

**Dixie National Forest**  
**East Fork Boulder Creek Native Trout Restoration Project**  
**Terrestrial Wildlife Specialist Report**

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# **I. Description of Affected Environment and Analysis**

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## **Introduction**

The purpose of the proposed project is to restore Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*; CRCT) to their historic range within the East and West Forks of Boulder Creek.

The need for the project is two-fold: (1) to comply with Article 402 and 4(e) conditions of the Federal Energy Regulatory Commission (FERC) License for the Boulder Creek Hydroelectric Project (Project No. 2219-020), and stipulations of the associated Settlement Agreement between Garkane Energy, the Utah Division of Wildlife Resources (UDWR), and the U.S. Forest Service (Forest Service), and (2) to fulfill obligations of UDWR and the Intermountain Region of the Forest Service to implement conservation actions for CRCT, as signatories to the Colorado River Cutthroat Trout Conservation Agreement and Strategy (CRCT Conservation Team 2006a, 2006b).

## **Project Area**

The project area includes the East Fork Boulder Creek from the natural barrier (below headwater meadow) to the confluence with the West Fork of Boulder Creek, the West Fork of Boulder Creek from an existing fish barrier approximately 0.23 miles (0.37 km) downstream to the confluence with the East Fork of Boulder Creek, and Boulder Creek from the confluence of the East and West Forks of Boulder Creek to approximately 0.5 miles (0.8 km) downstream to a recently constructed fish barrier. The project area also includes all perennial springs and inflows feeding the above stream sections. Also included in the proposed treatment area would be the Garkane Energy water transfer pipeline between the West Fork Reservoir and King's Pasture Reservoir; King's Pasture Reservoir; and the Garkane Energy penstock, between King's Pasture Reservoir and the Garkane Hydroelectric Power Plant (see attached Vicinity Map).

## **Resource Review**

### **Life History and Habitat Requirements**

Information concerning monitoring results, life histories, suitable habitats, threats, population trends, and ecology for certain species that are known or suspected to occur within the East Fork Boulder Creek Native Trout Restoration Project area (Table 1) can be found within the "Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Dixie National Forest" (Rodriguez 2008). Information concerning migratory birds can be found in "Utah Partners in Flight Avian Conservation Strategy Version 2.0" (Parrish et al. 2002). These documents are located in the Dixie National Forest Supervisor's Office in Cedar City, Utah. Potential effects and determinations are based in part upon the information presented in these documents.

**Table 1. Habitat suitability for Threatened (T), Endangered (E), Candidate (C) Sensitive, Management Indicator, and other wildlife species of concern for the East Fork Boulder Creek Native Trout Restoration Project on the Escalante Ranger District, Dixie National Forest.**

| Species   | Species occurrence in or near the proposed project area and justification for consideration or non-consideration in this analysis                       |
|---|---|
| <b>Threatened and Endangered Species</b>                  |   |
| California Condor (E) <sup>a</sup>                        | <b>Considered.</b> Condors may scavenge incidentally in the area.   |
| Mexican Spotted Owl (T)                                   | <b>Considered.</b> Juvenile dispersal may occur through the area.   |
| Utah Prairie Dog (T)                                      | <b>Not Considered.</b> Suitable grassland and shrub-steppe habitat with deep, well-drained soils does not exist within the project area.                |
| <b>Intermountain Region Sensitive Species</b>             |   |
| Bald Eagle  | <b>Considered.</b> Eagles may scavenge incidentally in the area.  |
| Desert Bighorn Sheep                                      | <b>Not Considered.</b> Suitable rugged terrain does not exist within the project area.  |
| Flammulated Owl   | <b>Considered.</b> Potentially suitable nesting and foraging habitat exists within the project area.  |
| Greater Sage-grouse                                       | <b>Not Considered.</b> Suitable sagebrush habitat does not exist within the project area.   |
| Northern Goshawk <sup>b</sup>                             | <b>Considered.</b> Known territory exists within the project area.  |
| Peregrine Falcon  | <b>Considered.</b> Potential riparian foraging habitat exists within the project area.  |
| Pygmy Rabbit  | <b>Not Considered.</b> Suitable sagebrush habitat does not exist within the project area.   |
| Spotted Bat   | <b>Considered.</b> Potential cliff roosting habitat is adjacent to the project area. Potential foraging habitat exists within the project area.         |
| Three-toed Woodpecker                                     | <b>Considered.</b> Potentially suitable nesting and foraging habitat exists within the project area.  |
| Townsend's Big-eared Bat                                  | <b>Considered.</b> Potential cavern roosting habitat does not exist within the project area. Potential foraging habitat exists within the project area. |
| Yellow-billed Cuckoo                                      | <b>Not considered.</b> Suitable riparian habitats of cottonwood and willow galleries below 6000 feet in elevation do not exist within the project area. |
| <b>Dixie National Forest Management Indicator Species</b> |   |
| Mule Deer   | <b>Considered.</b> Entire project area is within useable habitat boundaries.  |
| Rocky Mountain Elk  | <b>Considered.</b> Entire project area is within useable habitat boundaries.  |
| Northern Flicker  | <b>Considered.</b> Suitable habitat exists within the project area.   |
| Wild Turkey   | <b>Considered.</b> Suitable habitat exists within the project area.   |
| <b>Other Species of Concern</b>                           |   |
| Broad-tailed Hummingbird                                  | <b>Considered.</b> Suitable riparian habitat exists within the project area.  |
| American Dipper   | <b>Considered.</b> Suitable riparian habitat exists within the project area.  |

<sup>a</sup> This is a non-essential, experimental population (Endangered west of I-15)

<sup>b</sup> This species is also an MIS for the Dixie National Forest

## Existing Habitat

Existing habitat within the project area provides riparian habitat for many wildlife species. The project area is approximately 8.5 miles of riparian habitat. Habitats adjacent to the treatment areas consist mainly of aspen, ponderosa pine, and spruce/fir forest.

## Listed Species

**California condor:** No condors are known to nest on the Dixie National Forest. Condors may fly over the area and scavenge incidentally.

**Mexican spotted owl:** No Mexican spotted owls are known to nest on the Dixie National Forest. The nearest known suitable nesting habitat is nearly 10 air miles from the project area. Movement through the area would occur at night, between September and April, if owls were to use the area.

## Sensitive Species

**Bald eagle:** No bald eagles are known to nest on the Escalante Ranger District. Open habitats with available carrion could exist within the project area. Bald eagles may fly over the area and roost or perch incidentally, mainly from November through March.

**Flammulated owl:** Flammulated owls have been detected within the project and surrounding areas.

**Northern goshawk:** The East Fork Boulder goshawk territory is located within the project area. The territory has been active or occupied all seven years since it was located in 2004.

**Peregrine falcon:** The nearest known peregrine falcon eyrie is over 13 air miles from the project area. The nearest potentially suitable cliff habitat bounds the project on the north. The project area consists of riparian habitat, which may provide prey for foraging falcons.

**Spotted bat:** Potential cliff roosting habitat bounds the project on the north. Foraging may occur throughout the riparian project area.

**Three-toed woodpecker:** Coniferous habitat above 8000 feet elevation exists within the project area.

**Townsend's big-eared bat:** Potential cavern roosting habitat is not known within the project area. Foraging may occur throughout the riparian project area.

## Management Indicator Species

**Mule deer and Rocky Mountain elk:** Mule deer and elk use the project area during much, if not all, of the year.

**Northern flicker:** Suitable nesting and foraging habitat exists within the project area.

**Wild Turkey:** Suitable nesting and foraging habitat exists within the project area.

## Other Species of Concern

On August 1, 2007, the National Forests in Utah formalized an updated state-wide strategy for addressing migratory birds in Forest Service planning and project documents (USDA 2007). Species selected for this analysis were chosen based on the process identified in this strategy. Bird species selected for this analysis were derived from a compilation of species included in the Utah Partners in Flight Conservation Strategy (UPFCS) (Parrish et al. 2002), the Utah Comprehensive Wildlife Conservation Strategy (Gorrell et al. 2005), and the Fish and Wildlife Service Birds of Conservation Concern lists (USFWS 2008). Birds included in these publications include those at higher risk due to habitat loss or degradation, with highest-risk species given priority status in the UPFCS listing (Parrish et al. 2002). Species identified above that fit these criteria are the California condor, Mexican spotted owl, bald eagle, flammulated owl, northern goshawk, peregrine falcon, and three-toed woodpecker.

For this analysis, the broad-tailed hummingbird was selected as an additional representative species to analyze the effects of the proposed actions. The FWS was informed of the selection of these species for the project analysis on August 31, 2010 (project file). The American dipper was identified as a species of concern during scoping.

