permanganate to neutralize water leaving the treatment area would greatly minimize the potential for exposure (Finlayson et al. 2012, USEPA 2007).

In addition to the active ingredient rotenone, all liquid formulations contain petroleum solvents, which are complex mixtures. These petroleum solvents do not appear to be present in amounts that are toxicologically substantial relative to rotenone and other related compounds (SERA 2008). Following the recommended mitigations of the U.S. EPA Reregistration Eligibility Decision (RED) for rotenone (of restricting access of the general public to the treatment area and using potassium permanganate to ensure rotenone would not affect areas beyond the treatment area) would result in no or minimal exposure to the general public. Because of this, the risk characterization for human health effects is relatively simple and focuses on risks to workers from dispersing rotenone and other associated activities of the Proposed Action. The recent RED prepared by the U.S. EPA's Office of Pesticide Programs requires that workers involved in application of rotenone use proper personal protective equipment (PPE). If the specified required PPE are properly used, only maximum application rate exceeds the level of concern (SERA 2008). The level of concern is also exceeded when effective PPE is not used and when there is an accidental exposure. Accidental exposures are included in all Forest Service risk assessments to evaluate the proper handling of pesticides. Aggressive steps are warranted in the event of accidental exposures or mishandling of rotenone.

The U.S. EPA recommends the use of potassium permanganate to detoxify water treated with rotenone. If properly applied, potassium permanganate should not present any additional risk and should decrease risks associated with the use of rotenone as a piscicide. If improperly applied (i.e., applied in excess) the reduction in risk due to the neutralization of rotenone should outweigh risks associated with the use of potassium permanganate SERA (2008).

Conclusion. Potential impacts to human and ecological health from exposure to rotenone have been recently reviewed by both the EPA during the re-registration process for rotenone use and by the Forest Service in relationship to the use of rotenone as a piscicide (EPA 2006, EPA 2007, and SERA 2008). While rotenone and potassium permanganate have been shown to have potential impacts to human health, the concentrations to be used, duration of application, and potential exposure routes from the Proposed Action limit the potential for human health impacts. Additionally, neutralizing rotenone with potassium permanganate, informing the public of treatment timing and location, and restricting public access to the treatment area would further

ameliorate potential human health risks through reducing chemical exposure.

No Action Alternative. Under the No Action alternative, no chemical treatment with rotenone on BLM lands would be authorized via a PUP within identified waters. Therefore, there would not be any exposure to humans from any chemicals. No impacts to human health would result.

CUMULATIVE IMPACTS SUMMARY

The primary activities occurring within the watershed which is primarily federal lands with some private land includes:

- natural gas development,
- livestock grazing, and
- recreation (primarily big game hunting and dispersed hiking and camping, and fishing).

These activities are reasonably certain to continue into the foreseeable future. It is possible that natural gas development may increase in the area over time. Livestock grazing should remain similar as has been conducted, and recreation while light may show increases over time as populations increase and people seek areas in which to recreate.

The proposed action involves limited disturbance or impact. Ground disturbance in the form of the notching of small beaver dams and the removal of larger dams would mimic natural disturbance. Upon successful completion of the project, beaver would be reintroduced and it is expected that they would quickly repair dams and remake pond habitats. Chemical treatment would remove nonnative fishes and impact some portion of the aquatic insect population within the treatment reach. No cumulative effects are anticipated from the proposed action when added to other actions already occurring and expected to continue to occur within the watershed.

PERSONS/AGENCIES CONSULTED

1. Colorado Parks & Wildlife – Lori Martin
2. U. S. Fish & Wildlife Service – Patty Gelatt
3. Trout Unlimited – Grand Valley Anglers Chapter
4. Trout Unlimited – CTU Dave Nickum
5. Livestock Permittees – Jim Bair, and Mark Hill
6. USDA Wildlife Services – David Moreno

INTERDISCIPLINARY REVIEW.

The following BLM personnel reviewed and or contributed to this environmental assessment:

NAME	TITLE	AREA OF RESPONSIBILITY
Tom Fresques	Fish Biologist	NEPA Lead, Aquatics

Pauline Adams	Hydrologist	Soil, Water, Air
Erin Leifeld	Archaeologist	Cultural, Native American Religious Concerns
Kim Miller	Recreation Specialist	Wilderness Character, Wild & Scenic Rivers, Recreation
Carla DeYoung	Ecologist	Areas of Critical Environmental Concern, Special Status Plants, Vegetation
Everett Bartz	Range Management Specialist	Riparian Areas
Sylvia Ringer	Wildlife Biologist	Wildlife, Migratory Birds
Kristy Wallner	Range Management Specialist	Weeds/Invasive Species
Brian Hopkins	Planning and Environmental Coordinator	Document Review

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
COLORADO RIVER VALLEY FIELD OFFICE
SILT, COLORADO

FINDING OF NO SIGNIFICANT IMPACT
FOR
DOI-BLM-N040-2014-0062-EA

I have reviewed the direct, indirect and cumulative effects of the proposed action documented in the EA referenced above. The effects of the proposed action are disclosed in the Alternatives and Environmental Effects sections of the EA. Implementing regulations for NEPA (40 CFR 1508.27) provide criteria for determining the significance of the effects. Significant, as used in NEPA, requires consideration of both *context* and *intensity* as follows:

> (a) Context. This requirement means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short and long-term effects are relevant (40 CFR 1508.27):
>
> (b) Intensity. This requirement refers to the severity of the impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following are considered in evaluating intensity (40 CFR 1508.27).

1. Impacts that may be both beneficial and/or adverse.

Impacts associated with issuing a Pesticide Use Permit to Colorado Parks & Wildlife to conduct a fish eradication effort are identified and discussed in the Affected Environment and Environmental Effects sections of the EA. The proposed action will not have any significant beneficial or adverse impacts on the resources identified and described in the EA.

2. *The degree to which the proposed action affects health or safety.*

The proposed activities will not significantly affect public health or safety. The purpose of the proposed action is to authorize stream reclamation and removal of nonnative fishes. This would improve conditions and move select stream reaches to meeting Colorado Public Land Health Standards. Similar actions which have been conducted across Colorado and throughout the country have not significantly affected public health or safety.

3. *Unique characteristics of the geographic area such as prime and unique farmlands, caves, wild and scenic rivers, wilderness study areas, or ACECs.*

The only unique characteristics of the area are that the stream treatment reach was found to be eligible as a Wild and Scenic River. Suitability has yet to be determined, but the removal of nonnative fishes and the subsequent replacement with native species would be more in line with the Wild and Scenic Rivers Act and maintain and enhance eligibility status of the project segments.

4. The degree to which the effects are likely to be highly controversial.

The possible effects of proposed action are limited to target fish species, some aquatic invertebrates, beaver, and limited riparian vegetation. The projects effects are not likely to be highly controversial.

5. The degree to which the effects are highly uncertain or involve unique or unknown risks.

The possible effects on the human environment are not highly uncertain nor do they involve unique or uncertain risks. The technical analyses conducted for the determination of the impacts to the resources are supportable with use of accepted techniques, reliable scientific data, and professional judgment. Therefore, I conclude that there are no highly uncertain, unique, or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.

This proposed action would facilitate the future State action of restocking the treated stream reach with pure cutthroat trout. Depending on the lineage of cutthroat trout to be stocked, some additional implications could result. Green Lineage cutthroat trout, which are believed to be the native cutthroat of the Colorado River drainage, are currently treated as a federally threatened species via a U. S. Fish & Wildlife Service (FWS) position paper. If this lineage were stocked, there could be some implications associated with the ESA on land use activities that affect the species. Actions that may affect the species may require completion of Section 7 consultation. In summary, the resulting effects to land use activities are unknown at this time until FWS evaluates all identified cutthroat trout in Colorado and determines that the species, subspecies, or distinct population segments warrant listing or a change in listing status. A new position paper clarifying the status of green linage cutthroat trout west of the Continental Divide is expected in 2015.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

The area covered by the proposed action only comprises a small portion of the watershed. Cumulatively, many of the future actions planned on private and other lands may have some undetermined effect on select resources The proposed action would create negligible landscape-level cumulative impacts when viewed in conjunction with those activities currently occurring and reasonably certain to occur on adjacent private/other lands.

8. The degree to which the action may adversely affect scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places.

The potential for historic properties on these allotments is low.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

The proposed action has no potential to adversely affect any endangered or threatened species or their habitat based on effects analysis in the EA.

10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.*

The proposed action does not violate or threaten to violate any Federal, State, or local law or requirements imposed for the protection of the environment.

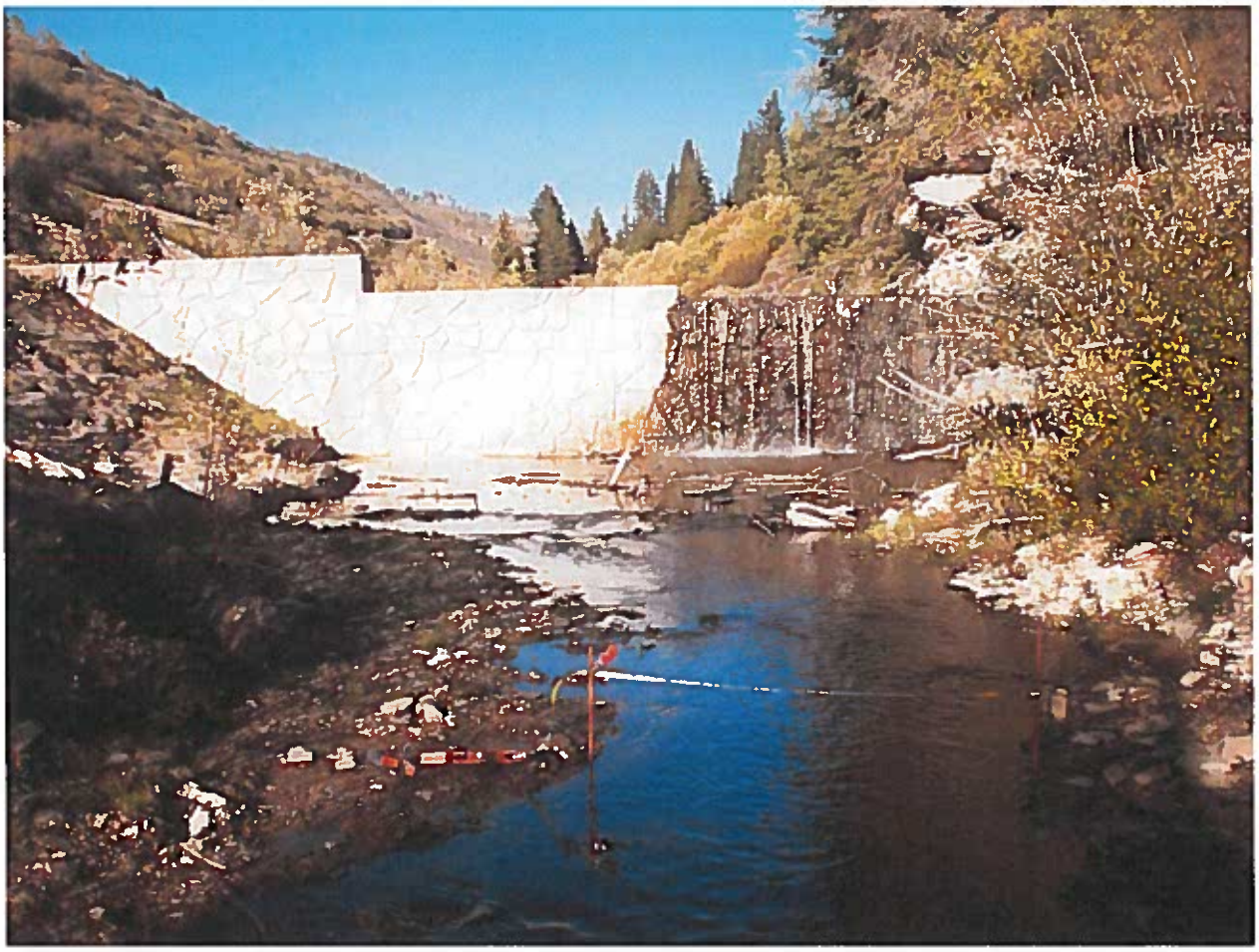
Based upon the review of the test for significance and the environmental analyses conducted with proposed mitigation, I have determined that the actions analyzed in the EA will not significantly affect the quality of the human environment. Accordingly, I have determined that the preparation of an Environmental Impact Statement is not necessary for this proposal.

Authorized Officer
Colorado River Valley Field Office

Date 6/17/2014

APPENDIX A

March 14, 2014
East Fork of Parachute Creek (Water Code 21460)
Nonnative Fish Control Reclamation Plan
August 11-15, 2014



East Fork of Parachute Creek Fish Barrier, September 2013

Lori Martin and Bruce Rosenlund
Colorado Parks and Wildlife
2014

Purpose
The purpose of this project is to restore the native Colorado River cutthroat trout (CRCT) population in the East Fork of Parachute Creek (East Fork) drainage, which is tributary to Parachute Creek and the Colorado River. The project is located on lands managed by the U.S. Bureau of Land Management (BLM), within the Federal Naval Oil Shale Reserve that is more commonly known as the Roan Plateau (Figure 1).

Background
The CRCT is recognized by Colorado Parks and Wildlife (CPW) as a Species of Special Concern, while the BLM designates this fish as a Sensitive Species. The CRCT range-wide status report indicates that, as of 2010, there are 361 CRCT conservation populations currently occupying 3,403 km (2,115 miles) of stream habitat, which is approximately 11% of the species' estimated historic range (Hirsch et al. 2013). Factors such as loss of habitat and introduction of nonnative fishes have contributed to the reduction in abundance and distribution of CRCT. Specifically, competition with nonnative brook trout has resulted in the displacement of CRCT in many systems.

