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Preliminary Environmental Assessment

Bonneville Shoreline Trail – Salt Lake County

**Salt Lake County, Utah
R4 Intermountain Region
Salt Lake Ranger District, Wasatch-Cache National Forest**

For Information Contact: Steve Scheid
6944 South 3000 East
Salt Lake City, UT 84121

sscheid@fs.fed.us
(801) 733-2689

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1.2 Summary

The Wasatch-Cache National Forest (WCNF) is analyzing a proposal to provide a quality, non-motorized recreation trail network that follows, to the degree possible, the shoreline of the ancient Lake Bonneville. This trail network could eventually connect communities from the Idaho border to Juab County. The segment of the proposed Bonneville Shoreline Trail (BST) being considered is located on the west slopes of the Wasatch Range, on or near the shoreline bench of ancient glacial Lake Bonneville in Salt Lake County and is within the Salt Lake Ranger District, WCNF, Utah. The Bonneville Shoreline is a very important regional trail, yet critical portions remain incomplete. In the future the BST would be recognized and valued for its unique ability to provide recreation along the Wasatch Front in the face of continuing urban development.

This analysis evaluates the following alternatives in detail:

- **Alternative 1 (No-Action):** The trail would remain in its current management plan, with no new sections added. It would follow Wasatch Boulevard rather than have new sections constructed.
- **Alternative 2 (BSTC Proposed Alignment):** The proposed route for the trail crosses National Forest Service (NFS) lands, private lands, corporate-owned lands, and government-owned lands. It also includes “connectors” that would connect sections of the trail that allow mountain bike access when such access is disrupted by Wilderness areas.
- **Alternative 3: (NFS right-of-way near Mile High Drive Trailhead in Segment 1 and All NFS in Segment 2).** The proposed route would follow the same alignment as Alternative 2 for Segments 3 and 4. In Segment 1, the proposed route for the trail would utilize a right-of-way access on the corner of NFS lands near Mile High Drive Trailhead. In Segment 2, the proposed route for the trail would remain on National Forest Service lands.

Based upon the analysis of the alternatives, the responsible official would decide whether, and under what terms and conditions, to authorize the construction of BST trail segments on NFS lands.

The Proposed Action may have minor impacts on vegetation, wildlife, recreation, Wilderness areas, open space, visual quality and aesthetics, traffic, soils, water resources, cultural resources, fires, and private property. These impacts are summarized below and are more fully discussed in Chapter 3: Affected Environment and Environmental Consequences.

1.0 Introduction

The purpose of this EA is to analyze and disclose the effects of the alternatives for constructing and operating sections of the BST. Effects analyses are included for the No-Action Alternative in which no additional trail would be built, and Action Alternatives displaying different trail alignments (see Chapter 2). Analysis includes the potential environmental effects of construction and operation activities that would be anticipated for each alternative. To ensure conformance with NEPA and Council on Environmental Quality (CEQ) regulations, the EA discloses potential cumulative effects of the alternatives in conjunction with all past, present, and reasonably foreseeable actions.

This EA provides the USFS and the public with information on the potential environmental effects of development and use of alternative trail segments, facilitating an informed decision on trail alignment.

1.1 Background

1.1.1 General Background of the BST

The BST is a trail concept originally proposed by the State of Utah, having substantial regional and local importance. Since its beginnings in 1990, interest in the BST has grown dramatically. In October 1999 the BST was designated as one of sixteen national Millennium Legacy Trails. The trail serves a variety of users and provides both recreational and economic benefits to local communities.

Originally planned to span a distance of 90 miles across four counties of the central Wasatch Front, trail planning now encompasses more than 280 miles through Cache, Box Elder, Weber, Davis, Salt Lake, and Utah Counties. Additional planning has been proceeding to continue the BST westward through Camp Williams and the Kennecott Land development, around the Oquirrh Mountains and into the Tooele valley.

The first several miles of the BST in Salt Lake County were built in the early 1990s near the This Is The Place State Park and the University of Utah. Currently there are 56 miles of the BST planned in Salt Lake County, and 27.5 miles already constructed and in use. Virtually all of the BST currently constructed and in use in Salt Lake County is in Salt Lake City, Sandy, and Draper.

1.1.2 Background of the Proposed Project

Salt Lake County prepared an alignment plan for the BST and presented it at a stakeholders meeting on September 12, 2004 and at a public open house on September 25, 2004. Comments from these meetings were considered and appropriate revisions were made. In January 2005, Salt Lake County released the BST Alignment Plan for Salt Lake County. This plan was created to serve as a guideline for development of the BST in Salt Lake County. This plan is the conceptual blueprint from which the proposed project was derived.

Public involvement was initiated on March 17, 2006; a summary of public involvement activities can be found in section 1.5 of this document. Preparation of this EA was announced in the WCNF Spring 2006 Schedule of Proposed Actions, which was published on April 1, 2006.

1.1.3 Relevant Documents

BST Memorandum of Understanding

The BST Memorandum of Understanding (BST MOU) is an agreement entered into by a coalition of trail building organizations, known as the Bonneville Shoreline Trail Coalition (BSTC) that designates nine criteria for the BST. In order for a trail to be considered a part of the BST, these criteria should be met. The criteria are as follows:

1. The trail will be built on or near the foothill bench generally considered to be the eastern shoreline of ancient Lake Bonneville.

2. The purpose of the trail is to provide a place where walkers, runners, cyclists and equestrians can experience their recreational pursuits at a distance from automobiles that is both safe and aesthetically pleasing.
3. The trail will provide access to public lands and the resources associated with those lands.
4. The trail will be for non-motorized use only. Walkers, runners, and bicyclists are identified as potential users, although all segments may not be appropriate for all of these uses.
5. The trail will be separate from the developed urban area, but trailheads will provide access that is convenient for residents of urbanized areas.
6. The trail should be designed to provide access and rapid deployment of fire fighting and other emergency resources to the urban/foothills interface, where feasible.
7. The trail will contribute to the preservation of aesthetic, historic, and educational values of the area.
8. The Bonneville Shoreline Trail logo as depicted within this document [i.e. the BST MOU] is copyrighted, which right is held by the Bonneville Shoreline Trail Committee. Permission to use this copyrighted material is given by the copyright holder to signatories of this document. The logo may be used for appropriate trail signage, related communications and advertising, but may not be used for commercial purposes or financial gain without the express written permission of the copyright holder. Information about the Bonneville Shoreline Trail Committee can be found at www.bonneville-trail.org.
9. In areas where the trail cannot be built to these criteria, especially where the trail allows motorized travel, a segment may use the title “Bonneville Shoreline Trail Connector” to lead users from one segment to another.

Bonneville Shoreline Trail Alignment Plan

In January 2005, the Bonneville Shoreline Trail Alignment Plan for Salt Lake County was released. The alignment plan was developed by Salt Lake County Parks and Recreation Department.

The purpose of the alignment plan is to provide a guideline for development of the BST in Salt Lake County. It provides a preferred route for use by the county, municipalities, planners, and developers to guide residential and commercial development, avoid unnecessary conflicts with development, and encourage government and volunteer groups to construct a regional trail. The plan designates some existing trails as sections of the BST. The plan designates bicycle and pedestrian routes on city streets as BST “Connectors”. In addition, the plan establishes standards for trail construction, trail use, and trail access. The plan discusses land ownership, partnerships, costs, funding sources, development priorities, and maintenance.

Bonneville Shoreline Trail Salt Lake County Forest Service Pre-NEPA Report

The Forest Service compiled a comprehensive BST planning document that was completed in January 2006 that includes addendums through February 2007 (USDA 2007b). The document

identifies preliminary issues and other pertinent information relating to the development of the BST in Salt Lake County. This document provides the blueprint for much of the environmental analysis contained in this EA.

Wasatch Cache National Forest 2003 Forest Plan

The Wasatch Cache National Forest (WCNF) 2003 Forest Plan guides all natural resource management activities and sets management direction for the WCNF. The Plan describes what desired future conditions and goals for the Forest are, what priorities for action have been identified (Objectives), what resource management practices may be employed and where (based on the availability and suitability of lands). The 2003 Forest Plan contains specific recognition of and direction for the BST:

- **Purpose and Need (pages 4-33 and 4-34)** The BST, designated in 1999 as one of sixteen national Millennium Legacy Trails, is envisioned to be an aesthetically pleasing (though urban influenced), non-motorized recreational trail experience, nearby yet apart from the urban Wasatch Front and its many communities. The Bonneville Shoreline is a very important regional trail yet critical portions remain incomplete. The trail serves a variety of users and provides both recreational and economic benefits to local communities. Access to the national forest continues to be threatened as development near the forest continues. In the future the BST will be recognized and valued as a unique opportunity to provide recreation corridors across multiple ownerships in the face of continuing urban development. In addition to recreational purposes, the trail may serve as a fire buffer, a recognizable, defensible physical boundary for the Forest, and access for fire suppression to protect property in the wildland urban interface.
- **Objectives to accomplish desired conditions (7.a., p. 4-34)** Focus trail development and management emphasis on Bonneville Shoreline and Great Western trails, working with the public and other agencies to complete these trails using partnerships and grants as much as possible, while minimizing impacts to big game winter range, adjacent property owners, and Wilderness.

In addition to specific direction for the BST, standards and guidelines for resource areas (e.g. riparian areas and recreation) are identified in the 2003 Forest Plan. The effects analysis for each of the issue topics (see section 1.6 and Chapter 3.0) will address how the Proposed Action would affect desired future conditions as outlined in the Forest Plan and whether or not the action is in compliance with Forest Plan standards and guidelines.

1.2 Purpose and Need for Action

The purpose of the action is to construct and use sections of the BST in Salt Lake County, Utah on National Forest System (NFS) lands located between Parley's Canyon and Hidden Valley Park. They would be connected with other sections of the BST trail that are or would be located on lands not under USFS jurisdiction.

Another purpose of the Proposed Action is to implement the Forest Plan's provisions regarding this trail in a manner that is consistent with the character envisioned for the BST (see section 1.1.3). The Forest Plan details a strong commitment by the USFS to complete the BST. In addition, local government has recognized the importance and value of the BST as a community asset. Currently, the BST in Salt Lake County is completed from City Creek, southward to Parley's Canyon, and from Hidden Valley Park in Sandy, south to Corner Canyon in Draper.

The USFS has worked closely with the BST Committee as well as with Salt Lake County and other local government agencies in BST land acquisitions, planning, and trail construction. Constructing the BST would also meet Forest Plan direction for recreation and other resource areas by providing improved access to public lands and offering a variety of non-motorized recreational opportunities that meet user needs and desires. Access to the WCNF continues to be threatened as development near the Forest continues. In the future the BST would be recognized and valued as a unique opportunity to provide recreation corridors across multiple ownerships in the face of continuing urban development.

The proposed trail is needed to provide unique quality recreation opportunities along the urban-forest interface. It is intended that measures will be developed in this analysis to help protect watershed values, wildlife habitat, and the scenic quality of these areas and to minimize conflicts between recreational users, as well as with adjacent property owners. In addition to recreational purposes, the trail may serve as a fire buffer and access for fire suppression to protect property in the wildland urban interface.

1.3 Proposed Action

The Proposed Action is to construct sections of the BST on NFS lands in Salt Lake County. Sections where construction would occur extend south of the mouth of Parley's Canyon in Salt Lake City to the Hidden Valley Park Trailhead area (approx. 11600 South Wasatch Blvd) in Sandy. Approximately 27 miles of trail are proposed to be constructed with approximately 11 miles of trail located on NFS lands (see figure 1). Remaining sections of the proposed alignment for the BST, approximately 16 miles, are located on private land in unincorporated Salt Lake County, and within the Cities of Holladay, Cottonwood Heights, and Sandy. The Forest Service has no authority to make decisions on private land segments of the trail and no trail construction will occur on private land without appropriate authorization from the landowner and local government agency.

The trail would average approximately 3 feet in width and would be consistent with USFS trail construction standards. The trail would be designed to average grades less than 10 percent and could potentially accommodate non-motorized uses including hiking and limited biking. Uses must be consistent with appropriate watershed and Wilderness regulations as the proposed alignment crosses small segments of three designated Wilderness Areas (Mt. Olympus, Twin Peaks, and Lone Peak) and Salt Lake and Sandy Cities' designated protected watershed areas. Leash laws would pertain to all segments of trail where dogs are permitted (consistent with local ordinances and outside of watershed protection areas).

Horseback use occurs primarily in the Draper area and use is relatively low compared to other uses. Based on watershed and other local ordinances; horses would not be permitted on any new section. Similarly, mountain bike use would only be permitted in sections that have formal trailhead or access points and the segments are entirely outside of Designated Wilderness (including Parley's to Mill Creek, Ferguson to Little Cottonwood Canyon TH, and possibly Bells to South Fork trailhead if feasible and consistent with Sandy City trails plan (see figure 11 for restrictions).

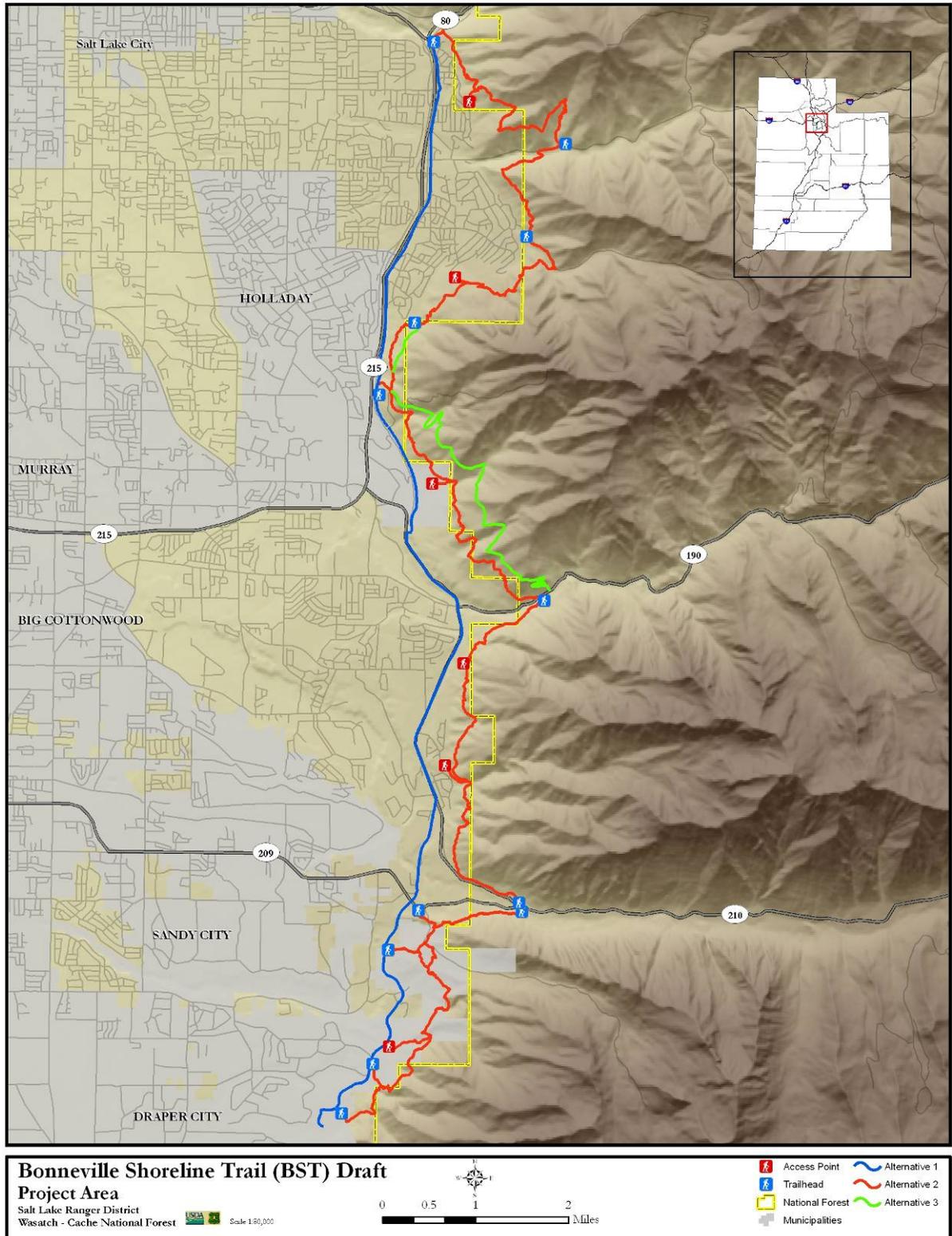


Figure 1. Bonneville Shoreline Trail.

1.4 Decisions to Be Made

Consistent with NEPA, this preliminary EA includes a detailed analysis of the potential environmental effects of construction and use of the proposed trail. The interspersed nature of land ownership along the proposed trail alignment requires that our environmental review consider the site-specific effects this trail might have on NFS and adjacent private lands and evaluate the cumulative effects of a feasible trail alignment along the entire segment of the BST in Salt Lake County. Considering and identifying a potential alignment for the BST will not necessarily result in trail construction of any particular segment. The USFS will consider trail development based on site-specific circumstances, including the availability of a trail to be completed from access point to access point.

In addition, although the entire alignment will be analyzed, the USFS has the authority to make decisions only on NFS land sections of the trail. All decisions regarding BST trail construction on private land will be made by the local government agency that has jurisdiction over the lands in question.

Following receipt of comments on this Preliminary EA, the EA will be revised as needed and a Decision Notice and Finding of No Significant Impacts (FONSI) will be prepared that documents the deciding official's decision whether, and under what terms and conditions, to authorize the construction of BST trail segments on NFS lands.

The Responsible Official may approve an alternative intact, as presented in the EA, or select an alternative that is a combination of elements of various alternatives, including the No-Action Alternative. The Responsible Official must decide either that the impacts of the selected alternative would be less than significant or that an environmental impact statement will be prepared. The Responsible Official must also determine whether the selected alternative is consistent with the WCNF Forest Plan. The WCNF Forest Supervisor is the Responsible Official who will make these decisions.

1.5 Public Involvement

The proposal was provided to the public and other agencies for comment during scoping March 17 to April 17, 2006. The scoping notice and associated maps were (and continue to be) posted on WCNF's website at: www.fs.fed.us/r4/wcnf/projects/proposed.

A public scoping meeting was conducted on April 5, 2006 to gather comments from the public and interested agencies and organizations on the proposed alignment, construction, and use of the extended BST. The public scoping meeting was held from 6:30 to 8:45, at the Whitmore Library located on Fort Union Boulevard in Salt Lake City, Utah. Sixty-six people registered at the meeting.

Some comments were received after the scoping period had officially ended. These comments were also considered and added to the project record. All commentors were added to the tracking/contact list and will be incorporated into future public involvement opportunities. In total, the comments from 354 individuals were collected during scoping. All comments have been archived and will remain in the project record.

A list of issues to address in this EA was developed from comments gathered from the meeting, comments gathered throughout the public scoping process, other agencies, and the interdisciplinary team.

1.6 Issues

Through public scoping and discussion with USFS Resource Specialists, a list of issues for analysis has been developed. All issues raised are considered in terms of potential effects relative to the No-Action and Action Alternatives. The list of potential issues was refined into those dismissed from analysis because they were outside the scope of this project, and those to be retained for in-depth analysis across the range of alternatives. Table 1 presents all of the issues raised during scoping. For a detailed description of why a given issue was retained or dismissed, and a further explanation of each issue/topic, please see the text following the table.

Table 1. Issues Raised During Scoping

Issue	Retain or Dismiss
Vegetation Impact	Retain
Wildlife Impact	Retain
Threatened and Endangered Species and Special Status Species	Retain
Motorized Use	Dismiss
Recreation/Trail Visitor Experience	Retain
Wilderness	Retain
Open Space, Visual Quality and Aesthetics	Retain
Archeological, Cultural, Paleontological, and Historic Resources	Retain
Traffic, Transportation and Parking	Retain
Personal/Individual Health	Dismiss
Surface Water and Hydrology/Flooding	Retain
Trail Design	Dismiss
Geologic and Soil Concerns	Retain
Trail Difficulty	Dismiss
Night Lighting	Dismiss
Need For Trail	Dismiss
Impacts on Private Property Values	Retain
Private Land Feasibility	Dismiss
Funding	Dismiss
Process	Dismiss
Fire	Retain
Private Property Impacts	Retain
Dog Leash Laws	Dismiss

1.6.1 Issues Not Within the Scope of this Analysis

The following issues have been determined to be outside of the scope of analysis. A brief rationale for the dismissal of these issues is given.

Motorized Use

Although motorized trespass on the BST is not a major problem in Salt Lake County, there are concerns for impacts from motorized use and ability to enforce motorized use closure. The entire length of the BST in Salt Lake County would be closed to motorized use. Trail design criterion and cooperative agreements with local law enforcement agencies, as well as policing by the public, would effectively enforce the motorized use closure.

Trail Design

There is concern over the design of the trail, in terms of width of tread, material, and appearance. Trail design is addressed by following existing USFS design standards. The trail design criterion specifies approximate tread widths of 36 inches for non-Wilderness sections of the trail and 24 inches for Wilderness sections. The trail would be constructed by hand and utilize native trail surfaces and would be consistent with USFS trail standards.

Trail Difficulty

Trail users want both easier and more challenging trails. The BST, as noted in the purpose and need, is designed as an urban-wild land interface trail designed to connect urban communities with the adjacent wild lands, primarily on or near the bench of the ancient Lake Bonneville shoreline. The trail is envisioned as a relatively flat and easy trail suitable for all types of users, although the trail could be more steep and rocky in selected areas including canyon crossings and wilderness segments. The trail is designed to an average grade of less than ten percent.

Night Lighting

Concerns were identified regarding impacts to the night sky from lighting. There is no lighting proposed for the BST and any lighting associated with trailhead development would be mitigated through appropriate design.

Need for Trail

Some questioned the need for this trail and stated there were already an adequate number of existing trails in adjacent areas to support the recreational need without the addition of the BST and its related impacts. The WCNF has entered a Memorandum of Understanding with the Bonneville Shoreline Coalition supporting the BST concept with verbiage similar to the direction in its 2003 Revised Forest Plan. The WCNF has helped secure funding for numerous BST land acquisitions and has been a partner in planning and constructing existing sections of the BST. Based on past involvement and Forest Plan direction, continuation of the BST in Salt Lake County is consistent with Forest Plan direction. The State of Utah has also identified the completion of the BST as one of its top priority trails projects.

Trail Decisions on Private Land

Some questioned the reasonableness of pursuing a proposed alignment across sections of private land where the current landowners may be unwilling to sell or grant legal easement across their land. The proposed alignment was developed as a starting point and was based on trail design criteria that was feasible from a construction standpoint and maximized the BST trail and recreation opportunity concepts. The USFS, in its 3/17/06 scoping notice, recognized the private land alignment issues and stated “No trail construction will occur on private land without appropriate authorization from the landowner and local government agency”, and “The environmental analysis for this proposal will include analysis for all sections of the BST,

including non-NFS land, however the USFS has the authority to make decisions only on NFS land sections of the trail. All decisions regarding BST trail construction on private land will be made by the local government agency that has jurisdiction over the lands in question. Those local governments have adopted plans for the BST in their jurisdictions”.

The USFS recognizes private landowners’ rights and has agreed to not build any trail on NFS lands that does not have legal access at both ends and recognizes that some sections of trail (on NFS and private lands) may not be built if access and easement issues are not resolved. However, The USFS believes that it is important to move forward with the BST concept in Salt Lake County and that the proposed alignment provides the best starting point, despite the potential limitation due to private land issues. Please note that trail impacts on private property will be analyzed. Analysis and decisions on the trail on private land segments will be determined by Salt Lake County.

Public Health

The issue of promoting public health and wellness through trail development was raised during scoping. Although a trail may affect individual health in a variety of ways, the related impacts are not considered to be relevant to the environmental effects assessment for this segment of the BST.

Funding

There were questions raised concerning how the construction and maintenance of this project would be funded. Funding of the project will not be taken into consideration during impact assessment. Any trail would be constructed and maintained with a substantial volunteer contribution and would be funded through a combination of Public and Private funds.

Process

Commentors requested that more detailed planning and mapping be made available. It was also mentioned that this proposal would have to go through USFS and affected local governments’ public processes. These concerns are recognized and are taken into consideration during the entire NEPA process, but do not drive analysis, and are therefore dismissed as an issue. Comments also mentioned that watershed ordinances would need to apply, particularly where the trail crosses creeks. And while such concerns are recognized and would be incorporated into the trail, they do not constitute an issue for detailed analysis.

Enforcement of Dog Leash Laws

It is recognized that dog leash law enforcement is relevant, and of concern on regional trails, and will be incorporated into trail operation. Because the issue of dog leash law enforcement is a trail issue in many places, not specifically unique on this proposed segment of the BST, the enforcement of dog leash laws is determined to be beyond the scope of this analysis. Enforcement will be referred to regional law enforcement.

1.6.2 Issues Determined to Be Within the Scope of NEPA Analysis and for the Development of Alternatives

For these issues, analysis will be conducted to determine the potential environmental effects of a range of reasonable alternatives. For each of the issues/topics identified as within the scope of

analysis, direct effects, indirect effects, and cumulative effects will be analyzed under each alternative. Where appropriate, the issues listed here may be combined for analysis.

