Lake Fuels Project

Aquatic Resources Report

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Summary
The Lake Project area was first identified as in need of vegetative treatment due to bark beetle infestation approximately seven years ago. The Lake Vegetation Project was proposed in 2002, and an environmental impact statement was completed. Due to delays caused by the appeal of the Lake Vegetation Project, conditions in the project area have changed and that project is no longer viable. Because of this changed condition, the Lake Vegetation Project is now being proposed as a fuels reduction project under the Healthy Forest Restoration Act (HFRA).
The Lake HFRA Project covers the same area as the Lake Vegetation Project. As of 2006 the spruce beetle had killed approximately 90 percent of the spruce in the stands proposed for treatment under the Lake Vegetation Project. The area has been identified in the Wildfire Protection Plan for Sanpete and Emery Counties, and has been identified in the Central Region Wildfire Protection Plan.

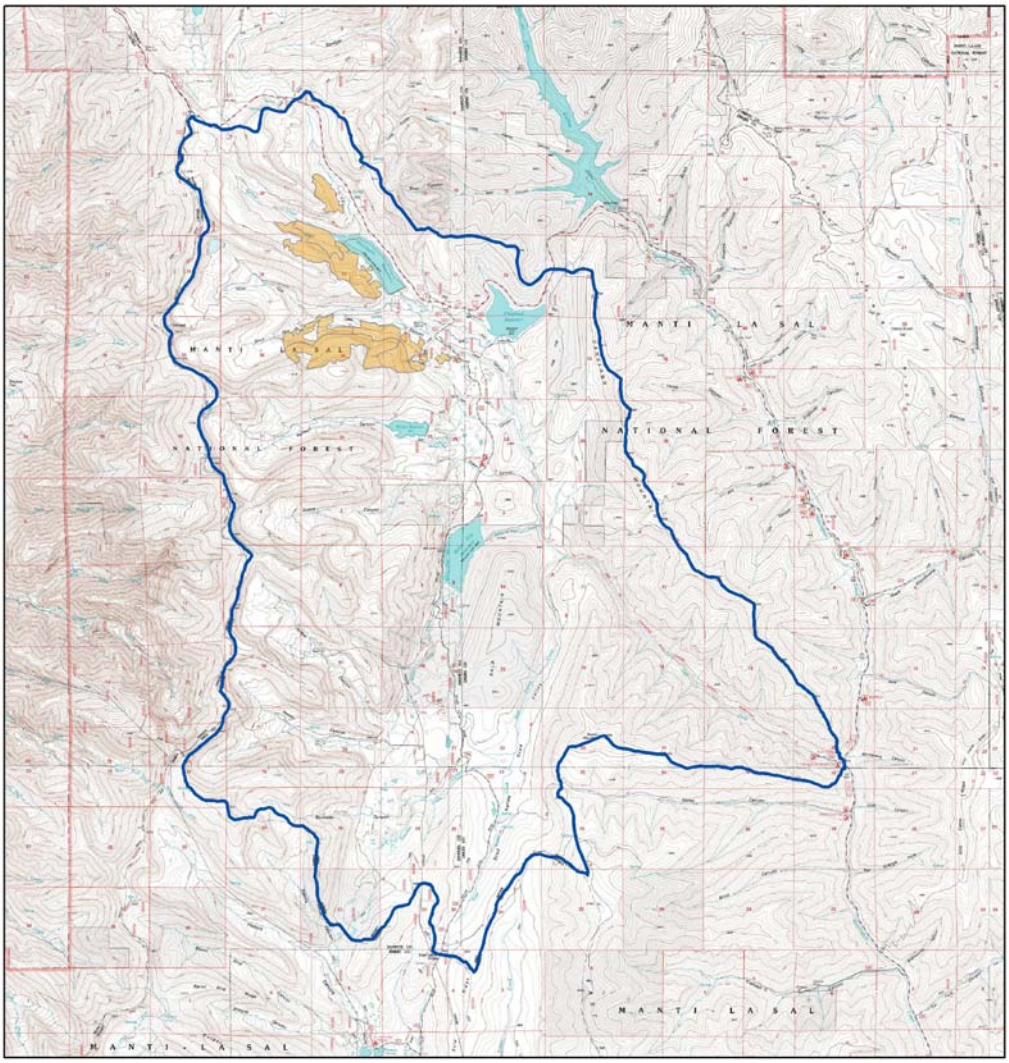
Introduction
The Lake HFRA Project Area encompasses a number of drainages including North Fork Lake Canyon Creek, South Fork Lake Canyon Creek, Spring Creek and several unnamed intermittent and ephemera1 streams. The project area also includes Huntington Reservoir. The entire watershed drains into Left Fork Huntington Creek.

The Forest contributes water to three major rivers: (I) the Upper Colorado River, (2) the Sevier River, and (3) the Jordon River, tributary to the Great Salt Lake. Within these three major drainages, 19 separate watersheds have been identified on the Forest.

There are 1,651 miles of perennial stream, 9,280 miles of intermittent streams, and 8,189 surface acres of lakes and reservoirs (greater than two acres) found on the Forest (Analysis of the Management Situation, 2004). The majority of the perennial streams, lakes, and reservoirs support fish.