**Broad-tailed hummingbird:** This species is common in Utah, and suitable breeding habitat could occur along portions of the project area.

**American Dipper:** This species is found in Utah year-round, and likely occurs within the project area.

## **Cumulative Effects Area**

The Cumulative Effects Area (CEA) for this analysis includes predominantly aspen, ponderosa pine, spruce/fir, and pinyon-juniper habitats with the Deer Creek, Bear Creek-Boulder Creek, and Headwaters Boulder Creek 6th level HUCs (see attached CEA Map). The CEA was selected based on topography and vegetation, indicating the region of habitat that would have an influence on species evaluated in this assessment. This area encompasses approximately 93,537 total acres, but only 77,136 acres (82%) are administered by the Forest Service. 16,401 acres (18%) are private or administered by the BLM. Due to the lack of information on private and BLM-administered lands, it was assumed that actions occurring beyond the Forest boundary would be similar to those described on the Forest.

The CEA for this project (see wildlife cumulative area map) was selected based on likely areas where the terrestrial wildlife species analyzed in this document may live for all or portions of their life cycle. This area may not represent the area where all of the species winter as many of them move long distances off the Dixie National Forest to unknown area. The CEA represents a landscape surrounding the project area where past, present, and future management actions have and/or will occur with special reference to: vegetation management (e.g., timber harvest, timber stand improvement, prescribed burning), utilities, oil and gas, livestock grazing, recreation use (e.g., OHV use, camping, and hunting), special uses (e.g., firewood collection, outfitters, and guides), and motorized access.

### **Past, Present, and Reasonably Foreseeable Actions**

The majority of timber harvest within CEA occurred in the 1980s. Thinning has focused on removing understory conifers for overall timber stand improvement to manage for maximum growth. In 2008, the Bear Creek Fire burned a total of 1,450 acres within the CEA. Several projects have been proposed to salvage and reforest areas burned in the Bear Creek Fire. Timber harvest is also planned within the Bear Creek drainage for private land near Haw's Pasture.

Oil and gas is limited to one lease at the north end of the CEA. Utilities consist of a powerline associated with the Garkane Power Plant. A Garkane water transfer pipeline extends for 4.2 miles, paralleling the East Fork Boulder Creek for approximately 1.7 miles. Timing restrictions are currently in place to avoid disturbance from non-emergency maintenance during sensitive goshawk nesting periods. Livestock grazing occurs throughout the project area and CEA. Recreational use includes OHV use, camping, hunting, and fishing. Special uses such as firewood collection, outfitting, and guiding also occur within the area. The Forest-wide Travel Management Plan will be implemented throughout the CEA presently and in the foreseeable future. The Plan addresses road access, maintenance, and closures that would protect hydrological and wildlife resources.

## II. Project Description

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Descriptions of the analyzed Proposed, Non-chemical, and No Action Alternatives, including actions that are not part of the Forest Service decision but connected to the project, are included in Appendix A.

## III. Effects of the Alternatives

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### **Proposed Action:**

The proposed action could affect terrestrial wildlife through direct disturbance from human presence in treatment areas. Terrestrial habitats will not be altered; temporary disturbance may occur during one day of reconnaissance and one day of treatment in each year treatment occurs. Temporary displacement of some species may occur due to disturbance, but will be short-term. Exposure to rotenone could occur through direct contact, ingestion of treated water, and consumption of aquatic organisms killed by rotenone. Rotenone “is highly toxic to fish and other aquatic life, but has low toxicity to birds and mammals” (Ling 2003, p.6). “Most mammal species are relatively resistant to rotenone” (ibid., p.19), and “rotenone is not easily absorbed in higher animals and does not accumulate in the body” (ibid., p.21). “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” (ibid., p. 32).

Abundance and diversity of aquatic invertebrates may be impacted as disclosed in the Aquatic Biota Report. Indirect impacts to wildlife may include temporary displacement of some birds feeding on fish or aquatic invertebrates, such as the American dipper. These effects would be temporary and are considered minor due to the abundance of terrestrial insects and other alternate prey, the fall timing of the project, the mobility of terrestrial vertebrates, and the proximity of similar aquatic habitats and prey sources to the treated waters.

### **Non-chemical Treatment Alternative:**

Effects of the non-chemical treatment alternative include disturbance from electro-fishing, gill-netting, and temporary dam building activities. Disturbance would be greater in duration and frequency with the non-chemical treatment alternative than with the proposed action, as disclosed in Appendix A. Such disturbance would occur over the duration of the project, possibly up to ten years. Greater disturbance may lead to a decrease in habitat effectiveness, and long-term displacement of some species. The increased duration and timing of disturbance associated with this alternative will likely lead to greater impacts to aquatic biota abundance and diversity, resulting in sustained predator displacement from the treated areas.

### **No Action:**

No effects to terrestrial wildlife will occur with the no action alternative.

## **Direct and Indirect Effects**

### **California Condor**

#### Proposed Alternative:

The project area is within a forested landscape, which provides little adequate open terrain for foraging condors. Open areas adjacent to the creek would not provide carrion to feed on; dead fish would “bloat and sink below the surface of the water where they disintegrate and are not available for terrestrial animal consumption” (US

EPA 2007, p.24). In the event that condors did forage on the dead fish, it is “unlikely that [they] will consume enough fish to result in a lethal dose” (ibid.). Condors may fly over the project area, but would likely not remain in areas with disturbance from treatment activities. The proposed action would not adversely impact condors.

Non-chemical Treatment Alternative:

Condors that may fly over the project area would likely not remain in areas with disturbance from non-chemical removal activities. This alternative would not adversely impact condors.

No Action Alternative:

No effects to condors would result from the no action alternative.

**Mexican Spotted Owl**

Proposed Alternative:

The nearest known Mexican spotted owl Protected Activity Center (PAC) is more than 9 air miles away from the project area, and the nearest designated Critical Habitat is over 11 air miles away. Suitable habitat exists in canyons and uplands near the PAC and within the boundaries of Critical Habitat. Dispersing Mexican spotted owls may pass through the project area at night, and would likely not be disturbed by daytime project activities. Nighttime project activities would occur at neutralization stations, which would be operated continuously as long as necessary to prevent the movement of rotenone into non-target waters. The neutralization stations would be located at specific point locations, and have a very small area of disturbance. If owls were to pass through the area at night, they would likely not be disturbed by project activities. The proposed action would not adversely impact Mexican spotted owls.

Non-chemical Treatment Alternative:

Dispersing Mexican spotted owls may pass through the area, but would likely not be disturbed by daytime non-chemical removal activities. This alternative would not adversely impact Mexican spotted owls.

No Action Alternative:

No effects to the Mexican spotted owl would result from the no action alternative.

**Bald Eagle**

Proposed Alternative:

The project area is within a forested landscape, which provides little adequate open terrain for foraging eagles. Open areas adjacent to the creek would not provide carrion to feed on; dead fish would “bloat and sink below the surface of the water where they disintegrate and are not available for terrestrial animal consumption” (US EPA 2007, p.24). In the event that bald eagles did forage on the dead fish, it is “unlikely that [they] will consume enough fish to result in a lethal dose” (ibid.). Bald eagles may fly over the project area, but would likely not remain in areas with disturbance from treatment activities. The proposed action would not adversely impact bald eagles.

Non-chemical Treatment Alternative:

Bald eagles that may fly over the project area would likely not remain in areas with disturbance from non-chemical removal activities. This alternative would not adversely impact bald eagles.

No Action Alternative:

No effects to the bald eagle would result from the no action alternative.

### **Flammulated Owl**

#### Proposed Alternative:

Flammulated owls have been known to occur within the project area and CEA. Disturbance may occur, but is unlikely as the proposed activities would occur during the day, when these nocturnal owls are roosting. Nighttime project activities would occur at neutralization stations, which would be operated continuously as long as necessary to prevent the movement of rotenone into non-target waters. The neutralization stations would be located at specific point locations, and have a very small area of disturbance. If owls were to pass through the area at night, they would likely not be disturbed by project activities. The proposed action would not adversely impact flammulated owls.

#### Non-chemical Treatment Alternative:

Potential for disturbance is greater with the increased time and number of people spent in the area, but is unlikely as the non-chemical removal activities would occur during the day, when these nocturnal owls are roosting. This alternative would not adversely impact flammulated owls.

#### No Action Alternative:

No effects to the flammulated owl would result from the no action alternative.

