3.7 Water Resources

3.7.1 Introduction

The Project Area is located in the Jordan River Basin. There are three major watersheds in the Project Area that are tributaries to the Jordan River. These watersheds are:

- Mill Creek Canyon
- Big Cottonwood Creek Canyon
- Little Cottonwood Creek Canyon

Mill Creek, Big Cottonwood Creek, and Little Cottonwood Creek are all perennial streams. Within each watershed there are a number of intermittent streams and drainages, including the following:

- Neffs Canyon
- Tolcats Canyon
- Heughs Canyon
- Dry Hollow
- Ferguson Canyon
- Deaf Smith Canyon
- Bells Canyon
- Middle Fork Dry Creek
- South Fork Dry Creek
- Rocky Mouth Canyon
- Big Willow Creek
- Little Willow Creek

This section will provide a description of the affected water resource issues in the Project Area including:

- Water quality
- Public Water Supply/Protected watersheds
- Riparian Areas
- Wetlands
- Floodplains

Each resource issue will be discussed separately following the order given above. Included in each discussion is a description of existing conditions, a summary of applicable laws, regulations, and guidelines, and an analysis of the effects of each alternative. Cumulative impacts of the alternatives on each resource are summarized in Cumulative Effects.

In general water resources are protected by specific standards and guidelines as outlined in the WCNF 2003 Forest Plan. Forest Plan standards and guidelines applicable to each resource issue are listed under that issue.

Methodology

Best available information from a variety of sources was compiled for this report. Sources of information include the United States Geological Survey, WCNF 2003 Forest Plan and Final EIS, State of Utah Department of Environmental Quality, Salt Lake County, Salt Lake City Public Utilities, U.S. Fish and Wildlife Service's National Wetlands Inventory, State of Utah GIS data, and Federal Emergency Management Agency floodplain maps. Data and information from these sources was used to describe the affected environment.

3.7.2 Water Quality

Water quality refers to the physical, chemical and biological characteristics of water and how these components affect beneficial uses (e.g. fisheries, recreation, agriculture, and drinking water). Water chemistry greatly affects the diversity and quantity of aquatic life present in a stream. Existing water quality is a result of the natural characteristics of watersheds, along with management activities (timber harvest, recreation, grazing, mining, construction), and natural events (wildfire, floods) occurring on both public and private lands.

Pollutants of Concern

Trail construction and use would have the most effect on sediment and bacteria. Each of these parameters is discussed in more detail below.

Sediment

Sediment affects water quality and the beneficial uses of water, whether for drinking water, fish reproduction and habitat, or recreation. Sediment often reaches stream channels through the process of erosion. The effect of additional sediment can be seen long after the sediment source has revegetated.

Ground disturbance increases soil erosion rates by leaving areas of unprotected soil. Increasing the number of acres disturbed by management activity can increase the potential of sediment being delivered to the channel system. The closer a disturbance to a stream channel, the more likely that sediment has an impact on water quality. These areas are highly sensitive to disturbance. Soil disturbance on the ridges or side hills may never affect water quality; disturbance of a channel bank or bed is immediately reflected in downstream sediment levels.

The relative stability of even small intermittent and ephemeral channels is important because it can affect areas of transported sediment. Neglecting to leave a buffer zone on any drainage can affect long-term water quality of streams located lower in the watersheds. Properly constructing stream crossings and approaches and providing proper drainage and adequate vegetative buffer strips can greatly reduce the amount of sediment delivered to the drainage network. Even

disturbed areas that are far from the drainage system may contribute sediment if they are connected to the stream by roads, ditches, or trails.

Bacteria

Bacteria are generally measured as fecal coliform or total coliform. Fecal coliform is bacteria that live in the digestive tract of warm-blooded animals (humans, pets, farm animals, and wildlife) and are excreted in the feces. In themselves, fecal coliforms generally do not pose a danger to people or animals, but they indicate the presence of other disease-causing bacteria. Unlike fecal coliform, disease-causing bacteria generally do not survive long enough in the water to be detected and the presence of fecal coliform can be an indicator of disease bacteria in the water (EPA 2007).

Bacteria are introduced into waterbodies either directly when humans or animals excrete into a stream or river, or indirectly through stormwater runoff. Fecal contamination can arise from direct discharge by humans and animals into streams and rivers or from sources such as leaking septic tanks, wildlife waste, and pet and human waste from recreational use or other human activities. Rainfall is frequently associated with increased abundance of fecal coliform in water due to stormwater runoff (EPA 2007).

These bacteria are important indicators for the health of recreational, drinking, and shellfishing waters. Fecal coliforms are sampled and tested for in surface and ground water (drinking water, lakes, rivers, and ponds) as well as estuaries and ocean waters (shell fishing beds, beaches, and boating areas). Both abundance and frequency of detection can be used as an indication of the level of contamination (EPA 2007).

Laws, Regulations, and Guidelines

The WCNF Forest Plan Standards and Guidelines that are applicable to water quality include the following:

Standards

(S2) Apply runoff controls during project implementation to prevent pollutants including fuels, sediment, oils, from reaching surface and groundwater.

(S6) Within legal authorities, ensure that new proposed management activities in watersheds containing 303d listed water bodies improve or maintain overall progress toward beneficial use attainment for pollutants which led to listing; and do not allow additions of pollutants in quantities that result in unacceptable adverse effects (Appendix II provides clarification of terms used in this Standard)

(S20) When constructing or maintaining roads, trails and facilities, use Best Management Practices to minimize sediment discharge into streams, lakes and wetlands.

Guidelines

(G2) Projects in watersheds with 303(d) listed waterbodies should be supported by scale and level of analysis sufficient to permit an understanding of the implications of the project within the larger watershed context.

(G3) Proposed actions analyzed under NEPA should adhere to the State Nonpoint Source Management Plan to best achieve consistency with both Sections 313 and 319 of the Federal Water Pollution Control Act.

(G4) At the end of an activity, allow no more than 15 percent of an activity area (defined in Glossary) to have detrimental soil displacement, puddling, compaction and/or to be severely burned.

(G5) Do not allow activities that could result in water yield increases that would degrade water quality and impact beneficial uses.

(G9) Avoid soil disturbing activities (those that remove surface organic matter exposing mineral soil) on steep, erosive, and unstable slopes, and in riparian, wetlands, floodplains, wet meadows, and alpine areas.

(G11) Use Best Management Practices and Soil and Water Conservation Practices during project level assessment and implementation to ensure maintenance of soil productivity, minimization of sediment discharge into streams, lakes and wetlands to protect of designated beneficial uses.

(G50) Design, construct, and operate recreation facilities, trails and concentrated use areas to provide a beneficial recreation experience, reducing social conflicts and minimizing or avoiding adverse effects on watershed integrity, soil productivity, aquatic/riparian systems, terrestrial species and their habitats, and cultural resources.

R1/R4 Soil and Water Conservation Practices Handbook (FSH 2509.25): Provides standards that must be followed.

The Federal Water Pollution Control Act (1972): Commonly known as the Clean Water Act (CWA), it is an act and series of amendments passed to maintain and restore the chemical, physical, and biological integrity of the nation's waters. It requires compliance with State and Federal pollution control measures; no degradation of in-stream water quality needed to support designated uses; control of nonpoint sources of water pollution through conservation or BMPs; Federal agency leadership in controlling nonpoint source pollution from managed lands; and rigorous criteria for controlling pollution discharges into waters of the United States.

States assign beneficial or designated uses to their streams, and set water quality standards for each use. Under Section 303(d) of the CWA, States are required to identify and establish a priority ranking of all waterbodies that are not meeting beneficial uses and to develop a Water Quality Limited Segments List (commonly called a 303(d) List). For those waterbodies on the 303(d) list development of a total maximum daily load (TMDL) is required. A TMDL is described as a "pollution budget" for a specific river, lake, or stream, and establishes wasteload allocations for point sources such as wastewater discharges from treatment plants or industrial facilities and load allocations for nonpoint sources such as stormwater runoff and agricultural runoff. Once a TMDL has been developed for a waterbody it is removed from the 303(d) list.

Section 305(b) of the CWA directs States to prepare a report biennially that describes the status and trends of existing water quality, the extent to which designated uses are supported, pollution problems and sources, and the effectiveness of the water pollution control programs. The State of Utah's latest 305(b) report was completed in 2006 (UDEQ 2006a).

Utah Nonpoint Source Pollution Management Plan (2000): In 1987 Congress added Section 319 to the Clean Water Act to address pollution of the nation's waters from polluted runoff. Nonpoint source pollution (NPS) is pollution that results from diffuse sources in contrast to pollutants which enter waterways from pipes or other man-made conveyances. NPS pollution

can include a variety of contaminates such as sediments, nutrients, pesticides, bacteria, organics and heavy metals that enter surface waters or leach into groundwater. Some common sources of NPS pollution include urban streets and parking lots, agricultural lands and operations, and construction sites (UDEQ 2000).

This plan emphasizes a watershed approach to controlling NPS pollution. In addition, it provides guidelines for BMPs that can be used to control NPS pollution (UDEQ 2000). As stated in Guideline 3 of the WCNF Forest Plan (see above), actions analyzed under NEPA should adhere to Utah's NPS Management Plan.

Affected Environment: Water Quality

Streams in the Project Area watersheds have a number of designated beneficial uses (see table 28). The attainment of these uses has been assessed by the State of Utah's Department of Environmental Quality. In general, water quality in the Project Area is of good quality and all major streams are either fully supporting their designated uses, or have a TMDL established (UDEQ 2006a). Results for waterbodies that occur within the Project Area are summarized in table 28.

Table 28. Summary of Designated Use Support for Waterbodies in the Project Area.

Waterbody	Designated Use[1]	Assessment Category
Mill Creek and its tributaries	2B, 3A, 4	Fully supporting
Big Cottonwood Creek and its tributaries	1C 2B 3A	Fully supporting
Little Cottonwood Creek and its tributaries	1C 2B 3A	Approved TMDL for dissolved zinc; TMDL was developed in 2002

Source: UDEQ 2006a.

[1] *1C: Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.*

2B: Protected for secondary contact recreation such as boating, wading, or similar uses.

3A: Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Past water quality issues that have occurred in the Mill Creek watershed were mainly caused by recreational use. Impacts from recreational use led to the Mill Creek watershed being listed in the past on the 303(d) list for sedimentation, habitat alteration, and bacteria. Several areas of the stream channel were reconstructed and recreational facilities were moved away from the stream to lessen human impact on the riparian habitat. A program was implemented by Salt Lake City that required animal owners to remove pet excrement. Upon completing the program, the Utah Division of Water Quality assessed the results and found that the bacteria standard was being met, and that riparian habitat had recovered significantly (UDEQ 2006a).