Project Area Description/Affected Environment
The Lake HFRA Project area is located on the Ferron/Price Ranger District, Manti-La Sal National Forest, and encompasses approximately 5,600 acres. The project area is comprised of Engelmann spruce/subalpine fir forested lands (23 percent of project area) and aspen (27 percent of project area), with perennial forbs, sage brush, and other mountain brush interspersed (50 percent of project area). Perennial streams, riparian areas, wetlands and a large reservoir are also present. Elevation ranges from approximately 8,700 to 10,000 feet. Approximately 90 percent of the spruce trees in the area are dead due to the spruce beetle epidemic. The aspen stands in the project area are experiencing encroachment by spruce and subalpine fir, and are being lost due to this encroachment and lack of regeneration.

Lake HFRA Project
Location of Proposed Treatment Units
Left Fork Huntington Subwatershed



Legend
Proposed Harvest Units
Left Fork Huntington Subwatershed

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1:100,000
Map prepared by Katherine Foster, January 2008

Purpose and Need for the Proposed Action

The District Ranger for the Ferron/Price District of the Manti-LaSal National Forest in collaboration with Sanpete and Emery Counties has determined a specific need on National Forest System land to address the fuel conditions in the Lake Fuels Project Area. Specifically there is a need to:

- Reduce the fire regime condition class from moderate to low at the stand level. Fuel loadings have increased in recent years as a result of Engelmann spruce mortality caused by spruce beetle.

Proposed Action

The project proposes to reduce fuels on approximately 820 acres:

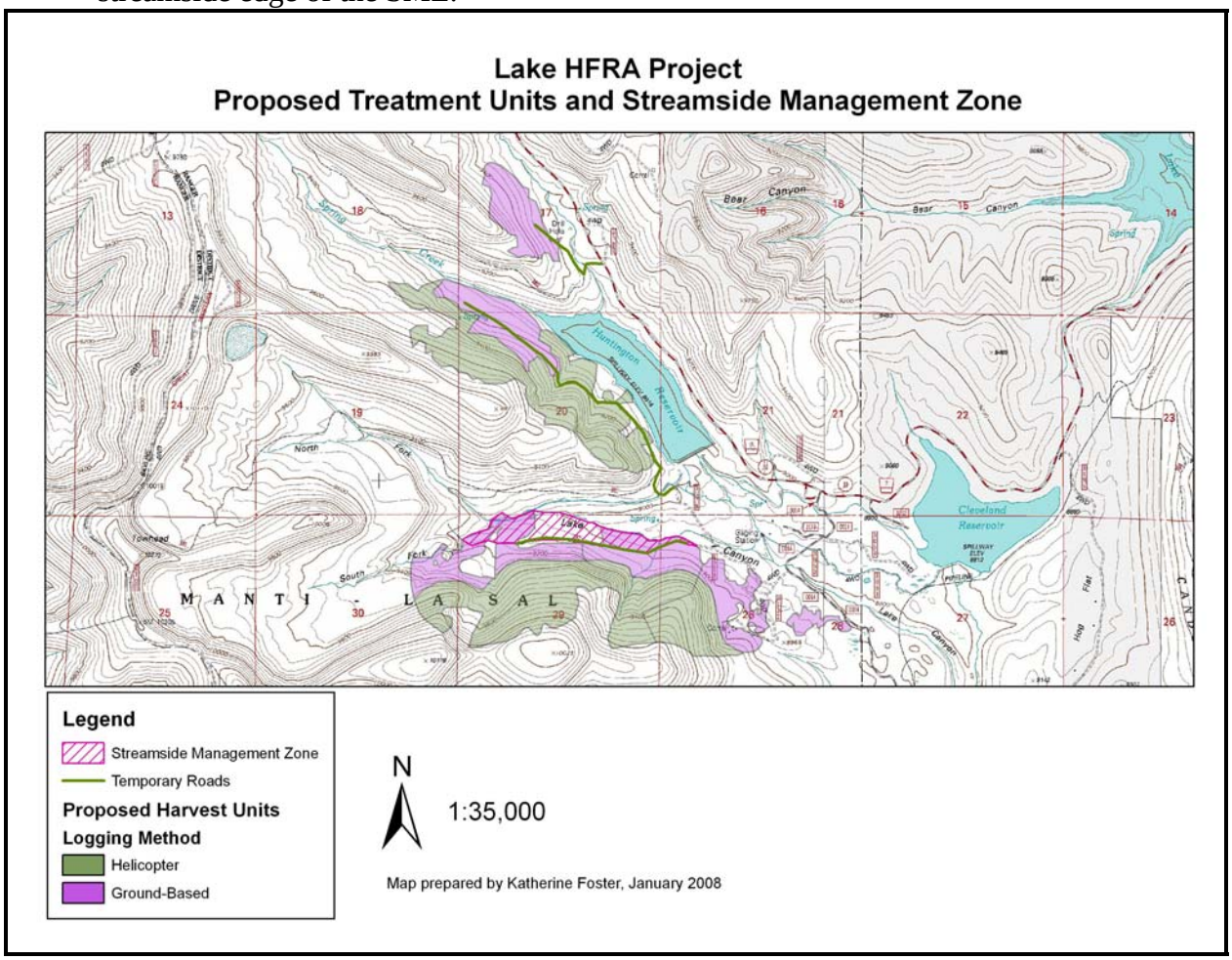
- Harvest approximately 6 million board feet of spruce and subalpine fir timber utilizing helicopter logging on approximately 420 acres and ground based logging systems (tractor) on approximately 400 acres. Some aspen would be harvested from areas accessible to ground based logging systems
- In the Engelmann spruce/subalpine fir type remove most of the dead or infested trees on 675 acres. All of these stands would be planted with Engelmann spruce to meet stocking requirements.
- Treat approximately 80 acres in aspen stands through small clear cuts in patches less than 10 acres in size and enhance the aspen component in others by removing the conifer element on approximately 65 acres. Aspen would be regenerated by coppice sprouting on approximately 145 acres.
- Construct 2.92 miles of temporary road and 0.07 miles of new system road. Approximately 2.2 of these miles would use the alignment and road prism of reclaimed roads that were ripped, seeded and water-barred but not restored to original ground contour. Upon completion of project activities, 0.07 miles of new road would remain on the system as National Forest System Roads with a maintenance level 2. This segment would be placed in system roads to access existing dispersed camping sites. The 2.92 miles of temporary road would decommissioned.
- Utilize approximately six temporary helicopter landings one acre in size and ten temporary tractor landings of approximately ¼ acre each to deck logs during the logging operation.
- Fuels reduction activities will occur on approximately 820 acres using various methods including, but not limited to, thinning, piling and burning, broadcast or jackpot burning, or chipping.
- Reduce fuels by removing approximately 50 percent of the dead Engelmann spruce from approximately 15 acres within the riparian buffer of Lake Fork Creek and Huntington Reservoir. No ground based equipment will be used within the buffer. Fuels treatments in this area would be limited to hand treatments such as piling and burning.
- Gopher baiting approximately 675 acres to protect planted seedlings.
- Take no actions within inventoried roadless areas.