Vegetation

Concerns were expressed about potential effects of construction and use of the trail on vegetation. Vegetation concerns include effects to existing native vegetation, preserving the vegetative communities along the trail, controlling invasive and non-native plant species and noxious weeds, as well as the potential effects on species at risk including sensitive, threatened, and endangered species.

These issues are analyzed in Section 3.1: Vegetation.

Wildlife

The foothill zone has been identified as providing critical winter habitat for mule deer and other wildlife species. Concerns were expressed about potential effects of construction and use of the trail on wildlife habitat, wildlife migration corridors, and wildlife in general.

There were also concerns about potential effects on management indicator species, sensitive, threatened, and endangered species.

The effects to migratory birds have been identified as an area of analysis.

The potential presence of additional people and domestic dogs in the foothills due to trail development may have impacts on wildlife and will be analyzed.

These issues are analyzed in Section 3.2: Wildlife and Fish Resources.

Recreation

The BST is of major recreational interest to the residents of the Salt Lake Valley, and visitors as well. The existing segments of trail are used for a variety of activities, such as hiking, biking, jogging, running, cross-country skiing, horseback riding, and people recreating with their dogs. Concerns were expressed about potential effects of construction and use of the trail for a variety of recreation-related issues as described below.

Compatibility with BST Concept - There are concerns that the trail meet the principles of the BST concept and the Forest Plan direction including: to provide access to the canyons, streams, mountains, and other features by locating the trail on or near the shoreline or high enough on the slope to provide ready access to public lands; to provide a place where walkers, runners, bicyclists and horse users can experience their recreational pursuits at a distance from automobiles that is both safe and aesthetically pleasing; and to provide an opportunity for quiet and scenic recreational use that is nearby, yet apart from the developed urban area.

User Conflicts and Types of Use - Concerns were expressed about potential safety issues and user conflicts. Types of use (non-motorized: hiking, biking, equestrian and dog use) and potential conflicts and safety issues with the mixing of these uses will need to be analyzed in depth to determine how a trail would best meet the purpose and need for action, and the needs of the community.

Trail Proliferation - There are concerns about the existing user-created trails as well as the potential for additional user-created trails along the proposed trail alignment.

Trail Administration and Maintenance - The proposed alignment crosses USFS and other local government jurisdictions. Based on the multi-jurisdictional nature of the trail alignment and existing and projected budgets for all managing agencies, there is concern about the ability to patrol and effectively manage this trail system's closures and restrictions, as well as responsibilities for trail maintenance.

These issues are analyzed in Section 3.3: Recreation and Visitor Use.

Wilderness

Selected sections of the proposed BST alignment traverse within Designated Wilderness Areas. There is concern for the compatibility and consistency with Wilderness characteristics, regulations, and management objectives, including prohibitions of mechanized equipment (such as bicycles). There is also concern for potential impacts on inventoried roadless areas along the trail alignment.

These issues are analyzed in Section 3.4: Wilderness.

Open Space, Visual Quality, and Aesthetics

Concerns have been raised about the cumulative effects of loss of nearby open space, diminished foothill access, and changes in the character of the landscape that is associated with development that has or continues to occur in these areas. There are concerns about the preservation of open space and encroachment on the foothills, including the potential effects the proposed BST would contribute in addition to the other impacts.

Changes in the viewshed, including its visual character and sense of naturalness, are part of these concerns. There are concerns that construction of the proposed BST would add a new visual impact that would affect the views from many viewpoints in Salt Lake County, as well as views from the foothills into the valley.

These issues are analyzed in Section 3.5: Open Space, Visual Quality, and Aesthetics.

Soils and Erosion

Concerns were raised about the geologic and soil characteristics of the area. Soil erosion must be taken into account in regard to trail construction and use, as well as with rehabilitation of unneeded existing user-created trails. Slopes are steeper in the upper portion of the site and concerns were raised about cutting and filling on the slopes, soil erosion, rolling rocks, and impacts on the hillside.

These issues are analyzed in Section 3.6: Soils and Erosion.

Surface Water Quality and Management

Potential effects to surface- and ground-water quality were raised as concerns including; management of storm water runoff, maintaining watershed water quality standards, and complying with Salt Lake City and Sandy City watershed requirements. While domestic animals are prohibited from these designated watersheds, there are also concerns for potential impacts to water quality from domestic animal and human waste along all sections of the BST.

These issues are analyzed in Section 3.7: Water Resources.

Archaeological, Cultural, and Historic Resources

Concerns were raised about the potential effects to archaeological, cultural, and historical resources. There are concerns that there may be resources that are buried or undetectable from an examination of the surface.

These issues are analyzed in Section 3.8: Archaeological, Cultural, and Historic Resources.

Fire

There is concern as to the effects this trail may have on wildfire, and suggestions that an increase of humans on a corridor such as this may increase the occurrence of human-caused fires. Soil disturbances in these soil types may invite invasion by highly adaptive annual plant species and could increase the danger and frequency of fire.

Urban trails similar to the proposed BST may also serve to reduce fire hazards by improving access for fire suppression and creating a firebreak. Analysis of fire (and flooding) impacts will be addressed.

These issues are analyzed in Section 3.9: Fire.

Private Property Impacts

There are concerns that access to and use of the trails and space may affect neighboring property owners and residents by reducing their sense of privacy and security, increasing trespass and vandalism, and increasing potential conflicts among recreational users and nearby residents, including conflicts caused by dogs that are allowed to run free contrary to on-leash regulations. The potential impact of the trail on private property values will also be examined.

These issues are analyzed in Section 3.10: Socio-Economic Resources.

Traffic, Transportation, and Parking

There are concerns that the BST will increase traffic-related issues in and around trail access points. Concerns such as vandalism, trash, increased congestion, access to and availability of mass transit for users, parking for trail users, and the effect these would have on nearby property owners and residents, will be analyzed.

These issues are analyzed in Section 3.10: Socio-Economic Resources and to some extent in Section 3.3: Recreation and Visitor Use.

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2.0 Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the BST project. Alternatives include a No-Action Alternative and two Action Alternatives. A description and detailed maps of each alternative considered is included.

This chapter also presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for choice among options by the decisionmaker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social, and economic effects of implementing each alternative.

The Action Alternatives were developed based upon feasible trail alignments for construction and operation within the trail corridor. Development of alternatives also recognized identified issues and approaches to addressing them. Alternative components and mitigating measures reflect input from the USFS, the Interdisciplinary Team, the consulting team, and public scoping.

Each alternative is described below and is accompanied by a map. The maps use a consistent terminology that designates different types of trail. This terminology is used throughout the document and key terms are defined below.

Proposed trail - trail that is not existing, may be located on private or public land, may or may not have legal access

Existing trail - trail or route that exists on the ground and has legal access

Existing trail without legal access - trail or route that physically exists on the ground on private property that has no legal access.

Access point (existing and proposed) - point of access to existing or proposed trail segments, generally undeveloped roadside parking with no additional facilities. May or may not have legal access.

Trailhead (existing and proposed) - developed off-road parking facility with trail information, may or may not have restroom facilities.

2.1 Alternatives

2.1.1 Alternative 1: No-Action

Under the No-Action Alternative, no new trail would be built on NFS lands. The current state of existing trails and roadways would remain. This applies to both the developed urban areas and the public and private Wilderness lands.

The existing trail network is a combination of city streets and trail segments on both public and private land. A variety of routes through the neighborhood streets are available and are used by many people, primarily joggers and bikers. The Wasatch bikeway is an identified bike route along Wasatch Boulevard.

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, and trails are not generally constructed, managed, or maintained, often resulting in 'dead ends'. The existing trail segments traverse both private and public land and in many places constitute trespasses or otherwise illegitimate trail segments.

It is not possible to traverse the distance from Parley's Canyon to Little Cottonwood Canyon on existing trail segments without crossing multiple trail-less segments and/or crossing private land.

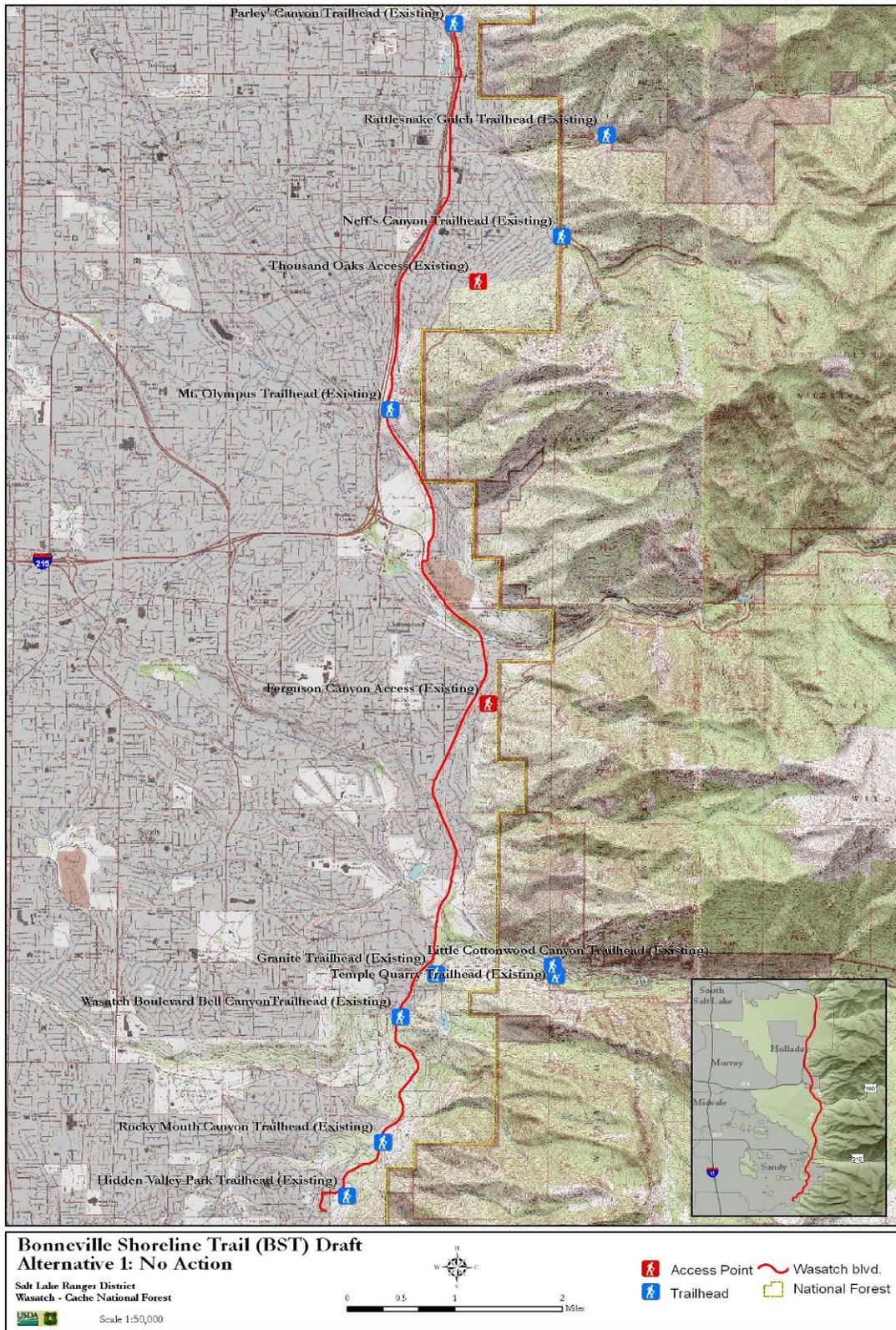


Figure 2. No-Action Alternative.

2.1.2 Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Alternative 2 is the proposed alignment for the BST from Parley’s Canyon to Hidden Valley Park in Sandy. This alignment uses Salt Lake County’s Alignment Plan as a blueprint. The BST between these two points is approximately 27 miles long, with approximately 11 miles occurring on NFS lands (see table 2).

Table 2. Project-wide Summary of Alternative 2.

Total Miles	National Forest Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
27.05	11	1	6	9	3	Beginning: 4948 End: 5238 Highest: 6145 Lowest: 4948

There are a number of existing and proposed trailheads and access points along this alignment. Trailheads and access points are summarized in table 2 and are used as termini for trail segments. For ease of analysis and comparison between Action Alternatives, the project area was divided into four segments:

1. Parley’s Canyon to Mount Olympus Trailhead
2. Mount Olympus Trailhead to Big Cottonwood Canyon
3. Big Cottonwood Canyon to Little Cottonwood Canyon
4. Little Cottonwood Canyon to Hidden Valley Park

A map and a description of each segment are provided below.

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

This segment of the BST would begin at the crossing of Interstate 80 at the mouth of Parley’s Canyon and end where the BST intercepts the Mount Olympus Trailhead. This segment is briefly summarized in table 3. Trailheads, access points, and other features of this segment are described following the table.

Table 3. Summary of Segment 1, Alternative 2.

Total Miles	National Forest Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
10.18	5.42	0	2	2	2	Beginning: 4948 End: 5239 Highest: 6145 Lowest: 4948

Description

Parley’s Canyon to Mill Creek Canyon

This would section begin at 4948 feet at the Parley’s Canyon Trailhead, and then climb the hill east of the trailhead, following a power line road, and then turn south to climb gradually to the

Bonneville Bench. An existing two-track road follows the bench to abandoned rock quarries. Climbing into the southernmost quarry on a branch of the road, the BST would then switchback up to the ridge above the quarries. Following a local path, the BST would go east into an unnamed canyon and climb again onto the ridge east of the Eastwood Hills water tank. Climbing east up the face of the ridge, the BST would turn south again into Crestwood Gulch. Crossing Crestwood Gulch, the BST would turn west and climb to the end of the north ridgeline of Mill Creek Canyon.

On the point of the Mill Creek Ridge, the BST would intersect with the end of the existing Pipeline Trail, at the location of the abandoned aqueduct penstock. Turning east again, the BST would follow the Pipeline Trail into Mill Creek Canyon. Intersecting with the Rattlesnake Gulch Trail, the BST would climb to the top of Rattlesnake Gulch to approximately 5981 feet and then descend to the Rattlesnake Gulch Trailhead in Mill Creek Canyon.

Mill Creek Canyon to Neffs Canyon

At the west end of the Rattlesnake Gulch trailhead parking lot, the BST would follow a power line west, paralleling Mill Creek Road to a bridge over Mill Creek. Elevation of the Mill Creek Bridge is approximately 5215 feet. This relatively new bridge has striped bicycle lanes on both sides, and would be the site of the pedestrian crossing from the north side of the creek to the south side.

The BST would climb steeply out of Mill Creek Canyon across the talus of the south wall of the canyon, using major rock outcroppings as a series of landings and reaching a high point of 5807 feet. It would cross the ridge 400 vertical feet above Olympus Hills development on the Bonneville Bench, and follow a long, relatively level, side-hill route descending to 5634 feet at the existing Neffs Canyon trailhead.

The terminus of the southbound route at Neffs Canyon would pass between development and the Mt. Olympus Wilderness managed by the USFS. Total mileage of this section would be approximately 1.71 miles.

Neffs Canyon to Mount Olympus Trail

Access would be provided to the trail route at the Neffs Canyon Trailhead at approximately 5634 feet. South of the trailhead in Mount Olympus Cove, existing housing development occurs at high elevations, crowding very steep slopes, and adjoins USFS Wilderness boundaries. In order to gain elevation and pass well above development on reasonable terrain, the trail must pass through a corner of the Mount Olympus Wilderness on the south ridge of Neffs Canyon. The BST would follow the Neffs Canyon water tank road to its intersection with Neffs Canyon Creek, and then cross the south face of the canyon at a gentle contour grade.

The BST would then begin a long southward traverse across the west-facing slope to a dry drainage, around another point, and into another dry drainage before reaching a prominent rock outcropping. The prominent rock is about 300 feet up a very steep slope above a water tank in the development below.

From the prominent rock outcropping, the BST would continue to climb to find a crossing of an unnamed canyon and high, narrow ridge to the south. At 6145 feet this would be the highest point on the proposed route between Parley's Canyon and Little Cottonwood Canyon.

Southbound the BST would begin a descent into a broad bowl characterized by boulder ridges covered with tall, dense, oak forest. The BST would descend to connect with the top of the “Z” trail. The “Z” trail is an old mine road that climbs up Mount Olympus in three long grades connected by two switchbacks. The BST would descend the “Z” from the upper terminus to a point at about 5640 feet on the lowest grade below the switchbacks.

From the “Z” Trail, the BST would go south along a steep side slope following a dedicated trail easement, until it reaches the steep slopes above Mile High Drive adjacent to the canyon on the USFS boundary. The BST would begin a switchback descent of the steep west-facing slope to reach an old mine road. Following one leg of the switchback road west, the BST would turn south and east into the canyon and enters the USFS boundary. It would continue to descend southwesterly across a side slope, and turn northwesterly to switchback down to Mile High Drive. A corner of the USFS boundary crosses the south end of Mile High Drive creating a wedge of public land where the Bonneville Bench skirts the lower slopes of Mount Olympus.

There is a private drive extending from the end of Mile High Drive to access two homes on the bench. This drive crosses NFS lands and is authorized under a USFS Special Use Permit. The trail BST would use this property corner to drop over the edge of the bench and access a way around and below the homes. On the bench south of the homes, the BST would join an existing path at elevation 5151 feet, and follow the path southward. It would then connect with a short section of the Mount Olympus Trail at approximately 5239 feet.

Trailheads

Mount Olympus Trailhead, described under Segment 2 would also provide access to this segment of the BST.

- **Parley’s Canyon Trailhead (Existing):** Located at the north end of Wasatch Boulevard, south of the bicycle/pedestrian bridge crossings of Interstate 80, this small, developed park offers paved parking for 15 cars, drinking water, and a picnic table. It would serve the Interstate-80 crossing, access to the bicycle/pedestrian tunnel under Interstate-215 into Parley’s Historic Nature Park, and the undeveloped southbound Parley’s to Mill Creek BST segment.
- **Neffs Canyon Trailhead (USFS, Existing):** The USFS has a paved lot at the end of White Way at the mouth of Neffs Canyon. The lot is not marked with spaces, but could serve 20 cars. The lot is shared with an occasional semi tanker truck that loads at the Olympic Water storage tank next to the trailhead. Both the Mill Creek to Neffs Canyon and the Neffs Canyon to Mile High Drive segments are served by this trailhead. A short access trail from the trailhead intersects the BST route.
- **Rattlesnake Gulch Trailhead (USFS, Existing):** A gravel lot for about 10 cars is available on the shoulder of Mill Creek Canyon Road. The lot is on Boy Scouts of America property and serves as a trailhead for the Rattlesnake Gulch Trail. The USFS maintains the trailhead. There are no facilities at the trailhead, other than an information kiosk. This trailhead serves both the Parley’s to Mill Creek BST segment and the Mill Creek to Neffs Canyon BST segment. It also serves bike use.
- **Mile High Drive Trailhead (USFS, Proposed):** Parking development is proposed on NFS land at the end of Mile High Drive, where the street becomes an access road

permitted by USFS to private residences on the Bonneville Bench farther south. A trailhead at this point would serve both the Neffs Canyon to Mile High Drive BST segment and the Mile High Drive to Heughs Canyon Segment. Conceptually, the parking lot would accommodate up to 10 vehicles.

Access Points

- **Water Tank Access (Proposed):** A partially paved lane leads from Teton Drive to the water tank at the end of “Mexican Ridge” within the Parley’s to Mill Creek section (see below). The road becomes a primitive footpath above the water tank and intersects the BST route on top of the ridge. Parking on the street would be marked near the water tank access road and limited to two vehicles.
- **Thousand Oaks Cul-de-sac Access (Existing):** At the end of Thousand Oaks Drive, a cul-de-sac is located in front of a gate to a gated community. An existing access trail climbs up a steep slope to intersect the lower leg of the “Z” Trail, which climbs up to the BST route. Parking would be limited to four cars and marked to prevent interference with driveways and the gated community access road. The Neffs Canyon to Mile High Drive segment of the BST would be accessed at about its mid-point by the “Z” Trail.

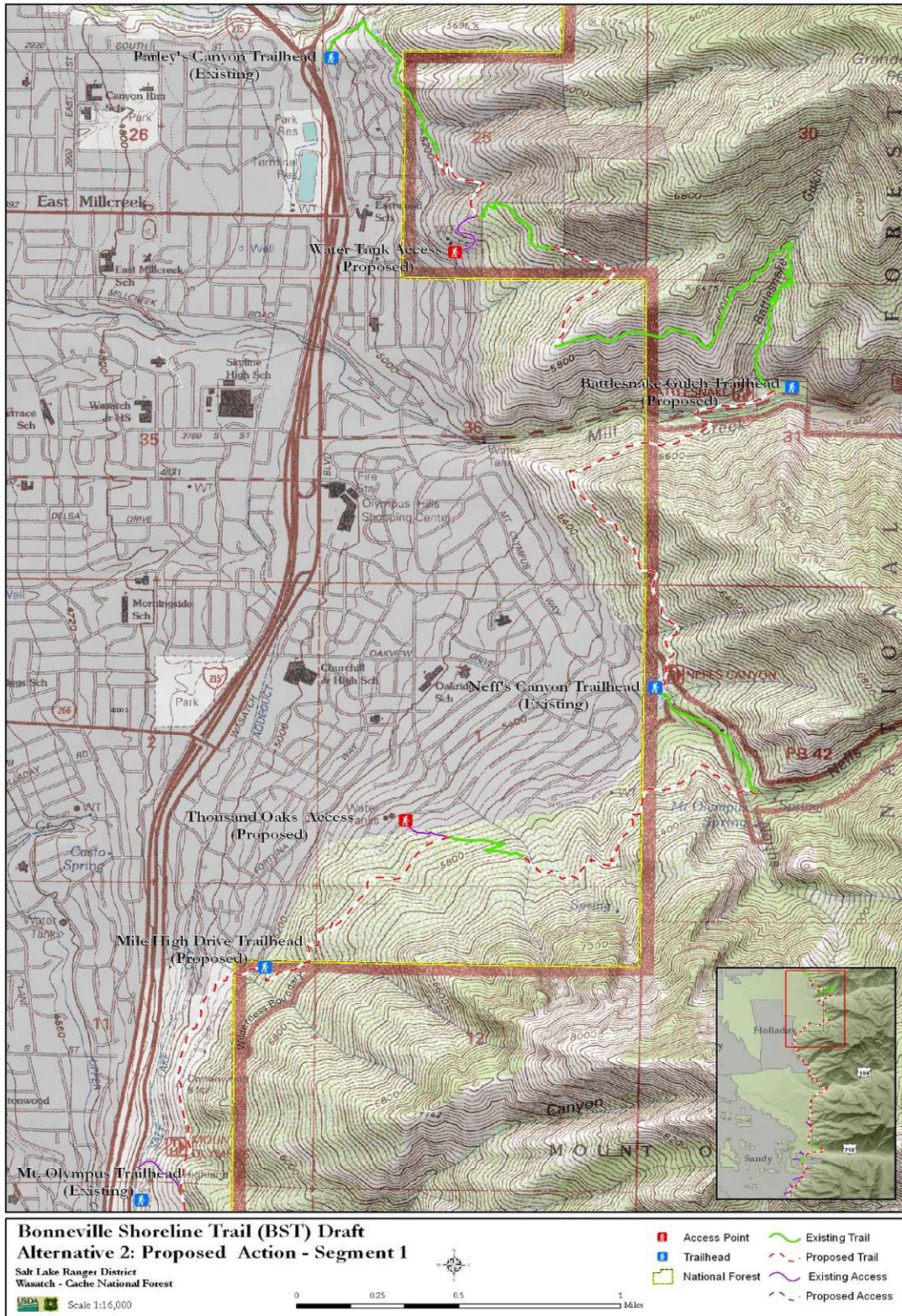


Figure 3. Alternative 2, Segment 1.

Segment 2: Mount Olympus Trail Junction to Big Cottonwood Canyon

This segment of the BST would begin at the junction with Mount Olympus trail and continue to Big Cottonwood Canyon. This segment is briefly summarized in table 4. Trailheads, access points, and other features of this segment are described following the table.

Table 4. Summary of Segment 2, Alternative 2.

Total Miles	Forest Service Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
4.26`	2.6	0	1	1	0	Beginning: 5239 End: 5141 Highest: 5647 Lowest: 5141

Description

Mount Olympus Trail Junction to Heughs Canyon

This segment of the BST would begin at 5239 feet at the Mount Olympus trail junction. It would descend in Heughs Canyon to elevation 5161 feet, before climbing to cross the creek at elevation 5217. This is the most level section of the trail between Parley's Canyon and Hidden Valley Park in Sandy. The BST would cross the corner of the Mount Olympus Wilderness between Tolcats Canyon and the first rock outcropping on the southwest-facing slope of Heughs Canyon.

Descending westward on the Mount Olympus Trail to elevation 5154 feet, the BST would turn south on the level bench again to the mouth of Tolcats Canyon, where it would then follow the Bonneville Bench into Tolcats Canyon and around the next ridge to the north slope of Heughs Canyon. The BST would, following contours, reach the creek in Heughs Canyon where rock cliffs close in on a footpath that follows the stream.

Heughs Canyon to Big Cottonwood Canyon

Beginning at a crossing of the creek in Heughs Canyon that is approximately on the USFS boundary, the BST would start at 5217 feet and climb to benches above the Canyon Cove development to reach Dry Hollow. From the north ridge of Dry Hollow at about 5561 feet, it would descend across a rocky cliff face to the bottom of Dry Hollow at 5400 feet and climb the steep south ridge to approximately 5623 feet. Coming in and out of Dry Hollow, the proposed alignment traverses the Mount Olympus Wilderness. Distance from Heughs Canyon to south ridge of Dry Hollow is approximately 1.4 miles.