Little Cottonwood Creek upstream of the project had previously been listed on the 303(d) list for dissolved zinc. Levels of dissolved zinc were found to exceed standards set for cold water fisheries. A TMDL was established in 2002 and it was removed from the 303(d) list. Sources of zinc in the watershed included drainage from areas with historic mining activities (UDEQ 2006a).

Downstream of the Project Area, Little Cottonwood from the Jordan River to the Metropolitan Wastewater Treatment Plant (WTP) and Big Cottonwood Creek from the Jordan River to the Big Cottonwood Creek WTP are on the 2006 303(d) list. Big Cottonwood Creek is on the 303 (d) list

for temperature and Little Cottonwood Creek for temperature and total dissolved solids (UDEQ 2006b). A TMDL study has yet to be completed for these segments and specific cause(s) of their impairment is currently unknown. As the listed segments are located downstream of a WTP, it is unlikely that activities occurring in the Project Area are affecting the water quality of these segments.

Effects of the Alternatives: Water Quality

Effects of Alternative 1: No-Action

Effects of the No-Action Alternative on water quality would be no effect to minor adverse effect. This alignment uses existing streets and sidewalks located in urban areas. No new trails or stream crossings would be built. Ongoing impacts to water quality from urban land use would continue. Use of existing streets and sidewalks by pedestrians, bicyclists, and motor vehicles is already ongoing and any additional use that may occur if designated as the BST would be difficult to detect.

This alignment does not occur within the Forest Service boundaries and compliance with WCNF Forest Plan standards and guidelines would not applicable.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

All waterbodies in this segment are meeting their designated uses. Given the overall quality of waterbodies in this segment, construction and use of the BST in this segment would result in no effect to minor adverse effects. Minor short-term, adverse effects that may occur include sedimentation from constructing trails and stream crossings. Minor long-term adverse effects may occur through continued use and maintenance of the BST.

Construction of the BST in this section would result in approximately 2.9 acres of new disturbance. The majority of adverse effects would be considered indirect effects since most of the surface disturbance associated with the BST would not be built in the immediate vicinity of streams or other waterbodies. However, direct minor adverse effects could result from the construction of stream crossings. Pollutants of concern would be bacteria from human and pet excrement and sedimentation.

A stream crossing would be built in Neff's Canyon. Under this alternative, all stream crossings would be built in compliance with Forest Service standards and guidelines (see listing of Forest Service standards and guidelines and handbooks above), which includes provisions for maintaining stream flow for fisheries (see Biological Resources) and for minimizing impacts to riparian areas. In addition all stream crossings would be bridged (see Chapter 2). Bridging stream crossings would decrease the impacts to streambanks, further reducing direct adverse effects from sedimentation to minor.

Mitigation measures, including BMPs, would be designed and implemented in accordance with Forest Plan standards and guidelines (see Standard 2 above) to reduce soil erosion and to reduce sediment from discharging into streams and other waterbodies. This segment already has a bridge in place where the trail would cross Mill Creek and impacts from the use of BST to Mill Creek water quality would be minor to no effect.

As a part of this alternative, BMPs would be implemented during construction of the trails that would control soil erosion and would decrease or eliminate the amount of sediment discharging into nearby streams. BMPs would be monitored throughout active construction of the trail and corrective actions would occur as necessary.

Ongoing educational efforts and programs regarding the impacts of human and pet excrement on water quality would reduce effects of bacteria from these sources to no effect or minor adverse effect.

Under this alternative the BST would be designed to control runoff from the trail (see Chapter 2), thereby reducing the amount of sediment carried to streams and other waterbodies during the long-term impacts of the use and maintenance of the BST. Trail design would result in only minor adverse effects to water quality from sedimentation.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

All waterbodies in this segment are fully supporting their designated use, which means that the overall water quality is good and the effects to water quality in Segment 2 would be the same or similar as described under Segment 1. Three additional stream crossings would be constructed. However, as discussed under Segment 1, stream crossings would be designed and built in compliance with Forest Service standards and guidelines resulting in minor adverse effects to water quality from sedimentation. Stream crossings would be bridged and would be built for the following drainages:

- Tolcats Canyon
- Heughs Canyon
- Dry Hollow
- Unnamed drainage

The existing bridge crossing Big Cottonwood Creek into the Oak Ridge Trailhead would be used and additional impacts of designating the bridge for use as part of the BST are not anticipated.

Implementing the BST proposed alignment in this segment would result in minor adverse short-term effects (as described under Segment 1) and minor long-term adverse effects as described under Segment 1. Approximately 2.0 acres of new disturbance would occur in this segment, and the majority of this disturbance does not occur in the immediate vicinity of streams or other waterbodies; resulting in minor adverse indirect effects to water quality.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Implementing the BST proposed alignment in this segment would result in minor adverse short-term effects and minor long-term adverse effects, as described under Segments 1 and 2. Approximately 2.1 acres of new disturbance would occur in this segment, and the majority of this disturbance does not occur in the immediate vicinity of streams or other waterbodies; resulting in minor adverse indirect effects to water quality.

The new bridge crossing on Little Cottonwood Creek just below the Temple Quarry Trailhead would be used and additional impacts of designating the bridge for use as part of the BST are not expected.

Three additional stream crossings would be constructed. However, as discussed under Segment 1, stream crossings would be designed and built in compliance with Forest Service standards and guidelines resulting in minor adverse effects to water quality from sedimentation. Stream crossings would be bridged and would be built for the following drainages:

- Ferguson Canyon
- Unknown drainage
- Deaf Smith Canyon

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Implementing the BST proposed alignment in this segment would result in minor adverse short-term effects and minor long-term adverse effects, as described under Segments 1 and 2. Acres of new disturbance in this segment is approximately 2.0, and the majority of this disturbance does not occur in the immediate vicinity of streams or other waterbodies; resulting in minor adverse indirect effects to water quality.

The existing bridge crossing on the Bells Canyon Trail would be used. This bridge was built in accordance with Forest Service standards and guidelines. Additional impacts of designating the bridge for use as part of the BST are not anticipated.

Five additional stream crossings would be constructed. However, as discussed under Segment 1, stream crossings would be designed and built in compliance with Forest Service standards and guidelines, resulting in minor adverse effects to water quality from sedimentation. Stream crossings would be bridged and would be built for the following drainages:

- Middle Fork Dry Creek
- South Fork Dry Creek
- Rocky Mouth Canyon
- Big Willow Creek
- Little Willow Creek

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Impacts would be the same as Alternative 2, Segment 1.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Impacts of implementing this alternative would be similar to those described under Segment 2 of Alternative 2. In general, effects would be short- and long-term minor adverse effects.

Direct adverse minor long-term and short-term effects may occur at stream crossings. Three additional drainage crossings are proposed under this alternative, resulting in seven total crossings. These additional crossings would occur on an unnamed ephemeral drainage that is a tributary to Tolcats Canyon. Short-term minor adverse effects would occur during the

construction of these crossings. Additional sediment controls during trail construction may be necessary, given their close proximity to each other and because there are three located in the same drainage, which could incrementally add sediments to the drainage network. Adherence to Forest Service standards for constructing drainage crossings and implementation of sediment control BMPs during trail construction would minimize these impacts and would result in short-term minor adverse effects.

In comparison to Segment 2: Alternative 2, under this alternative the proposed alignment for this segment would be built on steeper slopes and would result in new disturbance. Steeper slopes and higher number of acres disturbed may result in higher soil erosion rates and could result in higher delivery of sediments to streams than what may occur under Alternative 2. Mitigation measures and BMPs, in accordance with Forest Service standards and guidelines, would be implemented under all Action Alternatives and would result in minor indirect adverse effects.

3.7.3 Public Water Supply/Protected Watersheds

Surface water that originates in Wasatch Front canyons supplies water for municipal, industrial, agricultural, and domestic purposes. It can take less than 24 hours for the water in streams to reach homes in the Salt Lake Valley. Prior to 1910, Salt Lake City had 100 to 350 cases and 10 to 20 fatalities from typhoid each year. Source watershed protection and drinking water treatment has nearly eliminated illness caused by drinking water contamination. The protection of drinking water sources that originate on the WCNF is important to adjacent communities (SLC 2007, USDA 2003).

Laws, Regulations, and Guidelines

The Safe Drinking Water Act (1976): Requires Federal agencies having jurisdiction over any Federally owned or maintained public water system to comply with all authorities respecting the provision of safe drinking water. The State of Utah has primary enforcement responsibility through its drinking water regulations.

Federal Agency Source Water Agreement: effort to coordinate among Federal agencies the increasing numbers of individual programs to protect drinking water sources.

Salt Lake City - County Health Regulation #14 (watersheds) as authorized by Utah Code Annotated 26-24-20 (Regulation 14): Regulation 14 is designed to protect watersheds that provide culinary water to residents of the Salt Lake Valley. Water regulations are enforced by the Salt Lake County Sheriff's Office, the Salt Lake City Water Department, the Salt Lake City - County Health Department, the USDA Forest Service, and the Alta Marshal's Office. Regulation 14 prohibits any person from doing the following (USDA 2007a):

- to permit a dog(s) to be taken into the watershed area. This does not apply to seeing eye/hearing dogs or law enforcement dogs.
- to pollute or allow pollution of any water in the watershed area.
- to operate any type of motor vehicle upon the property within the watershed except on a highway or road open for public use, approved roads in residential/cabin areas, official picnic/camp area roads, and ski area parking lots. Emergency and official government vehicles are exempt when on official business.

- to deposit any human excreta within the watershed area other than into approved toilets. Cesspools are also prohibited.
- to permit a horse or any other domestic animal into the area without a permit.
- to camp overnight except in officially designated campgrounds. This does not apply to backpacking.
- to backpack camp unless the campsite is located over 200 feet from the nearest water source.
- to bathe, swim, or wash clothes, diapers, eating utensils, or any other object in any spring, marsh, stream, or other water source.
- to throw or break glass.

These prohibited activities apply in the entire canyon area from ridge top to ridge top, not just in the immediate area of surface water. Under Regulation 14 the following special considerations apply (USDA 2007a):

- There are special regulations governing construction, sewage work, livestock operations, underground waste-water systems, and water systems.
- Permanent residents of the canyon watershed areas may obtain special permits for one dog per household. The responsibilities and qualifications for the permit are very strict.

Forest Service Manual (Section 2500): Provides additional laws and executive orders as well as agency policy pertaining to watershed management.

Affected Environment: Public Water Supply/Protected Watersheds

Approximately 60 percent of the drinking water supply of the Salt Lake Valley comes from protected watersheds in the Wasatch Mountains (SLC 2007). Regulation 14 (see above) protects these watersheds and places restrictions on the type of activities that can occur within them. Protected watersheds that are located in the Project Area include Big Cottonwood Canyon, Little Cottonwood Canyon, and Bells Canyon watersheds. These watersheds are shown in figure 26.