A streamside management zone (SMZ) will be designated adjacent to Lake Canyon. See Figure below.

Management objectives within SMZ are to:

- Minimize compaction in the streamside zone

- Reduce fuel loading while retaining sufficient trees for streamside and aquatic large woody debris
- Provide an operable unit with specific/customized treatment prescription and stipulations
  Up to 50% of the merchantable trees may be marked for harvest but retain approximately 50% of larger diameter (18”+) trees within a tree length of the streamside edge of the SMZ.



Design features and best practices in the SMZ

- Heavy equipment operations only when soils are dry or frozen, or over 2 feet of equipment-supporting snow.
- No heavy equipment would operate within 100 feet of the streamside boundary of the SMZ.
- Intermittent drainages crossing the SMZ maintain a 50’ zone within each side of channel, no heavy equipment operation, but up to 50% of the merchantable trees may be removed
- No heavy equipment would operate and no trees would be removed within 100 feet of seeps, springs, spring brooks, or wetlands.
- No active lighting within the 100 feet of the streamside boundary of the SMZ.

Related activities

- Construct approximately .07 mile of new road, reconstruct approximately 0.5 mile of existing road and build approximately 2.9 miles of temporary roads.
- Utilize approximately four temporary helicopter landings one acre in size and eleven temporary tractor landings of approximately ¼ acre each to deck logs during the logging operation.
- Pre-commercial thin remaining live conifers 8 inches DBH and under.
- Treat fuels on 80 percent of the area by lopping and scattering, chipping, or hand piling or concentration burning of the slash generated by the logging operations. Approximately 110-300 acres will be concentration burned.
- Apply gopher bait on approximately 660 acres using underground methods.
- Nest trees with cavities will be protected.

Alternative 1 (No Action)
Under the No Action alternative, current management plans would continue to guide management of the project area. Timber harvesting or planting would not be implemented to accomplish project goals at this time.

Aquatic Species Considered: includes the following:
Proposed, Endangered, Threatened, and Sensitive (PETS) Species and Management Indicator (MIS) Species
All Proposed, Endangered, and Threatened species (USFWS designation) and those that occur on the Region 4 Regional Forester's Sensitive Species list and as well as Management Indicator Species were considered during that initial evaluation of the proposed project. These species are displayed in Table 1 below. Species not considered for further evaluation were eliminated for one or more reasons which are discussed in the table below. These species will not be further discussed in this document.