From the south ridge of Dry Hollow, the BST would then climb to 5647 feet, staying high above the gun club firing range located on the Bonneville Bench at the mouth of Big Cottonwood Canyon. Staying on high contours, the BST would connect to the west end of the abandoned Granite Aqueduct before descending to the power line corridor that enters Big Cottonwood Canyon. The power line access leads to Highway 190. Crossing the highway and following the south shoulder for a short distance east, the BST would reach an existing bridge over Big Cottonwood Creek into the abandoned USFS Oak Ridge Picnic Area that would serve as a trailhead. The distance from the south ridge of Dry Hollow to the Oak Ridge Trailhead is 1.3 miles.

Trailheads

The proposed Oakridge Trailhead, described under Segment 3, would also provide access to this segment of the BST.

- **Mount Olympus Trailhead (USFS, Existing):** This trailhead is a paved lot for 10 cars on the aqueduct bench beside Wasatch Boulevard. The steep Mount Olympus trail climbs the rocky bluff here and intersects the BST route at the Bonneville Bench at the midpoint of the Mile High Drive to Heughs Canyon BST segment.

Access Points

- **Heughs Canyon Access (Proposed):** On-street parking would be marked for five cars on Canyon Cove Drive and a foot trail right-of-way obtained on Heughs Canyon Circle to connect with the neighborhood trail along Heughs Creek. This is an important point of access, because of distance between access points, for the Mile High Drive to Heughs Canyon section and the Heughs Canyon to Big Cottonwood Canyon section. The access trail would also serve walk-in neighborhood use to these hiking-only sections.

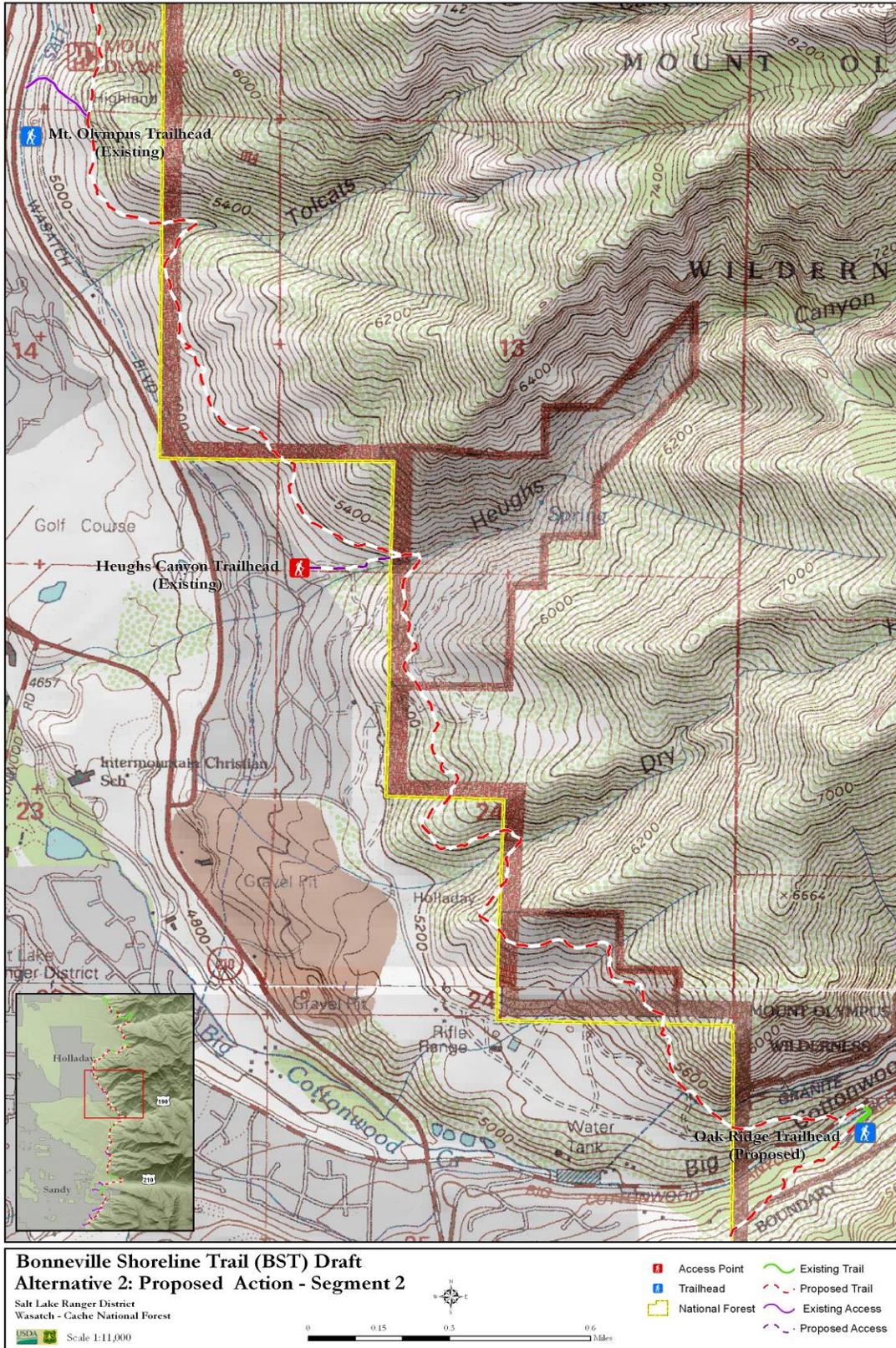


Figure 4. Alternative 2, Segment 2.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

This segment of the BST would begin at Big Cottonwood Canyon and end at Little Cottonwood Canyon. This segment is briefly summarized in table 5. Trailheads, access points, and logical sections of this segment are described following the table.

Table 5. Summary of Segment 3, Alternative 2.

Total Miles	Forest Service Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
5.51	1.73	1	1	0	1	Beginning: 5161 End: 5487 Highest: 5660 Lowest: 5161

Description

Big Cottonwood to Deaf Smith Canyon

From the proposed Oak Ridge Trailhead, the BST would climb west and south to an old aqueduct and to a power line to reach a bench in the mouth of Big Cottonwood Canyon. After traveling the narrow bench, it would climb again to go above the Prospector Hills development, crossing open steep slopes to the Bonneville Bench in a corner of USFS property and the Twin Peaks Wilderness beyond the mouth of the canyon. It would turn south again to cross the mouth of Ferguson Canyon and connect with the developed Ferguson Canyon Trail. The route from Oak Ridge Trailhead to the point where the trail would leave Ferguson Canyon water tank road is about 1.44 miles.

Following the trail toward its trailhead below the Ferguson Canyon water tank, the BST would descend the water tank road about one tenth of a mile. Diverting from the road, the BST would cross open west-facing slopes and small canyons, staying well above the Golden Hills development and avoiding developable areas of this private property, going south to the mouth of Deaf Smith Canyon. The trail must stay at a high elevation above the development in the mouth of Deaf Smith Canyon, until descending to cross Deaf Smith Creek west of its forks, approximately on the USFS boundary. The distance from the Ferguson Canyon water tank road to the crossing of Deaf Smith Creek is about 1.9 miles.

Deaf Smith Canyon to Little Cottonwood Canyon

This segment would begin at elevation 5400 feet at the Deaf Smith Creek crossing. After crossing Deaf Smith Canyon Creek below its forks, it would climb to follow contours across west-facing slopes. The BST would turn east into a steep unnamed canyon, still following contours. Crossing the dry drainage of the canyon, it would climb steadily up to the south ridge of the canyon and reach 5586 feet. It would then intersect an old mine road. From this point the trail would begin a long steady descent past abandoned mine tailings and through boulder fields to reach a power line.

Crossing under the power line, the BST would descend to elevation 5338 feet and intersect an aqueduct access leading east into Little Cottonwood Canyon. The BST would use this unimproved road, paralleling Highway 210, to enter the canyon. It would then depart from the road to detour to the north around one private property before reaching the park-and-ride lot on the north side of Highway 210 at an elevation of 5418 feet.

Trailheads

The Little Cottonwood Canyon Trailhead described under Segment 4 would provide access to this segment.

- **Oak Ridge Trailhead (USFS, Proposed):** A bridge from Big Cottonwood Canyon Road across the creek into this abandoned USFS picnic area would serve as the location for a trailhead. The BST routes for the Heughs Canyon to Big Cottonwood Canyon and Big Cottonwood Canyon to Deaf Smith Canyon segments intersect at this point. Conceptually, a parking lot could be developed here for up to 10 vehicles.

Access Points

- **Ferguson Canyon Access (Existing):** On-street parking is located on Timberline Drive at the intersection of the dirt access road to the Ferguson Canyon water tank. Signing and marked spaces for five cars would be improved at this location. This access already serves the Ferguson Canyon Trail and would serve the midpoint of the Big Cottonwood Canyon to Deaf Smith Canyon BST segment.
- **Golden Oaks Access (Proposed):** Golden Oaks Drive is a one-block dead-end street. Marked on-street parking for four cars would serve an access trail climbing up to the Big Cottonwood Canyon to Deaf Smith Canyon segment near the entry to Deaf Smith Canyon. This access would also serve the Deaf Smith Canyon to Little Cottonwood Canyon BST segment.

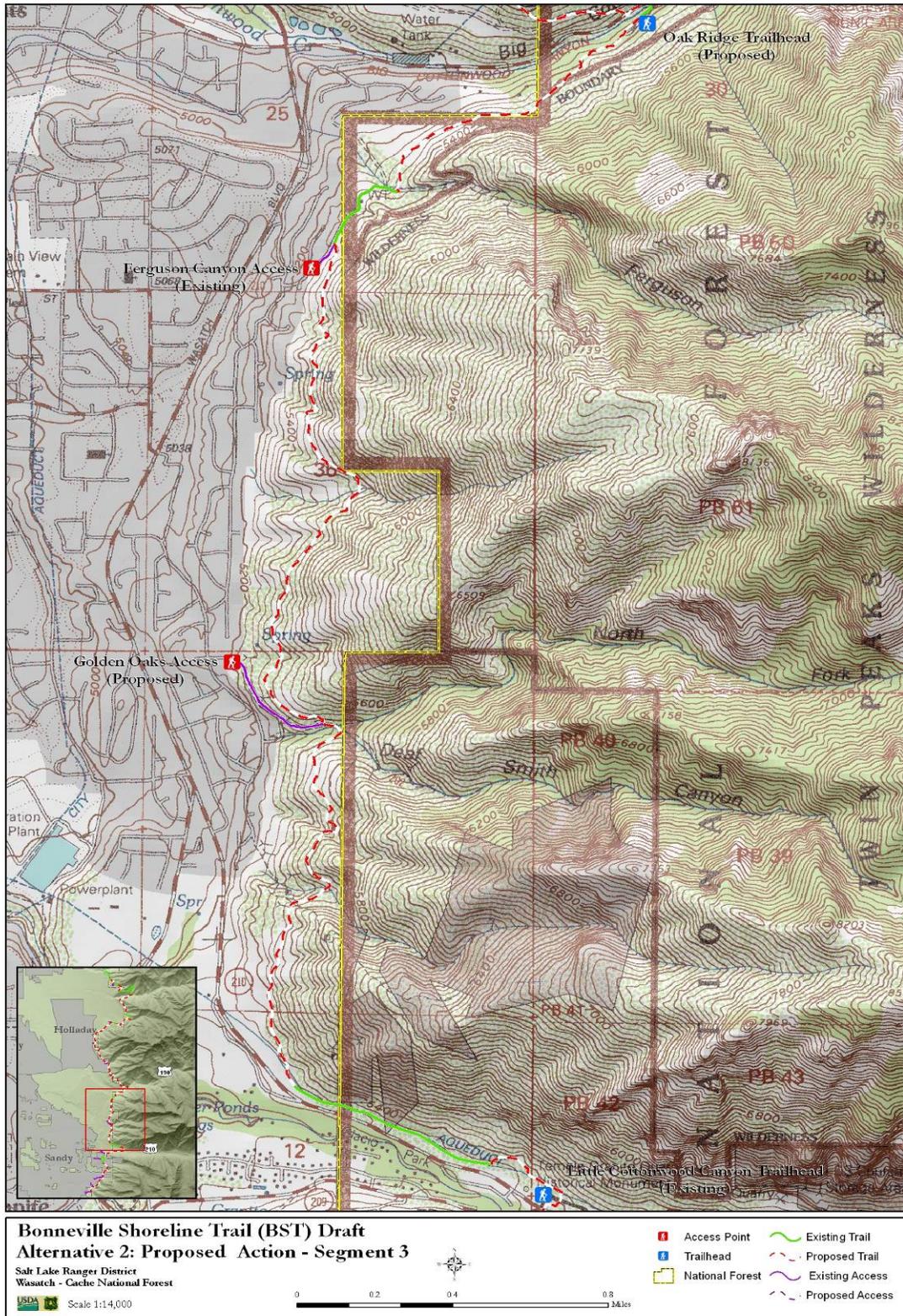


Figure 5. Alternative 2, Segment 3.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

This segment of the BST would begin at Little Cottonwood Canyon and end at Hidden Valley Park Trailhead. This segment is briefly summarized in table 6. Trailheads, access points, and sections of this segment are described following the table.

Table 6. Summary of Segment 4, Alternative 2.

Total Miles	Forest Service Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
7.09	1.25	0	1	6	0	Beginning: 5238 End: 5268 Highest: 5840 Lowest: 5238

Description

Little Cottonwood Canyon to South Fork Dry Canyon

This segment would begin at elevation 5238 at the Little Cottonwood Canyon Trailhead in Little Cottonwood Canyon. The BST would cross Little Cottonwood Creek near the west end of the trailhead parking lot. It would then climb the slope westward to go above residential development on the south face of the canyon. Once above development, it would parallel the USFS boundary westward and cross a small segment of the Lone Peak Wilderness, traverse the slope above the Sandy City water tank, and, following contours, reach the long moraine ridge extending from the mouth of Little Cottonwood Canyon. The BST would follow this ridge to intersect with the Bells Canyon Trail where it crosses the ridge. The Granite Trailhead parking lot at 3370 East Little Cottonwood Road is at the toe of the ridge a short distance north. The existing Boulders trailhead, located at 10235 Wasatch Boulevard, also provides access to the proposed route at the western side of Bells Reservoir.

The BST would follow the existing Bell Canyon Trail from the moraine ridge to Bell Canyon Reservoir, and pass the reservoir on newly constructed trail east of the lake. Leaving the loop trail around Bell Canyon Reservoir at its southernmost point, it would go through a rock cut to the old penstock pad south of the reservoir. Turning east from this point, it would cross brushy slopes into the Dry Creek Drainage well above Seven Springs development.

Crossing the north fork of Dry Creek, the BST would maintain a relatively level contour and go below the cliffs at the mouth of Middle Fork Canyon. Crossing Middle Fork, it would climb to west-facing slopes and cross at a high contour to the ridge above South Fork. It would turn east into South Fork Canyon and descend steadily to cross the creek at an elevation of 5469 feet. It would then climb a steep short slope to reach the broad, gently sloping basin above the South Fork water tank. The route intersects an existing local path that climbs eastward up South Fork Canyon from the water tank road.

South Fork Dry Creek to Hidden Valley Park

The BST would cross the water tank path and climb steep side slopes to go around a point of the mountain at a high contour on a narrow bench. Crossing Dry Gulch, it would climb to elevation 5840 feet south of Dry Gulch and reach the steep west-facing slopes north of Rocky Mouth Canyon. At Dry Gulch and again at Rocky Mouth Canyon, it would cross two sections of Lone

Peak Wilderness. The route must descend in a series of long switchbacks to the trail at the mouth of the canyon at elevation 5320 feet.

The BST would cross the existing access trail from Rocky Mouth Trailhead on Wasatch Boulevard and descend into Rocky Mouth Creek. Crossing the creek at 5303 feet, the BST would require switchbacks again to reach a narrow bench leading south to Big Willow Canyon, staying above anticipated housing development. Turning east into Big Willow Canyon, the BST would intersect a water company access road along the creek. The BST would follow this road down to the gate, where the road intersects the developed BST on the Bonneville Bench at Hidden Valley Park at elevation 5268 feet.

Trailheads

- **Little Cottonwood Canyon Trailhead (Existing):** The BST route crosses both the Little Cottonwood Canyon Park and Ride Lot and the access road into the USFS Temple Quarry Trailhead. Both of these lots would serve the Deaf Smith Canyon to Little Cottonwood segment and the Little Cottonwood Canyon to South Dry Fork Creek segment. The Temple Quarry Trailhead also serves a trail going up Little Cottonwood Canyon.
- **Granite Trailhead (Existing):** Sandy City has a trailhead located on Little Cottonwood road for about 15 cars serving its north access trail to Bells Canyon. The trailhead has a paved lot and bathroom facilities. The Little Cottonwood Canyon to South Fork Dry Creek BST segment intersects the Sandy City Bells Canyon Trail and follows it to Bells Canyon Reservoir.
- **Bells Canyon Trailhead (Existing):** Sandy City has a paved trailhead at 10235 South Wasatch Boulevard serving its west access trail to Bells Canyon. The Little Cottonwood Canyon to South Fork Dry Creek BST segment is also served by this access.
- **Rocky Mouth Canyon Trailhead (Existing):** The established Sandy City five-car gravel lot off Wasatch Boulevard provides access to sidewalks on Eagle View Drive and to the Rocky Mouth Canyon Trail, which intersects the South Fork Dry Creek to Hidden Valley Park BST segment at about the midpoint.
- **Hidden Valley Park Trailhead (Existing):** Parking, restrooms, water, and paved trails within Hidden Valley Park provide trailhead amenities and access to the Big Willow Canyon water company road that intersect the BST. This location would serve the South Fork Dry Creek to Hidden Valley Park segment. This is a Sandy City Trailhead.

Access Points

- **South Fork Access (Proposed):** Parking at the gate to the paved water-tank access road in the mouth of South Fork Dry Creek Canyon would serve the Little Cottonwood to South Dry Fork Creek BST segment and the South Fork Dry Creek to Hidden Valley Park BST segment.

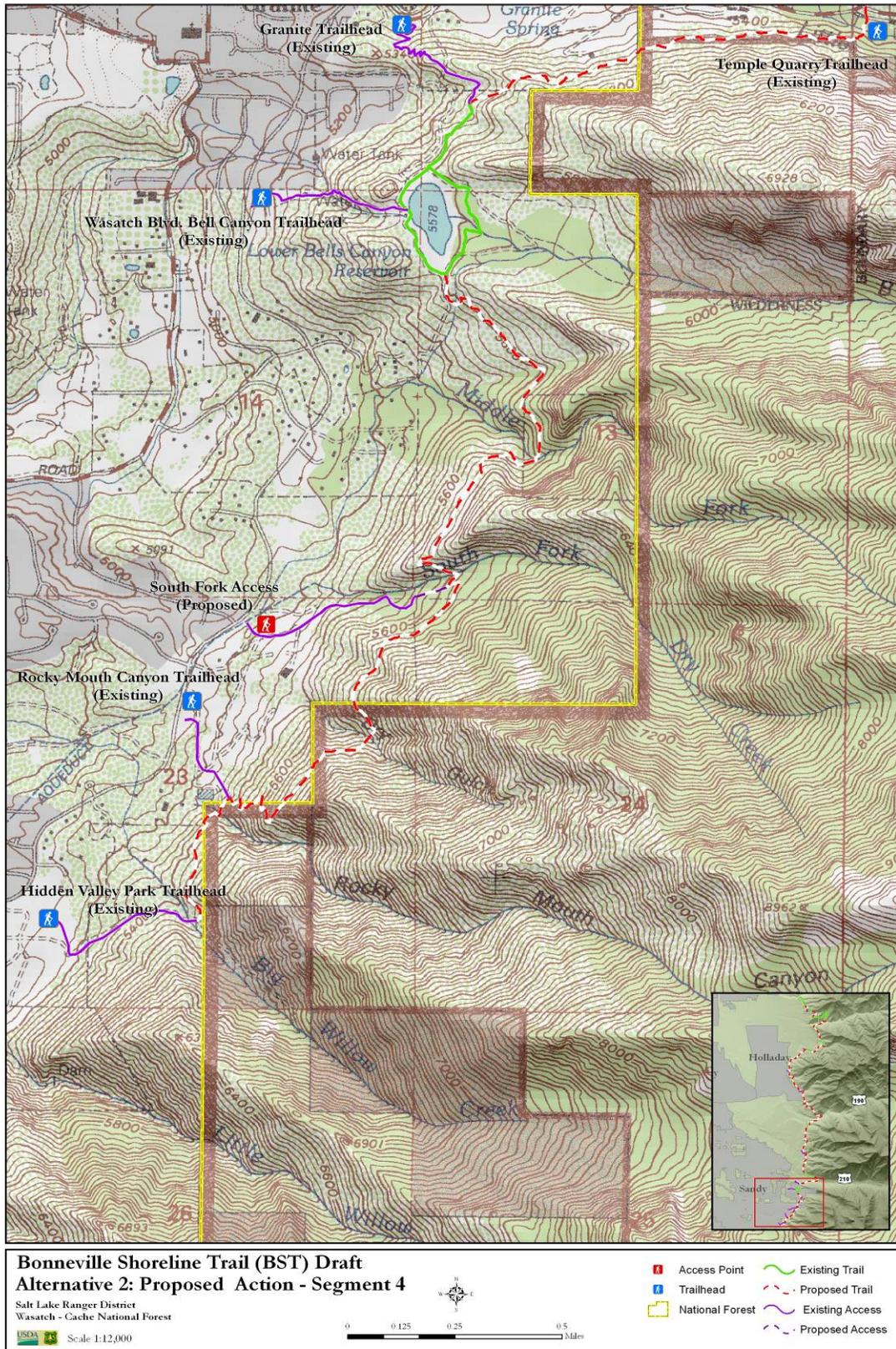


Figure 6. Alternative 2, Segment 4.

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

Alternative 3 is a proposed alignment for the BST beginning at Parley's Canyon and ending at Hidden Valley Park. This alternative was developed based upon comments received during scoping. Public comments received requested that an alternative be developed that included an alignment not on private land. The Alternative 3 alignment would follow the same alignment as Alternative 2 for Segments 3 and 4. All elements of Segments 3 and 4 as described under Alternative 2 would remain the same.

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Under Alternative 3, the alignment for Segment 1 would differ only slightly from the description of Alternative 2, Segment 1. This alignment is summarized in table 7 and can be seen in figure 7.

Table 7. Summary of Segment 1, Alternative 3.

Total Miles	Forest Service Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
9.94	5.41	0	2	2	2	Beginning: 4948 End: 5239 Highest: 6145 Lowest: 4948

Description

Parley's Canyon to Mill Creek Canyon

This section would begin at 4948 feet at the Parley's Canyon Trailhead and then climb the hill east of the trailhead, following a power line road, and then turn south to climb gradually to the Bonneville Bench. An existing two-track road follows the bench to abandoned rock quarries. Climbing into the southernmost quarry on a branch of the road, the BST would then switchback up to the ridge above the quarries. Following a local path, the BST would go east into an unnamed canyon and climb again onto the ridge east of the Eastwood Hills water tank. Climbing east up the face of the ridge, it would turn south again into Crestwood Gulch. Crossing Crestwood Gulch, it would turn west and climb to the end of the north ridgeline of Mill Creek Canyon.

On the point of the Mill Creek Ridge, the BST would intersect with the end of the existing Pipeline Trail, at the location of the abandoned aqueduct penstock. Turning east again, it would follow the Pipeline Trail into Mill Creek Canyon. Intersecting with the Rattlesnake Gulch Trail, it would climb to the top of Rattlesnake Gulch to approximately 5981 feet and then descend to the Rattlesnake Gulch Trailhead in Mill Creek Canyon.

Mill Creek Canyon to Neffs Canyon

At the west end of the Rattlesnake Gulch trailhead parking lot, the BST would follow a power line west, paralleling Mill Creek Road to a bridge over Mill Creek. Elevation of the Mill Creek Bridge is approximately 5215 feet. This relatively new bridge has striped bicycle lanes on both sides, and is well located for a safe pedestrian crossing from the north side of the creek to the south side.

The BST would climb steeply out of Mill Creek Canyon across the talus of the south wall of the canyon, using major rock outcroppings as a series of landings and reaching a high point of 5807 feet. It would cross the ridge 400 vertical feet above Olympus Hills development on the Bonneville Bench, and follow a long, relatively level, side-hill route descending to 5634 feet and the covered reservoir and trailhead parking lot in the mouth of Neffs Canyon.

The Mill Creek Canyon part of this southbound route has high difficulty and should be designated hiking only. The terminus of the southbound route at Neffs Canyon would pass between development and designated Wilderness managed by the USFS.

Neffs Canyon to Mount Olympus Trail

Access would be provided to the trail route at the Neffs Canyon Trailhead at approximately 5634 feet. South of the trailhead in Mount Olympus Cove, existing housing development occurs at high elevations, crowding very steep slopes, and adjoins USFS Wilderness boundaries. In order to gain elevation and pass well above development on reasonable terrain, the trail must pass through a corner of Wilderness on the south ridge of Neffs Canyon. The easiest climb and the least disruptive route would follow the Neffs Canyon water tank road to its intersection with Neffs Canyon Creek, and then cross the south face of the canyon at a gentle contour grade.