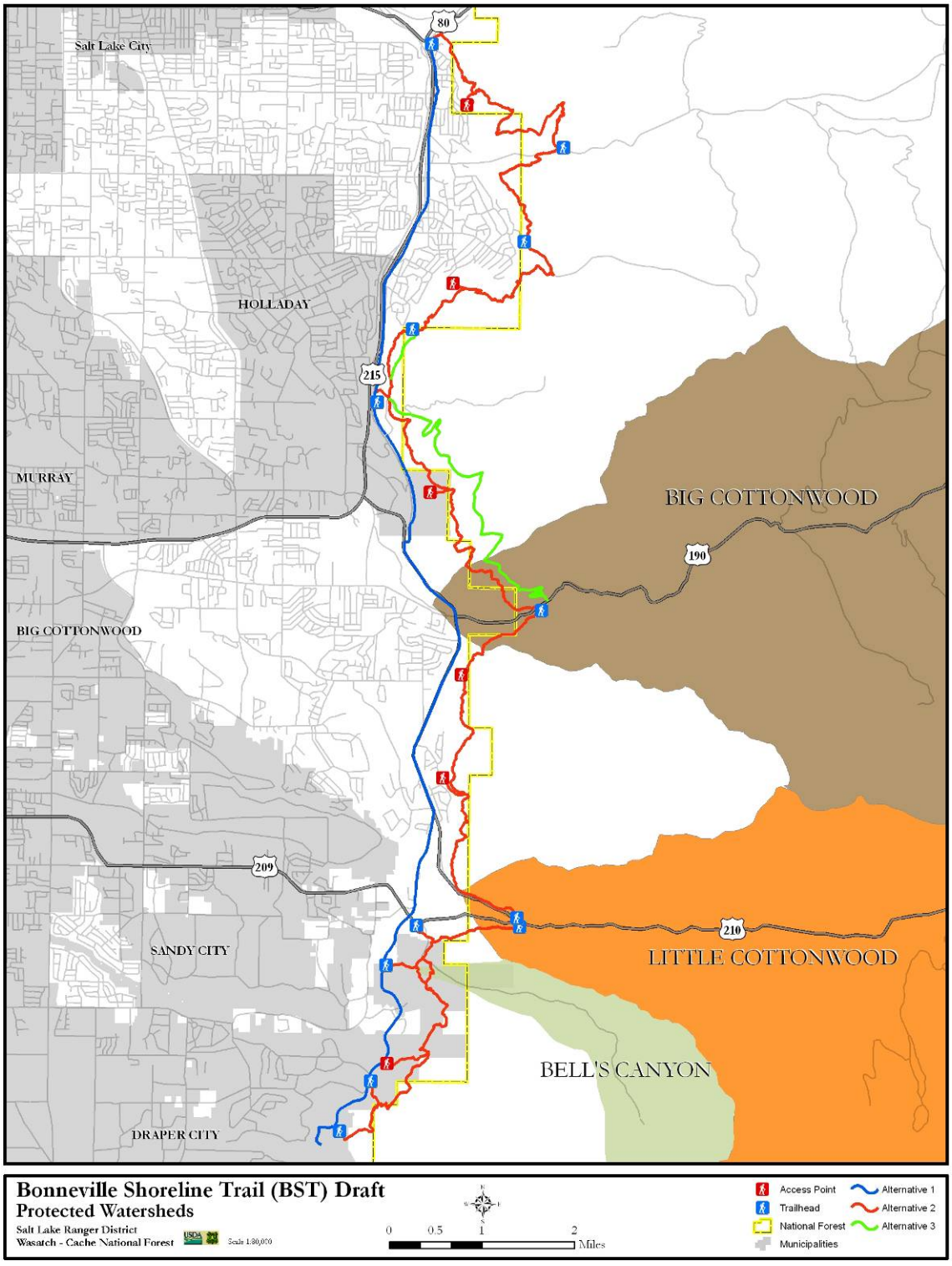

Figure 26. Map of Protected Watersheds in the Project Area.

Effects of the Alternatives: Public Water Supply/Protected Watersheds

Effects of Alternative 1: No-Action

No effect to minor adverse effect. Ongoing efforts to educate the public and to monitor the use in the watersheds would continue. Since the designation of protected watersheds, drinking water quality has improved and continues to improve. Regulations in place would continue to provide protection to water quality.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

This segment of the trail does not traverse protected watersheds.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

In this segment, approximately 1.3 miles of new trail would be located in the Big Cottonwood Canyon protected watershed, resulting in approximately 0.6 acres of new disturbance. Minor long-term adverse effects may occur to the protected watershed through continued use and maintenance of the BST. Impacts would be similar to those described under Water Quality. Minor short-term adverse effects may occur. Short-term impacts would be associated with trail construction.

The BST would cross from unprotected watersheds into protected watersheds providing additional access to protected watersheds that may be difficult to monitor and regulate. Increased human activities may result in additional impacts to these watersheds, including the possibility of pets being present in the watershed. Bacteria from human and pet excrement may impact water quality. Under this alternative, signs would be placed on the BST at the boundary of protected watersheds alerting users to special restrictions in place. Additional signing would be placed at trailheads and access points informing the public about restrictions in protected watersheds and indicating where pets are not allowed on the BST. These measures would lessen the impacts from long-term use and reduce effects to water quality in the watershed. Ongoing efforts to educate users about special restriction and sign placement would minimize impacts of recreational use on protected watersheds. These efforts would reduce long-term adverse effects of this alternative to minor.

BMPs for sediment control and stream crossings would be the same as those presented under the water quality section, and the effects as described in the water quality section would apply to protected watershed water quality as well.

Minor short-term adverse effects may occur with the construction of the new trail. During active construction of the trail, newly disturbed areas may experience increased rates of soil erosion, and the main pollutant of concern would be sediment. Under this alternative, BMPs would be implemented during construction to control sediments in stormwater runoff. Restroom facilities would be provided to volunteers constructing the trail and volunteers would be educated about protected watersheds and restrictions in the watershed, greatly reducing the impacts that may result from human fecal matter during trail construction.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

In this segment approximately 1.2 new trail miles would be located in portions of Big Cottonwood Canyon and Little Cottonwood Canyon, resulting in approximately 0.6 acres of new disturbance. Effects to protected watersheds would be the same as described under Segment 2.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Approximately 0.5 new trail miles would traverse a small section of the Little Cottonwood Canyon and the Bells Canyon protected watersheds in this segment and would result in approximately 0.2 acres of new disturbance. The effects of this new disturbance to the protected watershed would be similar to those described under Segment 2.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Under this alternative, in segment 2, approximately 1.4 miles of new trail would be built in Big Cottonwood Canyon, a protected watershed. Under all Action Alternatives, mitigation measures and BMPs would be implemented as described under Alternative 2. Additional impacts to water quality that may occur under this alternative are described in the water quality section. In this segment, implementing Alternative 3 would result in approximately 0.7 acres of new disturbance which could have minor long- and short-term adverse effects on the Big Cottonwood Canyon protected watershed.

3.7.4 Riparian Areas

Riparian areas are located adjacent to streams and around natural springs, seeps, fens, and reservoirs. Due to the presence of water, riparian areas frequently receive a disproportionate amount of use from wildlife, livestock, and humans. These areas are highly productive and biologically diverse, and provide habitat for wide variety of terrestrial and aquatic wildlife.

Riparian areas are also discussed in sections 3.1: Vegetation, and 3.2: Wildlife and Fish Resources. Discussion about riparian areas under those sections focuses on riparian vegetation and riparian areas as wildlife habitat. This discussion will focus on the physical characteristics of riparian areas, with emphasis on streambank stability.

Laws, Regulations, and Guidelines

The WCNF Forest Plan Guidelines that are applicable to riparian areas include the following:

Guidelines

(G6) In Riparian Habitat Conservation Areas (RHCAs) [defined in Appendix A] when projects are implemented, retain natural and beneficial volumes of large woody debris.

RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality. This designation still allows for a full range of activities, but it emphasizes the achievement of riparian management objectives that are identified on a site-by-site basis. These objectives should include riparian vegetation and instream habitat condition. The RHCAs, by condition, are defined in Appendix A. The Riparian

management objective for these crossings is full retention. This does allow for the removal of hazard trees that may cause a safety concern.

(G7) Manage Class 1 Riparian Area Greenlines for 70 percent or more late-seral vegetation communities as described in Intermountain Region Integrated Riparian Evaluation Guide (USDA Forest Service, 1992). Manage Class 2 Riparian Area Greenlines for 60 percent or more late-seral vegetation communities. Manage Class 3 Riparian Area Greenlines for 40 percent or more late-seral vegetation communities.

(G9) Avoid soil disturbing activities (those that remove surface organic matter exposing mineral soil) on steep, erosive, and unstable slopes, and in riparian, wetlands, floodplains, wet meadows, and alpine areas.

(G12) Locate new actions (such as incident bases, fire suppression camps, staging areas, livestock handling facilities, recreation facilities, roads and improvements including trails) outside of Riparian Habitat Conservation Areas. If the only suitable location for such actions is within Riparian Habitat Conservation Areas, sites would be located to minimize resource impacts.

The Endangered Species Act (1973): Requires Federal agencies to conserve threatened and endangered species and the ecosystems they depend on, including riparian and aquatic ecosystems.

Utah's NPS Management Plan (as described in the water quality section) includes specific BMPs for riparian area management and stabilization. According to Guideline 3 of the WCNF Forest Plan, this action should adhere to the plan and any BMPs described in that plan.

Affected Environment: Riparian Areas

WCNF has developed a rating system for riparian areas. This rating system recognizes that all riparian areas are valuable, but not all may require the same protection. Riparian areas in the Project Area that have been classified include Mill Creek, Big Cottonwood Creek, and Little Cottonwood Creek above Murray City diversion (USDA 2003a). All of these riparian areas are rated as Class 1. A Class 1 rating is defined as the following:

> Riparian areas with a high rating should be given special management considerations to protect or enhance the high resource value(s) of the area. This might include exclusion or intensive management of activities such as livestock grazing, concentrated recreation, road construction, dam construction, etc., as appropriate, to maintain or enhance the area for the identified resource values. Any stream with riparian dependent Threatened, Endangered, or Sensitive species is classified as a Class I riparian area (USDA 2003a, Appendix VII).