### **Three-toed Woodpecker and Northern Flicker**

#### Proposed Alternative:

Disturbance from the proposed activities could impact woodpeckers in the area, but is unlikely as both species are relatively tolerant of humans (Leonard 2001, Wiebe and Moore 2008). In addition, abundant available habitat remains within the 93,537 acres of the CEA. The proposed action would not adversely impact three-toed woodpeckers or northern flickers.

#### Non-chemical Treatment Alternative:

Potential for disturbance is greater with the increased time and number of people spent in the area, but is unlikely as both species are relatively tolerant of humans (ibid.). In addition, abundant available habitat remains within the 93,537 acres of the CEA. This alternative would not adversely impact three-toed woodpeckers or northern flickers.

#### No Action Alternative:

No effects to the three-toed woodpecker or northern flicker would result from the no action alternative.

### **Northern Goshawk**

#### Proposed Alternative:

The East Fork Boulder goshawk territory has nest area, post-fledgling area (PFA), and foraging habitat within the project area. There are two known nests within the project area, and goshawks have occupied the area continuously since 2004. Nesting activity has been observed each year with the exception of 2005. If the territory is active, disturbance from the proposed activities may impact goshawks, but will not cause nest abandonment as all young should be fledged and highly mobile by the time treatment occurs in September.

Disturbance to foraging goshawks will be minimal as there is abundant available foraging habitat within the remaining 93,537 acres of the CEA. The proposed action would not adversely impact northern goshawks.

Non-chemical Treatment Alternative:

If the territory is active, disturbance from the non-chemical removal activities will likely impact goshawks, and could cause nest abandonment. Nestlings have been observed in July in nearby territories on the Forest. Activities in June and July that cause disturbance near active nests “can cause abandonment, even with [20-day-old] nestlings present” (Squires and Reynolds 1997). The timing and duration of disturbance expected with this alternative could likely cause nest abandonment if the territory was active. Such impacts would adversely affect the northern goshawk.

Disturbance to foraging northern goshawks could occur as a result of the proposed activities, but is unlikely as goshawks would avoid areas where project activities were occurring, and there is abundant available foraging habitat within the remaining 93,537 acres of the CEA.

No Action Alternative:

No effects to the northern goshawk would result from the no action alternative.

## **Peregrine Falcon**

Proposed Alternative:

The nearest potentially suitable cliff habitat bounds the project on the north; however, the nearest known peregrine falcon eyrie is over 13 air miles from the project area. Most peregrine falcons forage within 1 mile of their eyrie (USFWS 1984), making it unlikely that the project area would be used for foraging unless an active eyrie were located in the nearby cliffs. Disturbance from the proposed activities could impact falcons if they happened to be nesting nearby, but would not cause nest abandonment as all young should be fledged and highly mobile by the time treatment occurs in September. In the event that a peregrine falcon was foraging in the area, suitable foraging habitat does exist. Disturbance to foraging peregrine falcons could occur as a result of the proposed activities, but is unlikely as peregrine falcons would avoid areas where project activities were occurring, and there is abundant available habitat within the remaining 93,537 acres of the CEA. The proposed action would not adversely impact peregrine falcons.

Non-chemical Treatment Alternative:

Disturbance from non-chemical removal activities could impact falcons if they happened to be nesting nearby, particularly in June, July, and August. General protective measures in the Recovery plan include “restricting human activities and disturbances between February 1 and August 31 which occur within one mile of the nesting cliff” (USFWS 1984). If an active peregrine falcon eyrie were located within one mile of the project area, the timing and duration of disturbance expected with this alternative could be detrimental to nesting success and would conflict with the protective measures described above. Such impacts would adversely affect the peregrine falcon if an active nest were located in the project area.

No Action Alternative:

No effects to the peregrine falcon would result from the no action alternative.

## **Spotted Bat and Townsend's Big-eared Bat**

### Proposed Alternative:

Bats may forage within the project area. Suitable foraging habitat exists along the extent of the riparian project area. Insects that bats feed on would likely not be impacted by the treatment (Durkin 2008). Poisoning from drinking treated water is "extremely unlikely" as rotenone "has low toxicity to birds and mammals" and "most mammal species are relatively resistant to rotenone" (Ling 2003).

There is little risk of disturbance from the proposed activities because these bats are nocturnal, and the proposed activities would occur during the day. Nighttime project activities would occur at neutralization stations, which would be operated continuously as long as necessary to prevent the movement of rotenone into non-target waters. The neutralization stations would be located at specific point locations, and have a very small area of disturbance. If bats were to pass through the area at night, they would likely not be disturbed by project activities. The proposed action would not adversely impact spotted or Townsend's big-eared bats.

### Non-chemical Treatment Alternative:

Disturbance is unlikely as the non-chemical removal activities would occur during the day, when the nocturnal bats are roosting. This alternative would not adversely impact spotted or Townsend's big-eared bats.

### No Action Alternative:

No effects to spotted or Townsend's big-eared bats would result from the no action alternative.

## **Mule Deer and Rocky Mountain Elk**

### Proposed Alternative:

Mule deer and elk use the project area during much, if not all, of the year. The Utah Division of Wildlife Resources (UDWR) has delineated useable winter and summer habitats within the project area. Mule deer and elk may be temporarily displaced by disturbance associated with the proposed action; however, this impact would be temporary and minimal as there is abundant available habitat within the remaining 93,537 acres of the CEA. Mule deer and elk would be expected to return to the area shortly after implementation.

Poisoning from drinking treated water is "extremely unlikely" as rotenone "has low toxicity to ... mammals" and "most mammal species are relatively resistant to rotenone" (Ling 2003). The proposed action would not adversely impact mule deer or elk.

### Non-chemical Treatment Alternative:

The timing and duration of disturbance expected with this alternative would likely decrease habitat effectiveness for mule deer and elk, and cause persistent displacement while personnel are implementing the treatment; however, abundant available habitat remains within the 93,537 acres of the CEA. This alternative would not adversely impact mule deer or elk.

### No Action Alternative:

No effects to mule deer or elk would result from the no action alternative.

## **Wild Turkey**

### Proposed Alternative:

Wild turkeys are known to be in the project area. Turkeys may be temporarily displaced by disturbance associated with the proposed action; however, this impact would be temporary and minimal as there is abundant

available habitat within the remaining 93,537 acres of the CEA. Turkeys would be expected to return to the area shortly after implementation. Poisoning from drinking treated water is “extremely unlikely” as rotenone “has low toxicity to birds” (Ling 2003, p.6). The proposed action would not adversely impact wild turkey.

Non-chemical Treatment Alternative:

The timing and duration of disturbance expected with this alternative would likely decrease habitat effectiveness for wild turkey, and cause persistent displacement; however, abundant available habitat remains within the 93,537 acres of the CEA. This alternative would not adversely impact wild turkey.

No Action Alternative:

No effects to wild turkey would result from the no action alternative.

## **Broad-tailed Hummingbird**

Proposed Alternative:

Potential foraging and riparian nesting habitat for these hummingbirds may occur within the project area. In the event that a broad-tailed hummingbird did nest in the project area, it is unlikely that the nest would be disturbed as the proposed action would occur in September, and “breeding usually ends by mid-August” (Parrish et al. 2002, p.138). Disturbance from the proposed activities may impact foraging hummingbirds, but is unlikely as most observations of broad-tailed hummingbirds in Utah have been recorded in July (ibid.), and treatment will occur in the fall. The proposed action would not adversely impact broad-tailed hummingbirds.

Non-chemical Treatment Alternative:

Non-chemical removal activities may occur in June and July, when broad-tailed hummingbirds are more likely to be in the area (ibid). The timing and duration of disturbance expected with this alternative could likely cause nest abandonment if a nest were located in the project area. Though this alternative may impact individuals, it would likely not have an adverse effect on the species, as the broad-tailed hummingbird is described as “the most common species in Utah” (Parrish et al. 2002, p.135).

No Action Alternative:

No effects to broad-tailed hummingbirds would result from the no action alternative.

## **American Dipper**

Proposed Alternative:

Potential foraging and nesting habitat likely exist within the project area. Because dippers forage mainly on aquatic insects (Kingery 1996), a decrease in abundance and diversity of aquatic invertebrates due to treatment could impact dipper feeding habits. Dippers have been known to disperse when “food biomass at lower elevations declined in summer” (ibid.), and would likely be able to disperse if such a decrease occurred with the proposed action. An additional 208 miles of perennial and intermittent stream exist within the CEA, and would likely provide sufficient feeding opportunities until treated segments recovered (1 to 36 months, Aquatic Biota Report). In the event that an American dipper did nest in the area, it is unlikely that the nest would be disturbed as the proposed action would occur in September, and even second broods should be completed by then (Kingery 1996). The proposed action would not adversely impact American dippers.