The BST would then begin a long southward traverse across the west-facing slope to a dry drainage, around another point, and into another dry drainage before reaching a prominent rock outcropping. The prominent rock is about 300 feet up a very steep slope above a water tank in the development below.

From the prominent rock outcropping, the BST would continue to climb to find a crossing of an unnamed canyon and high, narrow ridge to the south. At 6145 feet this would be the highest point on the proposed route between Parley's Canyon and Little Cottonwood Canyon.

Southbound the BST would begin a descent into a broad bowl characterized by boulder ridges covered with tall, dense, oak forest. It would descend to connect with the top of the "Z" trail. The "Z" trail is an old mine road that climbs up Mount Olympus in three long grades connected by two switchbacks. The BST would descend the "Z" from the upper terminus to a point at about 5640 feet on the lowest grade below the switchbacks.

From the "Z" Trail, the BST would go south along a steep side slope following a dedicated trail easement, until reaching the steep slopes above Mile High Drive adjacent to the canyon on the USFS boundary. Rather than beginning a switchback descent of the steep west-facing slope to reach an old mine road as described in Alternative 2, Segment 1, the BST would continue southwesterly through the NFS lands. The BST would continue southwesterly across the side slope, and turn northwesterly to switchback down to Mile High Drive. A corner of the USFS boundary would cross the south end of Mile High Drive creating a wedge of public land where the Bonneville Bench skirts the lower slopes of Mount Olympus.

There is a private drive extending from the end of Mile High Drive to access two homes on the bench. This drive exists under a USFS Special Use Permit. The BST would use this property corner to drop over the edge of the bench and access a way around and below the homes. On the bench south of the homes, the BST would join an existing path at elevation 5151 feet, and follow the path southward. It would then connect with a short section of the Mount Olympus Trail at approximately 5239 feet.

Trailheads and Access Points

Same as under Alternative 2, Segment 1.

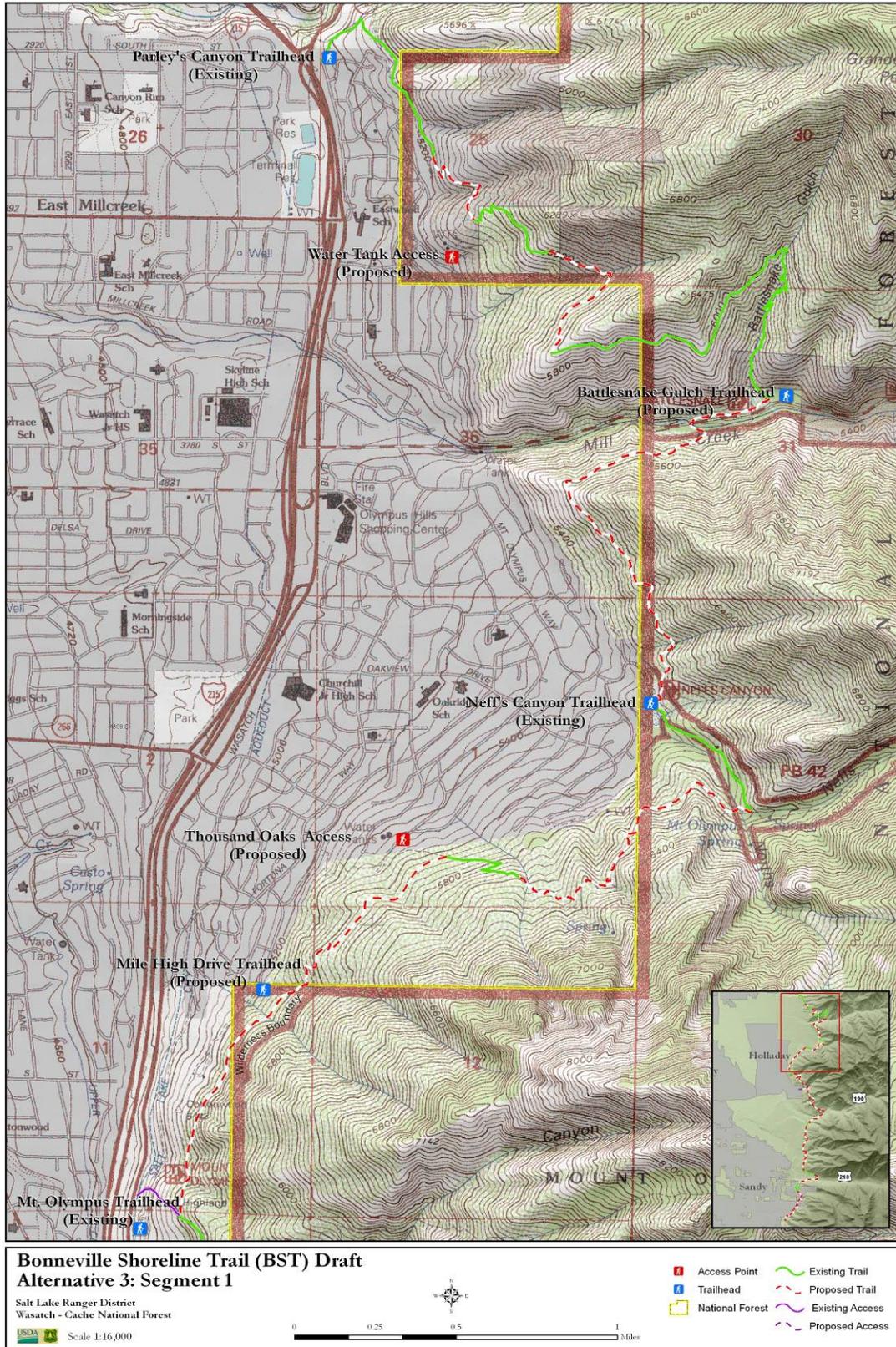


Figure 7. Alternative 3, Segment 1.

Segment 2: Mount Olympus Trail Junction to Big Cottonwood Canyon

Under Alternative 3, the alignment for Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon would be located entirely on NFS land. This alignment is summarized in table 8 and can be seen in Figure 8.

Table 8. Summary of Segment 2, Alternative 3.

Total Miles	Forest Service Miles	Access Points		Trailheads		Elevation
		Existing	Proposed	Existing	Proposed	
5.30	4.87	0	1	1	0	Beginning: 5239 End: 5141 Highest: 6300 Lowest: 5141

Description

Mount Olympus Trail Junction to Heughs Canyon

At the Mount Olympus Trail junction, the two proposed routes for Segment 2 diverge. Under the Alternative 3 alignment, the BST would cut at higher elevation, following the Bonneville Bench into Tolcats Canyon, then climbing a steep face back to the bench on USFS land. Here it would climb to an elevation of 5800 feet to 6300 feet. It would make its way around the next ridge to the north slope of Heughs Canyon. Following contours around 5900 feet, the BST would reach the creek in Heughs Canyon where rock cliffs close in on a footpath that follows the stream.

Heughs Canyon to Big Cottonwood Canyon

Beginning at a crossing of the creek in Heughs Canyon, at the junction of the existing access trail and above the USFS boundary, the BST would climb to benches above the Canyon Cove development to reach the steep terrain of Dry Hollow. Descending slightly across a rocky cliff face to the bottom of Dry Hollow and climbing the steep south ridge, it would emerge high above the gun club firing range located on the Bonneville Bench at the mouth of Big Cottonwood Canyon. Staying on high contours around 6000 feet, the BST would remain high on the hillside, before descending to the power line that enters Big Cottonwood Canyon. The power line access road leads to Highway 190. Crossing the highway and following the south shoulder for a short distance east, the BST would reach a bridge over Big Cottonwood Creek into the Oak Ridge trailhead.

Trailheads and Access Points

Same as under Alternative 2, Segment 2.

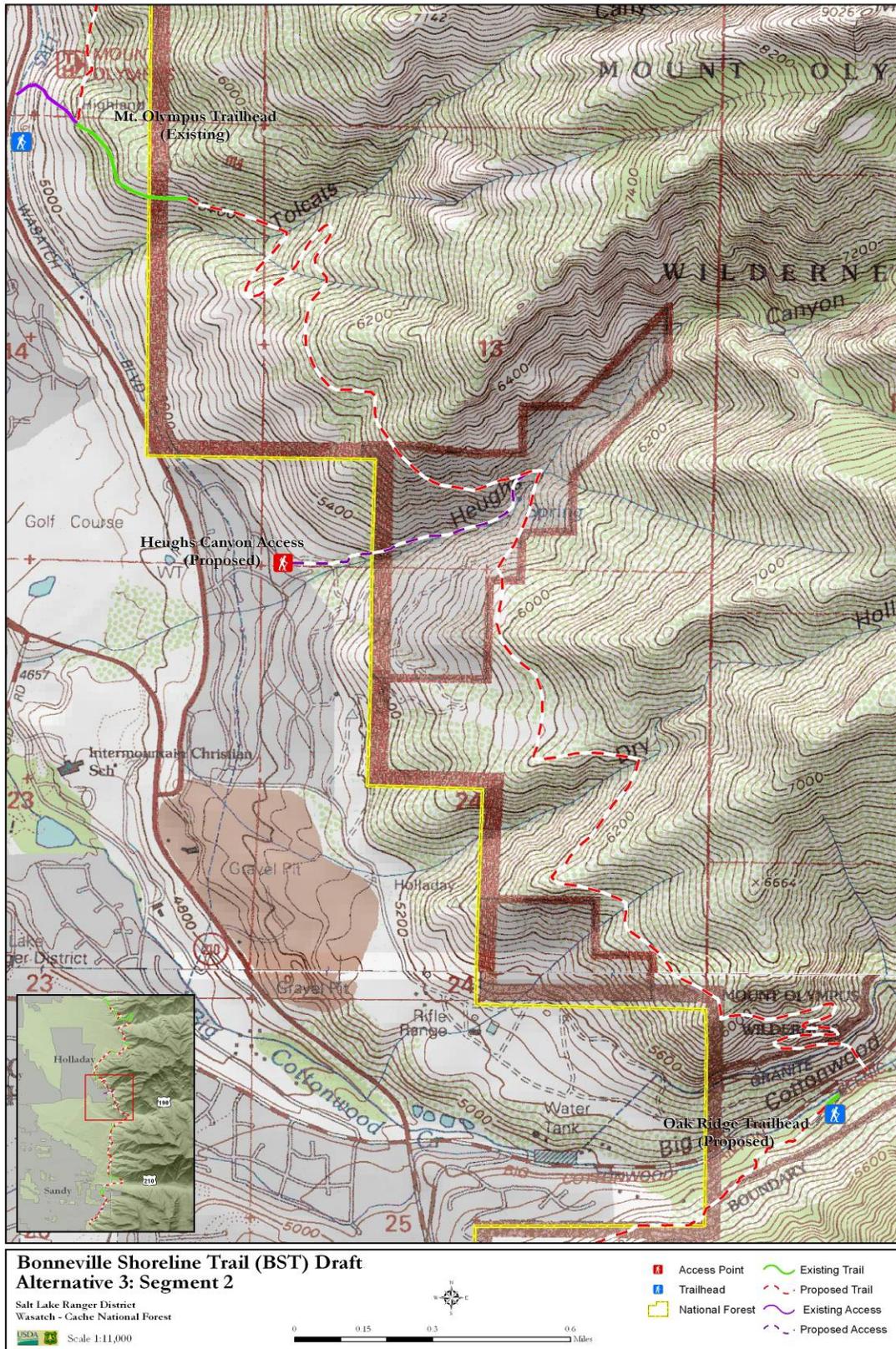


Figure 8. Alternative 3, Segment 2.

2.2 Elements Common to All Alternatives

2.2.1 Trail Specifications

Trail design would follow existing USFS design standards. The trail design criterion specifies approximate tread widths of 36 inches for non-Wilderness sections of the trail and 24 inches for Wilderness sections. Trail clearing widths in oak brush would be approximately ten feet in non-Wilderness and eight feet in Wilderness. The trail would generally be constructed by hand and utilize native trail surfaces and would be consistent with USFS trail standards. Based on terrain features, vegetation types, and topography, these design specifications could vary slightly.

2.2.2 Design Considerations Common to All Alternatives

In response to public comments on the proposal, design considerations were developed to address some of the potential impacts the Action Alternatives may cause. Based on terrain features, vegetation types, and topography, these design specifications could vary slightly. Design considerations are described below and would apply to all Action Alternatives:

- Excavated material would be disposed of down slope and clear of the trail tread when possible. Materials should not build up at the outside of the trail to create an unstable soft edge or a berm that would block the flow of water across the trail. The trail would have approximately a 45 percent slope cut into the hillside above the tread and the tread would be out sloped at about three percent for drainage (see figure 9) to allow water to flow downhill and across the trail without creating erosion problems. The trail profile would also utilize a rolling up-and-down line that uses “reverse grade” sections to allow rainwater to be shed at the low points.

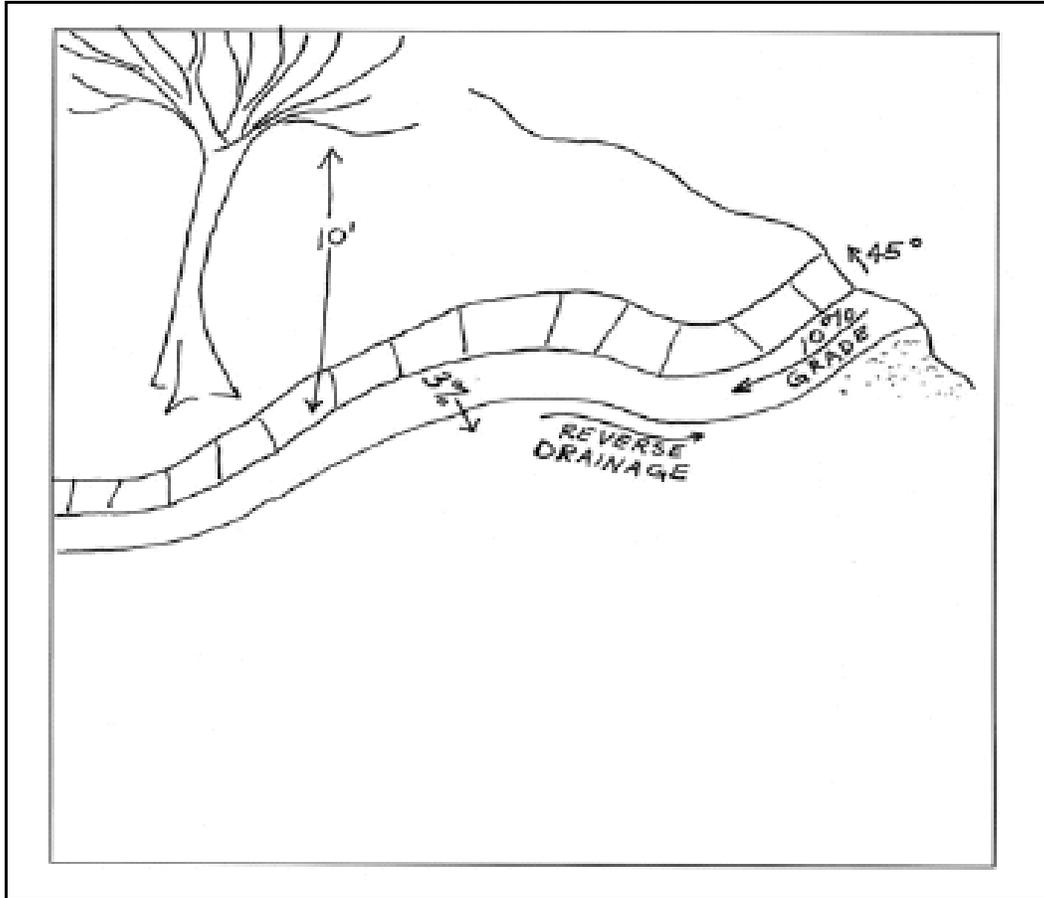


Figure 9. **Diagram of Conceptual Trail Design.**

- The reclamation of disturbed areas parallel to most trails or old four-wheel-drive routes and user-created trails that have been closed would be performed with the actual trail construction activities.
- Transplanting and seeding with native plant species compatible with those already established in the area would be utilized. A list of plants found in the Salt Lake County Regional Trails Plan identifies generally the desirable types of vegetation to be used in revegetation and reclamation project during trail construction. The Forest Botanist will determine revegetation on NFS lands.
- Trail signs will be strategically placed to provide trail users location and direction of travel. Trail signs will have the BST logo and will follow NFS signing regulations.
- Recreation use would be restricted to non-motorized use of the trail throughout Salt Lake County.
- Equestrian and animal use would not be allowed on trail sections across protected watershed lands. Dogs would not be allowed on the trail off-leash. Dogs could be allowed on trail sections crossing Wilderness boundaries if they are outside Salt Lake City

Protected Watershed boundaries. Maps that display which uses are allowed in each segment are shown in Section 3.3, Recreation and Visitor Use.

- Perennial and intermittent streams would be bridged with the appropriate structures as per USFS standards and guidelines.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

One alternative was considered that would have located the alignment of the BST entirely within the national forest boundaries. Because of the following reasons, an alignment of the BST trail located entirely on NFS lands would not meet the purpose and need for this action and it has been eliminated from detailed analysis.

- Located on steep and difficult technical terrain.
- Constructing and maintaining trails would have been difficult and costly, as well as exposing construction personnel and the user public to potential safety issues.
- Did not meet criteria for aesthetic values outlined in the MOU (see section 1.1.3).
- Conflicts with objectives and goals of the Wilderness Areas.
- Potential impacts to wildlife.
- Does not meet the theme of the BST, as it would be located too high above the elevation of Lake Bonneville.

Two additional alternatives that were considered were (1) the “city street” alternative, and (2) the “Non FS Land” alternative. These alternatives were eliminated from detailed analysis because (1) they don’t meet the theme of the BST, and (2) the trail could not be completed because parts would need to cross FS land.

2.4 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in table 9 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 9. Comparison of Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
Special Status Plant Species	No direct effects. Indirect effects include disturbance of special status plant species through increased user-created trails.	Minor adverse effects to one or more species. Mitigation measures such as pre-surveys and minor re-routing of trail alignment as necessary would help to reduce impacts.	Same as for Alternative 2.
Invasive Plant Species	Lack of a formal project may allow status quo weed management to occur indefinitely. This would result in ongoing degradation of east bench/foothill ecosystems.	Both short-and long-term adverse effects would be reduced to minor by implementing a weed management plan as a required project mitigation measure.	Overall similar to Alternative 2, but higher potential for adverse impacts due to increased disturbance associated with developing new trail across otherwise intact native vegetation communities.
Big Game and Big Game Winter Range	No effect to minor adverse effect. No loss of additional habitat; human use would continue to increase.	Considerable adverse long-term effects. Habitat would be fragmented and 48 acres/mile of current habitat would not be used as it is now.	Considerable adverse long-term effects. Very little difference from Alternative 3. This alternative leaves lower elevation winter range available, but reduces access for wildlife by increasing fragmentation.
TES, Forest Service Sensitive Species, and MIS	No direct effects. Indirect effects include potential change in available habitat or use by species through increased user-created trails.	Minor long-term adverse effects. Minimal changes in habitat type. Some habitat fragmentation would displace some individuals.	Minor long-term adverse effects. Effects would be less than Alternative 2. Smaller trail footprint on NF land and additional restrictive use in Wilderness segments.
Migratory Birds	No effects. No change in available habitat or use by species.	Long-term minor adverse effects. Minimal changes in habitat type. Some habitat fragmentation would displace some individuals.	Long-term minor adverse effects. These effects would be less than Alternative 2. Smaller trail footprint on NF land and additional restrictive use in Wilderness segments.

Issue	Alternative 1	Alternative 2	Alternative 3
Recreation and Visitor Use	No new acres of disturbance. Potential short- and long-term adverse effects will likely occur as user-created trail proliferation and unmanaged recreation activities increase.	Impacts from implementing this trail would likely reduce adverse impacts already in place. Establishing a managed network of trails would likely result in long-term beneficial impacts for the local and regional recreation experience.	Long-term beneficial effects. More trail located on NFS and designated Wilderness would provide a more secluded experience for visitor use. Would require additional elevation gain and steep sections that may not provide the same recreation benefits as Alternative 2.
Wilderness	No direct effects. Indirect effects include potential change in Wilderness character through increased user-created trails.	Impacts include increased access to Wilderness areas and 2.74 miles of proposed trail traversing Wilderness. Visitor use is expected to increase, but user-created trails and trail proliferation would not be allowed. Compared to the No-Action Alternative, wilderness character and regulations would be easier to manage because there would be a designated trail system.	Increased access to Wilderness areas and 5.24 miles of proposed trail traversing Wilderness. Additional impacts are similar to Alternative 2.
Open Space, Scenery Management, and Aesthetics	No direct effects. Trail is in highly urbanized area. No new facilities would be constructed. Indirect effects include potential change in visual quality through increased user-created trails.	Minor adverse effect. Construction of new trail and related signs, trailheads, and bridges may have a negative impact on the scenic integrity of the project area.	Same as for Alternative 2.
Soils and Erosion	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance of soils. Existing use and proliferation of user-created trails could increase. These types of uses are generally not constructed to FS standards and in areas that are susceptible to erosion.	Minor, adverse effect. Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures and design criteria would reduce soil erosion, soil compaction and subsequent loss of soil nutrients.	Minor adverse effect. Effects would be slightly higher than Alternative 2 since total new acres of disturbance on NFS lands would be 7.6 acres. As with Alternative 2 impacts would be reduced with proper implementation of mitigation measures.

Issue	Alternative 1	Alternative 2	Alternative 3
Landslide and Slope Failures	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance. Existing use and proliferation of user-created trails could increase causing a potential increase in landslide and slope failures.	Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures would reduce the probability of landslides and slope failures.	Minor adverse effect. Implementing Alternative 3 would have more impacts since it would be constructed on steeper slopes and would disturb more acres on NFS lands (7.6).
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.	Compared to Alternative 2, approximately 0.2 additional acres of disturbance would occur. Additional acres, combined with steeper slopes, implementing this alternative could result in more impacts to water quality than Alternative 2. These impacts would not be significant and effects of implementing Alternative 3 would be minor adverse short- and long-term.
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.

Issue	Alternative 1	Alternative 2	Alternative 3
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.	Under this alternative impacts to riparian areas would occur where the trail intercepts riparian areas. No new trails would be built parallel to riparian areas, resulting in no to minor short- and long-term adverse effects to riparian areas.	Same as for 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 for Alternative 2.
Archaeological, 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.
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.

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.	<p>Minor adverse effects may occur from:</p> <ul style="list-style-type: none"> • trespassing • vandalism • conflicts between visitor users and nearby property owners • increased traffic, transportation, and parking <p>Mitigating these effects revolve around effectively communicating trail regulations at each trailhead and access point, law enforcement and patrol.</p> <p>Beneficial effects may also occur as adjacent properties have easy, walk-in access to a regional network of trails and open space.</p>	Similar to Alternative 2. Segment 2 is all on Forest Service NFS land and therefore would have less of an effect on private property.

3.0 Affected Environment and Environmental Consequences

The analyses of Affected Environment and Environmental Consequences have been combined in this section to simplify the document. Relevant resource issues related to the Proposed Action are discussed below in Sections 3.1 through 3.10. Each resource discussion includes a(n):

- Introduction
- Summary of laws, regulations, and guidelines
- Description of affected environment
- Analysis of effects of the alternatives
- Analysis of the cumulative effects

Environmental consequences are discussed in terms of effects of the alternatives on the resource. Impacts and effects are used interchangeably throughout this document and have the same meaning. The following terms will be used to describe effects:

- **No Effect:** A change to a resource's condition, use, or value that is not measurable or perceptible.
- **Beneficial Effect:** An action that would improve the resource's condition, use, or value compared to its current condition, use, or value.
- **Minor Adverse Effect:** A measurable or perceptible, localized degradation of a resource's condition, use, or value that is of little consequence.
- **Moderate Adverse Effect:** A localized degradation of a resource's condition, use, or value that is measurable and of consequence.
- **High Adverse Effect:** A measurable degradation of a resource's condition, use, or value that is large and/or widespread and could have permanent consequences for the resource.

- **Short-term Effect:** An effect that would result in the change of a resource's condition, use, or value lasting less than one year.
- **Long-term Effect:** An effect that would result in the change of a resource's condition, use, or value lasting more than one year and probably much longer.

Effects will also be described in terms of indirect or direct effects:

- **Direct effects:** caused by the action and occur at the same time and place.
- **Indirect effects:** caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Cumulative effects were also analyzed for each resource. Cumulative effects are defined as:

The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).

Cumulative effects most likely arise when a relationship exists between the effects from a Proposed Action overlap with the effects of other actions in the same location during the same time period.

3.1 Vegetation

3.1.1 Introduction

The proposed alignments for the BST alternatives intersect a variety of foothill and lower montane vegetation types including grasslands, sagebrush and other shrublands, sparsely vegetated rock outcrops, Gambel's oak/mountain brush, white fir/Douglas-fir, and riparian communities along streams and drainages, primarily at mouths of canyons. Potential vegetation issues include impacts to Forest Service recommended Sensitive species, TES species, and introduction or spread of noxious weeds along the proposed alternatives. Riparian impacts are expected to be minimal, as stream crossings in the three main canyons would utilize existing roadway bridges. Additionally, all other ephemeral and perennial drainage (e.g., Heughs and Deaf Smith canyons) trail crossings would be bridged as well. Impacts to riparian vegetation resources are not analyzed as an issue for this resource. Riparian impacts are further discussed in Section 3.7, Water Resources.