Effects of the Alternatives: Riparian Areas

Effects of Alternative 1: No-Action

This alignment is located outside Forest Service boundaries and riparian areas are not classified. Designating existing roads and sidewalks for use as the BST would not result in additional impacts to riparian areas and there would be no additional effects beyond existing impacts to riparian areas under this alternative.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

The majority of the BST in this segment occurs in upland areas. The trail intercepts riparian areas at stream crossings, and only in Mill Creek Canyon does the trail follow the stream for a short distance. However, in Mill Creek the trail would be located outside of the riparian area on the north side of the road. Effects to riparian areas would only occur at stream crossings and would be minor adverse and long-term. These crossings are described in Water Quality. As mentioned in Chapter 2 and in the water quality section (above), all stream crossings would be bridged according to Forest Service standards and guidelines.

Short-term minor adverse effects may also occur during the installation of bridges. Installing bridges may require surface-disturbing activities which could destabilize streambanks and lead to loss of riparian acreage. Once bridge installation is completed, disturbed areas would be re-vegetated and these effects would be temporary.

Long-term minor adverse effects may result from increased human activity in the area which could lead to compaction of streambank and loss of vegetation. Bridging the crossings would lessen the impact to streambanks by providing users a safe and convenient place to cross and would reduce or eliminate dispersed crossings on foot, which can result in loss of vegetation, destabilization of banks, and stream widening.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The majority of this segment is located in upland areas. Effects to riparian areas would only occur at stream crossings. Such effects would be minor adverse and long-term. Stream crossings in this segment are described in Water Quality. As mentioned in Chapter 2 and in Water Quality all stream crossings would be bridged according to Forest Service standards and guidelines. Effects at stream crossings as described under Segment 1 and in Water Quality would be applicable to this segment.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The majority of this segment is located in upland areas. Effects to riparian areas would only occur at stream crossings. Such effects would be minor adverse and long-term. Stream crossings in this segment are described in Water Quality. As mentioned in Chapter 2 and in Water Quality (above), all stream crossings would be bridged according to Forest Service standards and guidelines. Effects at stream crossings as described under Segment 1 and in Water Quality above would be applicable to this segment.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The majority of this segment is located in upland areas. Effects to riparian areas would only occur at stream crossings. Such effects would be minor adverse and long-term. Stream crossings in this segment are described in Water Quality. As mentioned in Chapter 2 and in Water Quality (above) all stream crossings would be bridged according to Forest Service standards and guidelines. Effects at stream crossings as described under Segment 1 and in Water Quality above would be applicable to this segment.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Minor adverse short- and long-term effects may occur under this alternative. Similar to Alternative 2, the majority of this alignment occurs in upland areas. Effects to riparian areas would only occur at stream crossings. These crossings are described in the Water Quality section. As mentioned in Chapter 2 and in Water Quality (above) all stream crossings would be bridged according to Forest Service standards and guidelines. Effects at stream crossings as described in Water Quality for Alternative 2: Segment 1 and in Water Quality, Alternative 3 would be applicable to this segment.

3.7.5 Wetlands

Wetlands are some of the most productive and dynamic habitats in the world. The physical, chemical, and biological interactions within wetlands are often referred to as wetland functions. These functions include surface and subsurface water storage, nutrient cycling, particulate removal, maintenance of plant and animal communities, water filtration or purification, and groundwater recharge. Similarly, the characteristics of wetlands that are beneficial to society are called wetland values. Some examples of wetland values include reduced damage from flooding, water quality improvement, and fish and wildlife habitat enhancement.

Laws, Regulations, and Guidelines

(G9) Avoid soil-disturbing activities (those that remove surface organic matter exposing mineral soil) on steep, erosive, and unstable slopes, and in riparian, wetlands, floodplains, wet meadows, and alpine areas.

Wetlands are protected under EO 11990 which directs agencies to preserve and enhance the natural and beneficial values of wetlands when conducting Federal activities and programs affecting land use and when managing Federal lands and facilities. Additional protection to wetlands occurs under Section 404 of the Clean Water Act which regulates the discharge of fill or dredged materials into wetlands. EO 11990 defines wetlands as:

> …those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Affected Environment: Wetlands

According to the National Wetlands Inventory, there are two areas identified as wetlands in the Project Area. Wetland areas include the Bells Canyon Reservoir (10.6 acres) and .5 acres near the Neff's Canyon trailhead. Both of these wetlands are classified as palustrine (USFWS 2007a). Palustrine wetlands are those vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent, or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers (USFWS 2007a).

Effects of the Alternatives: Wetlands

Effects of Alternative 1: No-Action

No known wetlands are located near the alignment of the No-Action Alternative.

Effects of Alternative 2: Proposed Action (Salt Lake County proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

This wetland area occurs where existing trails are in place and in use. Construction of new trail is not anticipated in the immediate vicinity of this wetland.

Under this alternative, existing trails would be continued to be used and would be a source of sediment. Sediment could be carried to wetlands during stormwater runoff and could result in minor adverse effects to wetland quality and function. However, these impacts are minor and implementing Alternative 2 would not result in any additional effects beyond what already exists.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

No wetlands are located in this segment.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

No wetlands are located in this segment.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

This wetland area occurs where existing trails are in place and in use. Construction of new trail is not anticipated in the immediate vicinity of this wetland.

Under this alternative, existing trails would be continued to be used and would be a source of sediment. Sediment could be carried to wetlands during stormwater runoff and could result in minor adverse effects to wetland quality and function. However, these impacts are minor and implementing Alternative 2 would not result in any additional effects beyond what already exists.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

No known wetlands are located near the alignment of the Third Alternative in Segment 2. Impacts to wetlands would be the same as described under Alternative 2.

3.7.6 Floodplains

Laws, Regulations, and Guidelines

All Federal actions must meet the standards of EO 11988, Floodplain Management. In EO 11988, floodplains are defined as lowlands or relatively flat areas adjoining inland or coastal waters, including areas subject to a one percent (i.e. 100-year floodplain) or greater chance of flooding in any given year. Floodplains serve a variety of functions and values including:

- dissipating the energy of floods, reducing flood damage downstream

- storing floodwater which slowly releases water into adjacent streams, maintaining base flows

The purpose of the EO is to avoid incompatible development and management activities in floodplain areas.

Forest Plan Guidelines that are specific to floodplains include the following:

(G9) Avoid soil disturbing activities (those that remove surface organic matter exposing mineral soil) on steep, erosive, and unstable slopes, and in riparian, wetlands, floodplains, wet meadows, and alpine areas.

Affected Environment: Floodplains

In accordance with EO 11988, Federal Emergency Management Agency (FEMA) floodplain maps were reviewed to determine if the Proposed Action is located in or would affect a 100-year floodplain.

Floodplain mapping generally shows areas that have been classified or delineated into flood zones. These flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Hazard Boundary Map or a Flood Insurance Rate Map (FIRM). Each zone reflects the severity or type of flooding in the area. Zone A are areas with 100-year floodplains (i.e., floodplains that have a one percent chance of flooding in any given year) (FEMA 2007).

The State of Utah has available through their GIS data clearinghouse the most recent FEMA floodplain maps. For this project, a map was created that overlays the Action Alternatives onto the FEMA 100-year floodplain (Zone A) layer. This map was reviewed to determine if any of the Action Alternatives would be located within a 100-year floodplain.

The Action Alternatives cross Zone A floodplains in Mill Creek Canyon, Big Cottonwood Canyon, and Little Cottonwood Canyon. In Mill Creek, Big Cottonwood Canyon, and Little Cottonwood Canyon, existing structures are in place and would be used. Throughout the rest of the Project Area, Zone A floodplains are located outside of and down gradient of the Project Area.

Since the majority of the Project Area is located outside of regulated floodplains and the Proposed Action would not result in construction of new structures in regulated floodplains, this issue will not be analyzed in further detail.

3.7.7 Cumulative Effects

Past, Present, or Reasonably Foreseeable Future Actions

Past Actions

Past actions include watershed restoration efforts in Mill Creek Canyon, establishing a TMDL for Little Cottonwood Canyon, and designation of protected watersheds. These actions are described under affected environment in the water quality section.

Present Actions

Present actions in the watersheds include continuing recreational use in the watersheds; current urban development in the foothills of each of the watersheds; a large construction project at the

mouth of Big Cottonwood Canyon; existing roads in the Mill Creek, Big Cottonwood, and Little Cottonwood Canyons; and existing gravel mining at the mouth of Big Cottonwood Canyon.

Present actions as they are listed above can all potentially introduce pollutants into nearby streams and watersheds. Typically, recreationists are drawn to riparian areas. Many of the developed recreation sites upstream of the Project Area are located in riparian areas (FEIS). Continued recreational use in riparian areas can lead to loss of vegetation in these areas and destabilized streambanks, leading to adverse impacts to riparian areas.

Existing gravel mining and construction activities in the watersheds all occur down gradient of the Project Area. However, these activities could potentially introduce sediment into streams. Additional inputs of sediment from both the BST and these sources could potentially result in sedimentation of streams. However, since water quality of these streams is considered to be fully supporting its designated uses, sediment from these actions is not impacting water quality. In addition, construction sites, such as that located in Big Cottonwood Canyon, must implement stormwater controls that would reduce sediments discharging from these sites. If sediment controls are insufficient or overwhelmed by a large storm, construction sites are potentially a considerable source of sediment to nearby streams. In comparison to these sites and gravel mining, trail construction would contribute insignificant amounts of sediment to the stream.

Other sources of sediment include roads in Mill Creek, Big Cottonwood, and Little Cottonwood canyons. These roads are located adjacent to riparian areas and are potential sources of pollutants including sediment and road salt from snow and ice clearing activities in the winter.

Reasonably Foreseeable Future Actions

Actions that may occur in the reasonably foreseeable future include continuing development in the foothills of the watersheds, development of the Salt Lake County Water Quality Stewardship Plan, recreational use in the watersheds, and continued use of roads located in the canyons.

At this time the Forest Service does not have any scheduled proposed actions in the Salt Lake Ranger district that may affect waters resources.

Salt Lake County is currently developing the Salt Lake County-wide Watershed Water Quality Stewardship Plan (WaQSP). The purpose of the WaQSP is to provide an overall plan for Salt Lake County (SLCO 2007) that:

- Supports and enhances watershed functions (i.e. water quality; habitat; conveyance; and social, recreation, and aesthetic values)
- Establishes an adaptive management system
- Integrates existing planning efforts
- Identifies opportunities for collaboration, restoration, and improvement
- Assists with the procurement of funding
- Enhances the quality of life for Salt Lake County residents

Future implementation of this plan would likely improve water quality and the condition of water resources in the Project Area watersheds.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 29.