CPW and other agencies are currently engaged in the implementation of the CRCT Conservation Agreement (CA) (CRCT Conservation Team 2006). The primary goal of that document is to assure the long-term prosperity of CRCT across the fish's historical range. This CA was developed to direct implementation of conservation measures for CRCT in Colorado, Utah, and Wyoming as a collaborative and cooperative effort among State and Federal resource agencies. The majority of these efforts are aimed at preserving existing genetically pure CRCT populations, expanding the habitat occupied by genetically pure CRCT populations, and identifying candidate streams for reclamation and re-introduction of genetically pure CRCT. The East Fork drainage once supported a CRCT population ("blue fish" of the Colorado River lineage), but the CRCT population is now considered extirpated due to competition with brook trout. The East Fork project will support the goals and objectives of the CA, thereby resulting in a reintroduced CRCT population within the East Fork drainage. CPW will consult with the U.S. Fish and Wildlife Service (USFWS) to ensure the project is in compliance with the Endangered Species Act.

CPW manages the fisheries on the Roan Plateau, including those of the East Fork drainage as core conservation waters for CRCT. Adjacent waters to the East Fork drainage supporting naturally reproducing populations of genetically pure CRCT include the East Middle Fork of Parachute Creek (EMF), and its headwaters, Trapper and Northwater creeks. The EMF drainage is unique in that the CRCT is the only fish species present in the upper portion of the drainage. Populations of CRCT are also found in the other forks of Parachute Creek, including the West and Middle fork drainages. The West Fork, EMF, and East Fork flow off of the Roan Plateau cliffs, with large waterfalls acting as natural barriers to upstream migration of nonnative salmonids (brook, rainbow, and brown trout) from mainstem Parachute Creek.

There are two barriers located on the mainstem of the East Fork; the natural barrier as previously mentioned (approximately 5.0 miles upstream from the confluence with Parachute Creek), and a newly constructed fish barrier located approximately 4.5 miles upstream from the waterfall (approximately 9.5 miles upstream of the Parachute Creek confluence). The fish barrier was constructed in the fall of 2012 to prevent nonnative brook trout in the East Fork drainage from

proliferating in the remaining 4.0 miles of stream upstream of the barrier, while brook trout removal efforts are being conducted (Figures 2 and 3).

The East Fork drainage encompasses 40.5 square miles of land (25,940 acres), originating at the confluence of JQS Gulch and Golden Castle Gulch, at an elevation of approximately 8,480 feet. The stream descends generally in a southwesterly direction over 14.0 miles to its confluence with Parachute Creek (5,790 feet in elevation). The upper 4.0 miles of the East Fork drainage will be the focus of this project. Perennial tributaries within the project site upstream of the constructed barrier include the two headwater streams (JQS Gulch and Golden Castle Gulch), as well as First Water Gulch, Second Water Gulch, and Third Water Gulch.

Objectives

The objectives of this project within the East Fork drainage are to: 1) temporarily convert all beaver pond complexes (within approximately 4.0 miles of stream upstream of the constructed fish barrier) into stream habitat (May-August 2014); 2) remove all brook trout with a chemical fish toxicant (rotenone) from the approximately 4.0 miles of stream upstream of the constructed fish barrier to the upper limits of fish distribution, (August 2014); 3) assess the success of chemical treatment via extensive electrofishing and gill netting (2014-2015); 4) chemically re-treat the stream if necessary (2015-2016); 5) restock the East Fork drainage with progeny of CRCT, ensuring protection of and expansion of a genetically favorable CRCT population (2015-2017).

THREATENED AND ENDANGERED SPECIES CONCERNS

Prior to the construction of the fish barrier on the East Fork, the BLM prepared the East Fork Parachute Creek Fish Barrier Environmental Assessment (EA) (BLM 2011a). The EA addresses 45 species of conservation concern (including BLM Sensitive Species), and 15 Federally listed, proposed or candidate species. Following the review of the EA, the BLM published a Finding of No Significant Impact (FONSI) on June 14, 2011 (BLM 2011b).

The proposed objectives of this project should have no effect on any listed or special status species, as was the previous finding of the BLM in relation to the fish barrier EA. There is one exception to this, the slim possibility of encountering CRCT ("blue fish" of the Colorado River lineage). The population of CRCT that once occupied the East Fork drainage is now considered extirpated, though few individuals may remain at a level no longer representing a reproducing population. Overall, the proposed action will involve a very small portion of the watershed, result in no cumulative impacts, and will result in a long-term benefit to the restoration of CRCT within the Colorado River drainage.

CURRENT FISH POPULATIONS, DISTRIBUTION, GENETICS, AND POPULATION TRENDS

Current Fish Populations

Most recently, CPW and BLM crews completed backpack electrofishing at two stations along the East Fork in August 2011. The most downstream station (Station 1) was located just upstream of the natural waterfall, while the second station (Station 2) was located just upstream

of the newly constructed fish barrier and downstream of Third Water Gulch. Brook trout were the only fish collected at both stations; no CRCT were observed or collected. The stations are approximately 4.4 miles apart, but estimates of adult brook trout abundance per mile based upon data from both stations were nearly identical. The brook trout population estimate for fish ≥ 150 millimeters (6.0 inches) in length at Station 1 was 63 fish +/- 0.6 fish (95% confidence interval), equivalent to 1,331 adult brook trout/mile. The population estimate for the same size range of fish at Station 2 was 84 fish +/- 0.7 fish (95% confidence interval), equivalent to 1,216 adult brook trout/mile. However, more juvenile (< 6.0 inches in length) brook trout were collected at Station 1, which was 115 feet shorter in length sampled than Station 2. Juvenile fish increased the overall (all size classes combined) brook trout abundance estimate/mile to 4,518 fish +/- 163 fish (95% confidence interval) based on data from Station 1, while the same estimate of fish/mile based on Station 2 data included 2,979 fish +/- 77 fish (95% confidence interval).

Fish Distribution

Brook trout exist in the mainstem East Fork, and several tributaries during favorable water conditions, from the fish barrier (approximately 8,255 feet in elevation) upstream to the headwaters. JQS and Golden Castle Gulch are the headwater tributaries that form the mainstem East Fork at approximately 8,499 feet in elevation. Brook trout have been collected in JQS Gulch at an upper elevation of 8,680 feet. Brook trout have not been collected in Golden Castle Gulch, but fish may use the lower portions of this tributary during those times of the year when suitable habitat is available. Brook trout have also been collected in the lower portion of Second Water Gulch. The lower portions (+/-500 feet) of First Water and Third Water gulches likely provide suitable fish habitat during different times of the year. Historical sampling information suggests that CRCT followed a similar distribution as the current population of brook trout in the East Fork drainage.

Genetics

Molecular analyses based upon small sample sizes (10 fish or less) indicate the East Fork CRCT population was nearly genetically pure ("blue fish" of the Colorado River lineage). The East Fork is managed by CPW as a core conservation drainage.

Population Trends

Brook trout were quickly becoming a problem for CRCT persistence in the early 2000s. Crews from various state and federal agencies attempted to lethally remove as many brook trout as possible from the upper portions of the East Fork in late summer/early fall of 2004 and 2005. By 2006, very few CRCT remained in the East Fork drainage due to competition with a prolific and abundant brook trout population. CPW and BLM crews electrofished approximately 1.5 miles of the upper portion of the East Fork in early September 2006. Forty-six CRCT (9 adults, 37 young-of-the-year) were removed across two days from this section of the East Fork, approximately 0.25 mile downstream of the Timber Gulch confluence to just upstream of the confluence with Second Water Gulch. The plan was to remove the CRCT, and transport these fish to a nearby fishless pond (private) that would serve as a refugia. These CRCT would then be used as broodstock for future reintroduction projects. CPW built a spawning channel in the pond inlet, and also transferred freshwater shrimp (as a food supply) to the pond from a nearby reservoir. Sampling of the pond by CPW crews in 2007 resulted in five CRCT collected, ranging in size from 163 mm to 237 mm (6.4 to 9.3 inches). Numerous tiger salamanders were also

collected. The pond was sampled again in 2009, and no fish were collected. The loss of the CRCT in this private pond as well as the population within the East Fork drainage is unfortunate. Eradication of brook trout from upstream of the constructed fish barrier will allow CPW the opportunity to reintroduce CRCT into the East Fork drainage.

MANAGEMENT ALTERNATIVES

Do Nothing
Brook trout will continue to dominate the aquatic habitat of this stream if no actions are taken. If CRCT restoration is not completed on this proposed stream (or other streams), Colorado will not meet it's obligations for the conservation of native CRCT under the CA for CRCT in Colorado, Utah and Wyoming (CRCT Conservation Team 2006).

Regulation Change
Eradication of the current East Fork brook trout population by liberalizing regulations to encourage harvest is not possible, as the stream is currently managed with the most liberal statewide trout regulation. Even with a bag limit of up to 14 fish per day (current regulation), there is simply not enough fishing pressure in this remote, small stream to remove a fraction of the current brook trout population. Additional expenses would not be incurred with an unlimited harvest regulation change, but prospects for success are unrealistic.

Mechanical Removal
Traps and backpack electrofishing could be used to mechanically remove adult brook trout and some brook trout fry. However, due to the complex habitat found throughout the East Fork, it would be impossible to remove a significant number of all year classes of brook trout. Electrofishing over several years would not remove all of the brook trout, as demonstrated by past CPW removal efforts. Further, attempting to remove brook trout by mechanical means would be the most costly alternative due to extensive time and travel commitments as well as salary costs. Large-scale electrofishing removal efforts would also preclude CPW staff from attending to other high priority projects.

Chemical Removal (preferred alternative)
The preferred alternative involves using an U.S. Environmental Protection Agency (EPA) approved piscicide (rotenone) to eradicate all fish in the East Fork upstream of the constructed fish barrier, with an approved nonnative fish control plan and application (Figure 4 and Appendix A.). For this alternative, two treatments of 1.0 part per million (ppm) rotenone will be applied on August 12 and 13, 2014. The project area will be surveyed for the presence of live fish after the chemical treatment is completed. Chemical reclamation will occur again in 2015-2016, if live brook trout remain within the project area after the initial chemical treatment in 2014. Rotenone treated reaches will include any suitable habitat in the East Fork drainage occupied by brook trout upstream of the constructed fish barrier at approximately 8,255 feet in elevation. Currently, brook trout are known to exist up to approximately 8,670 feet in elevation in JQS Gulch. Treatments will be completed prior to the spawning of brook trout (early/mid-September), to ensure that eggs will not be present in the gravel and potentially not impacted by the chemical treatment.

Native CRCT will be reintroduced (per consultation with the USFWS, and coordination between CPW and the BLM) to the East Fork drainage when monitoring indicates the removal of brook trout has been successful. The preferred alternative will result in a core conservation population of CRCT occupying approximately 4.0 miles of habitat upstream of the constructed fish barrier.

IMPLEMENTATION OF PREFERRED ALTERNATIVE

Preferred Alternative
The preferred alternative involves temporarily converting all beaver pond complexes into stream habitat, and chemically removing all nonnative brook trout in the East Fork drainage upstream of the constructed fish barrier in 2014. Treated reaches will include the mainstem East Fork and any tributary habitat occupied by brook trout upstream of the constructed fish barrier. The project area will be re-treated with chemical in 2015-2016 should the piscicide treatment in 2014 prove unsuccessful in eradication of brook trout upstream of the constructed fish barrier. Beaver pond complexes will be reinstated, and suitable habitat restocked with genetically pure CRCT.

CHEMICAL OPTIONS

Currently, only antimycin and rotenone are certified for the control of fish by the EPA. Antimycin is currently not commercially available, and is not anticipated to be available in the near future. Rotenone has been successfully used for many years by the CPW to improve angling quality and for native fish conservation. Rotenone is the chemical proposed for use during the East Fork reclamation project.

Rotenone is a naturally occurring substance derived from the roots of tropical plants (*Lonchocarpus, Derris, Tepbrosia, and Dalbergia spp.*) (Ling 2003). Rotenone has been/is currently used by native cultures to capture fish for food where rotenone is naturally found. Rotenone has been used in fisheries management in North America since the 1930's, as well as an insecticide for gardening and livestock purposes (Ling 2003).

Potassium permanganate ($KMnO_4$) will be used as the rotenone detoxifying agent to prevent indirect impacts to non-targeted fish occupying the East Fork drainage downstream of the treated area (from the constructed fish barrier, upstream).

CHEMICAL APPLICATION

APPLICATOR CERTIFICATION

The Colorado Department of Agriculture (Division of Plant Industry) is the State agency responsible for restricted use pesticide applicator certification. Rotenone is a Restricted Use pesticide when applied as an aquatic pest treatment and because of this, users must comply with State regulations and hold the appropriate pesticide applicator's license(s). The lead biologist for this project, Lori Martin, is currently licensed as a Qualified Supervisor for the treatment of Aquatic Pests (Commercial Category 108). Project oversight (on or off-site) and supervision of unlicensed applicator technicians will be the responsibility of all Qualified Supervisors participating in the project.

TOXICANT APPLICATION METHODS AND CONCENTRATION

Treatment Area
The treatment area will include all waters within the East Fork drainage upstream of the constructed fish barrier that have the potential to hold brook trout (Figures 2 and 4).

Beaver Pond Complexes
Currently, two complexes of beaver ponds exist in the East Fork drainage upstream of the constructed fish barrier. One beaver pond complex is located just upstream of Second Water Gulch (Figure 5), while the other complex is located between Third Water Gulch and the constructed fish barrier. Temporarily converting all beaver pond complexes into stream habitat will be required for the project to be successful. It will be impossible to accurately manage and calculate the movement and neutralization of rotenone without the conversion of these large beaver pond complexes. In addition, the beaver ponds provide tunnels and back-water habitats that prevent the mixing of rotenone, thereby reducing the effective removal of brook trout. The beaver ponds provide excellent habitat for cutthroat trout populations. Therefore, the beaver ponds will be restored as soon as the successful removal of brook trout is accomplished.

Sub-surface Flow
A short stream reach of approximately ten feet exists where the East Fork stream flow goes underground, upstream of the confluence with Third Water Gulch. Dye moved through the gravel in this area during preliminary time of travel tests in September 2013. However, this area should be trenched prior to the chemical treatment to insure uninhibited movement of water and rotenone.