Non-chemical Treatment Alternative:

A decrease in abundance and diversity of aquatic invertebrates due to treatment will likely occur with this alternative (Aquatic Biota report). Though most dippers have completed first broods by May, second broods may be impacted by a reduction of food during the treatment period (Kingery 1996). Nest sites are typically inaccessible (ibid.), which would reduce the risk of nest disturbance, but fledgling dippers could be disturbed by treatment activities. The timing and duration of disturbance expected with this alternative would likely decrease habitat effectiveness and cause persistent displacement while personnel are implementing the treatment. Though this alternative may impact individuals, it would likely not have an adverse effect on the species, as abundant available habitat remains within the additional 208 miles of perennial and intermittent stream within the CEA.

#### No Action Alternative:

No effects to the American dipper would result from the no action alternative.

## **Cumulative Effects**

### **Proposed Action:**

The CEA for this project (see wildlife cumulative area map) was selected based on likely areas where the terrestrial wildlife species analyzed in this document may live for all or portions of their life cycle. This area may not represent the area where all of the species winter as many of them move long distances off the Dixie National Forest to unknown area. Through the analysis disclosed above, we determined that the direct and indirect effects of the proposed and non-chemical alternatives predominantly result in disturbance; it is the magnitude of the disturbance that differs. Likewise, the magnitude of habitat effectiveness varies inversely with the level of disturbance. Adverse effects of increased disturbance from past, present, or reasonably foreseeable future activities such as vegetation management, utilities, oil and gas, livestock grazing, recreation use, special uses, and motorized access would add cumulatively to direct or indirect effects of disturbance from either of the action alternatives.

Given the timing and duration of the proposed action, adverse cumulative effects from disturbance, if any, would be unlikely for all species analyzed due to the low likelihood of disturbance from the proposed action. Cumulative effects to abundance and diversity of aquatic biota as prey species would not be expected as an abundance of similar suitable foraging habitat remains within the CEA, and most predatory species would be able to move to more productive areas.

### **Non-chemical Treatment Alternative:**

The non-chemical alternative would result in potential disturbance of greater duration and frequency than with the proposed action. Adverse cumulative effects from disturbance associated with other management activities would likely not occur for the California condor, Mexican spotted owl, bald eagle, flammulated owl, three-toed woodpecker, northern flicker, spotted bat, and Townsend's big-eared bat, due to the already low likelihood of disturbance to these species from the non-chemical alternative.

Adverse cumulative effects from disturbance associated with other management activities would likely occur for northern goshawk and peregrine falcon if active nests were located within the project area during non-chemical treatment activities.

Adverse cumulative effects with the non-chemical treatment would likely not occur for the broad-tailed hummingbird and American dipper due to high abundance of individuals and habitat, though nesting individuals may be impacted due to the overlap of treatment activities with sensitive nesting periods.

Adverse cumulative effects from disturbance associated with other management activities would likely not occur for mule deer, elk, and wild turkey due to these species' highly mobile nature and the abundance of undisturbed habitat remaining in the CEA.

**No Action:**

The no action alternative will have no effect to any species, which precludes cumulative effects for the alternative.

## **IV. Summary of Determination of Effects**

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**Proposed Action:**

As a result of this analysis, it is our professional determination that implementation of the proposed action may affect, but will not likely adversely impact individuals or habitat of any species analyzed in this document, nor contribute to a trend toward Federal listing or cause a loss of persistence to these populations or species.

**Non-chemical Treatment Alternative:**

As a result of this analysis, it is our professional determination that implementation of the non-chemical alternative may adversely affect the northern goshawk and peregrine falcon. This alternative may affect, but will not likely adversely impact individuals or habitat of the other species analyzed in this document, nor contribute to a trend toward Federal listing or cause a loss of persistence to these populations or species.

**No Action:**

As a result of this analysis, it is our professional determination that implementation of the no action alternative will not affect individuals or habitat of any species analyzed in this document.

## **V. Compliance with Other Laws and Regulations**

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The Endangered Species Act of 1972 requires that actions of Federal agencies do not jeopardize or adversely modify Critical Habitat of Federally listed species. No Critical Habitat for any listed species will be adversely impacted with implementation of any of the alternatives.

Executive Order 13186, signed January 10, 2001, directs Federal agencies to protect migratory birds by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practical, adverse impacts on migratory birds' resources when conducting agency actions. This Order directs agencies to further comply with the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, and other pertinent statutes. This analysis is compliant with the National Memorandum of Understanding between the USDA Forest Service and the USFWS to promote the conservation of migratory birds (USDA 2008). In addition, the Dixie National Forest is compliant with the letter of understanding to the USFWS Utah Field Office (USDA 2007) concerning compliance with MBTA and Executive Order 13186.

## **VI. Forest-plan Consistency Determination**

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This analysis incorporates by reference the direction provided in the Dixie National Forest Land and Resource Management Plan (LRMP) (1986). The proposed analysis is project level analysis, and is not intended to re-examine the basic land use allocations made in the LRMP, nor does this project level planning propose broad changes in land use allocations. Instead, planning at the project level involves the development, analysis, and disclosure of likely environmental impacts associated with the implementation of specific actions designed to achieve the overall goals and objectives of the LRMP.

The proposed action is consistent with the LRMP regarding the following goals: Goal No. 13 Coordinate Fish & Wildlife Program with Utah DWR; Goal No. 14 Improve the quantity and quality of aquatic habitats through direct habitat improvement and increased coordination with other land use programs; and Goal No. 17. Manage classified species (CRCT - sensitive) habitat to maintain or enhance their status through direct habitat improvement and agency cooperation.

While the non-chemical alternative would also be consistent with the goals listed above, it would not be consistent with maintaining the Minimum Viable Population for goshawk listed on Table II-13A of the LRMP.

The No Action alternative would not be consistent with the goals listed above.