Table 29. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Water Quality	No effect to minor adverse effect. Existing use and proliferation of user-created trails could increase, causing a potential reduction in water quality.	Approximately 8.9 acres of total new disturbance would occur under this Alternative, resulting in minor short- and long-term adverse effects.	Same as Alternative 2. In comparison with impacts already in place in many of the watersheds (e.g. roads, recreations sites, construction areas, urban development), addition of the BST trail would not significantly affect water quality.
Public Water Supply/ Protected Watersheds	No new acres of disturbance. No new adverse or beneficial impacts would occur under this alternative.	Approximately 1.8 acres of total new disturbance would occur in protected watersheds under this alternative, resulting in minor short- and long-term adverse effects.	Compared to Alternative 2, approximately 0.1 additional acres of disturbance would occur in protected watersheds under this alternative and could result in a minimal increase in adverse effects to protected watersheds. Effects of implementing Alternative 3 would be minor adverse short- and long-term.
Riparian Areas	No effect to minor adverse effect. Existing use and proliferation of user-created trails could increase causing potential adverse effects to riparian areas.	Combined with upstream and adjacent impacts, Alternative 2 could result in minor adverse effects.	Same as Alternative 2.
Wetlands	No effect to minor adverse effect. Existing use and proliferation of user-created trails could increase causing potential adverse effects to wetland areas.	Increased use may occur and could result in minor adverse effects to wetlands located near existing trails. New trails would not be built near trails and would not introduce new sources of sediment or other pollutants.	Same as Alternative 2.

3.8 Archaeological, Cultural, and Historic Resources

3.8.1 Introduction

Archaeological, cultural, and historic resources are managed within the context of overall Forest management for the long-term benefit of all Americans. This benefit can be realized through such things as scientific study of past human activities and environments, traditional use by American Indians, and development of interpretive sites where people can see—and appreciate—the diversity of past Forest use. Most fundamentally, public benefit comes through maintenance of the sites themselves. Absent any land management conflicts, preserving important sites in place and in good condition is the overall goal of the Forest Service's heritage resource management. This can be achieved by protecting them from adverse management activities (or mitigating adverse effects, to the greatest public benefit), vandalism, weathering, alteration of their settings, and other processes that cause them to deteriorate to the point of losing their value. In this way, they stand as a legacy for the future (USDA 2003).

This analysis is based on a Class I cultural resource literature search of an area extending out one mile from the Project Area (Sagebrush 2007). The purpose of the project was to identify any known historic properties or prehistoric sites within and surrounding the BST corridor. A secondary purpose of the literature and records search was to identify the potential for encountering undocumented cultural resources within the project boundary.

Methodology

A Class I literature search of the Project Area was conducted. A study area extending out one mile from the proposed Project Area was examined for previously recorded cultural resource sites, previous cultural resource inventories, and potential historic sites. Research was conducted at the Utah State Historic Preservation Office (USHPO), Antiquities Department; (USHPO), Historic Files; U.S. Department of the Interior, Bureau of Land Management Public Room; and the U.S. Forest Service, WCNF, all of which are located in Salt Lake City. All research was conducted between April 19 and May 3, 2007.

National Register of Historic Places (NRHP)

The NRHP was consulted as part of the current project. NRHP records for Utah State are located at the USHPO. Historic Files in Salt Lake City and can also be found on the NRHP internet website.

Historic Files at the Utah State Preservation Office

As part of the Class I literature research, the general historic files at USHPO were consulted. These files contain documentation on historic records, which are not listed on the NRHP. The records include, but are not limited to, Structure/Site Forms, Reconnaissance Level Architectural Surveys, NRHP Nomination Forms, and Historic Site Forms.

Utah State Historic Preservation Office, Antiquities Section and United States Forest Service, WCNF

A file search for previous cultural resource projects near the current project area was conducted at USHPO, Antiquities Section on April 23, 2007, and at USFS on May 2, 2007. Additionally, a

GIS file search for this information was conducted by staff members at USHPO on April 23, 2007.

Historic Government Land Office Maps

GLO plat maps were acquired from the BLM Public Room in Salt Lake City on April 19, 2007. These maps, each covering a complete township and range, were prepared during the latter part of the 19th Century and provide valuable information about the history of an area, including pioneer roads, historic properties, homesteads, utility lines, and other human activities in the area. They were examined for historic properties on or directly adjacent to the project corridor. The maps acquired for the current project date between 1856 and 1931. During this time period, most of the historic development in Salt Lake City and Salt Lake County occurred on the valley floors and at the mouths of the canyons.

Utah Land District Mining Claim Records

The Utah Land District Mining Claim records issued by the U.S. Surveyors General Office were consulted as part of the records search on April 25, 2007. They are on file at the BLM, Public Room in Salt Lake City. These documents include detailed information on all mine claims issued on public land, including the location and measurements of the claim, Mineral Survey Number, initial survey information, field notes, and the Certificate of Approval signed by the U.S. Surveyor General for the State of Utah.

Laws, Regulations, and Guidelines

Laws, Policy and Direction

- The National Historic Preservation Act of 1966 (as amended) is the primary law that guides management activities (36 CFR 800). It requires Agencies to take into account the affect of other management activities on heritage resources (Section 106). It also requires development of long-term management plans that locate and protect heritage sites, and then integrate sites and information into overall agency programs and goals (Section 110). The implementing regulations for Section 106 were amended in 1999 (and revised in 2000), and require higher levels of consultation with Tribes, the State Historic Preservation Office, and communities.

- The American Indian Religious Freedom Act of 1978 protects the rights of American Indians to access and use religious sites, and directs Federal agencies to consult with Tribes on ways to ensure this use.

- The Archeological Resources Protection Act of 1979 imposes civil penalties for unauthorized excavation, removal, damage, or defacement of archaeological resources (36 CFR 296).

- The Native American Graves Protection and Repatriation Act, passed in 1990, requires an inventory of existing artifact collections, return of human remains, sacred objects, and objects of cultural patrimony to appropriate Tribes. It also calls for consultation with Tribes to develop procedures for use in the event that human remains are discovered either by intentional excavation or inadvertent discovery.

Standards for Heritage Resources Management

(S32) Review undertakings that may affect cultural resources to identify potential impacts. Compliance with Sections 106 and 110 of the National Historic Preservation Act shall be completed before the responsible agency official signs the project decision document.

Guidelines for Heritage Resources Management

(G88) Design any mitigation measures necessary to resolve adverse affects to sites in such a way that they provide the maximum public benefit that the sites (or the information derived from them) can offer.

3.8.2 Affected Environment: Archaeological, Cultural, and Historic Resources

Research completed for this project identified not only documented sites, but also potential sites from historic maps and documents. A total of 29 cultural resource surveys have been conducted in or near the current project area, 11 of which intersect the proposed trail corridor at some point. These 11 cultural resource projects were conducted between 1979 and 1996. Based on the amount of time that has lapsed, it is recommended that these areas be re-evaluated for cultural resources. A summary of the Class I cultural resource literature search is presented below:

National Register of Historic Places

Based on the findings from this portion of the literature search, five NRHP-listed properties are located within one mile of the survey corridor. None of these five properties lie on or directly adjacent to the project corridor. Therefore, none of these sites will be impacted by the proposed BST project.

Historic Files at the Utah State Preservation Office

Based on findings from this portion of the literature search, nine miscellaneous historic locations and one architectural survey were identified within 1 mile of the current project corridor. None of these nine properties or the architectural survey lie on or directly adjacent to the project corridor. Therefore, none of these will be impacted by the proposed BST project.

Utah State Historic Preservation Office, Antiquities Section and United States Forest Service, WCNF

This literature search identified a total of 16 cultural resource sites. Of the 16 known cultural resource sites in the Project Area, 9 are historic and 7 are prehistoric. Twelve of the sites lie outside the proposed trail corridor and will not be impacted by the BST project. The remaining four sites (two historic and two prehistoric) are located on or directly adjacent to the project corridor.

Of the four sites located on or directly adjacent to the project corridor, one historic site was recorded in 1996 and was recommended ineligible to the NRHP due to partial reconstruction, modifications, and lack of integrity at that time; a second historic site was recorded in 1991 and was recommended ineligible to the NRHP due to lack of integrity. The two prehistoric sites were both recorded prior to 1980 and an eligibility recommendation was not made at that time. Based on the amount of time that has lapsed since these sites were evaluated, it is recommended that a pedestrian survey be conducted to re-evaluate known cultural resource sites for inclusion into the NRHP.

Historic Government Land Office Maps

After examining the GLO plat maps, 36 potential historic localities were identified within 1 mile of the current project corridor, as well as numerous historic wagon roads, which have since been paved over and are used as main thoroughfares. Of the 36 known historic localities, 14 lie on or directly adjacent to the project corridor.

The historic wagon roads identified were documented on numerous GLO maps dating back to 1873. The majority, but not all, appear to have been destroyed by urbanization of the area and/or have been paved over and are now part of the towns and cities throughout the county.

Utah Land District Mining Claim Records

During this search, 33 historic mine claims were identified that lie within one mile of the current project corridor. These claims are within the Big Cottonwood, Little Cottonwood, Hot Springs, and West Mountain Mining Districts and date from 1894 to 1903. Of these 33 documented mine claims, 25 lie on or directly adjacent to the project corridor. The 25 historic mine claims and 14 historic GLO locations located on or directly adjacent to the project corridor may have potential to yield information important to local Salt Lake County history.

A secondary purpose of the literature and records search was to identify the potential for encountering undocumented cultural resources within the project boundary. This study did not involve any on-the-ground inventory; therefore, the number and types of undocumented historic and prehistoric locations that may exist within the current project area are unknown at this time. Overall, the probability of encountering undocumented prehistoric sites in the project area is low, although the potential to find undocumented historic sites is moderate to high. The file search identified few recorded prehistoric sites near the Project Area. On the other hand, multiple historic sites, and potential historic site locations were identified through the Class I literature search. A cultural resource survey of the Project Area would verify these predictive evaluations. It is recommended that a pedestrian survey be conducted of the project corridor in order to identify any previously undocumented cultural resources and to re-evaluate known cultural resource sites.

3.8.3 Effects of the Alternatives: Archaeological, Cultural, and Historic Resources

Beneficial impacts to archaeological, cultural, or historic resources could occur under any of the Action Alternatives. The greatest impacts to archaeological, cultural, or historic resources are dependent upon increased human use.

Effects of Alternative 1: No-Action

Under this alternative, new trail would not be constructed within the Project Area. Therefore, there would be no direct effect to archaeological, cultural, or historic resources within the Project Area as it relates to the construction of the BST.