Seeps
There are several seeps near the confluence with Golden Castle Gulch that connect to the East Fork. These areas should be treated with a backpack spray application of rotenone.

Tributaries
Golden Castle Gulch, First Water Gulch, Second Water Gulch, and Third Water Gulch were all flowing less than 0.10 cubic feet/second (cfs) during preliminary time of travel tests in September 2013. These tributaries can probably be treated with a backpack spray application of rotenone. However, all tributaries should be reevaluated in 2014, as several may require chemical treatment with drip stations.

Water Temperatures, Flows, and Time of Travel
East Fork water temperatures in September 2013 ranged from 48 degrees Fahrenheit (F) to 52 degrees F (Table 1). Stream flows in the Parachute Creek drainage (both within the East Fork and outside of the project area) varied over time (Table 1). In September 2013, stream flow in the East Fork increased in a downstream direction from the headwaters near Golden Castle Gulch (0.10 cfs) to just downstream of the constructed fish barrier (0.44 cfs).

Determining time of travel (as measured by dye tests) is critical for any restoration project, as this process is used to decide when and where rotenone is applied to the stream, and when

potassium permanganate will be applied to neutralize the rotenone. Time of travel appears to vary significantly with changes in stream flow (Tables 2 and 3). Dye required 12.42 hours to travel from the upper reaches of brook trout distribution in JQS Gulch (8,670 feet in elevation) to the constructed fish barrier (8,255 feet in elevation) in the fall of 2013 (Tables 2 and 3). Two large beaver pond complexes in the East Fork were present in the fall of 2013. These complexes will need to converted into stream habitat prior to chemical reclamation. Time of travel, based upon the average time of stream channel travel and with the beaver pond complexes converted, is estimated at 14.5 hours with a stream flow of 0.44 cfs. Time of travel in August of 2014 should be less than 14.5 hours, if stream flow during this time of year is similar to a 1.18 cfs stream flow observed in August 2011. Time of travel will be determined at least twice prior to chemical treatment, following the conversion of beaver pond complexes into stream habitat.

Rotenone Label

All rotenone use will be consistent with the label of the rotenone product. For this project, CFT Legumine 5% liquid rotenone will be used (Appendix B.). The effective rotenone concentration levels are expected to be consistent with the rotenone label for normal pond use, or 1.0 ppm as measured at the constructed fish barrier and primary detoxification station.

Rotenone Treatment Sites

Perennial sections of the East Fork will be treated with a water/rotenone solution, using drip stations to treat the majority of the habitat connected by flowing water. In addition, backpack sprayers will dispense a dilute solution of rotenone to stream banks, low flow areas, and waters not strongly connected to the stream current, to ensure all fish are removed. Description and operation of the backpack sprayers and drip stations are provided in Appendix C.

Five rotenone application sites (drips stations) should be established, if 14.5 hours of travel time is required for rotenone to move from the upper distribution of brook trout to the constructed fish barrier (Figure 7). Most drip stations will dispense a constant flow of 1.0 ppm rotenone for up to three hours, with the treatment stations spaced approximately three hours of stream flow time apart (Tables 4 and 5). Estimated time of travel (based upon a time of travel of 14.5 hours from September and October 2013), and rotenone concentrations and application rates (based upon a flow rate of 1.18 cfs from August 2011) are provided in Tables 4 and 5. Calculations regarding the volume of rotenone required for use during this project are based upon desired rotenone concentration (1.0 ppm) and stream flow (Table 6). Stream flows and time of travel will be recalculated the week prior to the chemical treatment, and Tables 4 and 5 will be adjusted accordingly.

Live Cages and Block Nets

Cages of live fish will be placed just upstream of most mainstem rotenone drip stations to insure that rotenone is effective in removing brook trout in the East Fork project area. The live cages (bioassays) will help personnel monitor the effectiveness of rotenone within each treatment reach, with all live cage fish expected to be moribund/dead within four to eight hours of chemical treatment. Block nets may be placed immediately upstream and/or downstream of the main potassium permanganate detoxification station at the constructed fish barrier to collect dead fish that might otherwise drift downstream and outside of the project area.

Equipment and Staff
All equipment, rotenone, and safety training will be provided by CPW. Personnel required to complete the project will be coordinated by CPW.

DETOXICANT APPLIATION METHOD AND CONCENTRATION

A detoxicant/oxidizing solution of potassium permanganate ($KMnO_4$) will be applied at a rate of 2.0-4.0 ppm through a constant head delivery device, while the East Fork is being treated with rotenone (Table 5). Stream flow will be measured prior to and during treatment to ensure the accurate delivery of the detoxicant solution. Calculations regarding the volume of potassium permanganate required for use during this project are based upon desired $KMnO_4$ concentration (2.0-4.0 ppm) and stream flow (Table 6). The primary detoxification station will be established on the East Fork downstream of the constructed fish barrier. Potassium permanganate will be applied within 200 feet of the downstream base of the barrier. The detoxicant generally requires approximately 30 minutes of contact time to fully oxidize rotenone, depending on water temperatures and organic composition of the water and stream channel. A CPW aquatic researcher will be present to monitor rotenone concentrations upstream and downstream of the potassium permanganate application site (primary detoxification station) to ensure that $KMnO_4$ is neutralizing all rotenone. Additionally, dilution of rotenone by ground water and contributions of additional stream flows from the East Fork tributaries downstream of the primary detoxification station will also assist in further diffusion of any residual rotenone. These tributaries include: Second Anvil Creek, Timber Gulch, Camp Gulch, Grassy Gulch, First Anvil Creek, Spring Gulch, Sheep Trail Hollow, Trail Gulch, Bull Gulch, Ben Good Creek, and Forked Gulch.

Equipment and Staff
All equipment, potassium permanganate, and safety training will be provided by CPW. Personnel required to complete the project will be coordinated by CPW.

EMERGENCY DETOXIFICATION STATION

Additional potassium permanganate will be available at the emergency detoxification station to ensure adequate chemicals are available in the event of a large thunder storm or accidental rotenone spill. The emergency detoxification station will be located on the East Fork near the confluence with Grassy Gulch, approximately 2.3 stream miles downstream of the constructed fish barrier (primary detoxification station) (Figure 4). Access to this station is via the Grassy Gulch road.

ZONE OF KILL

The areas of expected/potential fish mortality and/or impacts under varying conditions have been split into three zones:

Fish Toxicant Treatment Zone

The primary zone of toxicant effect is expected to be confined to the East Fork drainage upstream of the primary detoxification station and constructed fish barrier. Fish mortality is expected to occur in this area due to direct exposure to rotenone. Additional fish mortality or detrimental impacts to fish may occur downstream of the primary detoxification station as a result of direct exposure to potassium permanganate, as well as exposure to rotenone before the detoxicant completely oxidizes the remaining rotenone. Dead and/or moribund fish may be carried downstream and outside of the project area by stream flow, despite block nets being in place to prevent downstream drift of dead/moribund fish.

Incidental Mortality Zone

Extensive beaver pond complexes exist from the constructed fish barrier downstream to the East Fork waterfall. The large volume of water contained in these complexes will provide additional detention time and dilution, allowing the 1.0 ppm application rate of rotenone additional time to oxidize. However, if an unusual situation arises (i.e., elevated organic loading, or unexpected man-caused or natural event) where rotenone is not sufficiently detoxified by the primary detoxification station and moves downstream of the project area, the primary and emergency detoxification stations will increase the treatment level of potassium permanganate to 4.0 ppm. The downstream terminus of fish mortality may extend to the confluences of the East Fork with the Middle and West forks of Parachute Creek, should an unlikely situation occur. At these locations, dilution should reduce even 1.0 ppm of rotenone to less than 0.25 ppm, with the August 2008 stream flow (4.95 cfs) from the West Fork alone (Table 1). Additional stream flow from the Middle Fork could potentially dilute rotenone to less than 0.1 ppm by the time the toxicant reaches the mainstem of Parachute Creek.

No Kill Zone

The no kill zone is that area outside of the fish toxicant and incidental mortality zones where fish mortality is not expected to occur, with the exception of a catastrophic event occurring after the release of rotenone (i.e., 500 year flood, earthquake). This zone includes the area of the Colorado River downstream of the confluence with Parachute Creek. The magnitude of such an event should this occur will determine the quantity of toxicant that is released and our ability to cope with the release. It is difficult to speculate what the total effects on downstream aquatic systems would be from the release of toxicant when compounded by the effects of a major disaster. Likely, the effects of the rotenone released in such conditions would pale in comparison to the devastation resulting from the actual catastrophic event. Under normal circumstances, there is little chance of any toxic rotenone reaching the mainstem Colorado River, with Parachute Creek flowing nearly 40 cfs prior to entering the Colorado River (Table 1), and the Colorado River flow exceeding 2,000 cfs near the confluence with Parachute Creek (USGS 2014).

SCOPE OF PROJECT

The 2014 chemical treatment of the East Fork is scheduled for the week of August 11th, with the initial rotenone application occurring across the entire project area on the 12th, weather permitting. A second rotenone application will occur across the entire project area on the 13th.

Fish surveys (electrofishing and gill netting) will be conducted during the fall of 2014, and in 2015 (post-runoff) to determine the success of the 2014 chemical treatment. Another chemical treatment will be planned for 2015-2016, should the 2014 chemical treatment be unsuccessful.

Personnel and Equipment

Approximately eighteen personnel will be required to manage the rotenone drip stations, and operate the backpack sprayers and primary potassium permanganate detoxification station for each treatment day (Table 5). An additional four to five people will be needed as "rovers" to monitor and insure maintenance of the aid stations, and to monitor the chemical applications, block nets, and fish in the live cages.

By May/June 2014

- Obtain signed EA and FONSI for the project from the BLM
- Obtain signed application for fish control from CPW
- Have crews begin the process of converting beaver pond complexes into stream habitat
- Dig trench through the areas were the stream flow is sub-surface
- Continue moving water into a confined channel for the remainder of the summer
- Address access issues for equipment and personnel (i.e., Third Water Gulch and Grassy Gulch roads, JQS barbed wire fence, etc.)
- Seek consultation from USFWS, and coordination with BLM regarding reintroduction of native cutthroats ("blue fish" versus "green fish")

By July 15, 2014:

- Confirm personnel needed to carry-out project, and communicate time/place to meet, personal equipment/food needs and physical requirements for personnel
- Have all treatment stations, bottles, backpack sprayers, and protective equipment available
- Ensure public and cooperators are notified about the project during the treatment period (August 11-15) by posting area signs and providing news releases for distribution
- Confirm that all beaver pond issues have been addressed
- Obtain or confirm availability of radios for personnel

Week of August 4, 2014:

- Inform applicators that the project is still proceeding
- Confirm stream flows and flow times
- Ensure there are no beaver pond issues
- Ensure areas with sub-surface flow are trenched
- Update Tables 4 and 5 based on new stream flow and time of travel data obtained the week of August 4th
- Ensure that required rotenone and potassium permanganate are available, and drip stations and backpack sprayers are available and functional

- Have sentinel, hatchery fish available for live cages (100 fish), along with live cages (12 metal minnow traps) and 6 block nets (includes emergencies)
- Flag treatment sites, and any cross-country routes to treatment sites
- Have core personnel trained to escort applicators to the remote locations on Day 1
- Obtain snacks and water for aid stations, canopies for cover, radios for communication, bear spray for protection
- Prepare for cookout and relaxation at the BLM base camp cabin

Day 1 of Project (August 11):

- Travel and set up base camp at BLM cabin
- Confirm stream flows and flow times, and ensure there are no beaver pond issues; update Tables 4-5
- Flag remaining treatment sites, and any cross-country routes to treatment sites
- Ensure closure signs are still in place
- Pack in coolers for water and food stations
- Set up canopies for water and food stations
- Set up water and emergency food stations for backpack sprayer personnel near drip stations and primary detoxification station
- Set up primary and emergency detoxification stations, and ensure the operation of both stations
- Establish live cages upstream of rotenone drip stations 1-4 and upstream of the constructed fish barrier
- Establish live cages downstream of the primary detoxification station (just downstream of constructed fish barrier), just upstream of the emergency detoxification station at Grassy Gulch, and in mainstem Parachute Creek just downstream of the confluence with the East Fork
- Have core personnel trained to escort applicators to the remote locations on Day 2
- Provide assignments once all personnel arrive
- Have core personnel take applicators and sprayers to their sites (if personnel arrive early enough), and install drip stations for Day 2
- In the evening, hold meet and greet and safety meeting. Train applicators to operate drip stations and backpack sprayers. Establish communications protocols. Provide equipment, chemicals, and work sheets to each applicator.

Day 2 of Project (August 12):

- Begin applying rotenone and potassium permanganate at sites and times per Tables 4 and 5
- Set block nets in the area of the primary detoxification station and constructed fish barrier
- Have rotenone applicators begin their drip stations by designated times
- Have rotenone applicators using the backpack sprayers begin spray operations by designated times, and complete two applications during the day
- Begin the primary potassium permanganate detoxification station two hours prior to the anticipated arrival of the rotenone

- Due to the length of stream flow travel time from the upper stations, the application of potassium permanganate will run from the morning of August 12th through the early morning hours of August 13th
- Coordinate with the rovers to ensure aid stations are sufficiently maintained; resupply potable water and food stations as necessary
- Rovers will monitor the aid stations and crew, block nets and live cages during the day, and communicate issues with the Area Fisheries Biologist
- Return to the BLM base camp and review the day. Address any concerns and issues. Prepare for Day 3.