PETS Checklist Lake Fuels Common Name	Scientific Name	Status	Species Occurrence in the Project Area and Consideration
Spotted frog	*Rana luteiventris*	S	**Not considered**. Spotted frogs are most commonly found in cold, still, permanent water in habitats such as marshy edges of ponds or lakes, in algae-grown overflow pools of streams, and near flat water springs with emergent vegetation. In Utah, the spotted frog occurs in isolated populations in the West Desert and along the Wasatch Front (Crockett 2006). The spotted frog has not been found on the Manti – La Sal National Forest. The project area does not contain suitable habitat. Spotted frogs are not found within the project area.
Colorado River Cutthroat Trout (CRCT)	*Oncorhynchus clarkii pleuriticus*	S	**Considered.** Colorado River cutthroat trout (CRCT) require cool, clear water and well-vegetated streambanks for cover and bank stability. Deep pools, boulders and logs are important for instream cover. It is adapted to relatively cold water and thrives at high elevations. It also can be found in lakes and reservoirs (Natureserve, 2008). There are streams within the project area that maintain populations of CRCT.
Bonneville Cutthroat Trout (BVCT)	*Oncorhynchus clarki utah*	S	**Considered**. Bonneville cutthroat trout require cool, clear, well-oxygenated water and the presence of clean, well-sorted gravels with minimal fine sediments for successful spawning. They are found at high, moderate and low elevations in small head water streams in the Bonneville basin (USDI 2001). There is an archaic population of BVCT found within the project area.
Colorado Pikeminnow	*Ptychocheilus lucius*	E	**Not considered**. The Colorado pikeminnow is endemic to the Colorado River Basin, and it historically extended from the Green River in Wyoming, to the Gulf of California; it was

			widespread and abundant in warm-water rivers and tributaries. It is a long-distance migrator (hundreds of kilometers to and from spawning areas). Adults require deep pool and eddie habitats in streams that have high spring flows. Currently, in Utah this species occurs in the Green River from Lodore Canyon to the confluence of the Colorado River (Valdez et al, 2001a). Colorado pikeminnow are not found within the project area. There are no Colorado pikeminnow populations and no suitable habitat on the Forest, and the proposed project will not adversely affect stream flows.
Razorback Sucker	*Xyrauchen texanus*	E	**Not considered**. Historically the razorback sucker was widely distributed in warm-water reaches of the Colorado River and its tributaries from Wyoming to Mexico. Adults require deep pools, eddies and backwaters in spring; shallow water associated with sandbars in summer; and low velocity pools and eddies in winter. Young require quiet, warm, shallow water found at tributary mouths, and in coves or shorelines in reservoirs. Currently, within the Upper Colorado River Basin this species is only found in small numbers in the middle Green River, between the confluence of the Duchesne and Yampa rivers, and in the lower reaches of those two tributaries (Valdez et al, 2002b). There are no razorback sucker populations and no suitable habitat on the Forest, and the proposed project will not adversely affect stream flows.
Bonytail	*Gila elegans*	E	**Not Considered**. Historically, the bonytail existed in warm water reaches of larger rivers in the Colorado River Basin; it is considered to be adapted to pools and eddies of mainstream rivers. It has been extirpated from most of its historic range. Currently, a small number of wild adults exist in Lake Mohave in the Lower Colorado River Basin, and there are small numbers of wild individuals in the Green River and in sub-basins of the Upper Colorado River Basin (Valdez et al, 2002c). There are no bonytail populations or no suitable habitat on the Forest, and the proposed project will not adversely affect stream flows.
Humpback Chub	*Gila cvpha*	E	**Not considered**. The humpback chub is restricted to deep, swift main stem and large tributaries in relatively inaccessible canyons of the Colorado River Basin. Adults require eddies and sheltered shorelines in streams that maintain high spring flows that flush sediments from spawning areas and form gravel deposits used for spawning. Young require low-velocity shoreline habitats. Currently, there are six known extant populations, which are located in the Upper Colorado River, Yampa River and Little Colorado River (Valdez et al, 2002d). Humpback chubs population or no suitable habitat on the Forest, and the proposed project will not adversely affect stream flows.
Macroinvertebrates		MIS	**Considered**. Macro-invertebrates (aquatic insects) are ecological indicator species in aquatic habitats. Habitat requirements for aquatic macroinvertebrates vary with species; habitat requirements for any one species are very specific. Many macroinvertebrates are the larval form of flying insects such as mayflies, stoneflies, and caddisflies. There are streams within the project area that maintain populations of macroinvertebrates.

Table 1. PETS species. E = Endangered, T = Threatened, USDI-FWS Designation, S = Sensitive, MIS= Management Indicator Species USDA-FS Designation

Colorado River Cutthroat Trout

Colorado River cutthroat trout (CRCT) require cool, clear water and well-vegetated streambanks for cover and bank stability. Deep pools, boulders and logs are important for instream cover. It is adapted to relatively cold water and thrives at high elevations. It also can be found in lakes and reservoirs (Natureserve, 2008).

The distribution and abundance of CRCT have declined and it is now believed to occupy less than 14% of its historical range. CRCT historically occupied about 21, 386 miles of habitat in the western U.S. CRCT currently occupy about 3,022 miles of habitat, of which 1,111 miles are within the state of Utah. Of the 3,022 miles of habitat currently occupied by CRCT, 2,248 miles are administered by Federal agencies. Two-thirds of all occupied habitats occurred on National Forests (Hirsch et al, 2006).