However, the population adjacent to the Project Area is still increasing. With this increase in population, increased dispersed recreation on user-created trails will occur. Indirect, long-term, adverse effects include increased risk of archaeological, cultural, and historic resource disturbance because use of the Project Area.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Direct effects to archaeological, cultural, or historic resources are not anticipated. Two historic and two prehistoric cultural resource sites, as well as 25 historic mine claims and 14 historic GLO locations, are located on or directly adjacent to the project corridor. It has been recommended that a pedestrian survey be conducted of the project corridor in order to identify any previously undocumented cultural resources as well as to re-evaluate known cultural resource sites. All previously documented archaeological, cultural, and historical resource sites, as well as those sites found during the pedestrian survey, will be avoided or otherwise mitigated before any trail work is done in the immediate vicinity.

Indirect, beneficial effects related to the construction of the trail include an increased awareness and protection of the location of any previously undocumented sites. The recommended pedestrian survey will document previously undocumented sites throughout the Project Area.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

The effects of Alternative 3 would be the same as for Alternative 2.

3.8.4 Cumulative Effects

Alternatives can be evaluated based on the increased risk of archaeological, cultural, and historic resource disturbance. The No-action Alternative has a potential for indirect, long-term, adverse effects to archaeological, cultural, and historic resources, as they relate to dispersed recreation on user-created trails. All Action Alternatives have a potential for no effect to beneficial effects. No effects to cultural resources will occur during trail construction, because all previously documented archaeological, cultural, and historical resource sites, as well as those sites found during the pedestrian survey, will be avoided or otherwise mitigated before any trail work is done in the immediate vicinity. Indirect, beneficial effects related to the construction of the trail include an increased awareness and protection of the location of any previously undocumented sites.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in Table 30.

Table 30. Cumulative Effects of the Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
Archaeo-logical, Cultural, and Historic Resources	No direct effect. Indirect long-term, adverse effect due to increased user-created trails.	No adverse effect. Potential beneficial effect from increased awareness and protection of the location of any previously undocumented sites.	Same as for Alternative 2.

3.9 Fire

3.9.1 Introduction

Fire—both prescribed and wildland—is used as a tool to enhance ecosystem resiliency and to maintain desired fuel levels. Fire plays its natural role where appropriate and desirable, but is actively suppressed where necessary to protect life, investments, and valuable natural resources. Effects of wildland fire are acceptable, and fire operates within historical (within the last 500 years) fire regimes appropriate to the vegetation type.

Historically and currently, fire has been and continues to be the main recurring disturbance factor in most of the WCNF ecosystems. However, for the past 100 years, fire has been largely excluded from the forests, shrublands, and grasslands of the WCNF resulting in significant changes to many ecosystem components.

Methodology

Information for this report was gathered mainly from the following major sources:

- USDA Forest Service. 2003. Final Environmental Impact Statement Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- USDA Forest Service. 2003. Revised Forest Plan Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- David Evans and Associates, Inc. 2002. Wasatch Front Fuels Assessment Report.

Laws, Regulations, and Guidelines

Numerous legal directions pertain to fire and fuel on Federal, State, and private lands in the United States (USDA 2003). Those most applicable to National Forest Lands include:

The Organic Administration Act (1897) authorizes the Secretary of Agriculture to make provisions for the protection of national forests against destruction by fire.

The Bankhead-Jones Farm Tenant Act (1937) authorizes and directs the Secretary of Agriculture to develop a program of land conservation and land utilization to protect public lands.

The **Wilderness Act** (1964) authorizes the Secretary of Agriculture to take such measures as may be necessary in the control of fire within designated Wilderness.

The **National Forest Management Act** (1976) directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources.

The **Clean Air Act** (1977) provides for the protection and enhancement of the nation's air resources.

The **Federal Fire Policy** (1995) outlines policies on fire suppression and integrating fire on the landscape.

The **Wildland and Prescribed Fire Management Policy: Implementation Procedures. Reference Guide** (1998) covers the process for making fire suppression decisions, prescribed fire burn plans and implementation, and wildland fire use planning and implementation.

Protecting People and Sustaining Natural Resources in Fire-Adapted Ecosystems, A Cohesive Strategy for (USDA, 2000) describes fuel treatment priorities for Federal lands.

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Comprehensive Strategy (USDA, USDI 2001) and Implementation Plan (2002). The Departments of Interior and Agriculture collaborated with the western Governors to develop a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration and rehabilitation on Federal and adjacent State, Tribal, and private forest and range lands in the United States. The primary goals of the 10-year Comprehensive Strategy are to: 1) improve prevention and suppression, 2) reduce hazardous fuels, 3) restore fire-adapted ecosystems, and 4) promote community assistance.

Forest-wide goals, objectives, standards, and guidelines listed in the revised forest plan (USDA 2003a) are listed and discussed below:

Forest-wide Goal

Wildland fire use and prescribed fire provide for ecosystem maintenance and restoration consistent with land uses and historic fire regimes. Fire suppression provides for public and firefighter safety and protection of other Federal, State, and private property, and natural resources. Fuels are managed to reduce risk of property damage and uncharacteristic fires.

Forest-wide Sub-goals: Fire Use

- Increase the active use of fire to return fire-dependent ecosystems to proper functioning and to reduce hazardous fuels.
- Increase public understanding and support of the active use of fire to improve watershed and habitat conditions and reduce fuels.
- Take timely actions to restore proper functioning of ecosystems after wildfire.

Forest-wide Sub-goal: Fuel Reduction

- Reduce hazardous fuels (prescribed fire, silvicultural and mechanical treatments) with emphasis on interface communities (wildland/urban) and increase proactive participation of communities at risk.

Objectives for Wildland Urban Interface Fuels Management

Purpose: To work with the States of Utah and Wyoming and communities at risk to reduce unwanted wildfire on or near the Forest. To emphasize the safety of people and the protection of property in the heavily populated and increasingly developed wildland urban interface adjacent to the national forest.

Need: Soaring populations and a desire to live near forested lands coupled with increased use of NFS lands have increased the risk and frequency of fire. Compounding the situation is the presence of vegetative communities that have uncharacteristically high fuel loading because of years of fire suppression. The gambel oak and bigtooth maple vegetation types found along the

Wasatch Front are an example of this situation. These communities support severe fires, which can result in significant impacts to properties and natural resources.

Objectives to Accomplish Desired Conditions

- Treat approximately 2,000 wildland urban interface acres annually for a 10-year total of 20,000 acres.
- Expand outreach and education by helping communities and homeowners recognize fire hazards; design fire-resistant homes and landscapes by participating annually in Community Planning meetings and city or rural planning groups.
- Expand community participation in fuels treatment and restoration and assist in the development of community fire plans by assisting State and private groups to develop three to five fuel reduction plans annually.

Standards and Guidelines for Fire Management

Standards: Human life (firefighter and public safety) is the highest priority during a fire. Once firefighters have been assigned to a fire, their safety becomes the highest value to be protected with property and natural/cultural resources being secondary priorities.

Human-caused fires (either accidental or arson) are unwanted wildland fires, and will be suppressed. Natural ignitions will be suppressed in areas not covered by an approved Wildland Fire Implementation Plan included in the Forest Fire Management Plan.

Guidelines: When assigning protection priorities to property and to natural and cultural resources, decisions will be based on relative values to be protected, commensurate with fire management costs. Suppression costs should be appropriate for values protected.

The full range of suppression tactics is authorized forest-wide, consistent with forest and management area emphasis, direction, and Forest Fire Management Plan.

The full range of fuels reduction methods is authorized consistent with management direction for the specific area.

Minimum impact suppression techniques will be implemented when managing wildland fire activities within Wilderness.

3.9.2 Affected Environment: Fire

Fire occurrence records from 1970 to 2001 were analyzed for the following statistics. Of the almost 2000 fires recorded in the WCNF's fire occurrence database from 1970 to 2001, 63 percent of the fires were human-caused. The rest (37 percent) were started by lightning. The WCNF averages about 60 wildfires per year. The fewest recorded was 13 fires in 1984, and the years with the most fires were 111 (1979), 110 (2000), and 96 (2001). The average fire size is 40 acres. Most fires are extinguished at 0.1 acres in size and 70 percent of the fires are < 1 acre. The largest fire recorded since 1970 was the East Fork Fire. Located near Bear River, Utah, it burned 14,200 acres in June, 2002. According to the fire statistics, the number of large fires appears to be increasing—90 percent of the fires >100 acres have occurred since 1980. Fire seasons of 2000, 2001, and 2002 were some of the busiest on the WCNF in terms of number of fires and total acres burned (USDA 2003).

The use of prescribed fire on the WCNF has been very limited in the past. For the past several years, the WCNF has conducted prescribed burns on approximately 1,250 acres per year, primarily in aspen stands (USDA 2003).

In the last ten years, there has been a tremendous increase in the development and population adjacent to the WCNF and UNF boundary along the Wasatch Front. Soaring populations coupled with the increased use of national forest land has increased the risk and frequency of fire. Compounding the situation is the presence of vegetative communities with uncharacteristically high fuel loading. This situation can support severe fires which can result in significant impacts to properties and natural resources (USDA 2003a).

Given this situation and the current national emphasis on reducing fuels in the wildland-urban interface, the WCNF, in conjunction with the UNF, completed the Wasatch Front Fuels Assessment Report (Evans 2002). The Assessment analyzed the fuel situation and reduction opportunities on over 400,000 acres along the Wasatch Front. About half of the assessment area was classified as a medium/high, high, or very high fuel hazard. The oakbrush/shrub cover class dominates this area on the WCNF (USDA 2003a). Fire hazard levels within the Project Area are shown in figure 27.