Day 3 of Project (August 13):

- Begin applying rotenone and potassium permanganate at sites and times per Tables 4 and 5
- Recheck and maintain block nets in the area of the primary detoxification station and constructed fish barrier
- Place new sets of live fish in live cages upstream of rotenone drip stations 1-4, upstream and downstream of the primary detoxification station (constructed fish barrier area), just upstream of the emergency detoxification station at Grassy Gulch, and in mainstem Parachute Creek just downstream of the confluence with the East Fork
- Have rotenone applicators begin their drip stations by designated times
- Have rotenone applicators using the backpack sprayers begin spray operations by designated times, and complete two applications during the day
- Begin the primary potassium permanganate detoxification station two hours prior to the anticipated arrival of the rotenone
- Continue application of potassium permanganate until live cage fish upstream of the primary detoxification station survive for two hours
- Coordinate with the rovers to ensure aid stations are sufficiently maintained; resupply potable water and food stations as necessary
- Rovers will monitor the aid stations and crew, block nets and live cages during the day, and communicate issues with the Area Fisheries Biologist
- Cook out and games at the BLM base camp cabin after project completion

Day 4 of Project (August 14):

- Meet with crew, and discuss any concerns/observations of any live fish observed on Day 3. If problems, then re-treat problem areas. If no observed problems, then have crew pull stations, live cages, block nets, and excess flagging. Some crews may depart. Application of potassium permanganate will continue into the morning of day 4, or until fish in live cages survive upstream of the primary detoxification station.

Day 5 of Project (August 15):

- Address any problems/issues, and all personnel depart

NOTIFICATION OF OTHER GOVERNMENT ENTITIES

A copy of the proposed Application for Fish Control (Appendix A.) will be provided to the following individual prior to the treatment date:

Greg Gerlich, Aquatic Section Chief
CPW
6060 Broadway
Denver, CO 80216
303-291-7360

PUBLIC NOTIFICATION

The public will be notified of the planned treatment of the East Fork through a CPW/BLM press release in local newspapers. The project area will be closed to the public during the project and pesticide applicator safety signs will be posted throughout the project area warning the public of the application of a fish toxicant. The State of Colorado's Registry was consulted and the closest pesticide sensitive persons are located in Grand Junction, Colorado, more than 60 miles from the reclamation project area.

PROCEDURES IF UNPLANNED KILL OR SPILL OCCURS

The site specific emergency response detailed in this plan will be initiated if an unplanned kill or spill occurs, with the following people to be notified immediately:

Sherman Hebein, CPW
Northwest Region Senior Aquatic Biologist
970-209-2360

Greg Gerlich, CPW
Aquatic Section Chief
303-291-7360

JT Romatzke, CPW
Grand Junction Area Wildlife Manager
970-250-4507

Mike Porras, CPW
Public Information Officer
970 -210-3768

Colorado Department of Public Health and Environment
Water Quality Control Division
303-692-3500 (normal working hours)
877-518-5608 (24 hour emergency spill hotline)

Tom Fresques, BLM
West Slope Fish Biologist
[redacted]

DISPOSAL OF DEAD FISH

Fish killed by the toxicant will be left to recycle nutrients to the system. Public salvage of dead fish will not be allowed.

FINAL REPORT AND ANALYSIS

Within 60 days of the completion of the project, a report will be submitted to the Senior Aquatic Biologist (copied to the Aquatic Section Chief) and appropriate stakeholders documenting project results and any variance from planned procedures. Any problems encountered will be described and the corrective action explained. Live cage fish mortality and any unexpected losses of fish in the three zones will be documented and discussed. Fish population sampling via gill netting and electrofishing will take place immediately following project completion to ascertain the success or failure of this project.

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Figure 1. Map of the East Fork of Parachute Creek project area.

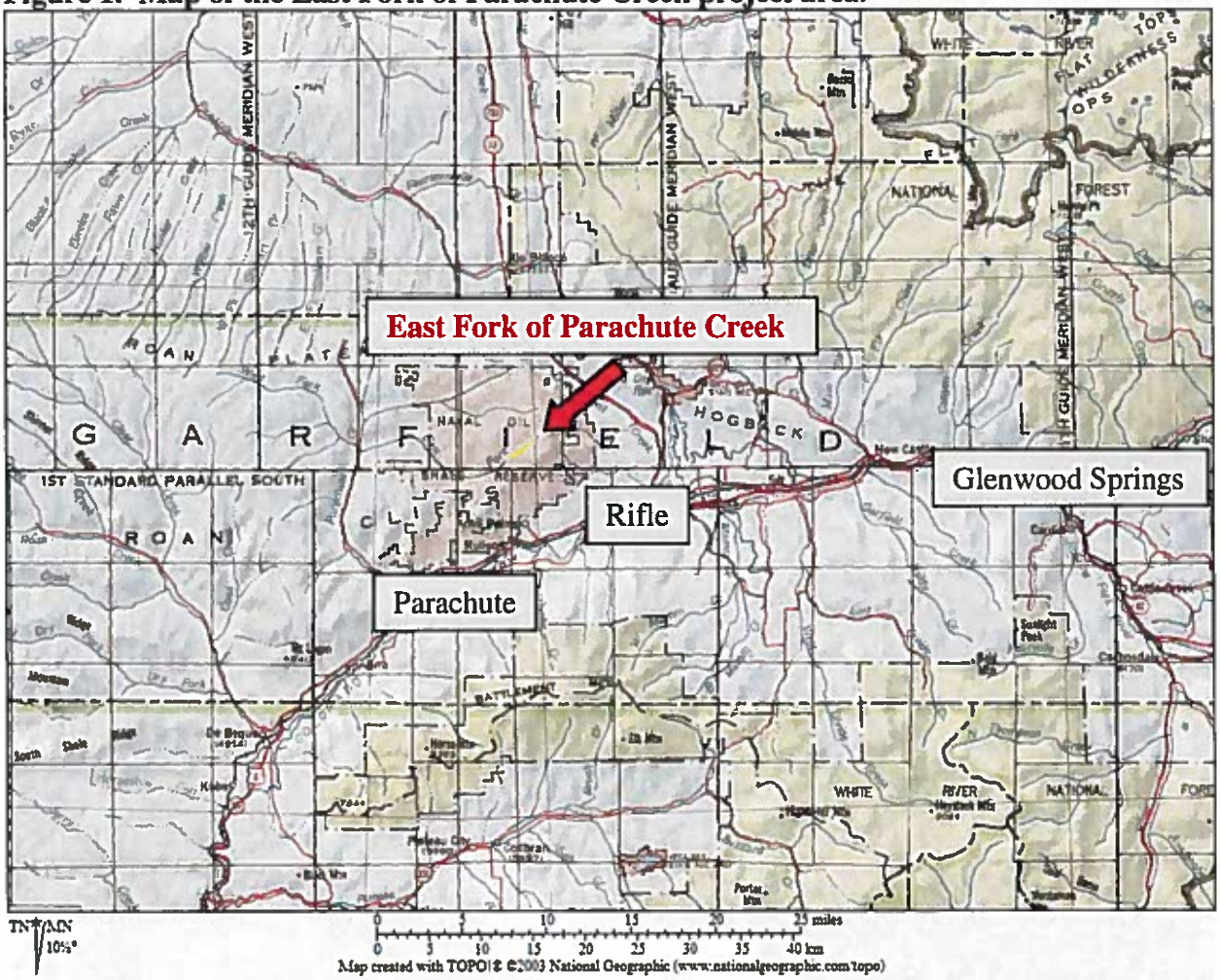

Figure 2. Aerial photograph of the East Fork of Parachute Creek project area. Image from August 2011 and provided by Google Earth.

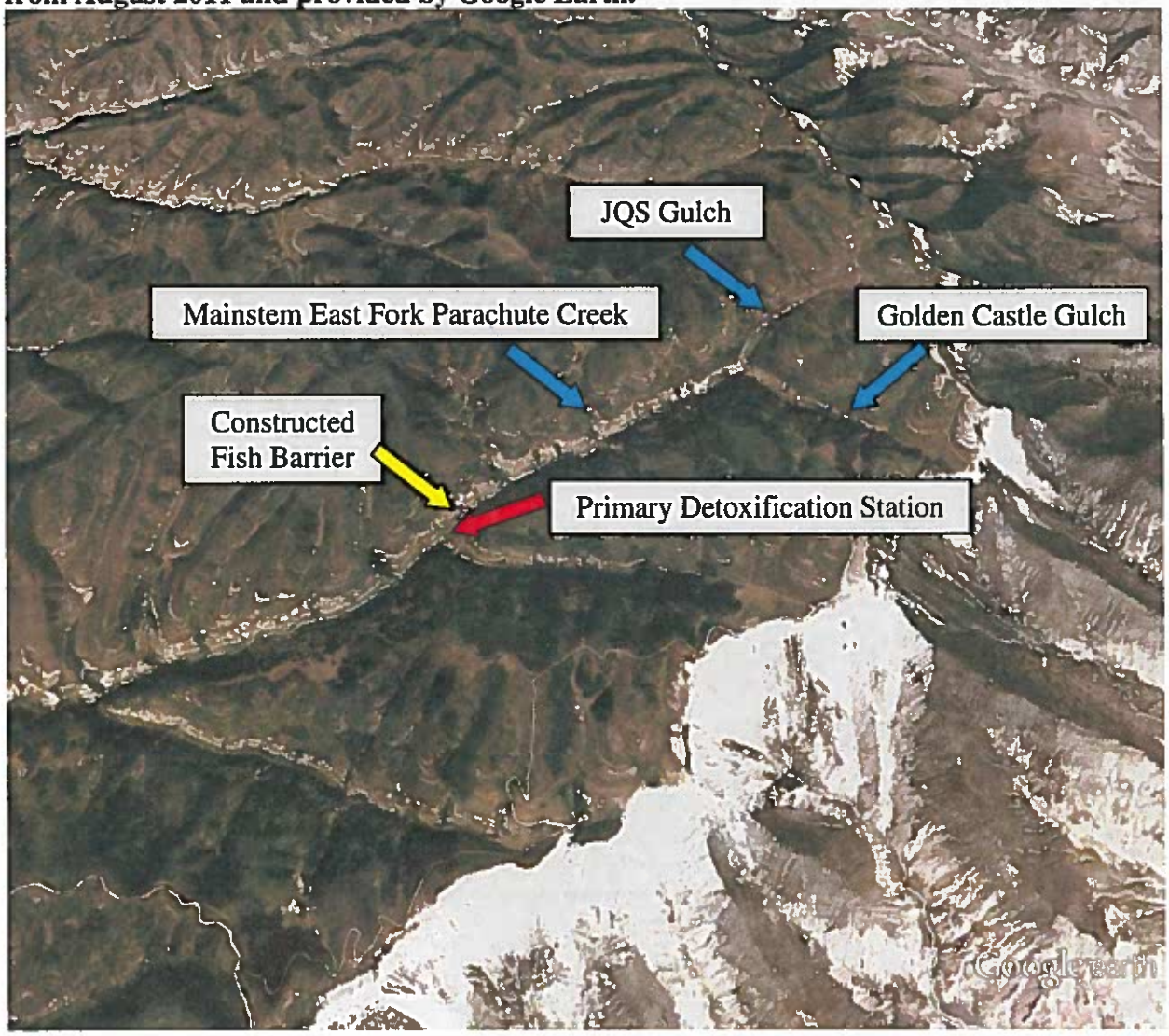

Figure 3. East Fork of Parachute Creek constructed fish barrier, September 2013.

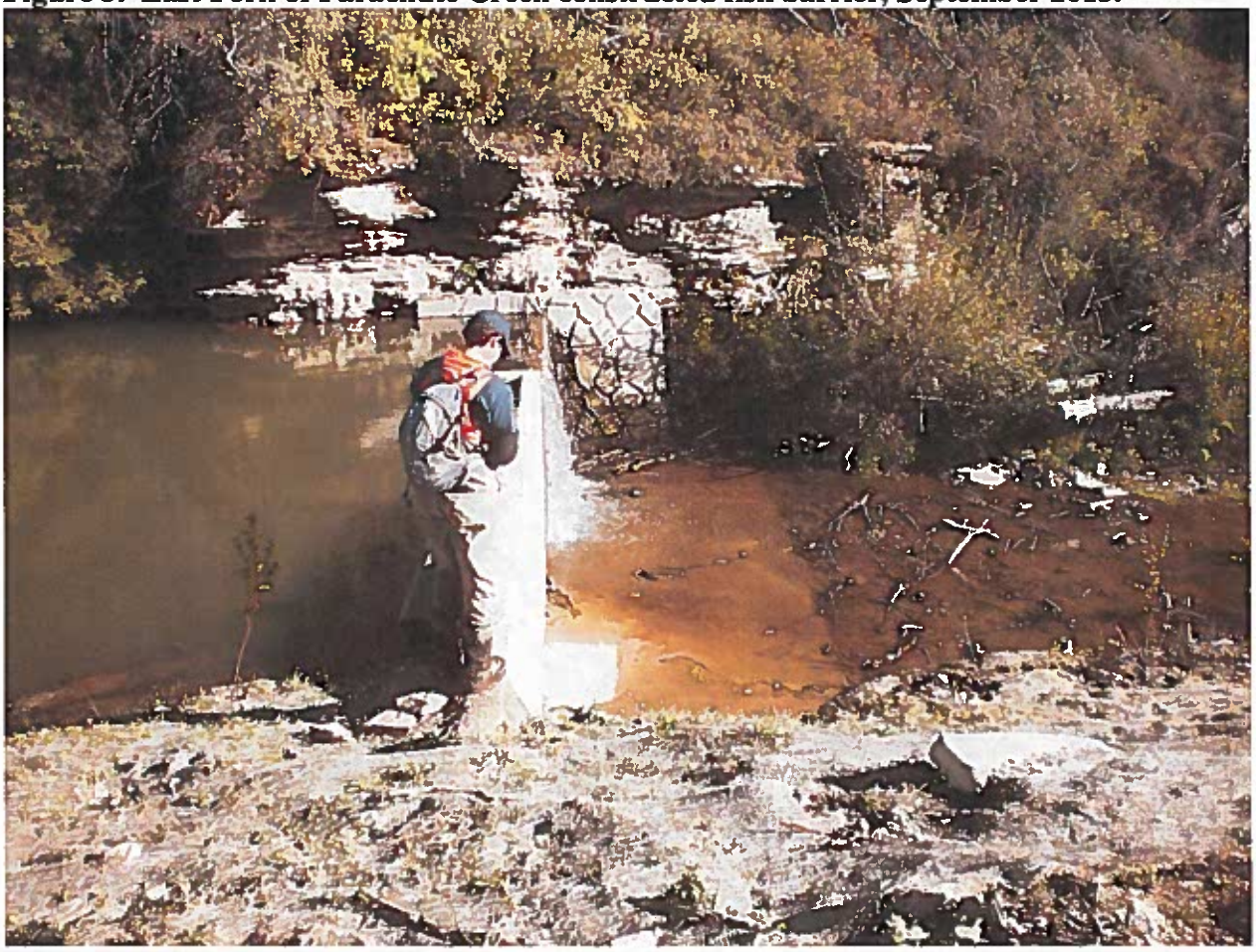

Figure 4. Map of the East Fork of Parachute Creek project area, including the upper limit of brook trout distribution, major tributaries, constructed fish barrier, and primary and emergency detoxification stations.