Methodology

Element Occurrence records were obtained from the Utah Natural Heritage Program (UNHP) for potential rare plant species known to occur within one mile of the proposed alignments (UNHP 2006). Field reconnaissance was conducted during early October 2006 for preparation of this environmental assessment. Field reconnaissance consisted of walking large portions of the northern part of the proposed SL County alignment from Parley's Canyon to Big Cottonwood Canyon, with spot checks along convenient access points further to the south. Background research also included discussions with the WCNF Botanist, review of Forest Service rare plant occurrence records, noxious weed survey and mapping records (Salt Lake County 2006a-c), and discussions with Salt Lake County weed management personnel.

3.1.2 Forest Service Special Status Plant Species

Laws, Regulations, and Guidelines

For the remainder of this document, "special status plant species" refers to Forest Service recommended sensitive plant species and watch list species.

The following are taken from the WCNF Forest Plan (USDA 2003a):

Vegetation - Desired Condition (p 4-7)

The desired future condition is to improve or maintain stable watershed conditions by maintaining vegetation with healthy ground cover and plant communities dominated by desired perennial grasses, forbs, with a range of shrub cover. Important and distinctive values of riparian areas are considered when implementing management activities.

Botanical Resources - Desired Condition (p 4-9)

Management activities provide for ecological conditions that contribute to the recovery of Federally listed, proposed, or sensitive species.

Forest-wide Sub-goals: Biodiversity and Viability (p 4-19)

3i - Maintain **viability** of species-at-risk (including endangered, threatened and sensitive species and unique communities).

3j - Manage Forest Service **sensitive** species to prevent them from being classified as threatened or endangered and where possible provide for delisting as sensitive (FSM 2670).

Guidelines for Biodiversity and Viability (p 4-43):

(G21) For projects that may affect Forest Service Sensitive species, develop conservation measures and strategies to maintain, improve and/or minimize impacts to species and their habitats. Short-term deviations may be allowed as long as the action maintains or improves the habitat in the long term.

(G23) Avoid actions on the Forest that reduce the viability of any population of plant species classified as Threatened, Endangered, Sensitive or recommended sensitive. Use management actions to protect habitats of plant species at risk from adverse modification or destruction. For species that naturally occur in sites with some disturbance, maintain the appropriate level of disturbance.

Affected Environment: Special Status Plant Species

Three Forest Service recommended Sensitive species occur within 1 mile of proposed alignments, specifically, Wasatch draba (*Draba brachystylis*), Wasatch daisy (*Erigeron arenarioides*), and broadleaf penstemon (*Penstemon platyphyllus*) (UNHP 2006). Additionally, one “watch list” species, Beckwith violet or bird-foot violet (*Viola beckwithii*), reportedly occurs within 1 mile of proposed alignments (UNHP 2006). No Federally listed Threatened or Endangered plant species or Forest Service Sensitive species are known from the vicinity of the proposed alignments (UNHP 2006). Forest Service management objectives and practices for “recommended Sensitive species” are the same as for “Sensitive species”, specifically to manage these species to prevent the need for future listing under the ESA (USDA 2003a). They are not afforded any special consideration or protection on non-Forest Service lands.

Two of the special status plant species, Wasatch daisy and broadleaf penstemon, were observed along portions of Alternative 2 during field reconnaissance. The other two special status plant species, Wasatch draba and Beckwith violet, would not have been evident during the fall reconnaissance, and were not observed.

Based on reconnaissance, Wasatch daisy (*Erigeron arenarioides*) is known to be present in several areas immediately adjacent to existing and proposed connecting portions along the Alternative 2 alignment from Parley’s Canyon to Mill Creek Canyon, and in the vicinity of the intersection with the existing Mount Olympus Trail (Glisson 2006). Based on UNHP records, field reconnaissance, and habitat preferences, Wasatch daisy may be expected to occur along portions of all four segments of the alignment for Alternatives 2 and 3 from Parley’s Canyon to Little Cottonwood Canyon (Segments 1, 2, 3, and 4).

Based on reconnaissance, broadleaf penstemon is known to be present along the Alternative 2 alignment in the vicinity of the Mount Olympus Trail (Glisson 2006) and is likely to be relatively widespread in the foothill mountain brush communities (Duncan 2006). Based on UNHP records and habitat preferences, broadleaf penstemon may also be expected to occur elsewhere along the alignment from Parley’s Canyon to Little Cottonwood Canyon (Segments 1, 2, and 3).

Wasatch draba is known to exist in the area from historical accounts but was not observed, and likely not evident, during field reconnaissance work. The nearest known occurrence for this plant is approximately ½ mile east of where the proposed alignment crosses the mouth of Bells Canyon. The plant typically occurs on limestone in the aspen-white fir-Douglas-fir zone and at higher elevations (ca. 6000-8000 feet) (Windham 2006). Wasatch draba is a relatively diminutive species that is reportedly poorly known and rarely collected (Welsh et al 1993). Based on UNHP records and habitat preferences, Wasatch draba may potentially occur along the alignment along the north facing slopes of canyon mouths and Mount Olympus, and from Little Cottonwood Canyon to Corner Canyon (Segments 1, 2, 3, and 4).

Beckwith violet was not observed, but probably was not evident at the time of the field reconnaissance. While a rare plant, it may be locally common and there is a reasonable likelihood that the alignment may intersect populations along the foothills (Duncan 2006). Based on UNHP records and habitat preferences, Beckwith violet may be expected to occur along the alignment from Parley's Canyon to Little Cottonwood Canyon (Segments 1, 2, and 3). Beckwith violet is known to occur along the foothills of Mount Olympus (UNHP 2006a).

Effects of the Alternatives: Special Status Plant Species

Effects of Alternative 1: No-Action

Alternative 1 would have no effect on special status species as there would not be any additional physical disturbance or increased visitation/use resulting from trail construction and use. There would be no direct or indirect effects to special status species from this alternative.

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

The Alternative 2 alignment passes through areas where special status plant species are known to occur. Although there is no detailed survey data available, this alternative is expected to result in minor adverse impacts to one or more of the special status plant species. The physical disturbance associated with construction and use of this trail is not expected to limit the viability of these species across their broader ranges or result in the need to formally list them under the Endangered Species Act. However, implementation of best management practices provides an important mitigation tool to minimize or possibly eliminate adverse impacts and ensure compliance with WCNF Forest Plan standards and guidelines for special status plant species (*Guidelines for Biodiversity and Viability, G21 and G23, p 4-43*).

Best management practice mitigation measures include pre-construction clearance surveys at a seasonally appropriate time for the various special status plant species and minor rerouting of the trail alignment to avoid populations as necessary. As an optional expanded mitigation measure, pre-construction surveys and adjustment of the trail alignment may be applied to non-FS portions of the trail to further minimize overall project impacts to populations of FS recommended special status plant species.

Expansion of invasive and noxious weed species (see discussion for vegetation issue #2) along the trail may pose an indirect threat to special status plant species.

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

Alternative 3 is expected to have minor adverse effects due to loss of individuals of one or more special status plant species. The effects of this alternative would essentially be the same as for

Alternative 2 although impacts to FS resources may be greater since the entire alignment for Segment 3 is on FS lands. There is a greater potential for Wasatch draba to occur along this alignment since it includes terrain within the known elevational range for this special status plant species (i.e., 6000–8000 feet). Mitigation measures would be implemented as noted for Alternative 2.

3.1.3 Noxious Weeds and Invasive Species

Noxious weeds and invasive plant species have been identified as one of the four greatest threats to NFS lands.

Laws, Regulations, and Guidelines

The following are from the WCNF Forest Plan (USDA 2003a).

Non-Native Plants - Desired Condition (p 4-10)

Established noxious weed infestations are not increasing or reduced to low densities. New invader species are not becoming established. New infestations of species are contained or reduced. New populations of existing noxious weeds are eradicated or reduced in highly susceptible, often disturbed areas. Native plants dominate most landscapes that have been rehabilitated.

Forest-wide Sub-goal - Noxious Weed Control (p 4-20)

3s. Greatly reduce known infestations of noxious weeds and rigorously prevent their introduction and/or spread.

3t. **Improve** Forest user's **awareness** of what noxious weeds are and how they spread and **increase** Forest users' **active participation** in reducing and preventing infestations.

Guidelines for Biodiversity and Viability (p 4-43)

(G25) Integrated weed management should be used to maintain or restore habitats for threatened, endangered, proposed and sensitive plants and other native species of concern where they are threatened by noxious weeds or non-native plants. When treating noxious weeds comply with policy in Intermountain Region's Forest Service Manual 2080, Supplement #R4 2000-2001-1 (Appendix III).

Affected Environment: Noxious Weeds and Invasive Species

The foothill ecosystems on the east side of Salt Lake Valley provide a narrow buffer zone along the urban interface between developed land and FS land. Although there have been no comprehensive weed inventories along the east bench area or the proposed route alignments, a variety of noxious and invasive weeds are known to occur along the foothills in the vicinity of proposed trail alignments. These include dyer's woad, leafy spurge, spotted knapweed, musk thistle, Scotch thistle, Canada thistle, field bindweed, myrtle spurge, houndstongue, Dalmatian toadflax, white top (hoary cress), and common mullein (Salt Lake County, 2006a-c).

Many invasive species readily establish and thrive on physically disturbed soils. Most are also capable of invading otherwise intact ecosystems, especially once a sufficiently large seed source becomes established in an area. Myrtle spurge and Dalmatian toadflax are examples of two invasive species in the vicinity of the Project Area that do not appear to need disturbance to expand their range. Trails may serve as conduits for spread of invasive species into intact native

plant communities. Left unchecked, many of these species would multiply and expand their range across suitable habitat, out-competing and displacing native vegetation in the process. Existing surveys of the Mill Creek, Big and Little Cottonwood canyons provide some map data of areas in the general vicinity of where the proposed trail alignments cross the canyon entrances (Salt Lake County, 2006a-c).

During the course of field reconnaissance infestations of a variety of invasive/noxious weeds were evident in the vicinity of many areas of the proposed alignment, on and off FS lands. Dalmatian toadflax is on the verge of being naturalized along much of northern portion of the project alignment for Alternative 2 (Segments 1 and 2), and is already at the point where it would be difficult to control. Animal dispersed weeds such as houndstongue and burdock form dense infestations in areas of Mill Creek Canyon (i.e., Rattlesnake Gulch) which have historically been popular recreation areas for dog owners. Myrtle spurge has infested major areas of non-FS lands along Segment 1 and on FS lands along the pipeline trail along the north slope of Mill Creek Canyon (Glisson 2006). The extent of invasive species infestations in the vicinity of trail alignments along Segments 3 and 4 is less well known as these areas have not been mapped and were not investigated as extensively during the reconnaissance.

Effects of the Alternatives: Noxious Weeds and Invasive Species

Effects of Alternative 1: No-Action

Even without additional disturbance resulting from trail construction and use, invasive species on FS lands and in the vicinity of FS lands pose an ongoing threat to the ecological integrity of native plant communities along the east bench. Unless effective invasive species control efforts are broadly implemented along the foothills (i.e., on FS and non-FS lands) invasive species populations could continue to expand and the threat to FS lands and resources would increase.

Under the No-Action Alternative, with no additional trail construction or increased visitor use, existing infestations on FS land pose a direct threat, while infestations on non-FS land pose an indirect threat. Continued implementation of the Forest Plan and effective weed control efforts may reduce the overall threat posed by invasive species to minor adverse effects in the future.

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

Regardless of whether or not any noxious weeds are now present along various portions of proposed route alignments, disturbance associated with trail construction may increase the potential for future infestations and facilitate expansion of existing infestations of invasive species. Considering the fairly extensive existing weed populations observed along, and in the general vicinity of, the proposed alignment on segments 1 and 2 during reconnaissance visits, implementation of a comprehensive weed management plan is an essential mitigation requirement for any Action Alternative associated with this project. A comprehensive weed management plan would help to achieve WCNF Forest Plan desired conditions and comply with forest-wide sub-goals, and guidelines. At a minimum, an effective weed control plan would include pre-construction surveys and control efforts for weeds within close proximity (e.g., 1/8 mile) of proposed alignments. The plan should also include measures for minimizing the potential spread of seeds and other propagules during trail construction, such as use of equipment wash stations when moving between areas. In order to be effective on a long-term basis, control efforts on the Forest would also need to be coordinated with activities on non-FS lands.

Under the Proposed Action, compliance with Forest Plan Standards and Guidelines and implementation of mitigation measures, such as a weed control plan and reclaiming disturbed areas with native plants, would reduce the overall effects of invasive species to minor adverse. Existing infestations on FS land would have direct effects, while infestations on non-FS land would have indirect effects. Implementation of an effective weed control program as a required project mitigation measure would reduce the severity of threats accordingly. Effective control efforts may reduce the overall threat posed by invasive species.

Construction of the proposed trail under the Proposed Action may offer potential beneficial effects in terms of opportunities to educate Forest user's about invasive species and through improved access for control efforts. Since ongoing natural expansion of existing occurrences into undisturbed areas is likely in the future anyway, the presence of a trail may allow for more effective access for weed control.

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

Potential adverse impacts are greater for this alternative simply because it involves construction of an entirely new trail section through otherwise intact native vegetation from the southern end of Mount Olympus to Big Cottonwood Canyon. This would result in an increased amount of physical disturbance with an increased risk of weed infestation to native plant communities. The proposed alignment under this alternative is located further within the Forest boundary and penetrates deeper into native areas on steeper terrain. This provides a potential vector for weed infestations deeper into otherwise intact vegetation communities. The steeper access and generally more rugged terrain would make access for future weed control efforts more difficult across this alignment.

Implementation of a comprehensive weed management plan as described for the Proposed Action would also be an essential mitigation measure for this Alternative.

Under Alternative 3, effective control efforts may reduce the overall threat posed by invasive species to minor adverse effects in the future. Noxious weed control efforts are in keeping with Forest Plan goals and Implementation of an effective weed control program as a project mitigation measure would reduce the impacts from noxious weed infestation. Existing infestations on FS land pose a direct threat, while infestations on non-FS land pose an indirect threat.

3.1.4 Cumulative Effects

Special Status Plants

A large amount of the foothill ecosystems bordering the Salt Lake Valley and the northern Wasatch Front have already been lost to development. This trend is likely to continue. Implementation of mitigation measures (pre-surveys and rerouting) as described above should eliminate any significant impacts on FS lands to special status plant species as a result of this project. Extension of mitigation measures to non-FS lands would help to minimize additional project related adverse cumulative impacts to special status plant species. The cumulative effects of incremental development of foothill ecosystems on non-FS lands in northern Utah may eventually threaten the viability of Beckwith violet in particular across its range.

Invasive Species

A variety of invasive species are already established and continually expanding along the east bench/foothill areas. By requiring a comprehensive weed management plan as an integral component of the FS portion of the BST and requiring coordination with non-FS land weed control efforts, the BST project may provide the impetus for a meaningful reversal of invasive species expansion throughout the vicinity of the Project Area. Failure to link FS efforts with a similar aggressive effort on non-FS lands would guarantee the WCNF needs to pursue an ongoing aggressive weed management effort for an indefinitely extended timeframe across the Project Area, with questionable effectiveness in addressing the overall problem.

Past, Present, or Reasonably Foreseeable Future Actions

Special Status Plants

Ongoing loss of habitat to development encroachment on non-FS lands would continue to adversely affect special status plant species, and may be a particular concern for Beckwith violet as noted above. Encroachment of suitable habitat by noxious weeds and other invasive plants on FS and non-FS lands may also pose a serious threat to native foothill ecosystems and special status plant species if the weed problem is not controlled in the near future.

Invasive Species

There are no additional foreseeable actions that would directly impact invasive species populations across the Project Area. Recent FS outreach programs such as the myrtle spurge elimination program (USDA 2006a, 2007) are an important step in the right direction and may eventually help to reverse the expansion of that particular invasive species when coupled with on-the-ground control efforts. If weed control efforts on non-FS lands are implemented on an aggressive basis, the overall situation may be reversible on FS and non-FS lands across the east bench.

Cumulative Effects of the Alternatives

Special Status Plants

The cumulative effects of Alternatives 2 and 3 include potential loss of special status plants on non-FS land. Without field survey data for each alignment, it is not possible to determine if one alternative would more adversely impact sensitive status plants. Implementation of proposed mitigation measures (e.g., pre-project clearance survey within a prescribed corridor along the alignment and minor trail reroutes as necessary) should minimize impacts under either Action Alternative. Applying this mitigation approach to non-FS lands would help to mitigate cumulative losses of these special status plants under both of the Action Alternatives.

Invasive Species

Selection of one of the Action Alternatives in combination with an integral requirement for a comprehensive weed management plan as a required mitigation measure would greatly benefit the long-term integrity of east bench ecosystems and ensure compliance with the WCNF Forest Plan. Cumulative effects of each of the alternatives are listed below in table 10.

Table 10. Cumulative effects of alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Special status plant species	No direct effects. Indirect effects include disturbance of special status plant species through increased user-created trails.	Minor adverse effects to one or more species. Mitigation measures such as pre-surveys and minor re-routing of trail alignment as necessary would help to reduce impacts.	Same as for Alternative 2.
Invasive species	Lack of a formal project may allow status quo weed management to occur indefinitely. This would result in ongoing degradation of east bench/foothill ecosystems.	Both short- and long-term adverse effects would be reduced to minor by implementing a weed management plan as a required project mitigation measure.	Overall similar to Alternative 2, but higher potential for adverse impacts due to increased disturbance associated with developing new trail across otherwise intact native vegetation communities.

3.2 Wildlife and Fish Resources

3.2.1 Introduction

A priority in all management decisions within this management area is the restoration and maintenance of a healthy and sustainable, broad-scale north-south wildlife corridor, and the shorter east-west corridors that move wildlife up and down in elevation.

The terrestrial wildlife resources in the WCNF are as diverse as the plant communities, geologic features, and elevations in which they exist. Wildlife is dependent on all other resources that comprise and influence a species habitat. This is a complex resource since a land management activity may benefit some species or their habitat while harming other species.

The purpose of this report is to describe the current resource conditions for habitat, and for wildlife and fish resources in the BST Project Area in Salt Lake and Davis Counties on the Salt Lake Ranger District.

The report also provides analysis of effects for a range of alternatives on wildlife and fish resources as required by NEPA, NFMA, other applicable laws and regulations, Forest Service directives, and the Forest Plan.

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.
- Wasatch-Cache National Forest. 2006. Management Indicator Species of the Wasatch-Cache National Forest. Salt Lake City, Utah. Version 2006-1.

Other information sources used to describe the proposed actions, impacts, species, and habitat are referenced in the respective discussions and listed in Chapter 5: References Cited.

Methodology

The Project Area is defined by the consultation regulations (50 CFR 402.02) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.”

Wildlife surveys and/or habitat assessments have been conducted by Forest Service biologists as directed in the Forest Plan. The objective is to monitor the status of the species of Federal, State and local interest and their habitat across the Forest, and to use the information to assist in the evaluation of the effects of proposed projects on the species and their habitat. Data has been collected for the following categories of terrestrial and aquatic wildlife: Federally listed threatened and endangered species (TEPS), Forest Service sensitive species (FSS), management indicator species (MIS), and other wildlife species such as big game animals and non-game birds.

Laws, Regulations, and Guidelines

There are many laws that pertain to and regulate wildlife management within the National Forests. A full review of these laws can be found in “The Principal Laws Relating to Forest Service Activities” (USDA 1993). Just a few of the important ones that apply to all wildlife resources include the following:

- **Bald and Golden Eagle Protection Act of June 8, 1940 (16 U.S.C. 688-668-d):** provides protection to bald and golden eagles.
- **Sikes Act of September 16, 1960 (16 U.S.C. 670a):** provides for carrying out wildlife and fish conservation programs on Federal lands, including authority for cooperative State-Federal plans, and authority to enter into agreements with States to collect fees to fund the programs identified in those plans.
- **Endangered Species Act of December 28, 1973 (87 Stat. 884 as amended; 16 U.S.C. 1531, 1532, 1533, 1536, 1540):** declares that “...all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.”
- **The Migratory Bird Treaty Act of 1918 (MBTA) as amended:** established to protect migratory birds. This act makes it illegal to pursue, hunt, take, capture, kill, or possess migratory birds or any part, nest, or egg of any such bird (16 U.S.C. 703-7012). In January of 2001 Executive Order 13186 was issued on the Responsibilities of Federal Agencies to Protect Migratory Birds.
- **Knutson-Vandenberg Act of June 9, 1930 (16 U.S.C. 576, 576a-576b):** authorizes the use of funds collected from timber sales through this act to be used for “protecting and improving the future productivity of the renewable resources of the forest land on such sale area, including sale area improvement operation, maintenance and construction, restoration and wildlife habitat management.”
- **The National Forest Management Act of 1976:** outlines policy and direction for wildlife and riparian and aquatic resources as can be found in Forest Service Manuals 2500 and 2600, and the Forest Service Handbooks.

Analysis Area

The analysis area contains a variety of terrestrial habitats, including sagebrush, pinyon-juniper, mahogany and mountain brush, grassland and forbland, aspen and aspen-mixed conifers, mixed conifers, and rock outcrops and barren areas.

The primary perennial streams in the analysis area are identified as those systems that may have fish species associated with them. These streams include Mill Creek, Big and Little Cottonwood Creeks, the North Fork and mainstem of Deaf Smith Canyon and Bell Canyon.

Intermittent systems with riparian habitat include Neffs Canyon, Tolcats Canyon, Heughs Canyon, Ferguson Canyon, forks of Dry Creek and Rocky Mouth, and Big and Little Willow Canyons.

The component of riparian habitat in the analysis area includes wetlands, riparian areas, and reservoirs. Springs and seeps are also present along existing water courses. Combined, these

habitats comprise less than 0.1 percent of the analysis area. However, these habitats are important for a variety of wildlife species, as most wildlife use riparian areas for at least some part of their life cycle.

Wildlife Issues

The Issues to be analyzed in this report have been identified from public meetings and reviews of the proposed project by Forest Service biologists familiar with the habitat and the species found on the WCNF. The issues include the following:

1. **Big Game Populations and Winter Range.** The foothill zone has been identified as providing critical winter habitat for mule deer and other wildlife species. Concerns were expressed about potential effects of construction and use of the trail on wildlife habitat, wildlife migration corridors, and wildlife in general.
 - Evaluation Criteria: Populations, migration corridors and habitat fragmentation.
2. **TES, FSS, and MIS.** There are concerns about potential effects on threatened and endangered species, Forest Service sensitive species, and management indicator species.
 - Evaluation Criteria: Presence/absence of species and suitable habitat.
3. **Migratory Birds.** The effect to migratory birds has been identified as an area of analysis.
 - Evaluation Criteria: Habitat available and type of change in available habitat.
4. **Domestic Dogs.** The potential presence of additional domestic dogs in the foothills due to trail development may have impacts on wildlife and will be analyzed.
 - Evaluation Criteria: Length of trail where dogs are permitted with and without leashes.

3.2.2 Big Game Populations and Winter Range

Affected Environment: Big Game Populations

There are 300 plus species on the Forest and it is impossible to track them all, so certain groups are carried forward through planning documents. Big game is carried forward due to the great interest of the public both for hunting and wildlife viewing. Changes in big game species composition have occurred in recent decades. Big game species that are found on the WCNF include moose, mountain goat, Rocky Mountain bighorn sheep, elk, and mule deer. Only mule deer and elk will be discussed in this report because the proposed Project Area is within the lower elevational reaches of the designated mule deer winter range. Elk winter range, for all practical purposes, is considered the same for this project.

Mule deer have declined from higher population levels in the 1960's. On the 8 hunting units that contain National Forest System lands administered by the WCNF, deer numbers are currently at or below herd objectives set by the Utah Division of Wildlife Resources. Mule deer winter range has been identified along the entire trail and is shown in figure 10. Elk winter range is essentially the same as for mule deer and issues considered and discussed for mule deer include elk.

Potential forage competition may occur among many species on winter ranges. These are comprised primarily of mountain brush community types including species such as Gambel oak,

sagebrush, serviceberry, mountain mahogany, and bitterbrush. Most critical winter range occurs outside the Forest, though the reduction in availability due to development has placed a higher value on the limited national forest winter range.

Winter range for deer and elk has been impacted through urban expansion along the Wasatch Front. This has involved a loss of habitat through development, and a reduction in the quality of habitat through the introduction of non-native grasses, forbs, and noxious weeds. In addition, fire cycles for these areas have been altered due to the larger composition of annual species that readily burn, and the high number of human caused ignitions. The proximity of elk and deer winter range to urban populations poses a potential concern of animal harassment from people. Deer and elk mortalities from being hit by vehicles are a threat to the animal populations where major highways pass through the canyons. The trail could provide additional avenues for big game to access the highways.

Winter range in the project area is mostly east and upslope of the forest boundary. Summer range conditions are not the limiting factor for big game populations.