Within the Lower Green Geographic Unit (GMU), there are 26 CRCT conservation populations in the 307 miles of stream and 1 conservation population in 36 acres of lakes throughout the state (CRCT Coordination Team 2006). A conservation population is a naturally reproducing and recruiting population of native cutthroat trout that is managed to preserve the historical genome and/or unique genetic, ecological, and/or behavioral characteristics. In general, a conservation population is at least 90% cutthroat trout (≤10% introgression), but may be lower depending on circumstances (CRCT Coordination Team 2006).

Lake Canyon Creek was surveyed in 1999 by the Utah Division of Wildlife Resources and CRCT, rainbow trout and cutthroat/rainbow trout hybrids were found (Berg et al, 2000). Lake Canyon Creek had water temperatures at the time of the survey which were 52 degrees F, an estimated flow of 4.2 cubic feet per second, a mean depth of 0.6 feet, and a mean width of 12.1 feet. A migration barrier was constructed in 2000 on Lake Canyon Creek to prevent any further migration of non-native rainbow trout from entering the stream through a diversion canal, which flows into Cleveland Reservoir (Berg and Slater 2000). The CRCT population in Lake Canyon Creek was identified as a "Conservation Population" in 2001 (Hart and Birdsey 2006). Lake Canyon Creek is one of only two streams on the Forest that has been identified as a conservation stream for CRCT.

Bonneville Cutthroat Trout

Habitat of the Bonneville cutthroat trout ranges from high-elevation streams with coniferous and deciduous riparian trees to low-elevation streams in sage-steppe grasslands containing herbaceous riparian zones to lakes. It occurs primarily in small headwater streams where optimum habitat includes areas with a 1: 1 pool to riffle ratio and slow, deep water with vegetated streambanks for shade, bank stability, and cover. It prefers summer water temperatures of about 55 F but can survive in water up to 70 F in lakes (Natureserve, 2008).

The distribution and abundance of Bonneville cutthroat trout BVCT) has changed from historical levels over a substantial portion of their range. Historically BVCT occupied about 6,758 miles of habitat within Utah, Idaho, Wyoming and Nevada. Currently the BVCT occupies an estimated 2,380 miles (23%) of its historical habitat. Of those miles, the BVCT currently occupy over 1,515 miles in Utah (May and Albeke, 2005).

A total of 153 separate BVCT populations occupy 2,061 miles of habitat which were designated as "conservation populations" (87% of currently occupied habitat). These

conservation populations were spread throughout the historical range, occurring in 19 of the 23 hydrologic units historically occupied by BVCT (May and Albeke, 2005).

According to the Utah Division of Wildlife Resources, trout populations within Spring Creek were genetically tested and found to be an archaic from of Bonneville cutthroat trout. Their assumption is that at some point there was connectivity to the fish population on the west side of the mountain or they were moved there some time in the past (Hart. J. per. Comm., Birdsey, P. pers, comm.). There are currently only four streams with BVCT on the Forest and Spring Creek is one of those streams.

Management Indicator Species

Macroinvertebrates

Aquatic macroinvertebrates include insects, such as mayflies, stoneflies, caddis flies and diptera (two-winged flies). They provide an ecological link between microscopic prey organisms and fish. Aquatic insects go through a series of life stages in a stream. Insects with incomplete metamorphosis (mayflies and stone flies) go through three stages: egg, nymph and adult. Insects with complete metamorphosis (caddis flies and dipterans) go through four stages: egg, larva, pupa and adult. The majority of their life is spent in the nymph or larva stage. While growing they go through a variety of stages called instars. The nymphs and larva emerge from the water as winged adults. The adults reproduce (lay eggs), completing the cycle.

The most resistant life stage of many aquatic insects is the egg. Eggs of many aquatic insects can survive dry conditions for many months, and extended hatching periods are common to many stream insects (Hynes 1972). Aquatic insects also have a variety of life cycles with a few having multiple generations per year, and some take more than a year for each generation. Even with species that have annual generations, there may be overlapping generations (Hynes 1972). These factors increase the likelihood that the more resistant egg stages are present over prolonged periods, reducing the impacts of short-term environmental disturbances. These cyclic and highly variable populations also mean that monitoring of individual taxon populations is not feasible for land management monitoring purposes.

The 1986 Forest Plan's monitoring and evaluation program includes aquatic macroinvertebrates as a management indicator species and calls for monitoring at baseline stations or as needed for select project activities (USDA Forest Service 1986)(page IV-6). Most of the baseline stations are at or near the Forest boundary. The Forest Plan was amended in 2006 to update the protocols used to collect macroinvertebrate data and to change the method used to analyze the data. The 2006 amendment did not alter the language regarding macroinvertebrate monitoring as an optional technique for selected projects. No site-specific surveys of aquatic macroinvertebrates have been conducted and no site-specific monitoring is proposed for this project. Monitoring will continue at baseline stations to characterize Forest-wide conditions; data analysis will be in cooperation with the Utah Division of Water Quality.

36 CFR 219.14(f) states that site-specific monitoring [for management indicator species] or surveying of a proposed project or activity area is not required, but may be conducted

at the discretion of the Responsible Official. The Forest Plan, as amended (USDA Forest Service 2006), is consistent with this direction.

Population Trend: At the time of this report, there is not enough data available to estimate Forest-wide trends using the method adopted in the 2006 amendment.