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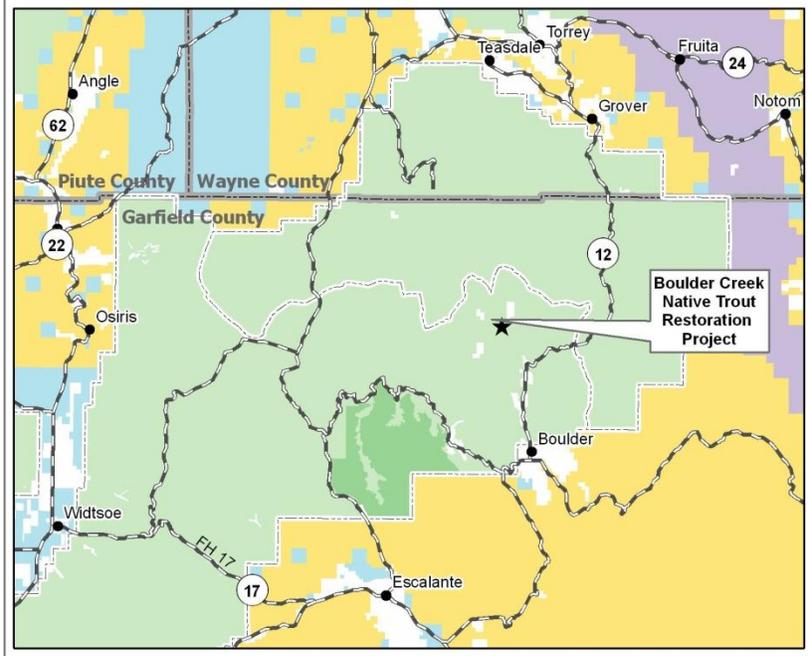
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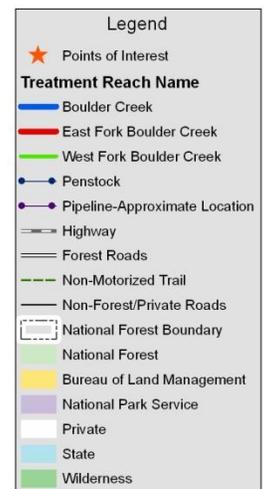
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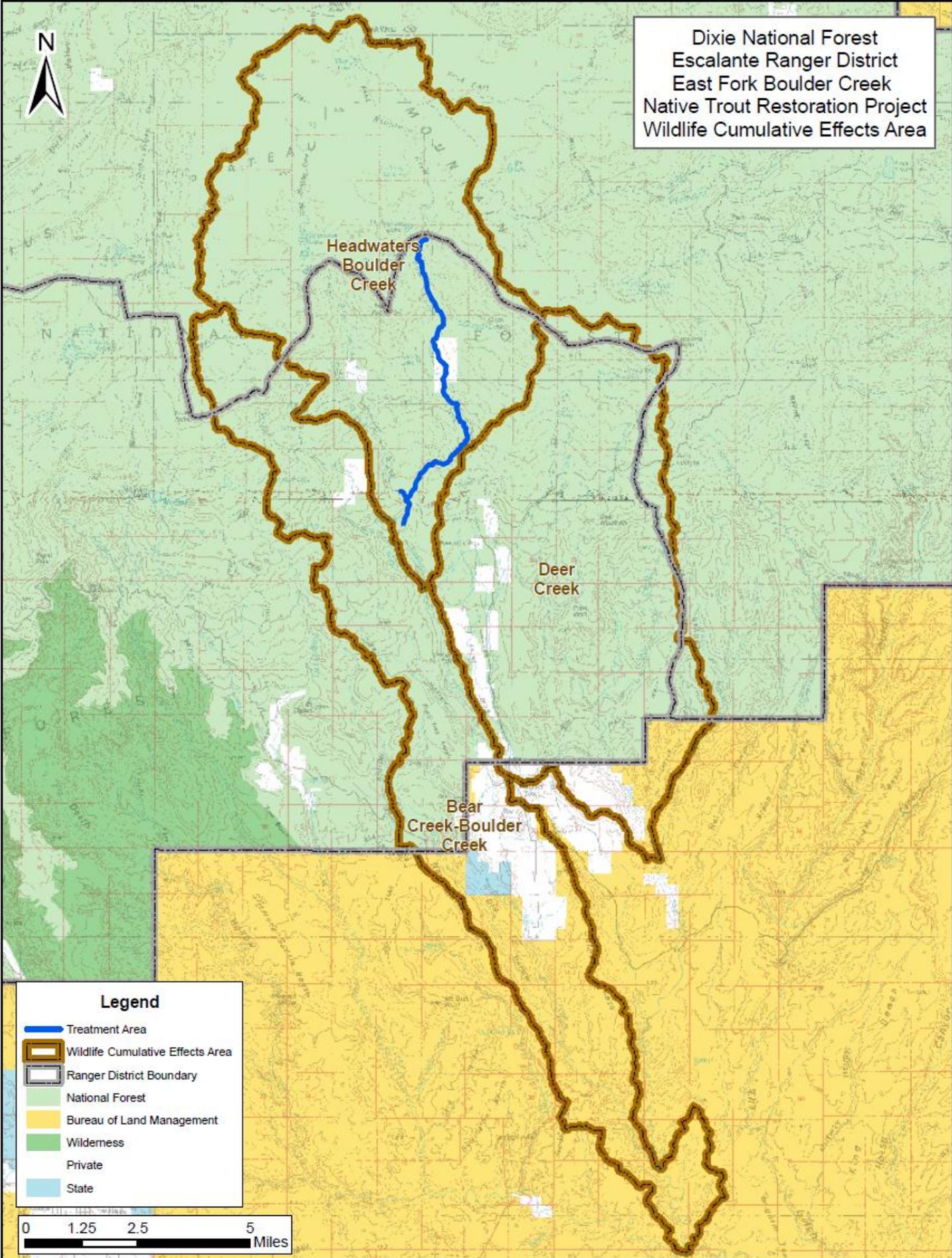
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Dixie National Forest  
Escalante Ranger District  
East Fork Boulder Creek  
Native Trout Restoration Project  
Vicinity Map

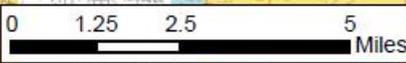


Dixie National Forest  
Escalante Ranger District  
East Fork Boulder Creek  
Native Trout Restoration Project  
Wildlife Cumulative Effects Area



**Legend**

-  Treatment Area
-  Wildlife Cumulative Effects Area
-  Ranger District Boundary
-  National Forest
-  Bureau of Land Management
-  Wilderness
-  Private
-  State



## **Appendix 1. Project Area and Alternatives Analyzed in Detail**

The following describes and compares the Forest Service alternatives analyzed. It includes a description of the UDWR's proposed project and considers UDWR's treatment alternative in detail. This section also presents the alternatives and the UDWR activities that would be authorized or connected actions to the alternatives in comparative form.

### **Project Area**

The proposed East Fork Boulder Creek Native Trout Restoration Project (project) is located approximately 7 miles northwest of Boulder, Utah (see Figure 1). The total treatment area is as follows:

- approximately 7.8 miles (12.6 km) of East Fork Boulder Creek from the natural barrier (below headwater meadow) on East Fork Boulder Creek to its confluence with West Fork Boulder Creek;
- approximately 0.2 miles (0.4 km) of lower West Fork Boulder Creek, from a previously constructed barrier to its confluence with East Fork Boulder Creek;
- approximately 0.5 miles (0.8 km) of Boulder Creek from the confluence of East Fork Boulder Creek and West Fork Boulder Creek downstream to a previously constructed fish barrier;
- all seeps and springs flowing into those sections of streams proposed for fish removal; and
- the Garkane Energy water transfer pipeline between the West Fork Reservoir and King's Pasture Reservoir; King's Pasture (East Fork) Reservoir; a pond on private property in King's Pasture, and the Garkane Energy penstock, between King's Pasture Reservoir and the Garkane Energy Boulder Creek Hydroelectric Power Plant (main power plant).

The treatment stream reaches flow through portions of Sections 27, 28, 33, and 34 of T31S, R4E, and Sections 3, 10, 15, 21, 22, and 28 of T32S, R4E, Salt Lake Baseline Meridian. Treatment would include connecting waters, including relatively large inflows or tributaries with permanent fish habitat and smaller springs and seeps that are capable of at least temporarily holding small fish. Known tributaries and inflows vary in length from 10 meters to over 750 meters.

The reaches on NFS-lands are all on the Escalante Ranger District of the Forest in Garfield County, Utah. The inflow of the water transfer pipeline is at the West Fork Reservoir in Section 8, T32S, R4E, and the outflow is at King's Pasture Reservoir in Section 10 of T32S, R4E. The inflow of the penstock is at King's Pasture Reservoir, and the outflow is at the main power plant in Section 35 of T32S, R4E.

### **No Action- No Further Treatment Scenario**

Under the No Action alternative, the Forest would not approve the pesticide use permit to UDWR, would not authorize UDWR to use motorized vehicles off of designated routes for the application of rotenone to waters of the treatment area on NFS lands, and would not approve a special use authorization for UDWR to bury removed fish.

The No Action alternative would not preclude UDWR from implementing actions on NFS lands that would meet the purpose and need for UDWR's project but do not require Forest Service authorization. This includes UDWR activities described under the Non-chemical Treatment alternative (Section 2.1.3) except for the use of motorized vehicles off of designated routes or burial of removed fish on NFS lands. The No Action alternative would also not preclude UDWR from implementing actions on non-NFS lands that are related to the purpose and need for UDWR's project but not under Forest Service jurisdiction or authorization.

One possible option for UDWR is to take no further action to meet the purpose and need of the proposed project. This possible option is identified in this analysis as the "No Action - No Further Treatment Scenario" and is the basis for the effects analysis for the No Action alternative to provide the base line for comparison of expected future conditions if neither the Proposed Action nor Non-chemical Treatment alternative were implemented by the Forest and UDWR were to take no further action to meet the purpose and need.

### **Proposed Action**

The Proposed Action is to approve the pesticide use permit that the Forest Service requires the UDWR to have to apply the fish toxicant rotenone to waters that flow on NFS lands and to authorize motorized vehicle use off of designated routes. The pesticide use permit would authorize the UDWR to implement a maximum of three treatments on NFS land, one treatment per year for three consecutive years. Waters on NFS land that would be treated by UDWR under the Forest Service pesticide use permit are as follows:

- approximately 7.8 miles (12.6 km) of East Fork Boulder Creek from the natural barrier (below headwater meadow) on East Fork Boulder Creek to its confluence with West Fork Boulder Creek;
- approximately 0.2 miles (0.4 km) of lower West Fork Boulder Creek, from a previously constructed barrier to its confluence with East Fork Boulder Creek;
- approximately 0.5 miles (0.8 km) of Boulder Creek from the confluence of East Fork Boulder Creek and West Fork Boulder Creek downstream to a previously constructed fish barrier; and
- all seeps and springs flowing into those sections of the stream reaches specified in the permit.