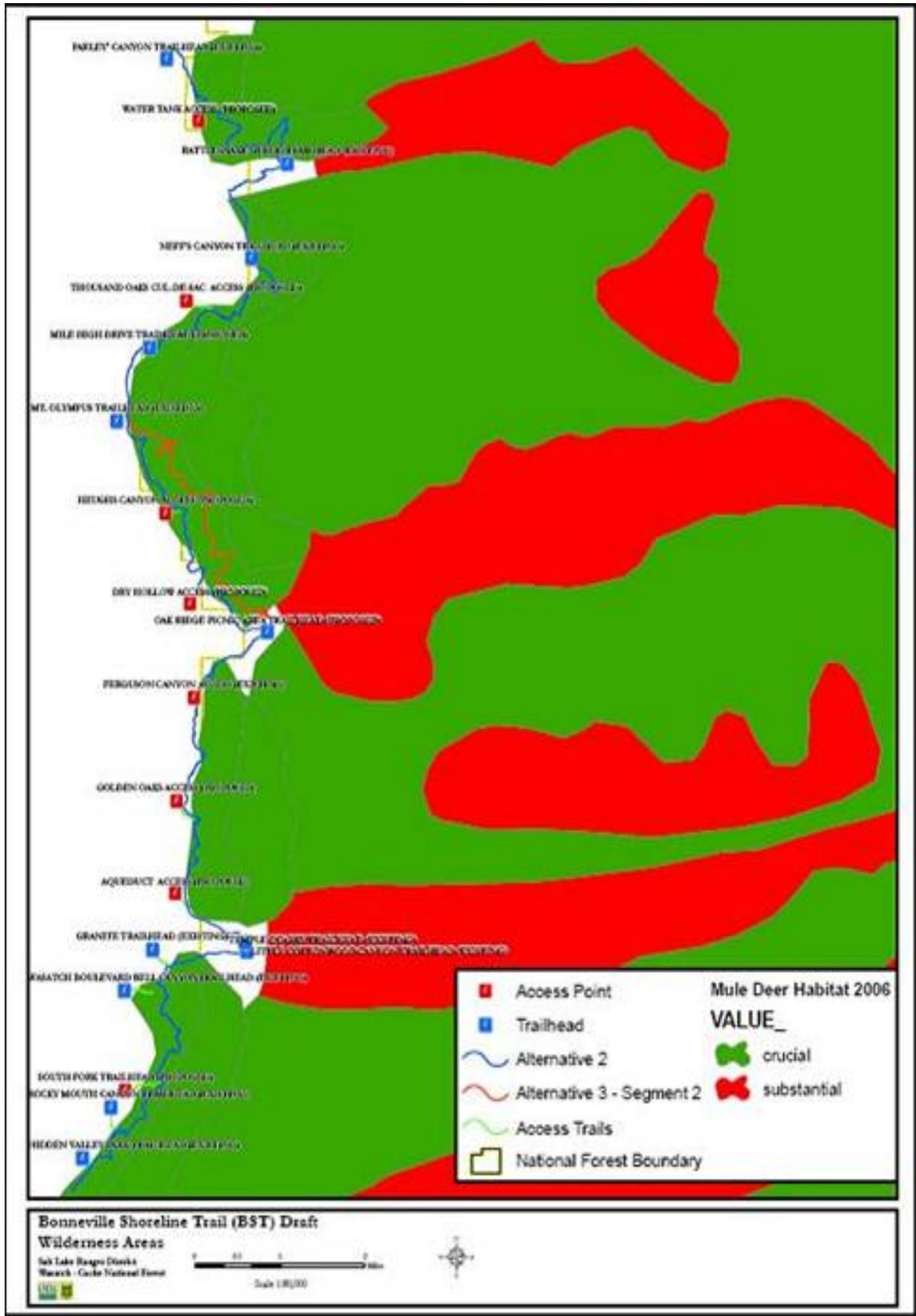


Figure 10. Mule deer winter range along the BST proposed route.

Effects of the Alternatives: Big Game Populations

Effects of Alternative 1: No-Action

The trail would not be built; however, anticipated use of the current trail would continue to increase as people are concentrated on the existing trail. This would lead to additional user-created trails and additional impacts to deer and elk. Impacts to the mule deer and elk winter range under this alternative would not be from the trail, but from increased housing development and subsequent increases in human use of the area. This would cause mule deer and elk to avoid the area in favor of areas with less human disturbances. Implementing this alternative would have no new effects on mule deer and elk winter range.

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

Segment 1: Parley's Canyon to Mount Olympus Trailhead

The effects of implementing Alternative 2: Segment 1 would be minor, long-term adverse effects. The impact on mule deer and elk winter range by formalizing this segment of trail is viewed in the form of habitat loss by avoidance. Generally, mule deer and elk avoid areas of human activity and seek more secluded habitat when it is available. It is estimated that the trail would cause deer and elk to stay about 400 feet from the area during times when the trail is in use. This would mean approximately 48 acres of current habitat for each mile of trail would be avoided by mule deer and elk during time of human use.

The factor that cannot be accounted for is whether or not the deer and elk would become adapted to the area and continue to use it in spite of increased human use. Past patterns have shown that deer avoid the areas during daytime but move back into the areas at night.

The overall problem is the continued loss of existing habitat for these species. Housing developments and resulting increased human intrusion into the existing habitat is moving deer and elk higher up the mountains into less preferred habitat. Implementation and formal development of this segment of trail would add to the loss of habitat for mule deer and elk.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The effects on the habitat of big game populations in Segment 2 due to this project would be the same as for Segment 1.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The effects on the habitat of big game populations in Segment 3 due to this project would be the same as for Segment 1.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The effects on the habitat of big game populations in Segment 4 due to this project would be the same as for Segment 1.

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, except the entire route in Segment 2 would be on WCNF administered lands.

3.2.3 Threatened and Endangered Species, Forest Service Status Species, and Management Indicator Species

Threatened and Endangered Species:

The Utah Field Office of the U.S. Fish and Wildlife Service maintains and publishes a list of Federally Listed and Proposed (P), Endangered (E), Threatened (T), and Candidate (C) Species and Habitat in Utah by County (USFWS 2007). Federally listed species that are found on or having habitat on the Salt Lake Ranger District, WCNF and their relationship to the proposed project are shown in table 11.

Table 11. Federally Listed Species in Salt Lake County, Utah.

Species	Status	Habitat in Project Area	Comments
Bald Eagle <i>Haliaeetus leucocephalus</i>	T	No	Nesting around Great Salt Lake. No roosting or food sources in Project Area.
Canada Lynx <i>Lynx canadensis</i>	T	Yes	Linkage habitat only. Project Area in low density vegetation and high human use.
June Sucker <i>Chasmistes liorus</i>	E	No	Found in Utah Lake to the south of the project area and in Red Butte Reservoir north of the project area.
Slender Moonwort <i>Botrychium lineare</i>	C	No	No impact. No habitat in Project Area: elevation too low. Only specimen is historic at Brighton Ski Resort.
Yellow-billed Cuckoo <i>Coccyzus americanus</i>	C	Yes	Limited riparian habitat along canyon streams. Not quality habitat for species. Impacts very minimal to habitat.

Bald eagle. The bald eagle is mainly a winter visitor to Utah; however, it does nest in Salt Lake and Davis Counties at lower elevations in the wetlands around the Great Salt Lake. Bald eagles are occasionally seen on the Forest, but their main foraging and roost areas are at the lower elevations where there is abundant prey. Bald eagles are not documented as using the WCNF in the project analysis area.

Canada lynx. Historically lynx have been found in Utah in very low numbers. Between 1916 and 1991 there are 27 referenced occurrences with 10 being verified. Most are from the Uinta Mountains with others scattered in other locations including Summit (two specimens) and Cache (one specimen) Counties. There have been no verified records since 1991.

The analysis area is in designated linkage habitat for the species. Linkage habitat is also described as an area a lynx may travel through but would not spend any prolonged amount of time in due to lack of cover habitat and forage to maintain the species. Habitat in which this species may be found is much higher in elevation than the project analysis area.

June Sucker. The June sucker is endemic to Utah Lake and uses streams flowing into the lake for spawning. In modern times it has not been known to exist naturally on the WCNF, although they may have spawned in the Provo River in areas which are now part of the Uinta National Forest. There was one experimental population within Red Butte Research Natural Area. Red Butte Reservoir was transferred to the Central Utah Water Conservancy District and with it the habitat for June sucker on the WCNF. At this time there are no June suckers on the WCNF.

Slender Moonwort. The following is a brief summary of the species and is included for information purposes only. It has been determined there is no suitable habitat for the plant in the Project Area.

Slender moonwort is a small perennial fern with pale green leaves two to seven inches long. Leaf segments are typically linear and divided or forked at the ends. It is considered to be one of the more distinctive moonworts.

The plant grows in habitat such as meadows with tall grass and forbs, and in small openings within forests dominated by a variety of spruce, pine or fir species. This species was first described by scientists and given the name slender moonwort in 1994.

Western yellow-billed cuckoo. The cuckoo is a low-elevation riparian shrub inhabitant. Historically it has been observed close to the Forest along the Wasatch Front and in Cache Valley. The UDWR Natural Heritage Program indicates that the species is a historical breeder in the State. There are small patches of potential habitat for the species where the proposed trail would cross various perennial and intermittent streams.

Wasatch-Cache NF Sensitive Species

Sensitive species are those species identified by the Regional Forester for which population viability is a concern, as evidenced by a significant current or predicted downward trend in numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution. On the Wasatch-Cache the Regional Forester has designated the terrestrial species shown in table 12 as Forest Service Sensitive.

Table 12. Sensitive Species on the WCNF.

Species	Habitat in Project Area	Comments
Spotted bat <i>Euderma maculatum</i>	Possible	No Impact. Has not been found in Salt Lake County. Habitat would not be modified.
Townsend's big-eared bat <i>Plecotus townsendii</i>	Possible	No Impact. Habitat would not be modified.
Wolverine <i>Gulo gulo</i>	No	No Impact. Has not been found in the area. No habitat in Project Area.
Boreal owl <i>Aegolius funereus</i>	Yes	No Impact. Has not been found in the area. Habitat conditions marginal to non-existent for this species.
Flammulated owl <i>Otus flammeolus</i>	Yes	No Impact. Has not been found in the area. Habitat conditions marginal to non-existent for this species.
Great gray owl <i>Strix nebulosa</i>	Yes	No Impact. Habitat modifications would be minimal. Habitat conditions marginal to non-existent for this species.
Northern goshawk <i>Accipiter gentiles</i>	Yes	No Impact. Habitat modifications would be minimal for this species. Possible foraging habitat only.
Peregrine falcon <i>Falco peregrinus</i>	Nesting: No Foraging: Yes	No Impact. Nesting habitat not present. Foraging habitat present, but there is minimal modification of foraging habitat.
Northern three-toed woodpecker <i>Picoides tridactylus</i>	Possible	No Impact. Habitat conditions marginal to non-existent. Habitat modifications would be minimal for this species
Columbian sharp-tailed grouse <i>Tympanuchus phasianellus columbianus</i>	No	No Impact. No habitat present. Not found in Project Area.
Spotted frog <i>Rana luteiventris</i>	No	No Impact. Historically found in Salt Lake County. No habitat present in the project area. Species believed to be extirpated from Salt Lake County.
Bonneville Cutthroat Trout	Yes	If existing stream crossings are used and the trails leading to the crossings are well drained with minimal sediment production, there will be no impact to the species or the habitat.
Colorado River Cutthroat Trout	No	No Impact. Project area outside the historic range of the species.

Spotted bat. Spotted bats are found in a variety of habitats including open ponderosa pine, desert shrub, pinyon-juniper, and open pasture and hay fields. They roost alone in rock crevices high up on steep cliff faces. Cracks and crevices ranging in width from 0.8-2.2 inches in limestone or sandstone cliffs are critical roosting sites. There is some evidence that individuals

show fidelity to roost sites. They are territorial and avoid each other while foraging. Information on seasonal movements is scarce, though spotted bats are thought to migrate south for winter hibernation.

Spotted bats are rare and may be limited by suitable roosting sites. They are found in relatively remote, undisturbed areas, suggesting that they may be sensitive to human disturbance.

Although there is habitat present on the Forests, no spotted bats have been found. Historically the spotted bat has not been documented on the WCNF. In northern Utah the only historical record found by the Utah Natural Heritage Program is a female collected on a school in Salt Lake City in 1934.

Townsend's big-eared bat. Western big-eared bats use juniper/pine forests, shrub/steppe grasslands, deciduous forests, and mixed coniferous forests from sea level to 10,000 feet. During winter they roost singly or in small clusters in caves, mine shafts, at rocky outcrops, or occasionally in old buildings. They remain at these sites, called hibernacula, from October to February. They hang from ceilings with their ears curled in ram's horn fashion, possibly to help prevent heat loss. They do not migrate, but move to different roost locations within hibernacula and even move to different hibernacula during a winter. These movements are thought to be in response to temperature changes. In summer, females roost with their young in nursery roosts. Males and non-breeding females roost alone.

Big-eared bats are very sensitive to human disturbance and abandon roost sites if disturbed. Low reproductive rates and limited roost sites make this species vulnerable.

This bat is known from seven locations on the Logan, Ogden, and Salt Lake Ranger Districts. It is associated with caves and mines that it uses for nursery colonies and hibernacula.

Wolverine. The wolverine is essentially a Wilderness mammal. It inhabits tundra and coniferous forest zones, generally at higher altitudes during summer and mid to lower elevations during winter. Low elevation riparian areas may be important winter habitat. Wolverines reportedly prefer to hunt around small meadows, timbered thickets, cliffs, and riparian and ecotonal areas. However, except for an occasional direct crossing, they generally avoid large parks, meadows and clear cuts. They are mainly active at night, but hunt during the day. Wolverines are active year round and are nonmigratory. Densities are low (one wolverine per 25-80 square miles), even in the best habitats, and closely tied to diversity and availability of food.

Historically the wolverine was found throughout the WCNF. There has not been a confirmed sighting for at least ten years. In the early 1990s one was reported on the Logan Ranger District. Cameras placed over bait were unsuccessful in documenting presence. Wolverines prefer mature and old growth forest but do forage in meadows and talus slopes.

Boreal owl. Boreal owls are closely associated with high elevation spruce-fir forests due to their dependence on this forest type for foraging year round. Nesting habitat structure consists of forests with a relatively high density of large trees (12 inch dbh), open understory, and multi-layered canopy. Owls nest in cavities excavated by large woodpeckers in mixed coniferous, aspen, Douglas-fir, and spruce-fir stands. In winter, they may move down in elevation and roost in protected forested areas.

Utah is the southern edge of the boreal owl's range. The species occurs in very small numbers. It has been found in 2-3 locations on the WCNF.

Flammulated owl. Flammulated owls can be found in mixed pine forests, from pine mixed with oak and pinyon at lower elevations to pine mixed with spruce and fir at higher elevations. They have also been found in aspen and second growth ponderosa pine. However, they prefer mature ponderosa pine-Douglas-fir forests with open canopies. Large diameter (>20 inch) dead trees with cavities are important site characteristics. They avoid foraging in young dense stands where hunting is difficult. Flammulated owls are migratory in the northern part of their range. They move south in the fall to central Mexico and Central America to spend the winter where insects are available. Territory size varies from 20-59 acres and is determined by age and patchiness of overstory trees.

Flammulated owls are more common in the State than boreal owls but they are still rare. They have been documented in several locations on the Wasatch Range.

Great gray owl. Great gray owls use mixed coniferous and hardwood forests usually bordering small openings or meadows. They forage along edges of clearings. Semi-open areas, where small rodents are abundant, near dense coniferous forests, for roosting and nesting, is optimum habitat for great grays. During winter some birds stay on or near their breeding territories and others make irregular movements in search of prey and favorable snow conditions. In the Intermountain Region, great grays occur primarily in lodgepole pine/Douglas-fir/aspen zone and in ponderosa pine.

The great gray owl is considered a winter vagrant in Utah with one observation recorded by the Utah Natural Heritage Program on the Uinta National Forest.

Goshawk. In 1991, the goshawk was designated as a sensitive species in the Intermountain Region of the Forest Service. As a result of this designation, special management is emphasized to ensure the goshawk's viability (FSM 2670). In March of 1997 the Utah Division of Wildlife Resources classified the goshawk as a State sensitive species. The purpose of this designation was to identify species in the State that are most vulnerable to population declines or habitat loss and to stimulate management actions for the conservation of this species.

To address the issue of declining goshawk habitat in Utah, a technical team was assembled. They developed seven questions and attempted to answer them in "The Northern Goshawk in Utah: Habitat Assessment and Recommendations". The seven questions and a summary of the findings follow, as quoted from the report:

1. **Is there adequate nesting habitat available?** Presently there appears to be adequate nesting habitat in the State and on the WCNF to maintain a breeding population of goshawk.
2. **Is there adequate foraging habitat available?** Based on habitat features important to selected prey used by goshawks, it appears that foraging habitat is presently available throughout the State and on the Wasatch-Cache.
3. **Are northern goshawks able to move freely between habitat patches?** Goshawks appear to be able to move freely among habitat patches throughout Utah and the Forest.

(It is noted that satellite tracked birds captured on the Wasatch-Cache have wintered south of Delta, Utah and along the Utah/Arizona border.)

4. **Is the population viable at the State level?** This assessment could not answer the question of population viability directly because there are inadequate demographic data available. Most of the currently forested lands were rated as medium or high value for both nesting and foraging habitat. Where surveys have been conducted, goshawks are present and nesting successfully. Furthermore, all available habitat patches are connected, and no known population is isolated. In general, existing habitat appears to be capable of supporting a viable population of goshawks at the State and Forest spatial scales.
5. **Where is the high value habitat?** High value habitat is distributed throughout the State, with 60 percent controlled by the USDA Forest Service.
6. **How are current management policies affecting goshawks?** Current management policies are affecting northern goshawks in a variety of ways. On National Forest Service administered lands in Utah, 20 percent of the high value habitat is being managed with a timber emphasis, 35 percent with mixed uses, and 27 percent with a range emphasis. Each of these management categories allows for activities that either can degrade or improve goshawk habitat. The information in this assessment does not reveal any substantial deficiencies in habitat quality in any management category.
7. **What are the important habitat trends and their implications for goshawks?** The most obvious trend in Utah forests and woodlands is the lack of early and mid-seral species in all of the potential vegetation types. If forest management stresses properly functioning condition, importance of large trees, maintaining native processes, using adaptive management, and recognizing the role of fires, the habitat outlook could be favorable for the goshawk and its prey. This is true on the WCNF also.

Specific habitat attributes used by this species include the following:

- snags
- downed logs woody debris
- large trees
- herbaceous and shrubby understories
- a mixture of various forest vegetative structural stages

On the WCNF, vegetation types that are considered suitable habitat include lodgepole pine, fir, Douglas fir, spruce and aspen. Abundant prey populations within goshawk foraging areas occur when

1. the specific habitat attributes are provided,
2. forests contain large trees and have relatively open understories,
3. forest openings are small to medium in size,
4. patches of dense, mid-aged forests are scattered throughout, and
5. the majority of forests are in the mid-aged, matures, and old age classes.

Management recommendations include managing for a more open canopy (40 percent in mid-aged forests and 50-60 percent in mature and old forests) because the foraging area need not provide hiding cover for fledgling goshawks. Medium openings (less than 4 acres) for understory development and tree regeneration are desired in mixed-species forests; smaller openings are desired in spruce-fir forests.

Peregrine falcon. Peregrine falcons occupy a wide range of habitats. They are typically found in open country near rivers, marshes, and coasts. Cliffs are preferred nesting sites, although reintroduced birds now regularly nest on man-made structures such as towers and high-rise buildings. Peregrines may travel more than 18 miles from the nest site to hunt for food. However, a 10-mile radius around the nest is an average hunting area, with 80 percent of foraging occurring within a mile of the nest.

Peregrine falcons are tied to high cliffs or buildings for nesting in areas where there are abundant avian species for prey. Historically for the Wasatch-Cache this was along the Wasatch Front. The best habitats on National Forest System lands are located in Salt Lake, Box Elder, and portions of Weber Counties. There are known nesting pairs in Box Elder County.

Northern three-toed woodpecker. Three-toed woodpeckers are found in northern coniferous and mixed forest types up to 9,000 feet. Forests containing spruce, grand fir, ponderosa pine, tamarack, and lodgepole pine are used. Nests may be found in spruce, tamarack, pine, cedar, and aspen trees. They forage on a wide variety of tree species depending on location. Fire-killed trees are a major food source, and forest fires may lead to local increases in woodpecker numbers three to five years after the fire. In the northeastern United States, they were found to have territories of 74 acres, with a density of three pairs per 247 acres, although densities may increase during beetle outbreaks. They stay on their territories year round, though insect outbreaks may cause irregular movements.

This species is found in conifer and aspen vegetation types throughout the WCNF and Utah. It may presently be at some of its highest population levels on the Forest because of the quantity of mature and old growth forests types.

Columbian sharp-tailed grouse. Sharp-tails need large areas of undisturbed native shrub-grassland year round. Spring to fall habitat consists of mountain shrub patches and riparian shrub areas for escape cover and late summer-early fall food, and sagebrush cover types with a high diversity of shrubs, forbs, and grasses and high structural diversity. In winter, sharp-tails use clumps of trees or tall shrubs along hillsides or riparian areas which provide both food and cover. Serviceberry, chokecherry, bittercherry, and hawthorn are important species. Sharp-tails also snow-burrow to conserve energy and to roost relatively safe from predators.

The range of the sharp-tailed in Utah is in Box Elder, Weber, and Cache Counties. It is a sagebrush/grassland species that would be found at the lower elevations of the Forest.

Spotted frog. Spotted frogs are generally found in small springs, ponds or slough with a variety of herbaceous emergent, floating, and submergent vegetation. Spotted frogs emerge from hibernation in the spring. Primary prey for spotted frogs is insects. Historically spotted frogs were found in the Beaver Creek Drainage, Summit County. Spotted frogs were last found on the WCNF in May 2007 in the Prove River Drainage below Soapstone Creek. Prior to that a single

individual was found in July 1996 at Farmington Ponds in Davis County, which is outside of the project area.

Bonneville Cutthroat Trout. Bonneville cutthroat trout require cool, clear water throughout their lives. Optimum habitat characteristics include areas with a 1:1 pool to riffle ratio and slow, deep water with vegetated streambanks for shade, bank stability, and cover. They prefer summer water temperatures of about 59 degrees Fahrenheit (F), but can survive in water up to 70 degrees F. They may also inhabit lakes.

Cutthroat trout are found in Mill Creek, Big Cottonwood Creek, North Willow of Deaf Smith Canyon and Little Cottonwood Creek.

Effects of the Alternatives: Threatened and Endangered Species and Forest Service Status Species

Effects of Alternative 1: No-Action

The trail would not be built and use of the current trail would continue to increase. Impacts to the TES and FSS under this alternative would not be from the trail or use of the trail, but from increased housing development and subsequent increases in human use of the area. This would cause these species to avoid the area in favor of less occupied areas. Implementing this alternative would result in no effect to TES and FSS.

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

The trail would have a 36-inch tread and 48-inch cut with a 10-foot clearing width for oak in non-Wilderness areas. In Wilderness areas the trail would have a 24-inch tread and 36-inch cut with an 8-foot clearing width for oak. This standard applies to all segments of the trail.

Only the Federally listed as threatened Canada lynx and candidate yellow-billed cuckoo are considered in this analysis (TES). The Project Area is on the fringe of Canada lynx designated linkage habitat and the riparian areas of the various streams are potential habitat for the yellow-billed cuckoo. The bald eagle, June sucker and slender moonwort do not have habitat in the Project Area and will not be considered further in this analysis.

Forest Service Sensitive (FSS) species that are not considered in this analysis because they are not present or do not have suitable habitat are the spotted bat, Townsend's big-eared bat, wolverine, sharp-tailed grouse, and spotted frog. Potential foraging habitat is present for the Northern goshawk and peregrine falcon. Habitat for the boreal owl, flammulated owl and great gray owl is marginal and is generally not used in preference to more suitable secluded habitat. However, they may be occasional visitants to the area.

Bonneville cutthroat trout are known to exist in Mill Creek, Big Cottonwood Creek, North Willow (of Deaf Smith Canyon) and Little Cottonwood Creek and have been stocked into Upper Bells Canyon Reservoir. Goshawk may have foraging habitat in the Project Area.

On WCNF segments of the trail where the trail crosses a stream or riparian area, Forest Service standards for Riparian Habitat Conservation Areas (RHCA) would be implemented to ensure protection of the habitat and the associated species. The riparian management objectives would be full retention of riparian vegetation. Instream habitat would include fish passable structures for all stream crossings with a minimal of bank or existing instream habitat. Hazard trees could

be removed to eliminate the threat to life. The RHCA and riparian guidelines are included in Appendix A.

Segment 1: Parley's Canyon to Mount Olympus Trailhead

The effects on the habitat for TES and FSS species due to this project would be long-term minor adverse. Effects, if measurable, would be in the form of monitoring and determination of use or nonuse. Such effects are hard to quantify, except on a site-specific basis, in a project with a footprint as small as this. This is especially true because of the existing trail segments, both official and user-created, and the stream crossings that are already in place.

Removal of some trees and the understory shrub and brush habitat would remove hiding cover for small mammals and birds. However, there is sufficient remaining habitat to support the species that may be displaced from the trail and associated buffer. The Canada lynx is not expected to use the general area. They prefer higher more secluded ridges with thicker stands of brush and undergrowth.

The open areas currently used by peregrine falcons and goshawk would not be reduced. The WCNF management objectives for these species would be supported on Forest Service managed lands.