Analysis of Effects
Proposed Action
Colorado River cutthroat trout and Bonneville cutthroat trout
Direct and Indirect Effects

There are two streams within the project boundary. Lake Canyon Creek contains a conservation population of CRCT, only 53% of the total length of this stream runs adjacent to the harvest units for the proposed project area. The other stream Spring Creek contains an archaic population of BVCT, only 22% of the total length of this stream runs adjacent to the harvest units for the proposed project area.

Timber harvest, salvage cutting, site preparation, and release would have no direct effects on Colorado River or Bonneville cutthroat trout because harvest would not occur within stream channels and riparian habitats would be protected from ground disturbing equipment. Habitat would be protected by placing a 100' buffer on all perennial streams and springs and a 50' buffer on all intermittent streams. Harvest would occur within the buffer, however no ground disturbing equipment would be allowed. Buffer zones of this width have been proven effective in filtering sediment from timber harvest activity and reducing measurable effects to aquatic resources (Newbold et al. 1980). The indirect effects of the proposed action would be a temporary reduction in herbaceous and shrubby vegetation ground cover following harvest activity that may result in increased sedimentation. Harvest activities within riparian or buffer zones that result in reduction of forest canopy can reduce shade and affect stream temperature, cover, primary production and habitat (Belt et al. 1992). Bank erosion and lateral channel migration can also contribute sediments if protection vegetation and living root systems are removed. Summer stream temperature increases due to the removal of riparian vegetation has been well documented (Belt et al. 1992).

Measurements by Hewlett and Fortson (1983) under winter conditions also indicate that removal of riparian vegetation can reduce temperatures by about 10°C. A portion of the streams in the project area flows through a wide floodplain with little riparian cover. Temperatures would not be affected by riparian harvest in these areas. Overall temperature increases would be minimal due to the fact that over 90 percent of the spruce in the project area has been killed by spruce beetle thereby reducing the canopy cover.

Large organic debris is a major component of watersheds and river systems because of its role in hydraulics, sediment routing, and channel morphology of streams flowing through riparian systems (Reardon et al. 2005). Large wood is important to the trout because it routes and stores sediment; provides habitat complexity and acts as a substrate for biological activity. The potential to reduce recruitment of large wood would occur

where up to 50% of approximately of the larger diameter (18”+) trees within a tree length of the streamside edge of the SMZ are removed. Although recruitment will be reduced enough trees would be retained to augment woody debris to the stream.

Prescribed burns would occur in a portion of the watershed but would have no direct effects on Colorado River or Bonneville cutthroat trout. Indirect effects would vary due to fire intensity, aspect and slope. All burns remove some degree of the forest floor cover (Reardon et al. 2005). Indirect effects on the riparian habitat include decreased basin stability, and in steep erodible topography, debris flows are possible along with dry ravel and small landslides off hillslopes (Reardon et al. 2005). Through analysis of the proposed alternative, it was determined that there will be temporary, short-term disturbance to soil resources beyond existing conditions under this alternative. However, based on the project description of treatments, soils will not be detrimentally disturbed. The overall impact of this action will not result in any long-term effects to existing soil resources beyond the current conditions (Davidson, Robert, 2008).

Construction of temporary roads, skid trails and log landings would have no direct effects on Colorado River or Bonneville cutthroat trout. Indirect effects would include the removal of vegetative cover and soil disturbance as these areas are established, shaped and drainage structures installed. Proposed road construction, reconstruction, and closures activities have the potential to increase sedimentation, concentrate runoff, possibly alter surface and subsurface flow and potentially affect water quality. The potential for sedimentation would be reduced by surfacing these roads with gravel, re-vegetating exposed soils outside the needed roadbed, establishing sedimentation traps in drains leading to streams and not establishing roads within streamside corridors. The proposed project includes construction of a road crossing on a tributary to Huntington Reservoir. Culverts or bridges can cause water velocities to be greater than the swimming ability of small fish, thereby impeding migration (Chamberlin et al. 1991). Debris accumulation at these crossings can also block fish passage. The design requirements for these facilities would address these potential impacts. A professional hydrologist or fisheries biologist is to assist in the design of the road crossing and would be present at construction to ensure there are no impacts to fisheries migration.

Aquatic resources within the project area are dependent upon high water quality1evels and low levels of siltation. Forest Plan standards and guides (USDA Forest Service 1986) and Best Management Practices (Foster, 2008) that have established specific protective buffer zones for streams would provide protection for Colorado River and Bonneville cutthroat trout habitat during timber harvest, associated silvicultural activities, and prescribed fire. The best practices developed for the project, including a streamside management zone adjacent to Lake Canyon, will maintain water and soil quality and aquatic habitat for cutthroat trout (Foster, 2008). The construction of temporary roads and skid trails may have a temporary impact on fisheries immediately downstream from crossings by silting in egg masses during the rearing season. However, this effect may be limited by the use of large cobble rocks at stream crossings which hold up well under traffic, prevent muddying of the water and serves as suitable substrate for juveniles and hatchlings to hide in after the timber sale has closed.