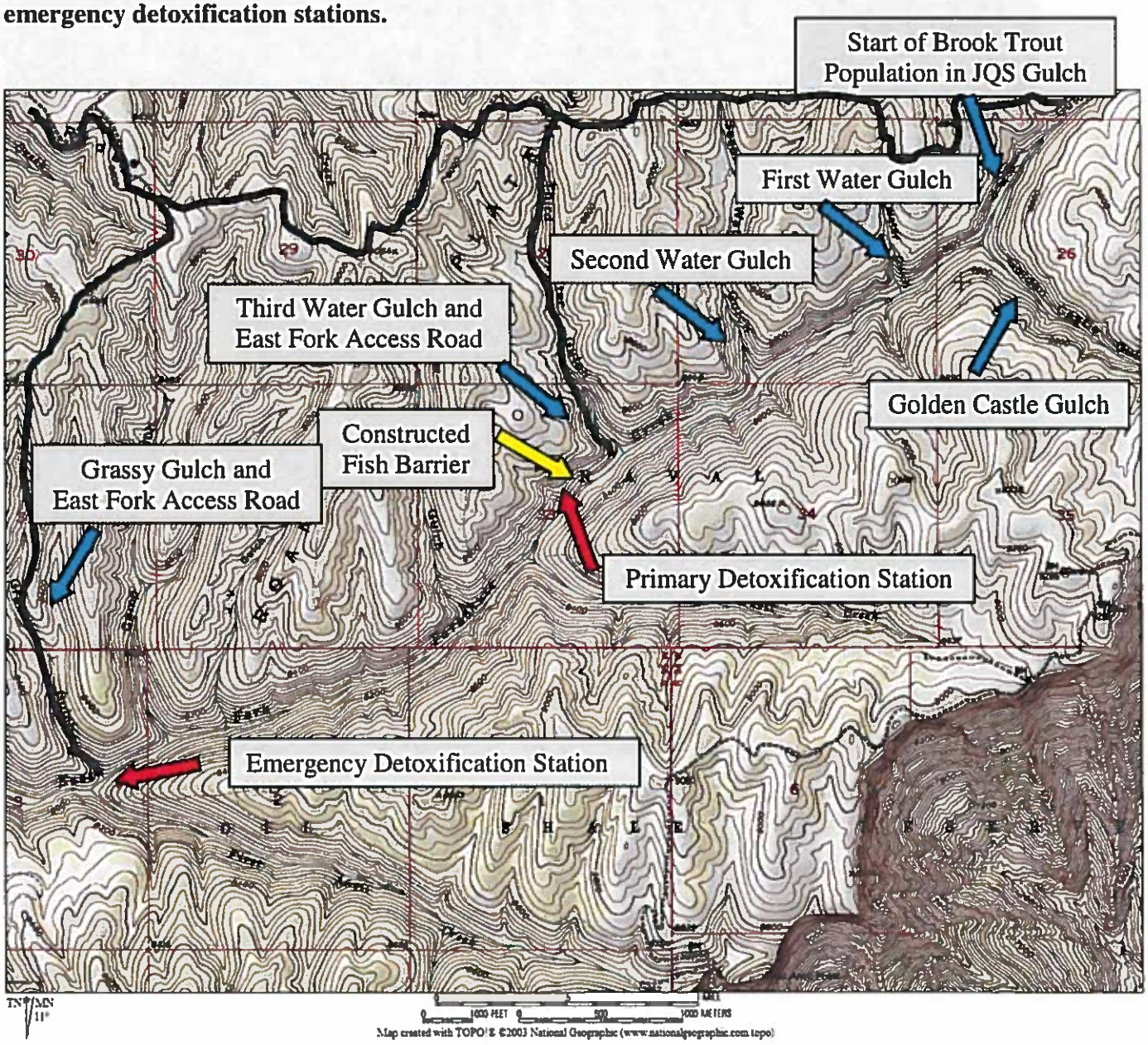

Figure 5. Beaver pond complex upstream of Second Water Gulch, September 2013.

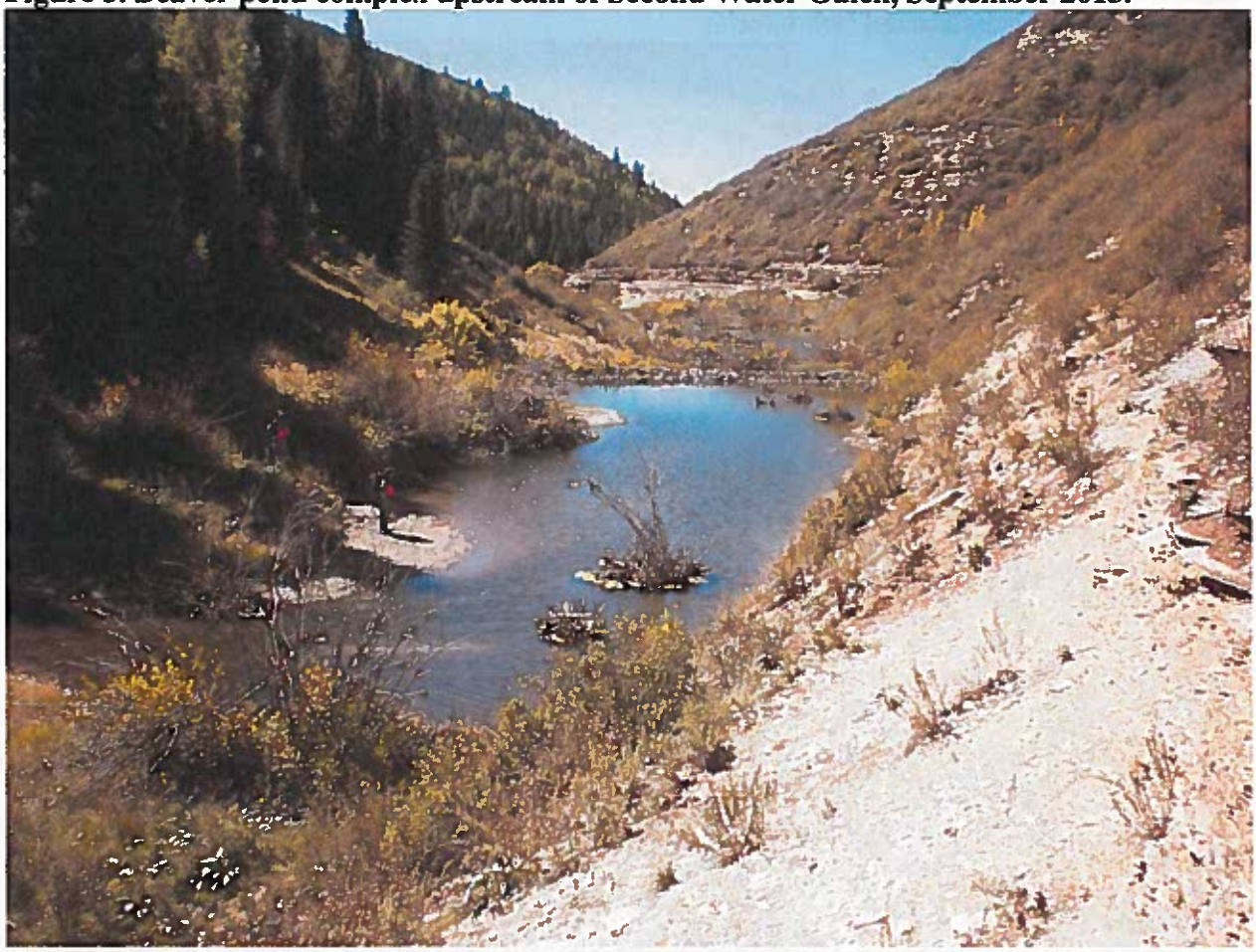

Figure 6. Preliminary dye test through the primary chemical treatment area of the project upstream of the constructed fish barrier.

Figure 7. East Fork of Parachute Creek rotenone treatment sites for the August 2014 project, based upon 0.44 cfs stream flow at constructed fish barrier and 14.5 hours of travel time from upper limit of brook trout distribution to constructed fish barrier. A minimum of five rotenone drip stations will be required. There are three hours of estimated travel time between drip stations 5 to 1, and 2.5 hours of travel time between station 1 and the constructed fish barrier. Centimeter=cm

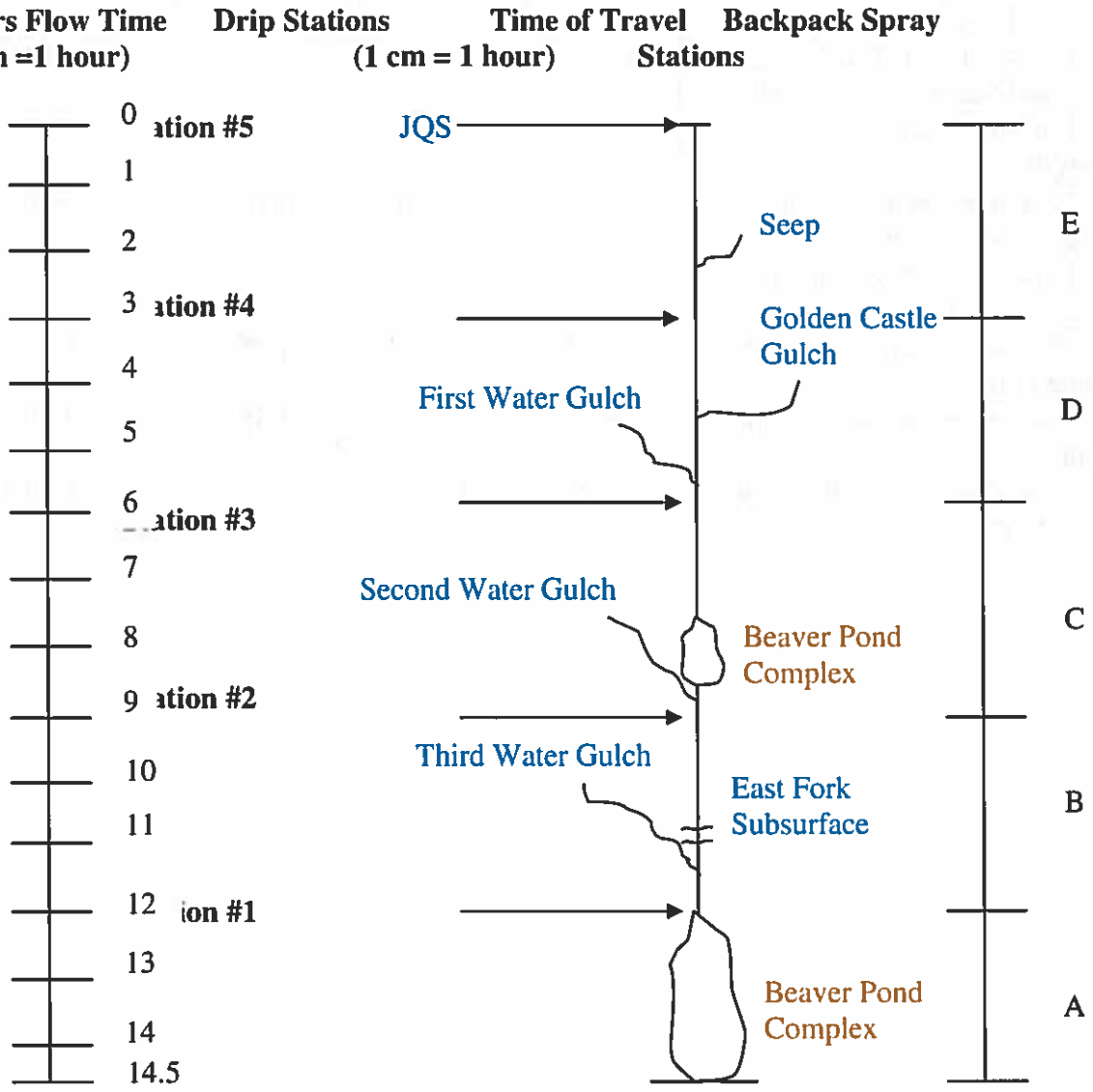

Table 1. Water temperatures and stream flows for various locations within the Parachute Creek drainage, 2008-2013. Not Determined=ND.

Location	Elevation (feet)	Date	Stream Flow (cubic feet/second)	Water Temperature (degrees Fahrenheit)/ Time Measured
East Fork-between Third Water Gulch and Second Anvil Creek	8,260	6/25/08	3.2	59.0/1820
East Fork- between Third Water Gulch and Second Anvil Creek	8,240	6/28/10	ND	54.5/1045
East Fork- between Third Water Gulch and Second Anvil Creek	8,240	8/16/11	1.18	63.1/1700
East Fork-upstream of natural waterfall	7,723	8/16/11	2.15	59.0/1215
East Fork-just downstream of Golden Castle Gulch	8,499	9/23/13	0.10	50.0/1525
East Fork-25 feet downstream of constructed fish barrier	8,255	9/24/13	0.44	49.5/1700
West Fork-near confluence with Middle Fork	5,867	8/6/2008	4.95	56.0/1520
West Fork-near confluence with Middle Fork	5,867	10/25/2011	3.85	41.9/0900
Parachute Creek-at confluence with Colorado River	5,056	7/16/2008	39.6	69.4/1700

Table 2. Time of travel information from the confluence of JQS Gulch and Golden Castle Gulch (headwaters of the East Fork of Parachute Creek) to the East Fork constructed fish barrier, collected by CPW September 23-24, 2013. Fahrenheit=F. Not Determined=ND.