Stream crossings would adhere to Forest Service RHCA and riparian standards throughout the length of the trail. The Mill Creek, Big and Little Cottonwood Creeks, and Bells Creek crossing below lower Bells Reservoir all have existing crossing and would not affect the Bonneville cutthroat trout or their habitat in the Project Area.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The effects on the habitat of TES and FSS species in Segment 2 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The effects on the habitat of TES and FSS species in Segment 3 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The effects on the habitat of TES and FSS species in Segment 4 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

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

Changing the alignment for this segment of the trail would increase the amount of brush and shrub habitat that is impacted by the trail. The increase in the mileage of trail on Forest lands would mean there would be more of the trail subject to Forest Service Wilderness restrictions and the trail width would be reduced to a 24-inch tread with a 36-inch cut and an 8-foot clearing for oak. The increase would not be substantial because of the existing similar habitat above and below the trail.

Species such as the Canada lynx would still avoid the area because of the preference for more isolated ridge type habitat. Foraging habitat for the Peregrine falcon and goshawk would increase slightly as more habitat is opened up on the forest. This is not a significant factor because of the

better quality existing habitat in other locations away from the Project Area. There would be no changes to the effects to stream crossings as RHCA and riparian habitat guidelines would already be in place for these areas.

The amount of impact on the habitat for TES and FSS species due to this project would be minor.

3.2.4 Management Indicator Species

Management Indicator Species (MIS) are used to assess the effects of a management activity on wildlife (please see table 13). The general guidance and criteria for selecting MIS are contained in 36 CFR 219.19(a) and in the Forest Service Manual 2621.1. The following criteria were used in selecting MIS:

1. MIS must have a strong (but not exclusive) affinity for the habitat type.
2. The habitat type is key habitat in the life cycle of the MIS.
3. The MIS is sensitive to change.
4. The MIS is relatively easy to monitor, i.e., high visibility and in adequate numbers.
5. The MIS is somewhat representative of all species that use the habitat type.
6. The MIS is, for the most part, a year-round resident on the forest.

Table 13. Management Indicator Species on the WCNF.

Management Indicator Species	Associated Community	Comments
Cutthroat trout <i>Oncorhynchus clarki utah</i> <i>O.c. pleuriticus</i>	Aquatic	<i>O.c. utah</i> : suspected in 5 streams in Project Area <i>O.c. pleuriticus</i> : no impact; outside of species historic range.
Beaver <i>Castor canadensis</i>	Riparian	No impact; not found in Project Area.
Goshawk <i>Accipiter gentilis</i>	Aspen, Conifer, Mixed Conifer	Minimal impact; footprint of trail on fringe of foraging habitat; no nesting habitat.
Snowshoe Hare <i>Lepus americanus</i>	Pole/sapling Aspen, Conifer, and Mixed Conifer	Minimal impact on habitat for species; suitable community types not found in the Project Area.

Five management indicator species were identified during the development of the Forest Plan (table 13). From a strict classification perspective the Bonneville and Colorado River cutthroat trout are recognized as separate subspecies and are addressed as separate species in this report. Information for the MIS species and associated communities and risk factors described below was obtained from the MIS Version 2006-1 document prepared by the WCNF biologists (USDA 2006b).

Bonneville and Colorado River cutthroat trout – aquatic. Bonneville cutthroat trout are found within the project area in Mill Creek and North Willow Creek. They are also found upstream in Big and Little Cottonwood creeks and Bell Canyon. Colorado River cutthroat trout exist in some streams in the Uinta Mountains that drain into the Colorado. This is outside of the project area.

Risks, those items imposed by the nature of the environment and population, include factors such as temporal variability, population size, growth and survival, and isolation of a population.

Threats that have the potential to impact fish populations include: non-native fish, roads, trails, motorized trails, grazing, timber harvest, oil and gas development, dams and diversions, developed recreation sites, and special uses authorized in riparian zones on National Forest System lands. These threats primarily affect habitat conditions which can affect population size, habitat for growth and survival, and population connectivity.

Beaver – riparian. The beaver occurs throughout most of North America and is fairly common in Utah. It is found in permanent slow moving streams, ponds, small lakes, and reservoirs. On the WCNF, the Uinta Mountains are classed as “substantial value” habitat and the rest of the Forest as “critical value” or “high value” habitat as indicated on Gap Analysis maps.

Risks and threats to beaver populations on the WCNF are predation and unnaturally high water flows from spring runoff (USDA 2006b). Except for unregulated, concentrated trapping, or wide-ranging removal of deciduous woody plants near permanent water sources, there are few threats to beaver populations. Improper livestock grazing can degrade riparian vegetation, degrade water quality, and increase erosion, thus impacting beaver and the riparian habitat they depend on.

Goshawk – aspen, conifer, and mixed conifer. The goshawk was designated a Forest Service Sensitive species in 1991 and is also discussed in the FSS section 3.2.3 above. The goshawk is a forest habitat generalist that uses a wide variety of forest ages, structural conditions, and successional stages. On the WCNF, vegetation types that are considered suitable habitat include lodgepole pine, fir, Douglas fir, spruce and aspen. The goshawk preys on large-to-medium-sized birds and mammals, which it captures on the ground, in trees, or in the air. Three components of a goshawk’s home range have been identified: nest area (approximately 30 acres), post fledging-family area (approximately 420 acres), and foraging area (approximately 5,400 acres). The species nest in a wide variety of forest types including aspen, coniferous, and mixed conifer forests. It typically nests in mature and old growth forests.

Urbanization and more intensive uses of the forest by humans could degrade goshawk habitat, especially on private lands. Private lands in Utah continue to be developed, making the lands administered by Federal entities increasingly important for goshawks. This trend could also affect the connectivity of the habitat across the State.

Predation by great horned owls and martins and bacterial and fungal diseases have an impact on the species. Outbreaks of insect and tree disease can reduce nesting habitat. Habitat alteration, especially from logging, can remove nest trees and reduce stand density and canopy cover. This can result in long-term effects to the species. Nest failure due to disturbance from logging or other factors during the incubation period would be considered a short-term impact.

Snowshoe hare – pole/sapling aspen, conifer, and mixed conifer. In the Rockies and westward, hares mainly use coniferous forests. They are predominately associated with forests that have a well-developed understory that provides protection from predation and supplies them with food. Such habitat structure is common in early seral stages but may also occur in coniferous forests with mature but relatively open overstories.

Predation is responsible for at least 90 percent of the mortalities in snowshoe hare populations. The populations of snowshoe hare vary in how they fluctuate, if they fluctuate, how often they fluctuate, and the magnitude of the fluctuation. On the WCNF the snowshoe hare population appears to fluctuate depending on weather conditions which in turn affect the food supply. Forest maturation can also reduce habitat quality. Activities such as extensive conifer timber harvesting, prescribed fire, or wildland fire affecting large areas of conifer forest can individually or in combination influence snowshoe hare habitat/populations.

Effects of the Alternatives: Management Indicator Species

Effects of Alternative 1: No-Action

The trail would not be built and use of the current trail would continue to increase. Impacts to the MIS under this alternative would not be from the trail or use of the trail but from increased housing development and subsequent increases in human use of the area. This would cause these species to avoid the area in favor of less occupied areas. Implementing this alternative would result in no effect to MIS.

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

The trail would have a 36-inch tread and 48-inch cut with a 10-foot clearing width for oak in non-Wilderness areas. In Wilderness areas the trail would have a 24-inch tread and 36-inch cut with an 8-foot clearing width for oak. This standard applies to all segments of the trail.

Bonneville cutthroat trout are known to exist in Mill Creek, Big Cottonwood Creek, North Willow (of Deaf Smith Canyon) and Little Cottonwood Creek and have been stocked into Upper Bells Canyon Reservoir. Goshawk may have foraging habitat in the Project Area. Snowshoe hare and beavers are not to be found in the Project Area because of lack of habitat. These species are from the WCNF MIS list.

On WCNF segments of the trail where the trail crosses a stream or riparian area, Forest Service standards for RHCAs would be implemented to ensure protection of the habitat and the associated species. The riparian management objectives would be full retention of riparian vegetation. Instream habitat would include fish-passable structures for all stream crossings with a minimal of bank or existing instream habitat. Hazard trees could be removed to eliminate the threat to life. The RHCA and riparian guidelines are included in Appendix A.

Segment 1: Parley's Canyon to Mount Olympus Trailhead

The effects on the habitat for MIS species due to this project are measured on a forest-wide basis, and the effects, while long-term in duration, would not impact the MIS species on a forest-wide basis. Effects, if measurable, would be in the form of monitoring and determination of use or nonuse of habitat by individual MIS; those parameters are difficult to quantify, except on a site-specific basis, in a project with a footprint as small as this. This is especially true because of the existing trail segments, both official and user-created, and the stream crossings that are already in place.

Removal of some trees and the understory shrub and brush habitat would remove hiding cover for small mammals and birds. However, there is sufficient remaining habitat to support the species that may be displaced from the trail and associated buffer. The open areas currently used by goshawk would not be reduced. The WCNF management objectives for this species would be supported on Forest Service managed lands.

Stream crossings would adhere to Forest Service RHCA and riparian standards throughout the length of the trail. The Mill Creek, Big and Little Cottonwood Creeks and Bells Creek crossing below lower Bells Reservoir all have existing crossings and would not affect the Bonneville cutthroat trout or their habitat in the Project Area.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The effects on the habitat of MIS species in Segment 2 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The effects on the habitat of MIS species in Segment 3 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The effects on the habitat of MIS species in Segment 4 due to this project would be the same as for Segment 1. The trail standards would be the same for all segments.

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

Changing the alignment for this segment of the trail would increase the amount of brush and shrub habitat that is impacted by the trail. The increase in the mileage of trail on Forest lands would mean there would be more of the trail subject to Forest Service Wilderness restrictions and the trail width would be reduced to a 24-inch tread with a 36-inch cut and an 8-foot clearing for oak. The increase would not be substantial because of the existing similar habitat above and below the trail.

Foraging habitat for the goshawk would increase slightly as more habitat is opened up on the forest. This is not a significant factor because of the better-quality existing habitat in other locations away from the Project Area. There would be no changes to the effects to stream crossings as RHCA and riparian habitat guidelines would already be in place for these areas.

The amount of impact on the habitat for MIS species due to this project would be minor when compared to existing habitat on a forest-wide basis.

3.2.5 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) as amended was established to protect migratory birds. This act makes it illegal to pursue, hunt, take, capture, kill, or possess migratory birds or any part, nest, or egg of any such bird (16 U.S.C. 703-7012). In January 2001, Executive Order 13186 was issued on the Responsibilities of Federal Agencies to Protect Migratory Birds. It specifies the need to avoid or minimize any adverse impacts on migratory birds. The order addressed the need to restore and enhance the habitat of migratory birds.

Affected Environment: Migratory Birds

Species of Federal and local interest have been identified for the Project Area along with their respective locations, primary and secondary breeding habitat, and winter habitat (table 14). The species in the list are generally found in habitat that may be associated with the Project Area. Species known for use of wetlands and open water have been eliminated from the list. Some of

the species such as peregrine falcon, flammulated owl, and the Northern three-toed woodpecker are discussed in more detail in the MIS and FSS sections of this report. The remaining species habitat types are summarized in the table.

The species were obtained from the WCNF list compiled for the Forest Plan. The list is composed of species from the Partners in Flight and Birds of Conservation Concern lists developed respectively by the Utah Important Bird Area Technical Team of the Audubon Society (Audubon Society 2007) and the U.S. Fish and Wildlife Service.

Table 14. Migratory Birds Found in the Salt Lake Basin and Wasatch Mountains.

FWS and PIF Species	Utah Mountains	Basin and Range	Primary/ Secondary Breeding	Winter Habitat
Bendire's Thrasher		x	Low desert/low desert shrub	Migrant
Black Rosy-Finch	x		Alpine/Alpine	Grassland
Black Swift	x		Lowland riparian/Cliff	Migrant
Black-chinned Sparrow		x	Low/high desert shrub	Migrant
Black-throated Gray Warbler	x	x	Pinyon-Juniper/Mountain Shrub	Migrant
Bobolink		x	Wet meadow/agriculture	Migrant
Brewer's Sparrow	x	x	Shrubsteppe/High desert shrub	Migrant
Broad-tailed Hummingbird	x	x	Lowland riparian/Mountain riparian	Migrant
Ferruginous Hawk		x	Pinyon-juniper/Shrubsteppe	Grassland
Flammulated Owl	x	x	Ponderosa pine/sub-alpine conifer	Migrant
Gamble's Quail			Low desert shrub/lowland riparian	Low desert shrub
Golden Eagle	x	x	Cliff/high desert shrub	High desert shrub
Grace's Warbler	x	x	Ponderosa pine/mixed conifer	Migrant
Gray Vireo	x	x	Pinyon-juniper/Northern oak	Migrant
Greater Sage Grouse	x	x	Shrubsteppe/shrubsteppe	Shrubsteppe
Lewis' Woodpecker	x	x	Ponderosa pine/lowland riparian	Northern oak
Loggerhead Shrike	x	x	High desert shrub/Pinyon-juniper	High desert shrub
Long-billed Curlew		x	Grassland/agriculture	Migrant
Northern Harrier	x	x	Wet meadow/high desert shrub	Agriculture
Peregrine Falcon	x	x	Cliff/lowland riparian	Wetland
Pinyon Jay	x	x	Pinyon-juniper/ponderosa pine	Pinyon-juniper
Prairie Falcon	x	x	Cliff/high desert shrub	Agriculture
Pygmy Nuthatch	x		Ponderosa pine/aspens	Ponderosa pine
Red-naped Sapsucker	x	x	Aspens/mixed conifer	Mountain riparian
Sage Sparrow	x	x	Shrubsteppe/high desert shrub	Low desert shrub
Sharp-tailed Grouse	x	x	Shrubsteppe/grassland	Grassland
Swainson's Hawk	x	x	Agriculture/aspens	Migrant
Three-toed Woodpecker	x		Sub-alpine conifer/lodgepole pine	Sub-alpine conifer
Virginia's Warbler	x	x	Northern oak/pinyon-juniper	Migrant
Wouldiamson Sapsucker	x	x	Sub-alpine conifer/aspens	Migrant
Yellow-billed Cuckoo	x	x	Lowland riparian/agriculture	Migrant

Effects of the Alternatives: Migratory Birds

Effects of Alternative 1: No-Action

The trail would not be built and use of the current trail would continue to increase. Impacts to the migratory bird species under this alternative would not be from the trail or use of the trail, but from increased housing development and subsequent increases in human use of the area. This would cause these species to avoid the area in favor of less occupied areas. No new effects would occur from implementing this Alternative.

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

Implementing Alternative 2 would have no effects to minor adverse long-term effects on migratory birds. Based on existing conditions of the Project Area and proposed trail alignment, some species would be displaced to more suitable habitat as the trail is formalized and the access points are added. In general, however, migratory birds found in the area would still have sufficient habitat to maintain all life stages of their life cycle.

The trail standards would be the same for all segments. The trail would have a 36-inch tread and 48-inch cut with a 10-foot clearing width for oak in non-Wilderness areas. In Wilderness areas the trail would have a 24-inch tread and 36-inch cut with an 8-foot clearing width for oak.

Segment 1: Parley's Canyon to Mount Olympus Trailhead

The amount of habitat removed or modified in this segment would be minimal and not have a measurable effect on the migratory bird species that may use the area.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The effects on migratory bird species in Segment 2 due to this project would be the same as for Segment 1.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The effects on migratory bird species in Segment 3 due to this project would be the same as for Segment 1.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The effects on migratory bird species in Segment 4 due to this project would be the same as for Segment 1.

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. There would be a smaller footprint on the trail in Wilderness areas, and thus less of an impact on the surrounding habitat because of the increased length of trail that traverses Wilderness areas.

3.2.6 Domestic Dogs

Affected Environment: Domestic Dogs

The potential presence of additional domestic dogs in the foothills due to trail development may have impacts on wildlife. Existing regulations for Wilderness areas on the WCNF and city and county ordinances are specific in which areas dogs must be on leashes. The number of additional

domestic dogs that may be in the area cannot be quantified. However, potential impacts include interaction with wildlife species and their habitats, “scaring” and “chasing” species that have become habituated to human presence from habitat along and adjacent to the trail, and not being restrained on a leash and being able to roam into the brush to harass species in the area.

Effects of the Alternatives: Domestic Dogs

Effects of Alternative 1: No-Action

The trail would not be built and use of the current trail would continue to increase. Impacts to the mule deer, elk, TES, FSS, MIS and migratory bird species under this alternative would not be from the trail, but would come from increased concentration of use of the trail. The increased concentration of use would emanate from increased housing development. The subsequent increases in human use of the area would result in additional user-created trails in areas that would cause these species to avoid the area in favor of less occupied areas.

The No-Action Alternative would still require management agencies and governments to provide enforcement of the existing trail and area use regulations. No new regulations would be proposed or implemented. Domestic dogs would still roam as they please and the owners will either comply with the leash regulations or they won't.

Direct Effects. Direct adverse long-term effects of the No-Action Alternative would be for domestic dogs to continue to harass wildlife in and along the existing trail route including any new user-created trails.

Indirect Effects. Use of existing habitat by other species would continue to decline as domestic dogs are encountered in the Project Area.

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

Under Alternative 2, there would be an increase in the number of miles on the WCNF that would come under Wilderness restrictions such as trail width, type of travel on the trail and the need to maintain domestic dogs on a leash.

The main problem that needs addressing is enforcement of the existing ordinances along with the Forest Service Wilderness restrictions on Forest Service managed portions of the trail. Without some enforcement presence on the trail, it would be difficult to ensure there would be no adverse impacts to the wildlife in the Project Area. Until this problem is addressed adequately, for the No-Action Alternative and Alternatives 2 and 3, minor adverse impacts to big game, migratory birds, and any other species currently occupying habitat in the Project Area would continue to occur due to unleashed domestic dogs.

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Impacts are currently taking place and would continue as the trail is developed. The effects of implementation of Alternative 2 would be minor adverse and related to the problem of controlling domestic dogs in habitat used by the wildlife species described in this report.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

The effects of domestic dogs on Segment 2 would be the same as for Segment 1.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

The effects of domestic dogs on Segment 3 would be the same as for Segment 1.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

The effects of domestic dogs on Segment 4 would be the same as for Segment 1.

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

Effects for Alternative 3 are the same as described in Alternative 2. The only difference is there would be more of the trail subject to Wilderness regulations which would provide a smaller trail width and regulate the type of use the trail can receive.

3.2.7 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 and humans. These areas are highly productive and biologically diverse, and provide habitat for a wide variety of terrestrial and aquatic wildlife.

Riparian areas are also discussed in the Section 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, [the riparian areas] 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.

3.2.8 Cumulative Effects

Big Game Populations and Winter Range

Deer and elk habitat does not stop at the Forest Service boundary; it formally extends into the foothills that are now being removed from accessible habitat by human developments. For mule deer and elk winter range, the increased housing developments in lower elevation habitat would

continue; the development will continue to force the deer and elk to use higher elevation lands. The winter range protection afforded by Forest Service land would remain unchanged. The long-term effect is expected to be minor and is the confinement of deer and elk to suitable habitat on the National Forest and control of the deer populations through Utah Department of Wildlife management efforts.

Threatened and Endangered Species, Forest Service Status Species, and Management Indicator Species

The increased housing developments in lower elevations would continue. These actions would bring changes to the area surrounding the trail as humans and domestic animals venture into existing occupied habitat normally used by the species listed in this section. The protection afforded to these species and their habitat on Forest Service land would remain unchanged. The long-term effect is expected to be movement of these species to suitable habitat on the National Forest or other available land away from the Project Area. Control of the human encroachment and additional impacts to the species and their habitat would have to come through local, county and Federal management regulations and efforts.

Management Indicator Species

The increased housing developments in lower elevations would continue. These actions would bring changes to the area surrounding the trail as humans and domestic animals venture into existing occupied habitat normally used by the species listed in this section. The protection afforded to these species and their habitat on Forest Service land would remain unchanged. The long-term effect is expected to be movement of these species to suitable habitat on the National Forest or other available land away from the Project Area. Control of the human encroachment and additional impacts to the species and their habitat would have to come through local, county, and Federal management regulations and efforts.

Migratory Birds

Cumulative effects will be the same as described for threatened and endangered species, Forest sensitive species and management indicator species, above.

Domestic Dogs

Cumulative effects will be the same as described for threatened and endangered species, Forest sensitive species and management indicator species, above.

Past, Present, or Reasonably Foreseeable Future Actions

There are no other actions related to this resource issue that may affect this project or the Project Area.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in Table 15.

Table 15. Cumulative Effects of the Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
Big Game and Big Game Winter Range	No effect to minor adverse effect. No loss of additional habitat; human use would continue to increase.	Minor adverse long-term effects. Habitat would be fragmented and 48 acres/mile of current habitat would not be used as it is now.	Minor adverse long-term effects. Very little difference from Alternative 3. This alternative leaves lower elevation winter range available, but reduces access for wildlife by increasing fragmentation.
TES, Forest Service Sensitive Species, and MIS	No direct effects. Indirect effects include potential change in available habitat or use by species through increased user-created trails.	Minor long-term adverse effects. Minimal changes in habitat type. Some habitat fragmentation would displace some individuals.	Minor long-term adverse effects. Effects would be less than Alternative 2. Smaller trail footprint on NF land and additional restrictive use in Wilderness segments.
Migratory Birds	No effects. No change in available habitat or use by species.	Minor long-term adverse effects. Minimal changes in habitat type. Some habitat fragmentation would displace some individuals.	Minor long-term adverse effects. These effects would be less than Alternative 2. Smaller trail footprint on NF land and additional restrictive use in Wilderness segments.

3.3 Recreation and Visitor Use

3.3.1 Introduction

Managing the WCNF for a variety of visitor use/recreation opportunities and settings is a priority in all management decisions. Visitor use in the Project Area is extremely high all year long. Common activities include hiking, biking, jogging, running, cross-country skiing and people recreating with their dogs. Horseback use does occur primarily in the Draper area and use is relatively low compared to other uses. Horses would not be permitted on any new section. Similarly, mountain bike use would only be permitted in sections that have viable trailhead or access points and the segments are entirely outside of Designated Wilderness. Such sections include Parley's to Mill Creek, Ferguson to Little Cottonwood Canyon TH, and possibly Bells to South Fork trailhead if feasible and consistent with Sandy City trails plan (see figure 11 for restrictions).

Demand for quality recreation opportunities is expected to grow as adjacent urban populations increase. Meeting this increased demand and managing conflicts between various user groups is important for balanced user growth for today and the future.

Issues to be analyzed in this report have been identified from public meetings, the public scoping process, from other agencies, and the Forest Service interdisciplinary team.

This section will provide a description of the affected recreation and visitor use issues in the Project Area, including:

- Recreation/Trail Experience
- Compatibility with BST concept
- User conflicts and types of use
- Trail proliferation
- Trail administration and maintenance

A discussion of recreation/trail experience will include a description of the existing conditions, a summary of applicable laws, regulations, and guidelines, and an analysis of the effects of each alternative. Cumulative impacts of the alternatives are summarized in Section 3.3.4: Cumulative Effects.

In general, recreation opportunities 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.

The report also provides analysis of effects for a range of alternatives on recreation and traffic/parking issues as required by NEPA, NFMA, other applicable laws and regulations, Forest Service directives, and the Forest Plan.

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.

Geographic Information System (GIS) data was provided by WCNF and Utah Automated Geographic Reference Center (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

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

Guidelines for Recreation Management

(G49) Manage recreation opportunities consistent with Management Prescriptions Categories (MPCs), Recreation Opportunity Spectrum (ROS) Classes, Landscape Character Themes (LCTs), Scenic Integrity Objectives (SIOs), and in accordance with Winter Recreation Maps as well as District Travel Management Plans.

(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.

(G51) In Semi-Primitive Non-Motorized areas, use of motorized equipment maybe approved for administrative purposes.

(G52) Explore opportunities for separation of conflicting uses in time (for example alternating days) as well as space (closure of area to specific uses) to resolve conflicts while continuing to offer varied recreation opportunities.

(G54) Use interpretation and environmental education to assist in improved understanding and ownership of forest stewardship needs.

Relevant Acts

Multiple-Use Sustained-Yield Act (1960): adds outdoor recreation as a use for which national forests were established.

Wilderness Act of 1964 and the Utah Wilderness Act of 1984: provides for establishing Wilderness for environmental preservation as well as recreation.

Land and Water Conservation Act (1964): provides continuing access to national forests and funding for recreation and defines admission and recreation fee collection guidelines.

National Trails System Act (1968): establishes that trails be provided to meet increasing recreation needs.

Executive Order 11644 (1972) and 11989 (1977) Off-Road Vehicles on Public Lands:

provides for closing areas to off-road vehicles where resources would, or are, being negatively impacted. This is also covered under 36 CFR 295.

Forest and Rangeland Renewable Resources Planning Act (1974): includes recreation among resources for which forest planning is required.

Other Applicable Laws\Guidelines

Recreation Opportunity Spectrum (ROS): mapping and classification system used to distinguish between different types of recreation settings in the Forest.

3.3.2 Affected Environment: Recreation and Visitor Use

The project area is located adjacent to Salt Lake County and provides various recreation opportunities. Substantial use already occurs on the existing trails that occupy the bench in certain municipalities and on adjacent USFS land. These small and unconnected trails currently provide some visitor utility to hikers, mountain bikers, dog walkers, horseback riders, and others. Visitor use studies of urban proximate trails indicate that a large portion of users live in nearby neighborhoods. For instance, a survey on the BST section between Emigration Canyon and the University Complex found that 90 percent of users accessed local trails from a nearby location.