Cumulative Effects

Both authorized and unauthorized recreation activities within and adjacent to the project area have impacted water quality in the past by increasing use and disturbance and would continue to do so. However, projects have been implemented to improve access for recreation, which have resulted in improvements in soil, water and vegetation. Future improvements to the existing trail system would include closing of some user-generated roads, and maintenance/improvement of designated trails. These improvements should reduce sedimentation and impacts to streams from recreation use. A new stream crossing is proposed over Spring Creek in the future for recreational winter use. This crossing would be a winter seasonal snow-pack crossing. A winter seasonal crossing is not likely to adversely impact water quality or Colorado River or Bonneville cutthroat trout habitat and would have no cumulative effects.

Past and present timber harvesting (Spring Canyon 1980s, Rolfson Reservoir 1990-1991, aspen regeneration, salvage on private lands) has decreased vegetation reducing the ability of an area to trap sediment, however, as revegetation occurs these impacts are reduced. As different units are harvested each year, previous units would begin to recover forest floor vegetation and ground litter from cast leaves and needles. This overlapping process of loss and recovery of ground cover and forest floor vegetation between years would continue post harvest arid would allow some stands to begin recovery before others are impacted.

Past transportation actions include development of roads for grazing, recreation, timber operations, access to private lands and improvement of Miller Flat Road. These actions have resulted in improved access and increased use of the area. Road maintenance and improvements work to reduce erosion and sediment production. The cumulative effects of construction of temporary roads, skid trails and log landings from this project should be minimal since the total acreage of disturbance is small for roads and a few additional acres for skid trails and landings. Many of these areas would be closed at project conclusion.

Sheep grazing occurs and would continue to occur on two range allotments within the project area watershed. Grazing can have a negative impact on fisheries habitat by reducing riparian vegetation, which can cause stream bank erosion. Sheep use within these allotments is controlled by grazing permits, to ensure riparian vegetation and stream bank stability are maintained. Livestock use is monitored by the Forest.

The Lake Canyon Creek fish barrier installed in 2001 on Huntington dam resulted in some short-term bank disturbance at the time of implementation. However, installation of the barrier protects Colorado River cutthroat trout by preventing hybridization from non-native rainbows and has resulted in long-term benefits. The watershed revegetation project in the heads of Rolfson, Jordon and Seeley Canyons reestablished vegetation to meet standards and objectives for the watersheds. Roads were closed and converted to

non-motorized trails. While some unauthorized OHV use impacts these closed roads, impacts to the watershed have been positive.

Past oil and gas projects (Questar natural gas pipeline, drilling in the 1950's and 1980's) have not resulted in a decline of cutthroat trout habitat. The Huntington Dam upgrade resulted in changes to the ground slope at the dam site; however the area has been revegetated. Access roads associated with a future gas well and construction of a BOR dam would result in increased access and recreational use. Dam safety repairs to Cleveland, Miller Flat and Rolfson Reservoirs would disturb some riparian vegetation and result in increased fishing pressure. However, revegetation of the riparian areas and restrictions on angling of protected species would reduce risk to fisheries.

The effects from the proposed project relative to all past, present and foreseeable future actions should not negatively impact Colorado River cutthroat trout and Bonneville cutthroat trout within the project area provided all planned design features, mitigation measures, BMPs, and Forest Plan Standards and Guidelines are implemented.

Macroinvertebrates

Direct and Indirect Effects

Site preparation, timber harvest and salvage cutting would have no direct effects on macrovinvertebrates because harvest would not occur within stream channels and riparian habitats would be protected from ground disturbing equipment. Indirect effects could include a minimal increase in sedimentation due to a temporary reduction in herbaceous and shrubby vegetation outside the riparian zone. Habitat would be protected by placing a 100 foot buffer on all perennial streams and springs and a 50 foot buffer on all intermittent streams. No ground disturbing equipment would be allowed within the buffer. Buffer zones of this width have been proven effective in filtering sediment from timber harvest activity and reducing measurable effects to aquatic resources (Newbold et al. 1980).

Prescribed fire may be implemented on a portion of the project area but will have no direct effects on macroinvertebrates. Indirect effects would vary due to fire intensity, aspect and slope, and all burns remove some degree of forest floor cover. The reduction in leaf litter and herbaceous plant cover may result in potential for increased sedimentation and enhanced nutrient content of river water. Water yield would likely increase slightly due to reduced transpiration and raindrop interception by herbaceous plants. Neither of these possible effects would likely be to the extent that it would change conditions for macroinvertebrate habitat.

Construction of temporary roads, skid trails and log landings would have no direct effects on macroinvertebrates. Indirect effects would include the removal of vegetative cover and soil disturbance as these areas are established, shaped and drainage structures installed. These activities have the potential to increase sedimentation, concentrate runoff, possibly alter surface and subsurface flow and potentially impact water quality. The potential for sedimentation would be reduced by surfacing these roads with gravel, re-vegetating exposed soils outside the needed roadbed, establishing sedimentation traps in drains leading to streams and not establishing roads within streamside corridors.