Location	Time of Travel (hours)	Elevation (feet)	Miles Walked	Stream Temp. (F)/ Time	UTM Coordinates for Zone 13 (meters)	Comments (gpm=gallons per minute; cfs=cubic feet per second)
JQS Gulch-3' falls with pool ups. of confl. with Golden Castle Gulch		8,550		50.0/ND	0249770 Easting 4386148 Northing	Fish below falls
Confl. of JQS and Golden Castle	0.0	8,499	0.0	ND	0249564 Easting 4385775 Northing	Golden Castle Gulch, ~10 gpm; seeps on N side of confl.; below confl., 0.1 cfs
YP 61	0.5	8,471	0.17	ND	0249377 Easting 4385702 Northing	
YP 62	1.0	8,452	0.44	ND	0249250 Easting 4385602 Northing	
Just dwn. confl. with First Water Gulch	1.5	8,430	0.65	ND	0249049 Easting 4385513 Northing	
Canyon on S side (YP 66)	2.0	8,408	0.91	42.0/ND	0248903 Easting 4385468 Northing	20 gpm
YP 67	2.5	8,404	1.07	48.0/1600 42.0/1000	0248826 Easting 4385410 Northing	End 9/23 Start 9/24
YP 71	3.0	8,401	1.26	ND	0248772 Easting 4385359 Northing	
YP 72	3.5	8,396	1.38	ND	0248666 Easting 4385324 Northing	
YP 73	4.0	8,413	1.56	ND	0248539 Easting 4385245 Northing	
YP 74	4.4	8,398	1.62	ND	0248490 Easting 4385242 Northing	Small dam
End of stream, start of beaver dam complex	**4.4 total for this section**	8,394	1.67	ND	0248464 Easting 4385218 Northing	
Dam complex for about 0.23 mile	ND	ND	ND	ND	ND	
Stream at base of last beaver dam in complex (YP 76)	0.0	8,352	1.90	52.0/1315	0248180 Easting 4385037 Northing	
Confl. with Second Water Gulch	ND	ND	1.92	52.0/1315	ND	< 0.05 cfs
YP 77	0.5	8,374	2.06	ND	0248051 Easting 4384884 Northing	
YP 78	1.0	8,338	2.29	ND	0247920 Easting 4384880 Northing	
YP 79	1.5	8,329	2.50	ND	0247769 Easting 4384816 Northing	
YP 80	2.0	8,311	2.65	ND	0247607 Easting 4384750 Northing	
Stream subsurface for 10 feet, then beaver dam (YP 81)	**2.17 total for this section**	8,308	2.72	ND	0247528 Easting 4384721 Northing	
Small beaver dam for about 200 feet	ND	ND	ND	ND	ND	
Stream starts (YP 82)	0.0	8,295	0.0	ND	0247460 Easting 4384675 Northing	
Third Water Gulch	ND	ND	ND	48.0/1615		About 0.05 cfs
50feet dwn. Third Water Gulch (YP 83)	0.5	8,277	2.83	ND	0247315 Easting 4384583 Northing	
End of stream time of travel, start large beaver dam complex	**0.75 total for this section**	8,288	2.90	ND	0247265 Easting 4384539 Northing	
Large dam complex for about 0.4 mile to fish barrier	ND	ND	ND	ND	ND	
Fish barrier	ND	8,255	3.30	49.5/1700	0246919 Easting	0.44 cfs below fish barrier

					4384267 Northing	
Total	**7.32**	8,255	3.30	49.5/1700	ND	

Table 3. Time of travel information for the from the upper distribution of brook trout in JQS Gulch to the confluence with Golden Castle Gulch, collected by the BLM October 24, 2013. Fahrenheit=F. Not Determined=ND.

Location	Time of Travel (hours)	Elevation (feet)	Miles Walked	Stream Temp. (F)/ Time	UTM Coordinates for Zone 13 (meters)	Comments
Upstream of upper limit of brook trout population in JQS Gulch	0.0	8,680	0.0	ND	0250239 4386637	
	0.5	ND	ND	ND	0250135 4386564	
	1.0	ND	ND	ND	0250056 4386512	
	1.5	ND	ND	ND	0250056 4386512	
	2.0	ND	ND	ND	0249983 4386449	
	2.5	ND	ND	ND	0249916 4386371	
	3.0	ND	ND	ND	0249855 4386284	
	3.5	ND	ND	ND	0249783 4386160	
	4.0	ND	ND	ND	0249694 4386052	
	4.5	ND	ND	ND	0249650 4385944	
	5.0	ND	ND	ND	0249592 4385794	
Confl. with Golden Castle Gulch	**5.1**	8,499	0.67	ND	0249559 4385785	
Total	**5.1**	8,499	0.67	ND	0249559 4385785	Upper limit of brook trout to confl. with Golden Castle Gulch

Table 4. Rotenone drip station information for treatment Days 1 and 2 (August 12 and 13, 2014). Information provided is based upon a stream flow of 0.44 cfs measured at the constructed fish barrier in September and October 2013.

Rotenone Drip Station	Drip Station Approx. Elevation (feet)	Drip Station Start Time	Drip Station End Time	Rotenone Concentration (parts/million) at Primary Detox. Station for Three Hour Duration	Hours Required for Rotenone to Reach Primary Detox. Station	Time that Rotenone Arrives at Primary Detox. Station	Time that Rotenone Leaves Main Detox. Station
1	8,288	0900	1200	1.0	2.5	1130	1430
2	8,360	0900	1200	1.0	5.5	1430	1730
3	8,400	0900	1200	1.0	8.5	1730	2030
4	8,520	0900	1200	1.0	11.5	2030	2330
5	8,680	0900	1200	1.0	14.5	2330	0230 (Aug. 13)

Table 5. Rotenone and potassium permanganate application information for treatment Days 1 and 2 (August 12 and 13, 2014). Information provided is based upon a time of travel of 14.5 hours (as determined during dye tests in September and October 2013), and a stream flow of 1.2 cfs measured in August 2011. The primary detoxification station will begin application a minimum of two hours prior to the predicted rotenone arrival time (1130 on August 12). The primary detoxification station will continue application a minimum of three hours after the predicted rotenone departure time (0230 on August 13). *=Spray applied across two treatments by one or two applicators. For simple/small streams, one applicator can cover both sides of the stream. For larger/complex streams, two applicators are used to walk each side of the stream. **=Spray can be 10-20% of total volume applied by drip stations. Part per million=ppm; Milliliters=mLs; Kilograms=kgs

Rotenone Application	Approximate Location (elevation in feet)	Start Time	End Time	Rotenone Concentration (ppm) and Application Duration (hours)	Volume of Rotenone (mLs)/hour	Total Volume of Rotenone (mLs)	Staff
Drip Station 1	8,288	0900	1200	1.0/3	122	366	1
Drip Station 2	8,360	0900	1200	1.0/3	122	366	1
Drip Station 3	8,400	0900	1200	1.0/3	122	366	1
Drip Station 4	8,520	0900	1200	1.0/3	122	366	1
Drip Station 5	8,680	0900	1200	1.0/3	122	366	1
Backpack Sprayer Zone A	Drip Station 1 to primary detox. including Third Water Gulch	0915	1200	Spray*		70**	1-2
Backpack Sprayer Zone B	Drip Station 2 to Drip Station 1 including Second Water Gulch	0915	1200	Spray*		70**	1-2
Backpack Sprayer Zone C	Drip Station 3 to Drip Station 2 including First Water Gulch	0915	1200	Spray*		70**	1-2
Backpack Sprayer Zone D	Drip Station 4 to Drip Station 3 including Golden Castle Gulch	0915	1200	Spray*		70**	1-2
Backpack Sprayer Zone E	Drip Station 5 to Drip Station 4	0915	1200	Spray*		70**	1-2
TOTAL Rotenone						***2,180***	***10-15***
Potassium Permanganate ($KMnO_4$) Application	**Approximate Location**	**Start Time**	**End Time**	**$KMnO_4$ Concentration (ppm) and Application Duration (hours)**	**Mass of $KMnO_4$ (kgs)/ hour**	**Total Mass of $KMnO_4$ (kgs)**	**Staff**
Primary Detoxification Station	Just downstream of constructed fish barrier	0930	0530 (Aug. 13)	2.0/20	0.244	4.88 (10.7 pounds)	3
TOTAL $KMnO_4$						***4.88 (10.7***	***3***

						pounds)	

Table 6. Amount of rotenone and potassium permanganate ($KMn0_4$) required for one hour of application at various stream flows and concentrations. Part per million=ppm; Milliliters=mLs; Grams=g; Acre-feet=AF; *Adapted from Rotenone Use in Fisheries Management, 2000; ** Adapted from A Field Manual for the Use of Antimycin A for Restoration of Native Fish Populations, 2008

Stream Flow (cubic feet/ second)	Time (Hour)	1 ppm* Rotenone (mLs/hour)	1 ppm** $KMnO_4$ (g/hour)	2 ppm** $KMnO_4$ (g/hour)	4 ppm** $KMnO_4$ (g/hour)	Area (acre-feet/ hour)
0.1	1	10.2	10.2	20.4	40.8	0.008
0.5	1	51	51	102	204	0.042
1.0	1	102	102	204	408	0.083
1.5	1	153	153	306	612	0.125
2.0	1	204	204	408	816	0.166
2.5	1	255	255	510	1020	0.208
3.0	1	306	306	612	1224	0.249
3.5	1	357	357	714	1428	0.291
4.0	1	408	408	816	1632	0.332
4.5	1	459	459	918	1835	0.374
5.0	1	510	510	1020	2040	0.415
5.5	1	561	561	1122	2243	0.457
6.0	1	612	612	1224	2447	0.498
6.5	1	663	663	1326	2650	0.540
7.0	1	714	714	1428	2854	0.581
7.5	1	765	765	1530	3058	0.623
8.0	1	816	816	1632	3262	0.664
8.5	1	867	867	1734	3465	0.706
9.0	1	918	918	1836	3669	0.747
9.5	1	969	969	1938	3873	0.789
10.0	1	1020	1020	2040	4077	0.830

1 ppm Rotenone = 1,233 mLs /AF*
1 ppm $KMn0_4$ = 1,233 grams/AF**

1 cubic foot/second for 1 hour = 0.083 AF/hour (449 gallons/min x 60 min/hour x 1 acre-foot/325,851 gallons = 0.083 acre-feet/hour)

Appendix A.
COLORADO PARKS AND WILDLIFE
APPLICATION FOR FISH CONTROL

NAME: Lori Martin **DATE:** March 6, 2014

ADDRESS: Colorado Parks and Wildlife, 711 Independent Avenue, Grand Junction, CO 81505

PESTICIDE APPLICATOR: 06184 **DATED:** Exp. 9/18/2014

FISH TOXICANT APPLICATOR CERTIFICATION: Aquatic Pests – 108 (Qualified Supervisor)

LEGAL & PHYSICAL DESCRIPTION OF WATER AND NEAREST TOWN: (INCLUDE WATER NUMBER IF APPLICABLE):

East Fork of Parachute Creek (Township 5 S, Range 94 W, Sections 26,27,33, and 34)

AT RECLAMATION:

Stream Miles: 4.0

Flow: Projected to be 0.4-2.0 cubic feet/second (cfs) at primary detoxification station

MAP OF AREA ATTACHED: Please see East Fork of Parachute Creek Nonnative Fish Control Reclamation Plan, Figures 1, 2, and 4

LAND OWNERSHIP IN PROJECT AREA: Bureau of Land Management (BLM)

PUBLIC OR GOVERNMENTAL AGENCIES CONTACTED IN PROJECT AREA:

BLM, angling public; A press release will be prepared and provided to various media outlets within the area.

DRINKING WATER TREATMENT FACILITIES IN PROJECT AREA:

None within the project area

PROPOSED DATE OF TREATMENT: August 11-15, 2014

OBJECTIVE OF PROJECT: To remove nonnative brook trout from the East Fork of Parachute Creek, and reintroduce genetically pure Colorado River cutthroat trout

METHOD OF ESTIMATING KILL: Gill nets will be employed and electrofishing will be conducted post-treatment to evaluate the success of the rotenone treatment.

TOXICANT AND AMOUNT: CFT Legumine 5% liquid rotenone with 1.03 gallons @ 1 cfs for drip stations and 0.1 gallons of CFT Legumine 5% for backpack spray stations per treatment. Two consecutive treatments planned. Total rotenone used will be accounted for during detoxification.

CONCENTRATION: 5% liquid rotenone (CFT Legumine) with 1.0 part per million (ppm) of product required for a concentration of 0.050 ppm active rotenone

TREATMENT TABLE ATTACHED: Please see East Fork of Parachute Creek Nonnative Fish Control Reclamation Plan, Tables 4-5

DISPOSAL METHOD(S) OF FISH KILLED: Fish killed will not be removed, but instead, will be left to recycle nutrients to the environment.

DETOXIFICATION PROCEDURES: The East Fork of Parachute Creek downstream of the primary detoxification station will be detoxified with potassium permanganate ($KMnO_4$) solution.

AMOUNT OF $KMnO_4$: At a stream flow of 1.2 cfs @ 2 ppm $KMn0_4$, up to 11 pounds of potassium permanganate will be required per treatment. Two consecutive treatments are planned.

CONCENTRATION OF $KMnO_4$: 2.0-4.0 ppm

CONTACT TIME OF $KMnO_4$: The primary detoxification station will apply potassium permanganate for approximately 20 hours or longer, if necessary, per rotenone treatment.