The UDWR activities that would be authorized by the Forest under the Proposed Action would completely eradicate non-native trout from East Fork Boulder Creek, a short segment of Boulder Creek, and a very short segment of West Fork Boulder Creek. All fish would be temporarily eliminated by UDWR from target waters. Use of motorized vehicles by UDWR off of designated routes may be needed to facilitate placement of equipment, especially neutralization equipment, in effective locations.

Several actions that are not part of the Forest Service decision are connected to the UDWR project, as follows. UDWR is proposing chemical treatment of connected waters on private property to meet the purpose of the UDWR project. Following fish removal, UDWR would introduce the CRCT into the treated stream segments to establish self-sustaining populations. Sterile hybrids of species of non-native trout may also be stocked by UDWR at some locations following the treatments to provide sport fishing

opportunities while native trout become established. The following describes the UDWR project in detail, including identification of those actions that do not require Forest Service authorization.

*Chemicals.* Liquid emulsifiable rotenone (Liquid Rotenone, 5% Active Ingredient, EPA Registration No. 432-172) would be used by UDWR to treat target waters. Rotenone was selected as the chemical to use because of its effectiveness in controlling fish populations and its lack of long-term effects on the environment (Sousa et al 1987). When used at the concentrations planned for the UDWR project, rotenone is a naturally occurring fish toxicant that is toxic to only fish, some aquatic invertebrates, and some juvenile amphibians. EPA found it to be not 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. UDWR has used rotenone successfully in many similar projects and has refined application techniques to minimize adverse side effects to the environment (Hepworth et al. 2001a, Hepworth et al. 2001b, Hepworth et al. 2001c, Ottenbacher and Hepworth 2001, Chamberlain and Hepworth 2002a, Chamberlain and Hepworth 2002b, Chamberlain and Hepworth 2002c, Fridell et al. 2004, Fridell et al. 2005, Fridell and Rehm 2006).

Potassium permanganate would be used by UDWR to neutralize the rotenone at suitable locations to prevent the movement 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 the UDWR project activities, including those that would be authorized by the Forest under the Proposed Action (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.

A more detailed description of the chemicals that would be used for the UDWR project activities, including those that would be authorized by the Forest under the Proposed Action, can be found in specialist report on Chemicals and Application of the Proposed Action.

*Application.* Liquid rotenone would be applied by UDWR at a rate of 0.5 to 2.0 ppm. In the pond and reservoir, liquid rotenone would be dispersed from personnel on small water-craft using pressurized backpack spray units. For flowing waters, seeps, and springs, liquid rotenone would be applied using a combination of 30 gallon and 5 gallon dispensers with constant flow drip-heads at approximately 50 to 60 stations throughout the UDWR project area over a 3 to 24 hour period (Finlayson et. al 2000, Ottenbacher et al. 2009). One 30 gallon drip station would be used by UDWR at each at the following:

- lower end of the headwater meadow at the upstream end of the UDWR project area,
- approximately halfway between the headwater meadow and King's Pasture Reservoir,
- immediately below King's Pasture Reservoir, and
- at the intake for the water flow pipeline between the West Fork Reservoir and King's Pasture Reservoir.

Five-gallon drip stations would be located by UDWR at approximately 1 mile intervals, beginning one mile below King's Pasture Reservoir and ending 1 mile upstream from the fish barriers on the main stem of East Fork Boulder Creek, and at all major springs and seeps within the UDWR project area. The

interval placement of drip stations on the main stem of East Fork Boulder Creek would be to facilitate efficient travel time of chemicals. Depending on flow volume, a single 30 gallon or 5 gallon drip would be placed by UDWR on the lower fish barrier on West Fork Boulder Creek. Pressurized backpack sprayers would be used by UDWR to apply a diluted solution of the chemical to springs and backwater areas containing fish that were not effectively treated by boat or drip station.

Rotenone would be neutralized by UDWR with potassium permanganate downstream from target waters. Three sites are planned: where the penstock water is released at the upper power plant, where water is released at the main power plant, and at the fish barrier at the lower end of the treatment area. Each site would have a main neutralization station and at least one contingency neutralization station to ensure effectiveness. The neutralization stations would prevent rotenone from escaping the target area, except for the estimated 0.25 to 0.5 miles downstream in which the neutralization or natural degradation of rotenone would be occurring.

*Post-treatment activity.* Following confirmation of complete non-native trout removal, UDWR would reintroduce CRCT into project stream reaches from “core” CRCT populations or from fish produced by UDWR CRCT brood stocks. Sterile hybrids of species of non-native trout may also be stocked by UDWR at some locations following the treatments to provide sport fishing opportunities while native trout become established. All UDWR transfers or stocking of fish would comply with Utah Department of Agriculture and Food rules and UDWR policies.

*Design Criteria.* The following design criteria would be implemented and included in the Forest Service authorizations:

1. Stream sections will be treated in the fall to minimize impacts on non-target wildlife species (amphibians, insectivorous birds and bats). The fall treatment period will also minimize the impacts on sport fishing recreation.
2. Each 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: notification of the Boulder Town Council, notification of private landowners in the treatment area, and news releases in local papers.
3. The treatment area will be placarded to prohibit public access during treatment and for at least 3 days following treatment.
4. Application of the chemical will be conducted by licensed pesticide applicators in accordance with all applicable regulations and policies.
5. Access by motorized vehicles will be on National Forest System roads designated for motorized vehicle use to the extent possible. Any use of motorized vehicles off of designated routes will be minimal and will require written Forest Service approval.
6. Neutralization sites will be placed to maximize their effectiveness at preventing downstream escapement of rotenone.
7. Treated waters will remain open to fishing.

8. Transport to the site and storage of chemicals on the site will comply with FSH 2109.14.40 (Pesticide-Use Management and Coordination Handbook, Chapter 40 - Storage, Transportation, and Disposal).
9. Sentinel fish (“in situ bioassay”) will be used for pesticide residues monitoring to determine the presence or absence of unacceptable environmental effects.
10. Treatments will be discontinued if the objective of complete removal of non-native trout from the project area has been met.

*Actions connected to but not included in the decision.* The following parts of the UDWR project, as described above, are not subject to Forest Service permit requirements, and therefore are not included in the Forest Service decision. Selection of the Proposed Action is for issuance of the pesticide use permit for the application of rotenone on NFS lands only. The following, however, are considered connected actions and thus included in the environmental analysis:

1. The proposed UDWR treatment area includes private property, including property owned by Garkane Energy; thus, this area is not under Forest Service jurisdiction. This includes approximately 1.4 miles of East Fork Boulder Creek, Kings Pasture Reservoir, and the pond in Kings Pasture. To meet the purpose and need of the UDWR project, these areas as well as the water in the transmission pipeline and penstock must be treated by UDWR. Forest Service approval of the pesticide use permit for UDWR to apply rotenone to waters on NFS land is not approval of UDWR activities on non-NFS lands; however, the Forest Service would not approve the pesticide use permit unless UDWR is able to complete its project by treating waters off of NFS land.

The expectation is that the entire UDWR project treatment area would receive chemical treatment as described below, although the UDWR may decide to use another method or methods to achieve the treatment objective. FERC license order Section 4(e), item 16, condition 4, requires Garkane Energy to use its reasonable efforts to cooperate in the work of UDWR and other agencies to remove non-native fish and re-establish CRCT in the above stream sections. This cooperation has already been demonstrated through construction of the fish barriers and through the first chemical treatment of Kings Pasture Reservoir in 2009.

2. Stocking of fish is under the jurisdiction of UDWR; thus, the CRCT stocking is not under Forest Service jurisdiction. To meet the purpose and need of the UDWR project, the stream would need to be stocked by UDWR with CRCT from core populations or UDWR brood stock post-treatment.

The expectation is that the post-treatment recolonization/stocking of CRCT would occur as described. The purpose and need for the UDWR project, including stocking with CRCT, is to implement conservation actions under the CRCT Conservation Agreement and Strategy, to which UDWR is a signatory. In addition, the Forest Service conditions regarding the non-native fish eradication and fish restocking were included in a 2006 settlement agreement relating to the FERC license conditions and signed by Garkane Energy, Forest Service, and UDWR.

3. Fishing regulations, including whether or not treated waters would remain open to fishing, is under the jurisdiction of UDWR.

The expectation is that UDWR would manage the fishing regulations to meet the conservation actions under the CRCT Conservation Agreement and Strategy. UDWR recognizes the importance of the area to recreation users. Because of this, UDWR may also stock sterile hybrids of species of non-native trout at some locations following the treatments while native trout become established.