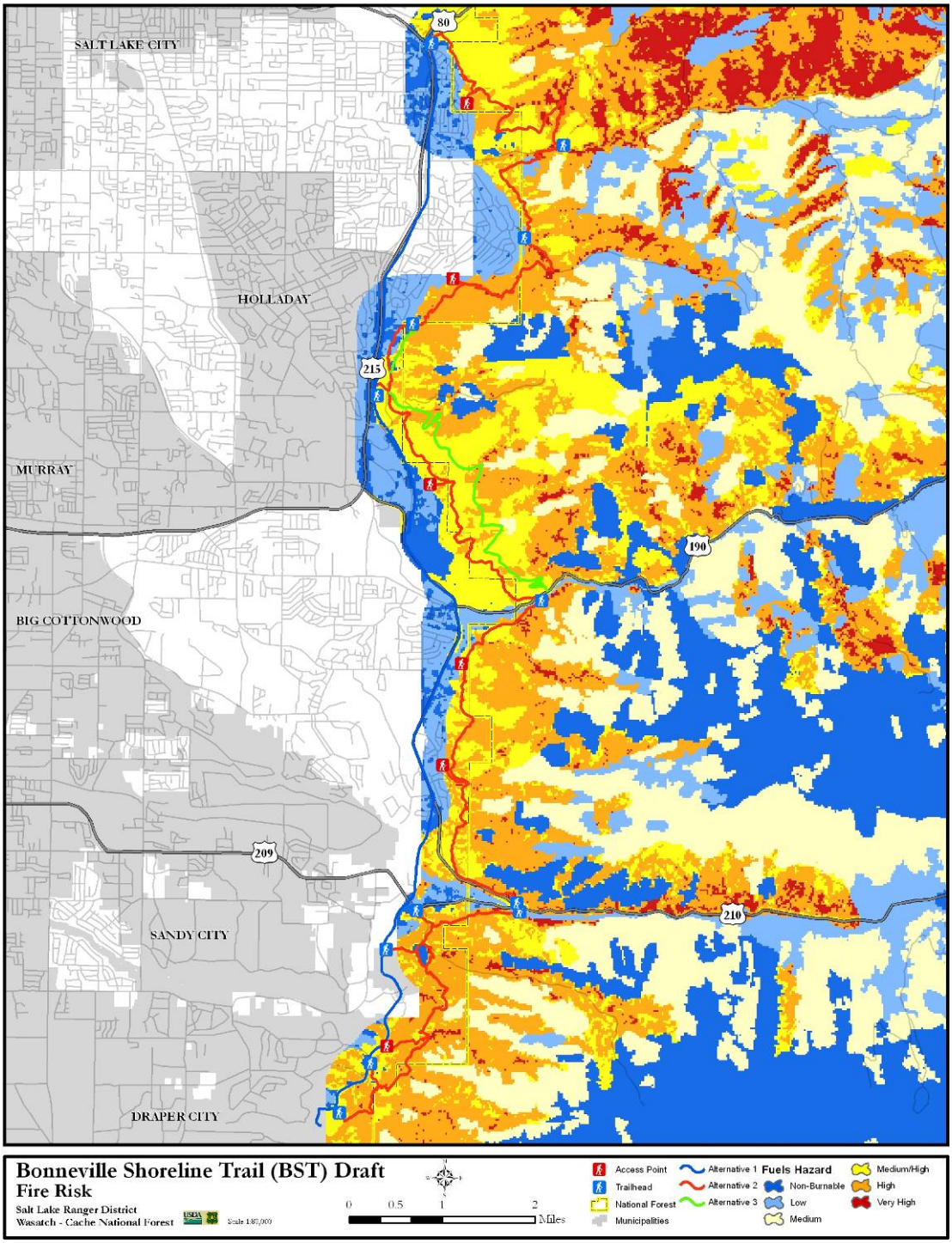

Figure 27. Project Area Fire Risk.

Several areas along the Front were identified as having higher opportunities and needs for treatment. These areas include the cities and towns of North Ogden, Ogden, South Ogden, Bountiful, North Salt Lake, Sandy, and Draper. Portions of some of the canyons, specifically Parley's, Ogden, and Little Cottonwood, were also labeled high-treatment opportunity. Emigration Canyon in particular was classified as the highest treatment opportunity.

3.9.3 Effects of the Alternatives: Fire

Adverse and beneficial impacts to fire management could occur under any of the Action Alternatives. The greatest impacts to fire management are dependent upon increased human use. Alternatives, in descending order of impacts to fire management, are Alternatives 3, 2, and 1.

Effects of Alternative 1: No-Action

Under this alternative, new trail would not be constructed within the Project Area. Therefore, there would be no direct effect to fire and fuel conditions within the Project Area as it relates to the construction of the proposed action.

However, the population adjacent to the Project Area is still increasing. With this increase in population, increased use on improved trails and dispersed recreation on user-created trails will occur. Indirect, long-term, adverse effects include increased risk of fire because use of the Project Area will increase.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Historical fire data show that the largest numbers of fires that occur on the Forest are along travel ways. Recreation can affect the fire management program both positively and negatively. As human use increases on the Forest, more people would be on hand to report fires that may normally go undetected for some time. With increased use, however, there would also be an increase in the incidence of human-caused wildfires (USDA 2003).

Alternative 2 would cause a short-term minor adverse effect to fire risk due to increased slash along the proposed trail. Requiring complete disposal of all construction debris would mitigate this increased risk.

Indirect minor adverse effects include increased risk of fire because use of the Project Area would increase. Non-motorized trail use would probably not increase use of the area for camping. Thus, the incremental increase in trail use by these users would not necessarily increase camping and resulting use of campfires.

Beneficial effects may also occur under Alternative 2. Increased trail use may increase the incidental public "monitoring" of fire and may increase the speed with which fire is reported. The new trail may provide improved fire fighter access and result in more rapid and effective fire suppression. The trail would also improve firefighter safety in that it offers a cleared, less obstructive access, but more importantly, egress as an escape route to a predetermined safety zone.

The new trail may also provide a fire control line to prevent fire from extending toward the urban interface. The new trail may also provide an opportunity for fire suppression, in that an established anchor point (the trail) that has already been constructed and cleared to mineral soil can be used as a point of "back fire" to prevent a fire from extending toward the urban interface.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

The effects of Alternative 3 would be the same as for Alternative 2.

3.9.4 Cumulative Effects

Alternatives can be evaluated based on the increase in fire risk. All Action Alternatives have a potential for adverse and beneficial effects on fire risk within the Project Area. The Action Alternatives which include the most trail construction and use may have the greatest potential to increase fire risk through an increase in human activity and increased slash along the trail. However, these Action Alternatives may also have the greatest potential to decrease fire risk through providing more public "monitoring", increased fire-fighting access, and an existing fire line.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 31.

Table 31. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Fire	No effect to long-term adverse effect. The potential for increased use and additional user-created trails could result in increased risk of fire.	Minor adverse effect to beneficial effect. Increased use could result in increased risk of fire. Beneficial effects that may occur include better access to areas for fire fighting activities, established fire control line, increased speed of fire reporting, and increased firefighter safety.	Same as for Alternative 2.

3.10 Socio-Economic Resources

3.10.1 Introduction

Managing the WCNF in a way that does not produce negative socio-economic impacts to adjacent communities and private properties is a priority in all management decisions. Issues to be analyzed in this report have been identified from public meetings, the public scoping process, other agencies, and the Forest Service interdisciplinary team.

This section will describe applicable WCNF Forest Plan goals, objectives, and desired future conditions. A detailed description of potential levels and types of visitor use, along with a description of local demographics will also be given. An analysis of the effects will be given for the following issues:

- Private property impacts
- Trespass and vandalism
- Conflicts between recreational users and nearby residents
- Traffic-, transportation-, and parking-related issues in and around access points

Cumulative impacts of the alternatives are summarized in Section 3.10.4: Cumulative Effects.

Methodology

Best available information from a variety of sources was compiled for this report. Primary sources of information include:

- USDA Forest Service. 2003. Final Environmental Impact Statement Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- Wasatch-Cache National Forest. 2006. Management Indicator Species of the Wasatch-Cache National Forest. Salt Lake City, Utah. Version 2006-1.

GIS data was provided by WCNF and Utah AGRC. Other information sources used to describe the proposed actions, impacts, and status are referenced in the respective discussions and listed in Chapter 5: References Cited.

Laws, Regulations, and Guidelines

Forest-wide Goal 10-Social/Economic Contributions: Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources and by participating in efforts to devise creative solutions for economic health (diversity and resiliency). Provide timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and settings for recreation consistent with goals for watershed health, sustainable ecosystems, biodiversity and viability, and scenic/recreation opportunities.

Social and Economic Desired Condition: Special use authorizations, landownership adjustments, rights-of-way, landline location, and easements serve public needs. National Forest property boundaries are located and posted on the ground. Adjustments made in land ownership achieve resource management or protection objectives, provide needed access, or allow NFS lands to be managed more efficiently. Rights-of-way to access Forest lands are acquired to meet planned resource activities. Proactive efforts to educate and inform users and adjacent landowners result in reduced levels of unpermitted uses, encroachments, and user conflicts. Local economic development goals are considered when developing National Forest land uses and management strategies. Increased intergovernmental coordination with Federal, State, county, and Tribal governments, and a high level of communication and dialogue with a broad range of stakeholders is also desired.

3.10.2 Affected Environment: Socio-Economics

For the purpose of analysis, it is important to understand the potential levels and types of visitor use that may occur along the proposed alignments. This section is closely tied with recreation impacts and incorporates data from current visitor use along existing BST segments that was presented in Section 3.3.2.

Table 32 provides current population and growth estimates for various adjacent cities as well as for Salt Lake City, Salt Lake County, and the State. Future recreation activities will likely follow these population trends. Census data for Cottonwoods Heights was not available because it was not incorporated into Salt Lake County until 2005. Also, the considerable population increase in Holladay between the years 2000 and 2005 was due in part to two large annexations to the city.

Table 32. Population and Growth Estimates for Utah, for Salt Lake County, and for Selected Cities.

Location	2000	2005	2010	2020	2030	% Growth between 2000-2030
Holladay	14,561	25,885	26,578	30,065	32,883	126
Sandy	88,418	99,967	108,000	119,292	122,357	38
Draper	25,220	32,185	40,719	47,208	51,309	103
Salt Lake City	181,743	185,336	187,259	193,130	197,079	8
Salt Lake County	898,387	967,390	1,077,556	1,283,784	1,431,843	59
Utah	2,150,205	2,355,120	2,661,902	2,951,006	3,683,687	71

Sources: Wasatch Front Regional Council 2003; Governors Office of Planning and Budget 2000.

The following is a description of the demographics of four communities lying adjacent to the BST (taken from the 2000 U.S. Census). The description should provide a picture of a substantial proportion of potential trail users. Due to the lack of available data, other potential areas such as Highland, Mill Creek, and Olympus Cove were not included in this description. However, the demographics are very similar.

Holladay City has a population of about 14,500 people. The median age is about 37 years and the median household income is roughly $66,000. Residents of Holladay are overwhelmingly white (95.5 percent). The majority of adults (61 percent) are married, and 75 percent of households are characterized as families. Average family size is 3.33 persons. Most (82 percent) residents own

their housing unit. More than half of the population over 16 works. Residents of Holladay hold primarily white collar jobs with 43 percent listed as management and professional, and 35 percent listed as sales and office occupations. Holladay residents are well educated; 30 percent have attained some college, 28 percent have earned Bachelor's degrees, and 18 percent have earned graduate or professional degrees.

Cottonwood Heights has a larger population than Holladay with about 28,000 residents. Residents of Cottonwood heights are slightly younger than those of Holladay with a median age of 32 years. They are also slightly less well off with an average (median) household income of $63,000. Like most east-bench communities, Cottonwood Heights is overwhelmingly white (94 percent). Slightly over half of Cottonwood Heights' adults (56 percent) are married, and 77 percent of households are characterized as families. Average family size is 3.31 persons. Fewer Cottonwood Heights residents (73 percent) residents own their housing units than do those of Holladay. Residents of Cottonwood Heights are largely white collar and service workers with 40 percent of residents working in management and professional occupations and 34 percent working in sales and office occupations. Finally, Cottonwood Heights' residents are well educated with 30 percent having attended some college, 29 percent have earned bachelors degrees, and 13 percent have earned graduate or professional degrees.