METHODS TO DETERMINE DISSIPATION OF TOXICANT:

Survival of live cage fish and toxicant analysis by CPW's Aquatic Research Laboratory.

EMERGENCY ACTION PLAN ATTACHED: Please see East Fork of Parachute Creek Nonnative Fish Control Reclamation Plan.

CHEMICAL RECLAMATION HELP COMMITTEE REVIEW:

East Fork of Parachute Creek Nonnative Fish Control Reclamation Plan reviewed by Sherman Hebein of CPW.

FISH POPULATION INFORMATION: Please see East Fork of Parachute Creek Nonnative Fish Control Reclamation Plan.

SENIOR FISHERY BIOLOGIST:_____ DATE:

APPROVE( ) DISAPPROVE( )

FINAL REPORT RECEIVED - DATE:

YEAR FOLLOW UP REPORT RECEIVED - DATE:

CC: AQUATIC SECTION CHIEF
REGIONAL SENIOR AQUATIC BIOLOGIST (IF NOT DIVISIONAL APPLICATION)
DISTRICT WILDLIFE MANAGER

Appendix B.
CFT LEGUMINE 5% ROTENONE LABEL

RESTRICTED USE PESTICIDE
Due to aquatic toxicity
For retail sale to, and use only by, Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

CFT LegumineTM

Rotenone

Fish Toxicant

For Control of Fish in Lakes, Ponds, Reservoirs, and

CFT Legumine is a trademark of CWE Properties Ltd , LLC

KEEP OUT OF REACH OF CHILDREN
WARNING....

Streams ACTIVE INGREDIENTS:

5.0% '.w/vw•'

Other Associated Resins.....5.0%

OTHER INGREDIENTS'.....90.*

'Contains Petroleum Distillates Total..... 100.0%

FIRST AID Have product container or label with you when, obtaining treatment advice.	
If swallowed	• Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice. • Do not give any liquid to the person. • Do not anything to an unconscious person • Do not induce vomiting unless told to do so by the poison control center or doctor.
If on skin or Clothing	• Take off contaminated "clothing. • ' Rinse skin immediately with plenty of water for 15-20 minutes. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If inhaled	•" Move person to fresh air. If person is not breathing, call an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.
If in eyes ""	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a physician, Poison Control Center, or the National Pesticide Information Center at 1-800-858-7378 immediately for treatment advice.

Note to Physician: Contains Petroleum Distillates. Vomiting may cause aspiration pneumonia. For information on this pesticide product (including health concerns, medical emergencies, or Pesticide incidents), call the National Pesticide Information Center at 1-800-858-7378.

EPA Reg. No. 655-899

Manufactured for CWE Properties Ltd., LLC, P.O. Box 336277, Greeley CO 80633

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
WARNING

May be fatal if inhaled or swallowed. Causes moderate eye irritation. Harmful if absorbed through skin. Do not breathe spray, mist. Do not get in eyes, on skin, or on clothing. Wear goggles or safety glasses.

When handling undiluted product, wear either a respirator with an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix 140); or a NIOSH approved respirator with an organic vapor (OV) cartridge or canister with any R, ls; or HE prefilter.

Wash thoroughly with soap and water after handling and before eating,:. drinking, or using,': tobacco. Remove contaminated clothing and wash before reuse. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

ENVIRONMENTAL HAZARDS

equipment washwaters. This pesticide is extremely toxic to fish. Fish kills are expected at recommended rates. Consult your State Fish and Game Agency before applying this product to public waters to determine if a permit is needed for such an application. Do not contaminate untreated water when disposing of

CHEMICAL AND PHYSICAL HAZARDS

FLAMMABLE: KEEP AWAY FROM HEAT AND OPEN ' FLAME. FLASH POINT MINIMUM 45°F (7°C).

For information on this pesticide product (including health concerns, medical emergencies, or pesticide incidents), call the National Pesticide Information Center at 1-800-858-7378.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

STORAGE: Store only in original containers, in a dry place inaccessible to children and pets. This product will not solidify nor show any separation at temperatures down to 40°F and is stable for a minimum of one year when stored in sealed drums at 70°F.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Triple rinse or equivalent. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

CFT Legumine is registered for use by or under permit from, and after consultation with State and

Federal Fish and Wildlife Agencies.

GENERAL INFORMATION

This product is a specially formulated product containing rotenone to be used in fisheries management for the eradication of fish from lakes, ponds, reservoirs and streams.

Since such factors as pH, temperature, depth and turbidity will change effectiveness, use this product only at locations, rates, and times authorized and approved by appropriate State and Federal Fish and Wildlife Agencies. Rates must be within the range specified on the label. Properly dispose of unused product. Do not use dead fish for food or feed.

Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir.

Re-entry Statement: Do not allow swimming in rotenone-treated water until the application has been completed and all pesticide has been thoroughly mixed into the water according to labeling instructions.

FOR USE IN PONDS, LAKES, AND RESERVOIRS

The actual application rates and concentrations of rotenone needed to control; fish will vary widely, depending on the type of use (e.g., selective treatment, normal pond use, etc.) and the factors listed above. The table below is a general guide for the proper rates and concentrations. This product disperses readily in water both laterally and vertically, and will penetrate below the thermocline in thermally stratified bodies of water.

Computation of Acre-Feet An acre-foot is a unit of volume of a body of water having the area of one acre and the depth of one foot. To determine acre-feet in a given body of .water, make a series of transects across the body of water taking depths with a measured pole or weighted line. Add the soundings and divide by the number made to determine the average depth. Multiply this average depth by the total surface area in order to determine the acre-feet to be treated. If number of surface acres is unknown, contact your local Soil Conservation Service, which can determine this from aerial photographs.

Amount of CFT Legumine Needed for Specific Uses: To determine the approximate number of gallons needed, fmd your "Type of Use" in the first column of the table below and then divide the corresponding numbers in the, fourth column, "Number of Acre-Feet Covered by One Gallon" into the number of acre-feet in your body of water.

Type of Use	Parts per Million		Number of Acre-Feet Covered by One Gallon
	CFT Legumine	Active Rotenone	
Selective Treatment `;'	0.10 to 0.13	0.005 to 0.007	30 to 24
Normal Pond Use .";'	0.5 to 1.0	0.025 to 0.050	6.0 to 3.0
Remove Bullheads or **Carp**	1.0 to 2.0	0.050 to 0.100	3.0 to 1.5
Remove Bullheads or Carp in **Rich** Organic **Ponds**	2.0 to 4.0	0.100	1.5 to 0.75
Preimpoundment Treatment' Above Dam	3.0 to 5.0	0.150 to 0.250	1.0 to 0.60

*Adapted from Kinney, Edward. 1965. Rotenone in Fish Pond Management. USDI Washington, DC Leaflet FL-576

Pre-Mixing and Method of Application: Pre-mix with water at a rate of one gallon of CFT Legumine to 10 gallons of water. Uniformly apply over water surface or bubble through underwater lines.

Detoxification: Water treated with this product will detoxify under natural conditions within one week to one month depending upon temperatures, alkalinity, etc. Rapid detoxification can be accomplished by adding chlorine or potassium permanganate to the water at the same rate as CFT Legumine in parts per million, plus enough additional to meet the chlorine demand of the untreated water.

Removal of Taste and Odor: Waters treated with this product do not retain a detectable taste or odor for more than a few days to a maximum of one month. Taste and odor can be removed immediately by treatment with activated charcoal at a rate of 30 ppm for each I ppm of CFT Legumine remaining. (Note: As this product detoxifies, less charcoal is required.)

Restocking After Treatment: Wait 2 to 4 weeks after treatment. Place a sample of fish to be stocked in wire cages in the coolest part of the treated waters. If the fish are not killed within 24 ' hours, the water may be restocked.

USE IN STREAMS IMMEDIATELY ABOVE LAKES, PONDS, AND RESERVOIRS

The purpose of treating streams immediately above lakes, ponds and reservoirs is to improve the effectiveness of lake, pond and reservoir treatments by preventing: target fish from moving into the stream corridors, and not to control fish in streams per se. The term "immediately" means the first available site above the lake, pond or reservoir where treatment is practical, while still creating a sufficient barrier to prevent migration of target fish into the stream corridor.

In order to completely clear a fresh water aquatic habitat of target fish, the entire system above or between fish barriers must be treated. See the use directions for streams and rivers on this label for proper application instructions.

In order to treat a stream immediately above a lake, pond or reservoir you must: (a) Select the concentration of active rotenone, (b) Compute the flow rate of the stream, (c) Calculate the application rate, (d) Select an exposure time, (e) Estimate the amount of product needed, (f) Follow the method of application.

To prevent movement of fish from the pond, lake, or reservoir, the stream treatment should begin before and continue throughout treatment of the pond, lake or reservoir until mixing has occurred.

1. Concentration of Active Rotenone

Select the concentration of active rotenone based on the type of use from those listed on the table. Example: If you select "normal pond use" you could select a concentration of 0.025 parts per million.

2. Computation of Flow Rate for Stream

Select a cross section of the stream where the banks and bottom are relatively smooth and free of obstacles. Divide the surface width into 3 equal sections and determine the water depth and surface velocity at the center of each section. In slowly moving streams, determine the velocity by dropping a float attached to 5 feet of loose monofilament fishing line. Measure the time required for the float to move 5 feet. For fast-moving streams, use a longer distance. Take at least three readings at each point. To calculate the flow rate from the information obtained above, use the following formula:

$$\frac{F=WsxDxLxC}{T}$$

Where F = flow rate (cubic feet/second), Ws = surface width (feet), D = mean depth (feet), L mean distance traveled by float (feet), C = constant (0.8 for rough bottoms and 0.9 for smooth bottoms), T = mean time for float (sec.).

3. Calculation of Application Rate

In order to calculate the application rate (expressed as gallons/second), convert the rate in the table (expressed as gallons/acre-feet) to gallons per cubic feet and multiply by the flow rate (expressed as cubic feet/second). Depending on the size of the stream and the type of equipment, the rate could be expressed in other units, such as ounces/hour, or cc/minute.

The application rate for the stream is calculated as follows:

$$RS = Rp \times C \times F$$

Where It_s = application rate for stream (gallons/second), R_1, = application rate for pond (gallons/acre-feet), C = 1 acre-foot/43560 cubic feet and F = flow rate of the stream (cubic feet/second).

4. Exposure Time

The exposure time would be the period of time (expressed in hours or minutes) during which CFT Legumine is applied to the stream in order to prevent target fish from escaping from the pond into the stream corridor.

5. Amount of Product

Calculate the amount of product for a stream by multiplying the application rate for streams by the exposure time.

$$A = Rs \times H$$

Where A = the amount of product for the stream application, R_s `= application rate for stream (gallons/second) and H = the exposure time expressed in seconds; **FOR USE IN STREAMS AND RIVERS**

Only state or Federal Fish and Wildlife personnel or professional fisheries biologists under the authorization of state or Federal Fish and Wildlife agencies are permitted to make applications of CFT Legumine for control of fish in streams and rivers. Informal consultation with Fish and Wildlife personnel regarding the potential occurrence' of endangered species in areas to be treated should take place. Applicators must reference the Stream and River use Monograph before making any application to streams or rivers.

CFT ULGUMINE STREAM AND RIVER USE MONOGRAPH

USE IN STREAMS AND RIVERS

The following use directions. are to provide guidance on how to make applications of CFT Legumine to streams and rivers. The unique nature of every application site could require minor adjustments to the method and rate of application. Should these unique conditions require major deviation from the use directions, a Special Local Need 24(c) registration should be obtained from the state.`

Before applications' .of CFT Legumine can be made to streams and rivers, authorization must be obtained from state or federal Fish and Wildlife agencies. Since local environmental conditions will vary, consult with the state Fish and Wildlife agency to ensure the method and rate of application are appropriate for that site.

Contact the local water department to determine if any water intakes are within one mile downstream of the section of stream, river, or canal to be treated. If so, coordinate the application with the water department to make sure the intakes are closed during treatment and detoxification.

Application Rates and Concentration of Rotenone

Slow Moving Rivers: In slow moving rivers and streams with little or no water exchange, use

instructions for ponds, lakes and reservoirs.

Flowing Streams and Rivers: Apply rotenone as a drip for 4 to 8 hours to the flowing portion of the stream. Multiple application sites are used along the length of the treated stream, spaced approximately 1/2 to 2 miles apart depending on the water flow travel time between sites. Multiple sites are used because rotenone is diluted and detoxified with distance. Application sites are spaced at no more than 2 hours or at no less than 1-hour travel time intervals. This assures that the treated stream remains lethal to fish for a minimum of 2 hours. A non-toxic dye such as Rhodamine-WTR or fluorescein can be used to determine travel times. Cages containing live fish placed immediately upstream of the downstream application sites can be used as sentinels to assure that lethal conditions exist between sites.

Apply rotenone at each application site at a concentration of 0.25 to 1.0 part per million of CFT Legumine. The amount of CFT Legumine needed at each site is dependent on stream flow (see Computation of Flow Rate for Stream).

Application of Undiluted Material

CFT Legumine can drain directly into the center of the stream at a rate 0.85 to 34 cc per minute for each cubic foot per second of stream flow. Flow of undiluted CFT Legumine into the stream should be checked at least hourly. This is equivalent to from 0.5 to 2.0 ppm of this product, or from 0.025 to 0.100 ppm rotenone.

Backwater, stagnant, and spring areas of streams should be sprayed by hand with a 10% v/v solution of CFT Legumine in water to assure a complete coverage.

Calculation of Application Rate:

$$X = F\ (1.699\ B)$$

X = cc per minute of CFT Legumine applied to the stream, F the ; flow rate (cu.ft/sec.) see Computation of Flow Rate for Stream section of the label, B = parts per million desired concentration of CFT Legumine

Total Amount of Product Needed for Treatment: should be treated for 4 to 8 hours in order to clear the treated section of stream of fish. To determine the total amount of CFT Legumine required, use the following equation:

$$Y=X\ (0.0158\ C)$$

Y = gallons of CFT Legumine required for the stream treatment, X = cc per minute of CFT Legumine applied to the stream, C = time in hours of the stream treatment.