### **Non-chemical Treatment Alternative**

Under the Non-chemical Treatment alternative, the Forest Service would authorize UDWR to use motorized vehicles off of designated routes and approve a special use authorization for UDWR to bury fish that are removed as necessary to implement a non-chemical treatment to remove non-native trout from waters on NFS land.

The non-chemical treatment methods would not involve the use of rotenone or other pesticides on NFS lands and, therefore, would not require Forest Service approval. The effects of the non-chemical treatment are being analyzed, because this option may be exercised by UDWR in the event that the Forest Service were to choose not to authorize pesticide use, and the approach would be a connected action to the authorization of the use of motorized vehicles off of designated routes and approval of a special use authorization for burial of removed fish. The other connected actions that would also not require new Forest Service action are described below. UDWR's non-chemical treatment and other connected actions may or may not occur under the No Action alternative if the UDWR were to use motorized vehicles only on designated routes. These UDWR actions also may or may not occur under the Proposed Action.

Under the Non-chemical Treatment alternative, UDWR would use electrofishing to remove non-native trout from the treatment waters on NFS lands. Except for possible motorized vehicle use off of designated routes and burial of removed fish, this alternative would not require Forest Service authorization.

*Treatment area.* The treatment area would remain the same as described in the Proposed Action.

*Methodology and Equipment.* Electrofishing would be used by UDWR to remove non-native trout from the treatment area on NFS lands. Electrofishing introduces an electric current into the water and is commonly used as a fish removal method. The electricity causes an involuntary muscle contraction in the fish, attracting them toward the source of the electricity (electrode). Workers with long-handled nets then collect the stunned fish. Voltage, amperage, pulse frequency, and waveform are manipulated to maximize effectiveness, which can be influenced by water flow and velocity, temperature, clarity, conductivity (dissolved mineral content), and substrate. Other factors influencing effectiveness include the fish size, species and behavior, presence of aquatic vegetation, time of year, and time of day. It is most effective in shallow water and is, therefore, most commonly used in rivers and streams and occasionally in the shallow water zones of lakes.

Electrofishing removal would be accomplished by UDWR using multiple Smith-Root LR24 backpack electrofishing units or their equivalent from another manufacturer. Block nets of sufficient width would be set up to prevent fish emigration during removal activities. Dip nets, buckets, and live wells would also be necessary for capture and removal of brook trout (*Salvelinus fontinalis*) and capture and safe holding of CRCT.

*Removal activities.* Mechanical removal of non-native trout species using backpack electrofishing has been attempted in several other projects (Moore et al. 1986, Meronek et al. 1996, Thompson and Rahel 1996, Buktenica et al. 2000, Kulp and Moore 2000, Shepard et al. 2002, Peterson et al. 2004, Moore et al. 2005, Meyer et al. 2006, Earle et al. 2007). The results of these prior mechanical removal projects indicate: 1) achieving complete mechanical removal of trout in streams with the width, complexity, and number of small, heavily vegetated springs/tributaries found in East Fork Boulder Creek would be difficult; 2) success would be enhanced by implementing multiple-pass depletion removal efforts 3 to 4 times within the same year, and 3) success would be enhanced by treatment over multiple years (minimum of 2). For this UDWR project, the multi-year removal effort would involve a minimum of 5 to 6 people conducting multiple-pass removal efforts for the majority of summer and early autumn (late June to September) over a period of several years. While such removal efforts would undoubtedly cause major reductions in brook trout density and biomass, they may or may not result in complete eradication. UDWR would begin CRCT reintroduction efforts only when no brook trout are found within the project area.

The electrofishing removal by UDWR would follow the population monitoring methods used by Utah State University's Institute for Natural Systems Engineering, Utah Water Research Lab (INSE) during their Garkane-funded fish population monitoring on the Boulder Creek system (Hardy et al. 2009a, Hardy et al. 2009b). Personnel would electrofish approximately 100-meter reaches in 8.5 miles of the mainstem of East Fork Boulder Creek, West Fork Boulder Creek, and Boulder Creek along with all spring inflows and tributary streams. A block net would be placed across the upstream and downstream end of each reach to increase capture efficiency by preventing emigration. Up to 4 passes, or until no fish were collected, would be completed through each reach. Each pass would involve all personnel walking in the stream channel and on the banks while applying constant electric current to the water from at least two backpack electrofishers. All organisms within the stream would be subjected to the electric field. All non-native brook trout would be removed from the system, killed and buried. Any CRCT collected would be held in buckets/live wells and returned to the stream after completion of the 4 pass removal.

*Effort.* One crew would consist of at least 2 personnel using backpack electrofishers, 2 netters retrieving stunned fish, and 1 person with a bucket receiving and disposing of fish. Electrofishing batteries would be recharged using small gasoline powered generators. Based on their previous monitoring efforts, INSE estimated that in a 40 hour work week, 9 sites that were each 100 m long could be completed by a 5 to 6 person crew using the four pass methodology (C. Williams, Institute for Natural Systems Engineering, personal communication with M. Golden, Dixie National Forest, 3/12/2010). Based on this INSE estimate, for UDWR fish removal activities under the Non-chemical Treatment alternative, one removal effort on the 11.5 km mainstem stream (12.8 reaches, 900 m long) on NFS land would require approximately 512 hours (12.8 reaches times 40 hours) or 63 days (8 hours per day) to be completed by a 5 to 6 person crew using the four pass method. An additional effort of approximately 13 days would be needed to treat the 2.3 km mainstem on private property.

Because UDWR's removal activities would need to occur between late-June or early July and September to minimize access, weather, and high stream flow issues, each removal effort would be limited to approximately 20 days to be able to conduct 4 removal efforts in a single year. To be able to treat the entire mainstem stream, on NFS lands and private lands, during any one removal effort, 20 people (four 5-person crews) would be needed. For four removal efforts, this would total up to 80 days per year. As described below, UDWR may need up to 10 years of removal effort under this method.

During the UDWR's 2009 chemical treatment of East Fork Boulder Creek above King's Pasture Reservoir, 23 relatively large inflows or tributaries with permanent fish habitat were identified, along with many smaller springs and seeps capable of at least temporarily holding small fish. These tributaries and inflows varied in length from 10 m to over 750 meters. Additional inflows and tributaries that contain fish habitat are probably present in the reach below Kings Pasture and could add another 30 days or more to the estimated treatment time.

Efficiency of fish removal by electrofishing is substantially lower in certain types of habitats found in the treatment area, especially those with heavy aquatic vegetation, root wads, woody debris, and boulder fields. The time for one removal effort in these types of areas could be higher, and effectiveness could be lower. Also, in order to eliminate the possibility of fish moving between treated and untreated reaches, crews would need to operate simultaneously, which may negatively impact fish-removal efficiency, as stream bed disturbance from upstream crews would impact water clarity and visibility for downstream crews. Because of reduced removal efficiency with electrofishing as the fish removal method, the UDWR project may extend to 10 years.

*Post-Fish Removal activities.* Post-fish-removal activities by UDWR would be the same as those described for the Proposed Action.

*Design Criteria.* The following design criteria would be included in the written authorization for use of motorized vehicles off of designated routes and the special use authorization for the burial of removed fish:

1. State of Utah decontamination protocols for prevention of the spread of Aquatic Nuisance Species will be followed for all gear and personnel involved with the removal project.
2. The Forest Archaeologist will be consulted about potential locations to bury fish to avoid impacts to cultural resources.
3. Dead fish collected will be buried no closer than 300 feet from the stream and away from known camping areas to minimize bear/human interactions.
4. Access by motorized vehicles will be on National Forest System roads designated for motorized vehicle use to the extent possible. Any use of motorized vehicles off of designated routes will be minimal, and will require written Forest Service approval.
5. Trails will be used whenever possible to move from one location to another to minimize soil and vegetation disturbance and to prevent establishing new trails.
6. Sensitive plant habitat will be avoided during action implementation.
7. Personnel will ensure reach being treated is void of livestock and people not involved with the operation. Treated waters will remain open to fishing.

*Actions connected to fish removal actions on NFS lands.* The following parts of the UDWR project, as discussed above, are not subject to Forest Service permit requirements, and therefore are not included in the Forest Service decision. They are considered connected actions to UDWR's fish removal activities on NFS lands and thus included in the environmental analysis:

1. As described for the Proposed Action, the UDWR treatment area includes private property, including that owned by Garkane Energy; thus, this area is not under Forest Service jurisdiction.

The expectation is that under the Non-Chemical Treatment alternative, the UDWR would implement non-chemical treatment methods on non-NFS lands, as described below, although the UDWR may decide to use another method or methods to achieve the treatment objective on the private lands or not pursue treatment on the private lands. The flowing portions of the project area on private lands would undergo similar electrofishing removal by UDWR, as described for NFS lands above.