Macroinvertebrates within the project area are dependent upon high water quality levels and low levels of siltation. Soil and water conservation practices (SWCP's) are incorporated in the project design and requirements. With implementation of the design features and SWCP's direct and indirect effects are expected to be minimal and limited in scope, intensity, and duration (Foster, 2008)

Cumulative Effects
Measurable direct or indirect effects to macroinvertebrates are negligible; therefore cumulative effects are negligible.

Analysis of Effects
Alternative 1 (No Action)
Colorado River cutthroat trout and Bonneville cutthroat trout
Direct and Indirect Effects
There would be no direct or indirect impacts as a result of the Alternative 1 (No Action) alternative. There would be no harvest activities within the project area or within streamside edge of the SMZ. Recruitment will not be reduced and all the trees would be retained for woody debris to the stream. No treatments in the area could result in a high intensity, high severity fire which could lead to a large accumulation of ash within the stream which could cause an increased mortality of both species of cutthroat trout. High intensity, high severity fire could increase water temperatures and reduce long-term down woody debris in the cutthroat streams within the project area.

Macroinvertebrates
Direct and Indirect Effects
There would be no direct or indirect impacts as a result of the Alternative 1 (No Action) alternative. There would be no harvest activities within the project area or within streamside edge of the SMZ. No treatments in the area could result in a high intensity, high severity fire which could lead to a large accumulation of ash within the stream which could cause an increased mortality in the populations of macroinvertebrates in the streams. High intensity, high severity fire could increase temperatures and reduced long-term woody debris in the stream affecting macroinvertebrate populations within the streams.

Determination of Effects and Rationale
Proposed Action
The rationale, for each of the following determinations, was set forth in the individual species accounts.

Colorado Pikeminnow – There are no Colorado pikeminnow populations or suitable habitat on the forest and the proposed project will not adversely affect the stream flow. Therefore, the Proposed Project will have "No Effect" on this species.

Bony tail Chub -There are no bonytail populations or suitable habitat on the forest and the proposed project will not adversely affect the stream flow. Therefore, the Proposed Project will have "No Effect" on this species.

Humpback Chub -There are no humpback chub populations or suitable habitat on the forest and the proposed project will not adversely affect the stream flow. Therefore, the Proposed Project will have "No Effect" on this species.

Razorback Sucker -There are no razorback sucker populations or suitable habitat on the forest and the proposed project will not adversely affect the stream flow. Therefore, the Proposed Project will have "No Effect" on this species.

Bonneville Cutthroat Trout – Spring Creek contains a population of archaic Bonneville cutthroat trout, 22% of the total length of this stream runs adjacent to the harvest units of the proposed project area. The Proposed Project "may impact individuals but is not likely to cause a trend to Federal listing or a loss of viability."

Colorado River Cutthroat Trout –Lake Canyon Creek contains a conservation population of CRCT, 53% of the total length of this stream runs adjacent to the harvest units for the proposed project area. The Proposed Project "may impact individuals but is not likely to cause a trend to Federal listing or a loss of viability."

Spotted Frog – The spotted frog has not been found on the Manti-La Sal National Forest and there is no suitable habitat within the project area. Therefore the Proposed Project will have "No Impact" on this species.

Macroinvertebrates – The proposed project is within an area that contains suitable habitat for macroinvertebrates. The Proposed Project “may impact individuals but is not likely to cause a trend to Federal listing or a loss of viability.”

Determination of Effects and Rationale
<u>Alternative 1 (No Action)</u>

Colorado Pikeminnow - Timber harvesting or planting would not be implemented to accomplish project goals. The Alternative 1 (No Action) will have "No Effect" on this species.

Bony tail Chub - Timber harvesting or planting would not be implemented to accomplish project goals. The Alternative 1 (No Action) will have "No Effect" on this species.

Humpback Chub – Timber harvesting or planting would not be implemented to accomplish project goals. The Alternative 1 (No Action) will have "No Effect" on this species.

Razorback Sucker - Timber harvesting or planting would not be implemented to accomplish project goals. The Alternative 1 (No Action) will have "No Effect” on this species.

Bonneville Cutthroat Trout –Timber harvesting or planting would not be implemented to accomplish project goals. However the potential for a severe fire and the accumulation of ash in the stream which has the potential to impact the Bonneville cutthroat in Spring Creek. The Alternative 1 (No Action) "may impact" individuals but is not likely to cause a trend to Federal listing or loss of viability."

Colorado River Cutthroat Trout - Timber harvesting or planting would not be implemented to accomplish project goals. However the potential exist for a severe fire and the accumulation of ash in the stream which has the potential to impact Colorado River cutthroat trout in Lake Canyon Creek. The Alternative 1 (No Action) "may impact" individuals but is not likely to cause a trend to Federal listing or loss of viability."

Spotted Frog - Timber harvesting or planting would not be implemented to accomplish project goals. The Alternative 1 (No Action) will have "No Impact" on this species.

Macroinvertebrates – Timber harvesting or planting would not be implemented to accomplish project goals. However the potential exist for a severe fire and the accumulation of ash in the stream which has the potential to impact macroinvertebrates in the streams. The Alternative 1 (No Action) "may impact" individuals but is not likely to cause a trend to Federal listing or loss of viability."

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