Application of Diluted Material

Alternatively, for stream flows up to 25 cubic feet per second, continuous drip of diluted CFT Legumine at 80 cc per minute can be used Flow of diluted CFT Legumine into the stream should be checked at least hourly. Use a 5 gallon reservoir over a 4 hour period, a 7.5 gallon reservoir over a 6 hour period, or a 10 gallon reservoir over an 8 hour period. The volume of the reservoir can be determined from the equation:

$$R = Hx\ 1.25$$

Where R = the volume of the reservoir in gallons, H = the duration of the application in hours.

The volume of CFT Legumine diluted with water in the reservoir is determined from the equation:

$$X = Y(102\ F)H$$

Where X = the cc of CFT Legumine diluted in the reservoir, Y = parts per million desired concentration of CFT Legumine, F = the flow rate (cubic feet/second), H = the duration of the application (hours).

For flows over 25 cubic feet per second, additional reservoirs can be used concurrently. Backwater, stagnant and spring areas of streams should be sprayed by hand with a 10% v/v solution of CFT Legumine in water to assure a complete coverage.

Detoxification

To limit effects downstream, detoxification with potassium permanganate can be used at the downstream limit of the tre ated area. Within 1/2 to 2 miles of the furthest downstream CFT Legumine application site, the rotenone can be detoxified with a potassium permanganate solution at a resultant stream concentration of 2 to 4 parts per million, depending on rotenone concentration and permanganate demand of the water. A 2.5% (10 pounds potassium permanganate to 50 gallons of water) permanganate solution is dripped in at a continuous rate using the equation:

$$X = Y(70\ F)$$

Where X = cc of 2.5% permanganate solution per minute, Y = ppm of desired permanganate concentration, F = cubic feet per second of stream flow.

Flow of permanganate should be checked at least hourly.
Live fish in cages placed immediately above the permanganate application site will show signs of stress signaling the need for beginning detoxification. Detoxification can be terminated when replenished fish survive and show no signs of stress for at feast four hours.

Detoxification of rotenone by permanganate requires between 15 to 30 minutes contact time (travel time). Cages containing live fish can be placed at these downstream intervals to judge the effectiveness of detoxification. At water temperatures less than 50°F detoxification may be retarded, requiring a longer contact time.

WARRANTY STATEMENT

Our recommendations for the use of this product are based upon tests believed to be reliable. The use of this product being beyond the control of the manufacturer, no guarantee, expressed or implied, is made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice. To the extent consistent with applicable law, the buyer must assume all responsibility, including injury or damage, resulting from its misuse as such, or in combination with other materials.

Appendix C.
ROTENONE DRIP STATIONS AND BACKPACK SPRAYERS

A. Rotenone Treatment Station Equipment Check List (1-gallon chicken waterer and 4- gallon backpack sprayer)

1. Licensed Applicator. Prior to the treatment, the applicator will assemble/supervise the preparation of the treatment stations and kits (needed materials to run the station):

- Check all drip stations and kits to ensure they are complete and ready to use
- Measure rotenone hourly dosages for each treatment station into nalgene bottles
- Check all backpack sprayers and sprayer kits to ensure they are complete and ready to use
- Measure rotenone dosages for each backpack sprayer in nalgene bottles

2. Rotenone Drip Stations (Chicken Waterers). All equipment and chemicals needed to run one rotenone drip station will be placed within one, 5-gallon bucket for each person running a drip station. The following are the items needed per day/per rotenone drip station kit:

Item	Purpose	Notes
5-gallon bucket	To hold items listed below	
Bear spray	To protect from bears	
Board	Helps make a level place for waterer	Include some small tent stakes
1 chicken waterer (1-gallon)	Constant flow station	May need to adjust hole/dosages
Eye wash bottle	Use in an emergency to wash rotenone from eyes	
Paper clips (attach. to waterer)	Clean out drip hole in waterer	Attach extra's to lid
Dowel	Something clean to stir mixture	
Level (bullseye)	Make sure waterer is level	
Goggles	Eye protection	
Gloves	Skin protection	Include nitrile and large gloves
Paint mask	Airway protection	
Waders/hip boots	Needed for stream access	**Not in kits. Biologist to provide.**
500 ml cup	Filling chicken waterer	
Funnel (4")	Hold paint filter	
Paint filter (gallon)	Place inside funnel to filter water	
Garbage/Plastic Bags	1. In case of hail, use to cover station. 2. Following treatment, place PPE (goggles) in one bag.	
Rotenone	Toxicant	Each hour of rotenone in separate nalgene bottles
Dye	Allows backpack applicators to see where rotenone may not have traveled, so the backpack applicator can follow the dye front and spray areas without dye	May or may not be applied-decision to be determined
Timing device	Know when to start/end	Not everyone has a watch
Worksheet	Written reminder of station, location, operator, start time, etc.	

3. Rotenone Drip Station Application Work Sheet and Instructions

Stream Name _____ Date_____

Operator _____

Drip Station # _____

Drip Kit # _____

Flow _____
Concentration _____
Duration _____

ml Rotenone per Hour _____ Start Time _____
ml Rotenone per Hour_____ Start Time _____
ml Rotenone per Hour _____ Start Time _____

Time all Fish are Dead in Live Car/Block net upstream of your station_____

Instructions

1. Ensure that application site is safe, a suitable work site for several hours, and you have food, water, medications, bug spray, bear spray, and adequate clothing for a day in the field.

2. Prepare a level site to hold the chicken waterer. This may involve using rocks/boards to build a level platform for the waterer that will allow the rotenone flow to fall directly into moving water. A board and level are included in the 5-gallon kit bucket, but at most sites, 3 rocks will provide a good 3 point base. Avoid back waters, or areas with excess vegetation.

3. Open 5-gallon bucket, and put on goggles and gloves.

4. Remove top of chicken waterer, and using large cup, funnel and filter material, fill treater with filtered water to about 1/3 full.

5. Add the one hour amount of rotenone to the water in the chicken waterer (do not put rotenone through the filter), mix well, and fill the waterer with filtered water to about **1/3 inch** of the top. Mix again.

6. At the appropriate start time (0900), start the waterer. Note, at the end of mixing, the waterer is upside down (red base is on top). To start the waterer, place one hand on the red base, and one on the bottom of the upside down unit. Holding waterer over the stream, in one smooth quick motion, turn the waterer so the red base is at the bottom. Make sure the 1/16" hole is over the stream, and allow the rotenone/water mix to start flowing into the red base and out the hole drilled in the base. If the rotenone is not flowing through the hole, use a paper clip to open the hole. A black line on the red base indicates where the hole is. If instructed to do so and dye is provided in kit, then as soon as the chicken waterer starts, the drip station applicator will add dye to the stream. Backpack spray applicant will follow 15 minutes behind dye front, spraying areas not being treated well by the chicken waterer application. *Note, prior to treatment day, and at the briefing, applicators will have the chance to practice turning the waterers over.*

7. Check that waterer is level. Monitor the flow from the waterer throughout the one hour period, cleaning the hole with the paper clip as needed.

8. If the waterer runs out of rotenone/water mix prior to the end of an hour, refill, but do not start until the next start time. If the waterer is running long (70 min), allow rotenone to flow until empty, and then remix second run and restart. Add a little less water for the second run, if the first run of the waterer was greater than 60 min. Please note times when the first, second, and third runs started and ended on the work sheet provided with the kit. If for some reason the waterer runs out in 30 min, close down, and make radio contact with project lead to determine plan of action.

9. After all chemical is dispensed, clean up site making sure all rotenone is washed from the waterer and bottles. Place goggles in a clean plastic bag to keep them clean for the next day.

4. **Rotenone Backpack Sprayer.** This is the hardest job of the rotenone project, with applicators walking the entire wetted perimeter of the project to spray backwaters and pools with a heavy load. Staff assigned to this work need to be very fit, and able to work off trail in riparian habitats.

Item	Purpose	Notes
Backpack sprayer (4-gallon)	Apply rotenone to sides of stream channel and areas not connected with constant stream flow	
Bear spray	To protect from bears	
Rotenone	Toxicant	Each run of rotenone in separate nalgene bottles
Protective coat	Chemical proof jacket (Tyvex)to protect body from contact of rotenone mist and spills from sprayer	Avoid plastic rain jackets, since they turn into personal steam baths on hot days. Tyvex suit included in kit.
Waders/hip boots	Needed for stream access	**Not in kits. Biologist to provide**
Eye wash bottles/water bottle with nipple	Emergency wash for rotenone in eyes	Bottles on belt of sprayer
Fog proof goggles	Eye protection	Since this is hard work, goggles often fog
Gloves	Skin protection	Electrofishing style gloves work well here
500 ml cup	Filling sprayer with water	
Dye	Allows applicator to see where they have sprayed	Dye can also be provided to add at the drip station, so the backpack applicator can follow the dye front and spray areas without dye; may or may not be applied-decision to be determined
Funnel	Hold paint strainer/filter	Only needed if there is no screen cup included with the sprayer
Gallon nylon paint filter	Place inside cap/funnel to filter water	
Timing device	Know when to start/end	Not everyone has a watch
Worksheet	Written reminder of station, location, operator, start time, etc.	

5. Rotenone Sprayer Application Work Sheet and Instructions

Stream Name _____ Date_____

Operator _____

Area to Spray _____

Sprayer Kit #_____

ml Rotenone _____ Start Time _____
End Time _____

ml Rotenone _____ Start Time _____
End Time _____

Instructions

1. Ensure that your protective equipment (goggles, gloves, boots and chemical proof jacket) are clean and without holes. Fill belt bottles with water for eye wash and personal use. Overall, make sure you have lots of water with you, since water will not be available from the stream.

2. Check that all hoses, wands, spray heads and pump handles are attached to the sprayer. Attach wand to sprayer and move pump hand into pumping position. **Note, Field King sprayer are set up for left hand pumping, and right hand wand use. If left handed, consider moving pumping handle.**

3. Put on waders, chemical jacket, goggles and gloves.

3. Remove top of sprayer, add one dye tab, and using the paint filter and large cup, **filter about 1 gallon of clean stream water into sprayer.**

4. Add rotenone to the sprayer from the nalgene bottle provided by the team leader. **Do not pour the rotenone thru the paint filter. Shake to mix**

5. Using the filter and large cup, **fill the sprayer with filtered water.**

6. Pump the handle of the sprayer just enough to add some pressure to the tank, and check for any leaks around fittings.

7. Standing with your back to the wind, test sprayer, making sure that the rotenone water mix is coming out in a stream. Avoid fine spray settings that forms mists/fogs of rotenone.

8. Overall, keep the wind to your back while spraying, and make sure you spray the water – not vegetation.

9. Remember a little rotenone goes a long way, and you have a total of four gallons of rotenone/water mixture to apply to your zone (2 treatments of 1 gallon each x 2 people). The licensed applicator will discuss with you the zone/area(s) you will need to cover.

10. If instructed, as soon as the chicken waterer starts, the drip station applicator will add dye to the stream. Backpack spray applicant will follow 15 minutes behind dye front, spraying areas not being treated well by the chicken waterer application.

Check List for Drip Station (Chicken Waterer) Kits

Items	X	
Board, stakes		
Bear spray		
Chicken waterer		#
Paper clilps (extras in lid		
Eye wash bottle		
Dowel		
Level		
Goggles		
Paint mask		
Gloves (long & nitrile)		
Waders/hip boots		**Not included in kits**
Dye		May or may not be included in kits
Bags		
Cup		
Paint filter		
Funnel		
Rotenone		
Daily Work Sheet		
Watch		

Items	X	
Board, stakes		
Bear spray		
Chicken waterer		#
Paper clilps (extras in lid		
Eye wash bottle		
Dowel		
Level		
Goggles		
Paint mask		
Gloves (long & nitrile)		
Waders/hip boots		**Not included in kits**
Dye		May or may not be included in kits
Bags		
Cup		
Paint filter		
Funnel		
Rotenone		
Daily Work Sheet		
Watch		

Items	X	
Board, stakes		
Bear spray		
Chicken waterer		#
Paper clilps (extras in lid		
Eye wash bottle		
Dowel		
Level		
Goggles		
Paint mask		
Gloves (long & nitrile)		
Waders/hip boots		**Not included in kits**
Dye		May or may not be included in kits
Bags		
Cup		
Paint filter		
Funnel		
Rotenone		
Daily Work Sheet		
Watch		

Check List for Backpack Sprayer Kits

Items	X	
Backpack sprayer		
Bear spray		
Rotenone Kit :		Kit #
Water belt		
Eye wash bottle (belt pack)/water bottle with nipple		
Protective equipment (Tyvex)		
Fog proof goggles		
Paint mask		
Cup		
Paint filter		
Gloves (nitrile and large pair)		
Bags for dirty/used equipment		
Rotenone, per measured per run		
Dye		
Daily Work Sheet		
Watch		
Waders/hip boots		**Not included in kits**

Items	X	
Backpack sprayer		
Bear spray		
Rotenone Kit :		Kit #
Water belt		
Eye wash bottle (belt pack)/water bottle with nipple		
Protective equipment (Tyvex)		
Fog proof goggles		
Paint mask		
Cup		
Paint filter		
Gloves (nitrile and large pair)		
Bags for dirty/used equipment		
Rotenone, per measured per run		
Dye		
Daily Work Sheet		
Watch		
Waders/hip boots		**Not included in kits**

Items	X	
Backpack sprayer		
Bear spray		
Rotenone Kit :		Kit #
Water belt		
Eye wash bottle (belt pack)/water bottle with nipple		
Protective equipment (Tyvex)		
Fog proof goggles		
Paint mask		
Cup		
Paint filter		
Gloves (nitrile and large pair)		
Bags for dirty/used equipment		
Rotenone, per measured per run		
Dye		
Daily Work Sheet		
Watch		
Waders/hip boots		**Not included in kits**