For the non-flowing portions of the project area on private lands, electrofishing would not be effective in removing brook trout from King's Pasture Reservoir or the pond in Kings Pasture. To remove brook trout from these areas without use of chemicals, UDWR would deploy experimental gill nets with many different mesh sizes at several locations and depths throughout each water body. Other studies where this method has been successful at eradicating brook trout suggest that it would take at least two and up to four seasons of semi-continuous netting to eliminate all size classes of trout from small lakes with relatively low trout densities (Knapp and Matthews 1998, Parker et al. 2001).

2. Potential recolonization from East Fork Boulder Creek would severely reduce the efficacy of removing brook trout from King's Pasture Reservoir; therefore, UDWR would need to construct a fish migration barrier in East Fork Boulder Creek on private property above King's Pasture Reservoir.

The barrier would generally consist of a small check dam constructed of boulders and large rocks, creating a vertical drop of approximately 5 ft on the downstream side. The location for the barrier would be selected by UDWR to utilize any naturally occurring drops which can be enhanced and where the stream channel and floodplain are confined to minimize the size of the structure and the amount of water impounded behind it. Barrier construction would comply with laws, regulations, and permitting requirements of the State Engineer for stream channel alteration. Barrier materials would be taken from the ground surface, near the stream. The collection of these materials would not require excavation, stream alteration, or vegetation disturbance. If sufficient material is not available on site, additional materials would be hauled to the barrier site from an approved source.

The barrier location would be selected by UDWR to minimize changes in stream gradient, hydraulic function, and water pooling. In addition, the barrier would be constructed by UDWR adjacent to existing roads where equipment access is acceptable, thus requiring little disturbance to surrounding areas. Riparian vegetation would be disturbed as little as possible during the construction of the barrier, while areas where surface disturbance would occur would be restored to pre-project conditions. The barrier would not be placed in areas of cultural or historic significance or in areas where sensitive, threatened or endangered plants occur. It would be designed to operate under the natural fluctuations of a stream flow without routine maintenance. The barrier would be designed to pose little, if any, threat to the natural stream system or its associated riparian area so that if it were to fail, no damage would result to the stream environment. UDWR's maintenance could include

the adjustment or replacement of individual rock materials, but such work would be minor. The barrier could be removed but only after treatment is determined to be fully successful.

Neither netting nor electrofishing are options for UDWR for removing any non-native trout that may be using the upper portion of the penstock inflow or the lower portion of the pipeline from the West Fork Reservoir during treatment efforts. Shutting off water to these areas until they were completely dry would be the only way to ensure complete eradication; however, this is not feasible (M. Avant, Garkane Energy, personal communication with M. Golden, Dixie National Forest, 4/1/2010). Because of this, the effectiveness of the rest of the treatment would be reduced, contributing to the likelihood of the longer period of treatment.

3. Stocking of fish by UDWR would be as described for the Proposed Action.
4. As described for the Proposed Action, fishing regulations, including whether or not treated waters would remain open to fishing, is under the jurisdiction of UDWR. The expectation is as described for the Proposed Action.

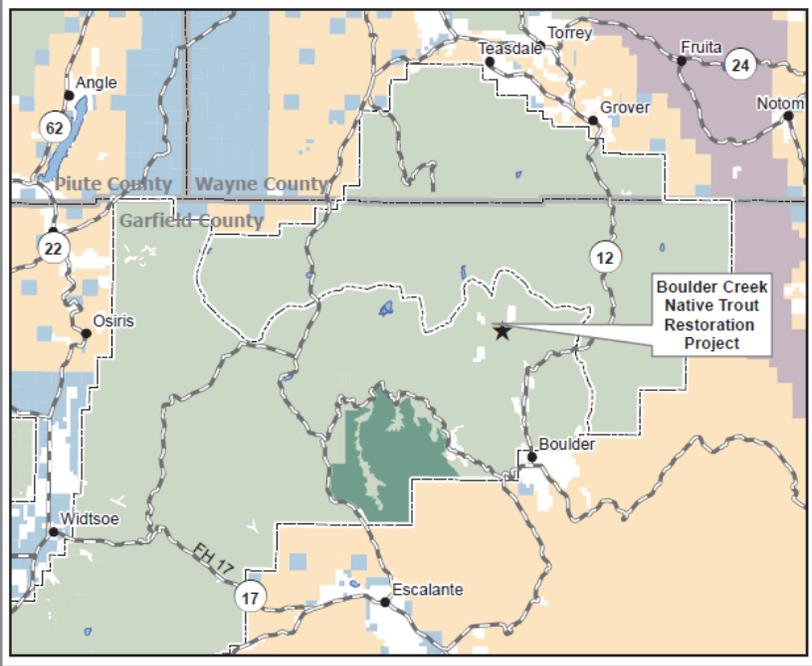
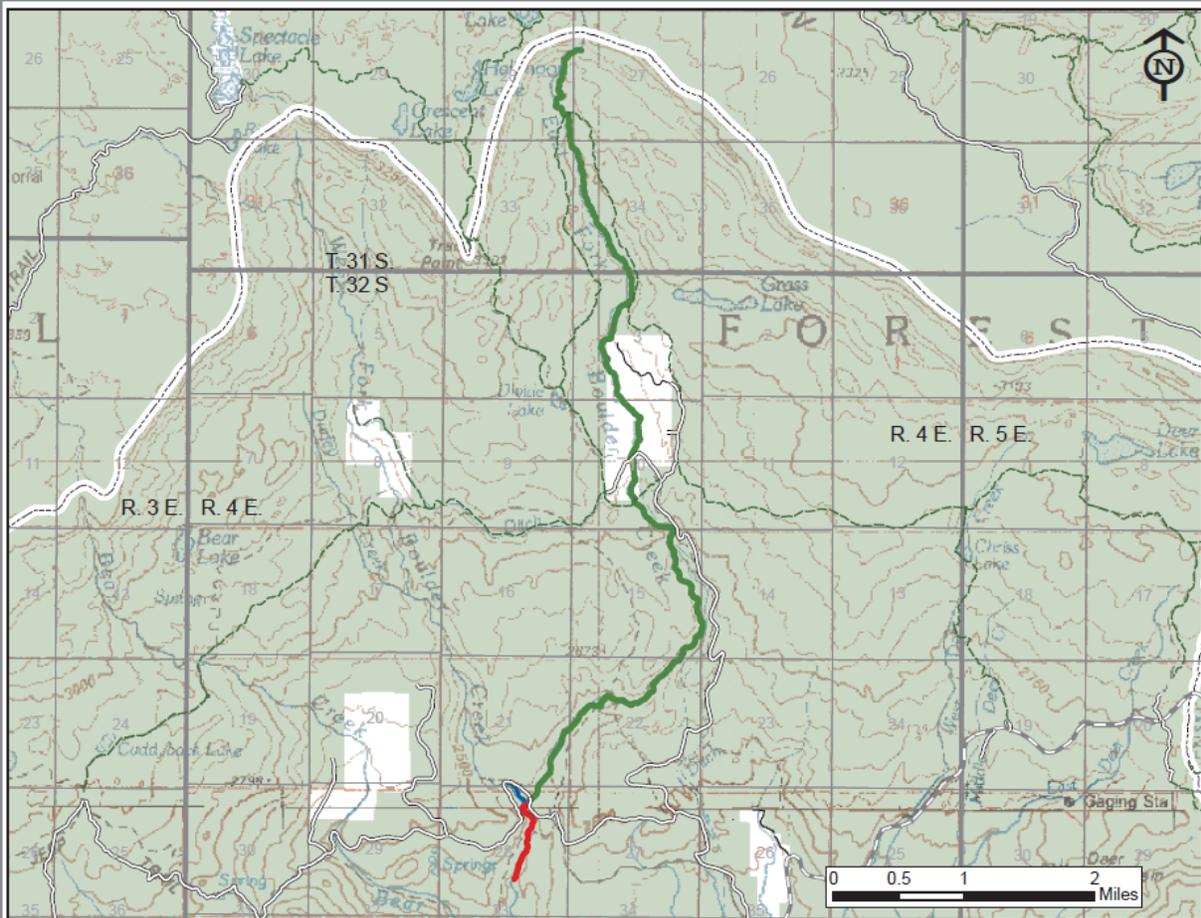
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Figure 1. Project area location



Dixie National Forest  
Escalante Ranger District  
East Fork Boulder Creek  
Native Trout Restoration Project  
Vicinity Map