The city of Sandy has the largest population of the four cities that surround the BST with approximately 88,000 residents. Year 2015 projections place Sandy City at a population of 113,000 (Sandy City Parks, Recreation, and Trails Master Plan Update, 2005). Residents of Sandy are slightly younger than those of Holladay and Cottonwood Heights, with a median age of 29 years. Yet, the Sandy City Recreation Master Plan Update emphasizes that Sandy City has aged substantially since the 2000 census and hence, is deliberately planning facilities and programs to accommodate older adults. According to the 2000 census, Sandy City residents earn about as much as do those of Holladay with a median household income of $66,000. Like most east-bench communities, Sandy is overwhelmingly white (91 percent). A majority of Sandy City adults (62 percent) are married, and 85 percent of households are characterized as families. Average family size is 3.7 persons. The Sandy City recreation master plan suggests that the figure may be closer to 3.2 today. Home ownership is the norm in Sandy with 84 percent owning their own living units. Residents of Sandy are largely white collar and service workers.

Draper, the southernmost of the communities lying adjacent to the section of the BST in question, is a smaller community of about 25,000 residents. It is a younger community with a median age of 29 years. Draper residents are more affluent than her more northerly neighbors with a median household income of approximately $72,000. Again, like the previously described east bench communities, Draper is overwhelmingly white (91 percent). A majority of Draper adults (61 percent) are married and 86 percent of households are characterized as families. Average family size is 3.69 persons. Home ownership is the norm with 84 percent owning their own living units. Residents of Draper are largely white collar, professional, and service workers with 44 percent of residents working in management and professional occupations and 31 percent working in sales and office occupations. Finally, Draper residents are well educated with 32 percent having attended some college, 24 percent have earned bachelors degrees, and 10 percent have earned graduate or professional degrees.

Table 33. Demographic Breakdown of Affected Cities.

City	Pop.	Median Age	Median House-hold Income	% Family House-holds	% of White Resi-dents	% < 18	% Living in Owned Housing	Ave. Family Size	% Married
Holladay	14,561	37	$66,468	75	96	30	82	3.33	61
Cottonwood Heights	27,569	32	$62.814	77	94	30	73	3.31	56
Sandy	88,418	29	$66,458	85	94	35	84	3.73	62
Draper	25,220	29	$72,341	86	91	32	84	3.69	61

Taken together, the east bench communities from which the BST is likely to draw a significant portion of its user base is typical of most wildland recreation users nationwide. That is, they are highly educated, young, white collar and professional workers who are predominately white. Salt Lake City suburbs, including Sugarhouse, Highland, Mill Creek, and Olympus may also draw a significant user base to the BST. Families characterize most nearby residents and could thus be expected to be an important part of the BST user base. It might also be noted that should Holladay, Cottonwood Heights, and Draper follow Sandy's trend in rapidly aging, the BST could see substantial demand from older users.

3.10.3 Effects of the Alternatives: Socio-Economic Resources

Effects of Alternative 1: No-Action

This alignment does not occur within the Forest Service boundaries and compliance with WCNF Forest Plan standards and guidelines would not applicable. This alignment uses the existing Wasatch Boulevard so no direct impacts are likely. Ongoing impacts to private property from urban land use would continue. Use of existing streets and sidewalks by pedestrians, bicyclists, and motor vehicles is already ongoing.

The demands for recreation opportunities will likely increase as populations grow. The No-Action Alternative is somewhat limited in the types of recreation opportunities available and will not likely satisfy future recreation demands. Future recreation demands will likely be sought for in surrounding areas such as the foothills and NFS lands.

In the foothills above the city streets there exists a network of trails ranging from well-established dirt roads (some still in use) to game trails and user-created trails. The trail network lacks continuity, is not generally constructed, managed or maintained, and often results in "dead ends". The existing trail segments traverse both private and public land and in many places constitute trespasses or otherwise illegitimate trail segments. Trespassing and illegitimate trail segments will likely increase conflicts between recreation users and nearby private property owners. Vandalism and traffic-, transportation-, and traffic-related issues will likely stay the same, but may increase as recreation use and populations grow.

The No-Action Alternative has the potential to have adverse effects on property values; security; privacy; and traffic-, transportation-, and parking-related issues. These effects are based on the premise that the Wasatch Boulevard will not satisfy future recreation needs. Unmanaged recreation activities will therefore increase and may lead to long-term adverse impacts to adjacent communities and private properties.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Impacts to private properties across the length of the proposed BST alignment can be difficult to predict and somewhat speculative. However, an approximation may be made by extrapolating from a general knowledge of socio-economic literature and from data collected from existing BST users on different sections of the trail. From these data, inferences about levels of use, kinds of use, and potential effects can tentatively be made. As described in the Affected Environment section, visitor use is expected to be high and would likely come from nearby neighborhoods.

The proposed BST alignment would have overall minor beneficial social and economic effects to nearby and adjacent private properties. Several nationwide studies suggest that natural open space and trails are prime attractions for potential home buyers. One such study conducted by the Office of Planning in Seattle, Washington, revealed that properties near, but not immediately adjacent to, the 12-mile Burke-Gilman trail sell for an average of 6 percent higher than comparable properties. In addition, 60 percent of the interviewed property owners adjacent to the trail believe that being adjacent to the trail would either make their home sell for more or have no effect on the selling price (NPS 2007a).

The proposed BST alignment would also have minor adverse effects. The first issue is trespassing and vandalism. The BST may have a balancing effect on trespassing and vandalism for the following reasons. Some degree of unavoidable incidences of trespassing and vandalism would likely occur with increased visitor use, therefore resulting in minor adverse effects. On the other hand, an increase in visitor use would also produce an increase in visibility to homes, businesses, and other private properties. Increased visibility to an area has a natural tendency to diminish crime rates and therefore produce a balancing effect. Organized neighborhood watch areas and proper signage indicating property boundaries and right-of-ways would help mitigate adverse effects.

The second issue is conflicts between recreation users and nearby residents. As with trespassing and vandalism, minor adverse effects may be unavoidable as property owners strive to minimize their sense of loss of privacy and security. Two potential ways to mitigate these adverse effects include posting signs at trailheads and along the trail, indicating where the trail enters right-of-ways and require dogs to be on a leash (e.g., when going through residential areas).

The third issue is impact of traffic, transportation, and parking to private property owners. It can be assumed that the BST is likely to receive high levels of visitor use. However, it is not likely that increased visitor use would have a measurable effect on traffic and transportation. This assumption is based on the premise that, as with the University of Utah section of the BST, the majority of users would come from neighborhoods located in close proximity to the trail, resulting in a no-net or minimal increase to local traffic and transportation.

Similar to the effects of traffic and transportation, parking may have some adverse effects, but overall they would be minor. The hotspot areas (Mill Creek, Big Cottonwood, and Little Cottonwood canyons and proposed Sandy City connections) would likely absorb most of the parking needs for the anticipated level of visitor use on the BST. Proposed access points in residential areas would primarily serve walk-in use from adjacent neighborhoods. Parking arrangements differ between access points and trailheads. Trailheads would generally provide defined off-street parking areas and may have other amenities, including drinking fountains, restrooms, and picnic sites. Access points would generally offer only on-street parking and would be well marked and signed to control and direct public use. Signs located at all access

points and trailheads indicating overflow areas and other nearby trailheads could mitigate against vehicles overflowing to undesignated parking areas. See Chapter 2 for a description of parking for all existing and proposed trailheads and access points. It should be noted that access points likely provide the greatest potential for conflict as increased use at these areas would have the greatest potential impact in that immediate community. This is evident near Heughs Canyon, Bell's Canyon, and Rocky Mountain trailheads, as residents have successfully petitioned local government to post these areas as no parking.

Implementing the Proposed Action would likely result in tradeoffs between long-term beneficial and adverse impacts. A high quality recreation trail leading to Wilderness areas and open space has a tendency to increase property values to adjacent communities. Furthermore, a designated trail may absorb adverse effects from user-created trails and unmanaged recreation activities. Conversely, increased recreation use adjacent to private properties may increase trespassing, vandalism, and conflicts between recreation users and adjacent property owners. Compared to Alternative 1, the Proposed Action would likely have a long-term positive impact.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Impacts of implementing this alternative would be similar to those described under Alternative 2. In general, effects would be minor adverse to beneficial effects. Segment 2 occurs entirely on Forest Service property and the trail would be situated a further distance from the boundary and residential areas. Construction activities and use of the trail would not be as noticeable under this alternative. Minor adverse effects would therefore be less overall.

3.10.4 Cumulative Effects

Past, Present, or Reasonably Foreseeable Future Actions

The project area currently receives high visitor use all year long. Cumulative effects that relate to socio-economic components/issues of this section are adverse and beneficial for all three alternatives.

Past Actions

Past actions include various types of recreation activities (hiking, biking, horseback riding, dog walking, and others) on short segments of designated and user-created trails and along the Wasatch Boulevard. Heughs Canyon, Bell's Canyon, and Rocky Mountain trail were posted as no-parking areas at the request of residents.

Present Actions

Present actions as they are listed below have beneficial and adverse impacts to socio-economic issues for all three alternatives. Present actions in the project area include continuing recreational use on designated and user-created trails, current urban development in the foothills, a large construction project at the mouth of Big Cottonwood Canyon, a water tank project at the mouth of Little Cottonwood Canyon, and existing gravel mining at the mouth of Big Cottonwood Canyon.

Reasonably Foreseeable Future Actions

Actions that may occur in the reasonably foreseeable future include increased recreation use, increased user-created trails and trail proliferation, continued development in the foothills, and a

potential Neff's Canyon detention basin. Reasonably Foreseeable Future Actions may have beneficial and adverse impacts to socio-economic issues for all three alternatives.

Cumulative Effects of the Alternatives

Table 34. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Socio-Economic Resources	Increased recreation, trail proliferation, and user-created trails are likely to occur and could result in adverse effects to socio-economic issues. Compared to the other two alternatives, recreation use would be more difficult to manage.	Minor adverse effects may occur from: • trespassing • vandalism • conflicts between visitor users and nearby property owners • increased traffic, transportation, and parking Mitigating these effects revolve around effectively communicating trail regulations at each trailhead and access point, law enforcement and patrol. Beneficial effects may also occur as adjacent properties have easy, walk-in access to a regional network of trails and open space.	Similar to Alternative 2. Segment 2 is all on Forest Service NFS land and therefore would have less of an effect on private property.