Completion of the preferred alignment may affect some locally important existing trails by increased use, recreation opportunities, etc. Some of the potentially affected trails are:

- Mormon Pioneer National Historic Trail: Emigration and Parley's Canyons
- Pony Express National Historic Trail: Parley's Canyon
- California National Historic Trail: Parley's Canyon
- Parley's Creek Corridor Trail: Parley's Canyon
- Grandeur Peak Trail: Parley's to Mill Creek Segment
- Pipeline Trail: Mill Creek Canyon
- Rattlesnake Gulch Trail: Mill Creek Canyon
- Neff Canyon Trail: Neff Canyon
- "Z" Trail: Mount Olympus Cove
- Mount Olympus Trail: Wasatch Boulevard
- Heughs Canyon Trail: Canyon Cove neighborhood
- Ferguson Canyon Trail: Ferguson Canyon
- Rocky Mouth Canyon Trail: Rocky Mouth Canyon
- Bell Canyon Trail: Bell Canyon

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. From these data inferences about levels of use, kinds of use, and desired experiences sought can tentatively be made.

During September of 2005, a study of BST users conducted for the Utah Museum of Natural History EIS (NPS 2007b). Estimated use for the University of Utah section of the BST was approximately 6,000 users for September, 2005 alone. Ninety percent of trail users of that section came from the University, Research Park, the University dorms complex and other local neighborhoods. It should be acknowledged that the University complex serves as a magnet for potential trail users and since few such magnets exist along the proposed alignments (Mill Creek, Big Cottonwood, and Little Cottonwood canyons and proposed Sandy City connections might be exceptions), this figure may over-estimate use densities.

Although the proposed new sections of trail would serve their local communities, there is also potential that these new trailheads could serve a larger population once a significant portion of the trail network is completed, similar to the Jordan River Parkway. Also, the Mt. Olympus trailhead attracts a substantial number of users on a year-round basis. Other trailheads such as Big Cottonwood Canyon and Little Cottonwood Canyon trailheads would also likely serve as hubs for local and non-local community users.

The majority of BST users along the University complex were hikers, runners, or mountain bikers. It should be noted that the existing condition and proposed action in the project area do not and will not likely provide opportunities for mountain bikers, which is different from the SL City/U of U section.

Where permitted, dog use is likely to be popular. Approximately 1500 dogs were observed on the University section of the BST during September 2005. Nearly all were off leash. It was observed that along the University section of the trail, only about 4 percent of the users were children. In addition, family recreation was the least important among motives for using the trail. However, the university complex is designed to accommodate adult, working professionals. Many of the BST users of this section of the trail came during work, study, or lunch breaks, or used the trail before or after work. Conversely, the proposed alignments would pass close to residential neighborhoods where families predominate.

The proposed trail routes pass through a variety of jurisdictions (city, county, and Federal), each of which has certain constraints on user types. In particular, there are three designated Wilderness areas and three protected watersheds in the project area. Affected Wilderness areas are Mount Olympus, Twin Peaks, and Lone Peak.

Activities using any type of mechanized transport, such as mountain bikes, are prohibited in Wilderness areas.

Affected protected watersheds include Big Cottonwood, Little Cottonwood, and Bell's Canyon. Under the **Salt Lake City - County Health Regulation #14 (watersheds)**, dogs and horses are not allowed where the trail crosses the 'culinary' watershed boundaries that supply drinking water to the urban areas (see figure 11).

Restricted Recreation Uses:

- Mountain bikes: The Wilderness Act of 1964 prohibits any mechanical transport in Designated Wilderness Areas.
- Dogs and horses: not allowed where the trail crosses the 'culinary' watershed boundaries.

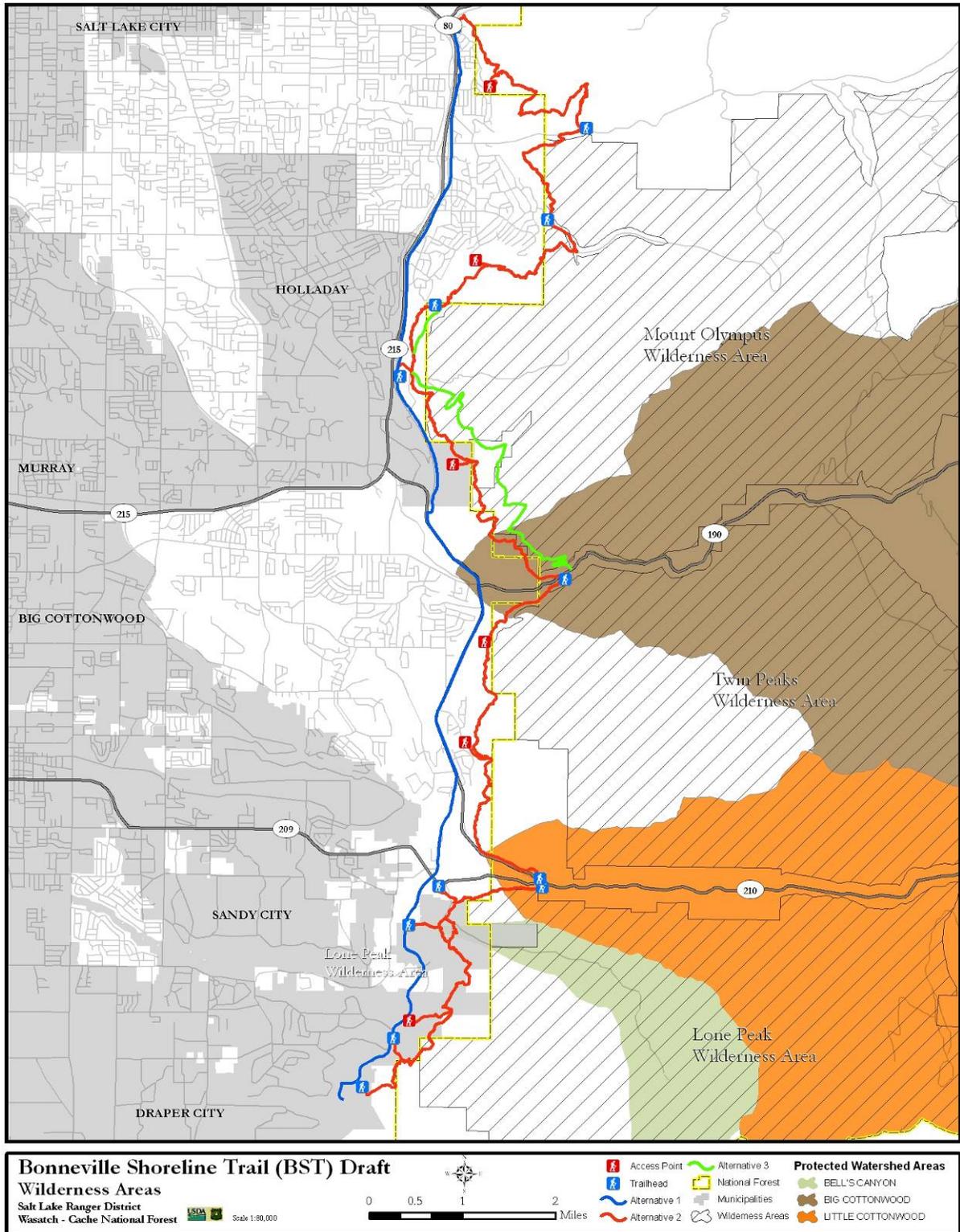


Figure 11. Map of Protected Watersheds and Designated Wilderness Areas in the Project Area.

The USFS uses the ROS as a management tool to describe and allocate outdoor recreation settings. In addition, the ROS system provides a way to help managers and recreation users understand what recreation experiences to expect through narrative descriptions and where these are available throughout the forest. Table 16 summarizes the ROS classes related to the project area.

Table 16. Recreation Opportunity Spectrum Classification System.

ROS Class	Description of Setting
Roaded Natural	Opportunity to be with other users in developed sites; little challenge or risk; predominantly natural appearing environment as viewed from sensitive roads and trails with moderate evidence of human sights and sounds; moderate concentration of users at campsites; some obvious user control; access and travel is standard motorized vehicles; resource modification and utilization practices are evident but are in harmony with the natural environment.
Semi-Primitive Non-Motorized	High probability of solitude, closeness to nature, challenge and risk; natural appearing environment; some evidence of others; minimum of subtle, on-site controls; access by non-motorized trails or non-motorized primitive roads or cross-country; has an area of primitive roads or trails that are not open to motorized use: vegetation alterations to enhance forest health are few and widely dispersed.
Wilderness\ Semi-Primitive Non-Motorized	Similar to Semi-Primitive Non-Motorized but occurs on designated Wilderness lands. Wilderness laws and guidelines are maintained.

3.3.3 Effects of the Alternatives: Recreation and Visitor Use

Effects of Alternative 1: No-Action

The No-Action Alternative (Wasatch Blvd.) would not result in direct effects to recreation and visitor use, as no new trail would be built on NFS lands. Conversely, a number of secondary indirect effects can be expected to occur as the population grows. Visitor use is expected to increase on built trails, existing user-created trails, as well as proliferation of user-created trails. Additionally, user conflicts and types of recreation uses are expected to increase. Since Wasatch Blvd. is a fairly busy and high-speed thoroughfare, it is unsuitable for attracting users other than road bikers, neighborhood walkers, and joggers. Users attracted to the kinds of recreation experiences offered by more traditional wildland trails are not observed using Wasatch Blvd. as a recreation resource today.

This alternative is not compatible with the BST Concept for a number of reasons, primarily because of location and the types of recreation opportunities available. The increased demand for recreation under this alternative, compared to Alternatives 2 and 3, would not be met. Additionally, Alternative 1 would likely produce more dispersed and unmanaged recreation activities and, therefore, increased user conflicts and conflicts with adjacent property owners would likely occur.

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

Compliance with Forest Plan Standards and Guidelines would result in long-term beneficial effects to the forest, local communities, and the region. Alternative 2 is also compatible with the BST concept and overall objectives of the trail, and would result in the following benefits:

- Provide ready access to the Wasatch foothills public lands.
- Provide a place for people to pursue their recreational pursuits that are safe and aesthetically pleasing, trying where possible to accommodate a broad range of non-motorized uses.
- Provide a place for people to have an opportunity for quiet and scenic recreational use nearby, yet apart from the urban Wasatch Front.

Direct effects of Alternative 2 would include approximately 8 miles of new trail to be built on national forest land. Restrictions of certain user types would occur along the trail. Designated Wilderness Areas prohibit motorized and mechanized vehicles such as mountain bikes. Dogs are not allowed where the trail crosses the 'culinary' watershed boundaries. In addition, there may be other displacements or user restrictions as the trail enters or exits different jurisdictions. Trail signs would be used for boundary control, public safety, resource protection, and direction at trail junctions. Additionally, trail signs would show point-to-point restrictions/closures of certain uses, e.g., mountain bikes not allowed in Wilderness (see figure 11).

It is likely that the majority of users would come from neighborhoods located in close proximity to the trail. A preponderance of local neighborhood use also brings with it high-frequency users. Should this general principle of recreation use apply to the proposed alignments, the majority of users would be high-frequency users. Such a trend is held for the University section of the BST. Here, over half (57 percent), of the trail visitors used the trail over 40 times a year. Another 15 percent used the trail between 21 and 40 times per year. Conversely, only 15 percent of visitors used the trail 5 or fewer times per year. There are no compelling reasons to suspect that trail use frequency would not follow this pattern for the proposed alignments.

Frequent users also tend to be users of short duration. Likewise, this pattern was evident in the University section of the BST. Nearly three-quarters of visitors used the trail for 1 hour or less. Bikers were more likely to use the trail for longer durations than either runners or hikers/walkers. Although many midday users of the University section of the BST visited the trail for only brief periods necessitated by time constraints, before work, after work, and weekend users followed that same pattern. With the exception of through-users and endurance athletes using the trail for training purposes, short duration use is likely to be the most characteristic pattern of use along the proposed alignments.

Issues of concern on national forest land such as user conflicts, trail use, and trail proliferation would be addressed and managed according to Forest Plan Standards and Guidelines, forest-wide goals and objectives, desired future conditions, and other applicable laws and guidelines, i.e., Protected Watersheds and ROS. It should be noted that bikes would be prohibited in most sections and therefore result in less user conflict in those areas. These same issues would be addressed and managed by local government jurisdictions where the trail leaves national forest boundaries. Based on the multi-jurisdictional nature of the trail alignment, it would be essential for all involved authorities to plan and coordinate actions mutually.

Compared to other alternatives, Alternative 2 is the most compatible with the BST Concept, provides ways to manage user conflicts, offers a variety of managed and regulated recreation opportunities, and reduces user-created trails and trail proliferation.

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

Overall effects would be similar to Alternative 2. Direct effects of Alternative 3 would include approximately 10 miles of new trail to be built on NFS land, as compared with 8 miles of under Alternative 2. The proposed trail alignment is identical to Alternative 2 with the exception of a small area in Segment 1 and the entire length of Segment 2 which occurs all on national forest land. The south end of Segment 2 is rather steep (1,000 foot elevation change in less than one half mile).

Compared to the No-Action Alternative, Alternative 3 is more compatible with the BST Concept, provides ways to manage user conflicts, offers a variety of managed and regulated recreation opportunities, and reduces user-created trails and trail proliferation. Segment 2 under this alternative would provide more seclusion, however, would require additional elevation gain and steep sections that may not provide the same recreation benefits as the proposed action. Some hikers may not enjoy Segment 2, while may find it more enjoyable (more solitude, greater challenge/workout, further from urban area, views, etc.).

3.3.4 Cumulative Effects

As the WCNF continues to pursue the goal of managing for wide spectrum of recreation experiences, the cumulative effects of the BST are considered to benefit local communities and the region overall. The BST would be recognized and valued as a unique opportunity to provide a recreation corridor across multiple ownerships in the face of continuing urban development.

Past, Present, or Reasonably Foreseeable Future Actions

Past Actions

Past actions include various types of recreation activities (hiking, mountain biking, horseback riding, dog walking, and others) on short segments of designated and user-created trails.

Present Actions

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 near the mouth of Big Cottonwood Canyon.

Present actions as they are listed above all potentially impact recreation experience. Continued recreational use will likely lead to increased user-created trails and trail proliferation, increased user conflicts, illegal trespass onto private property, and illegal use on designated lands such as wilderness and protected watershed areas.

Reasonably Foreseeable Future Actions

Actions that may occur in the reasonably foreseeable future include increased demand for recreation opportunities, urban encroachment on NFS lands, and a potential Neff's Canyon detention basin.

The WCNF would continue to play an important role in meeting the demand for recreation opportunities. As recreation use continues to grow, conflict between users may escalate. Management of these user conflicts would be guided by Forest Plan Standards and Guidelines,

forest-wide goals and objectives, desired future conditions, and other applicable laws and guidelines, e.g., Protected Watersheds and ROS.

In addition, as recreation opportunities continue to grow, some visitors may be displaced to other locations and/or not be able to find the type of experience they are seeking. For example, Designated Wilderness Areas displace mountain bikers while Protected Watershed areas displace horseback riders and dog walkers. Other issues of concern such as trail proliferation, trail administration, and trail management are considered minor with the implementation of BMPs.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in Table 17.

Table 17. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Recreation and Visitor Use	No new acres of disturbance. Potential short- and long-term adverse effects will likely occur as user-created trail proliferation and unmanaged recreation activities increase.	Impacts from implementing this trail would likely reduce adverse impacts already in place. Establishing a managed network of trails would likely result in long-term beneficial impacts for the local and regional recreation experience.	Long-term beneficial effects. More trail located on NFS and designated Wilderness would provide a more secluded experience for visitor use. Would require additional elevation gain and steep sections that may not provide the same recreation benefits as Alternative 2.

3.4 Wilderness

3.4.1 Introduction

Maintaining Wilderness characteristics, regulations, and management objectives within this Project Area is a priority in all management decisions.

Select sections of the proposed BST alignments pass through the Mount Olympus, Twin Peaks, and Lone Peak Wilderness areas (see figure 12). Mount Olympus and Twin Peaks are managed by WCNF while Lone Peak is jointly managed with the Uinta National Forest (UNF). Use is extremely high all year long, primarily coming from day visitors to the area (USDA 2003). Because of its adjacency to urban development, these Wilderness areas offer critical wildlife habitats, watersheds, and recreational opportunities for the Salt Lake area.

Methodology

Best available information from a variety of sources was compiled for this report, including:

- USDA Forest Service. 2003. Final Environmental Impact Statement Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- USDA Forest Service. 2003. Wasatch Cache National Forest - Forest Plan.
- The Wilderness Act of 1964.

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

Wilderness Issues

The primary concerns for this proposal within designated Wilderness areas center on the compatibility and consistency with Wilderness characteristics, regulations, and management objectives.

Issues to be analyzed in this report have been identified from public meetings, the public scoping process, from other agencies, and the Forest Service interdisciplinary team. Relevant Wilderness management issues listed in the WCNF FEIS include:

1. **Biological Diversity of Wilderness.** Concerns were expressed about potential effects on water quality, vegetation, wildlife and fisheries, fire, insects and disease, and undesired species.
2. **Recreation Use in Wilderness.** A primary concern is the increased use of Wilderness visitors impacting both popular sites, as well as pristine areas. Recreation use in Wilderness is increasing and can affect Wilderness values and resources, naturalness, wildness, and solitude.
3. **Future Trends.** In addition to increased recreation use in Wilderness, there continues to be public interest and opposition to adding to the National Wilderness Preservation

System. Furthermore, more areas are incorporating permit systems, designated sites, and use restrictions for the purpose of preserving wilderness character.

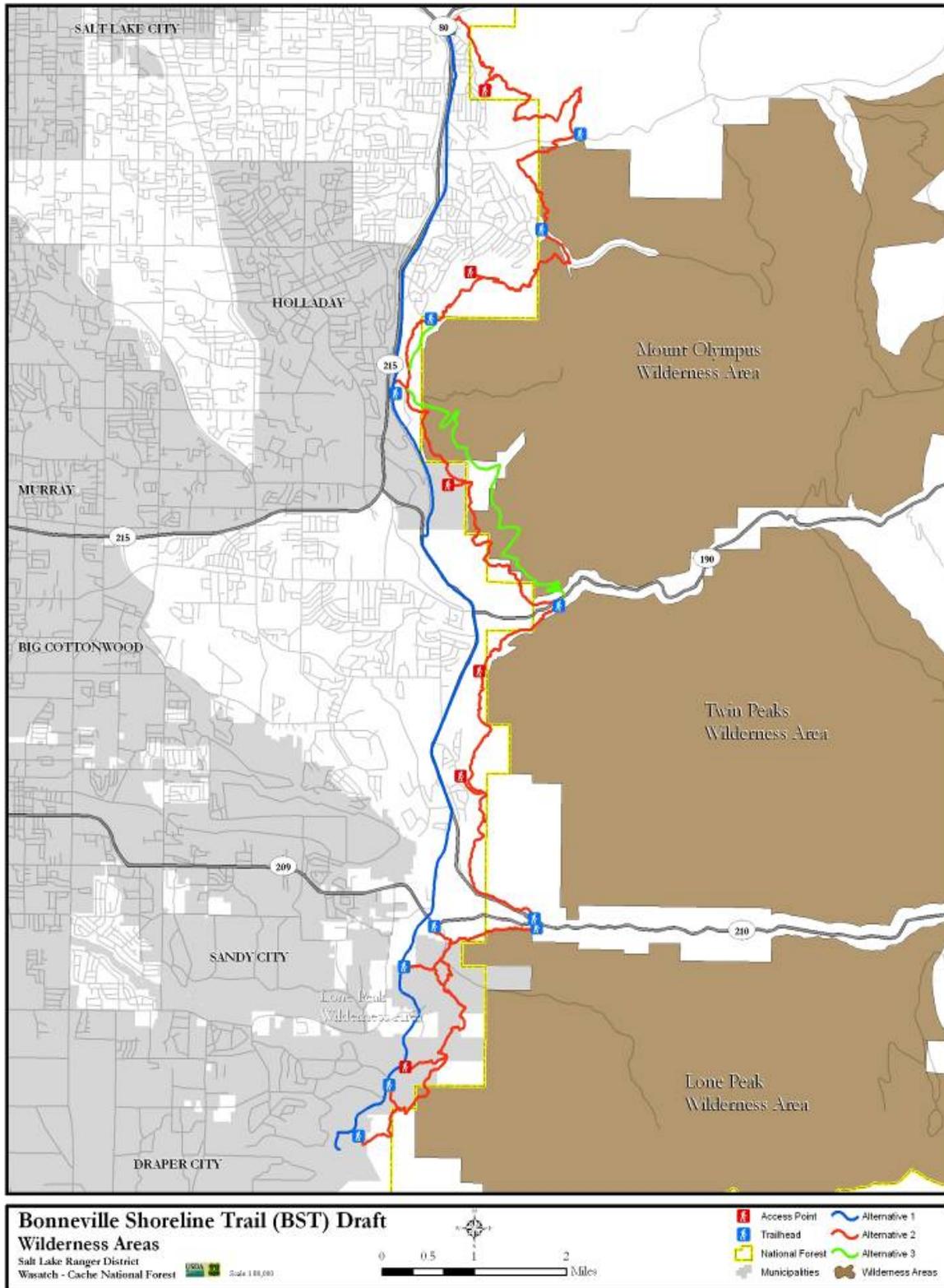


Figure 12. Wilderness Areas Within the Project Area.

Laws, Regulations, and Guidelines

The WCNF Forest-wide goal of designated Wilderness is to “maintain Wilderness ecosystems and character, primarily influenced by the forces of nature, to provide opportunities for public use, enjoyment, and understanding of Wilderness, and to preserve a high quality Wilderness resource for present and future generations. Manage Wilderness to sustain wild ecosystems for values other than those directly related to human uses.”

The sub-goal of Wilderness is to recognize differences in population proximity and to provide Wilderness experiences for more people.

Wilderness areas would continue to be managed in accordance with the Wilderness Act of 1964 and the Utah Wilderness Act of 1984. In addition, Wilderness would be managed to allow ecosystems to function naturally.

The following acts describe relevant history and management guidelines pertaining to the project’s Wilderness areas:

- **The Wilderness Act (1964):** The National Wilderness System was created by the Wilderness Act of 1964. Wilderness areas are managed by the Federal Agency in ownership of the land prior to its establishment as Wilderness. Wilderness areas are administered for the use and enjoyment of the American public while leaving Wilderness unimpaired for the future use, to preserve the Wilderness character, and for the gathering and dissemination of information regarding their enjoyment and use as Wilderness (Wilderness.net 2006).
- **Endangered American Wilderness Act of 1978 (PL 95-237):** Includes the designation of Lone Peak as a Wilderness area and some watershed protection requirements for that area.
- **Utah Wilderness Act of 1984 (PL 98-428):** designated Mount Olympus and Twin Peaks areas, among 10 other Wilderness areas (Wilderness.net 2006). Also includes some requirements for grazing in Wilderness, State water allocation authority, prohibition on buffer zones, and mineral resources.

3.4.2 Affected Environment: Wilderness

Wilderness is defined by Congress as “an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” In general, Wilderness areas are Federally-owned undeveloped lands that retain their primeval character and influence, without permanent improvements of human habitation. Further, Wilderness areas have been unaffected by man’s imprint, have outstanding opportunities for solitude or primitive and unconfined recreation, and are at least five thousand acres or of a sufficient size as to make practicable preservation and use in an unimpaired condition. Finally, Wilderness areas may contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Wilderness.net 2006).

There are three existing Wilderness areas in the Project Area which contain proposed segments of the BST (see figure 12). The three Wilderness areas are Mount Olympus, Twin Peaks, and Lone Peak. Lone Peak is jointly managed with the Uinta National Forest while the other two are

managed by WCNF. The total acreage of these three Wilderness areas is approximately 36,464 acres. Table 18 summarizes total acreage by Wilderness area in the WCNF.

Table 18. Summary of Wilderness Acreage by Wilderness Area in the WCNF.

Wilderness Area	Year Established	Acres (Approximate)
Mount Olympus	1984	15,292
Twin Peaks	1984	11,496
Lone Peak	1978	9,746*
Total		36,464

* Lone Peak total acreage equals 30,088 of which 20,342 are in UNF and 9,746 are in WCNF.

- Mount Olympus Wilderness** is characterized by narrow canyons and rugged terrain varying from moderate to severe. Mount Olympus reaches an elevation of 9,793 feet. Large basins and bare rocky ridges occupy the higher elevations while lower elevations are composed of dense mountain brush mixed with sagebrush and grass. There are 12 system trails in the area totaling approximately 37 miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. The western side of the Wilderness near the urban-forest interface is often free of snow much of the winter and receives substantial hiking use. The higher elevations receive much of their winter use by backcountry and Nordic skiers, as well as snowshoers. The Mt. Olympus Wilderness generally has the greatest use of the three Wilderness areas due to its proximity to the urban center, larger trail system, and number of accessible year-round access points. The southern side of this Wilderness area is within the Salt Lake City Watershed (see figure 11) and has numerous restrictions including dogs, horses, and swimming (Wilderness.net 2006).
- Twin Peaks Wilderness** is directly south of and has similar characteristics to Mount Olympus Wilderness. Elevation ranges from approximately 5,000 feet to 11,319 feet. The area has about five system trails totaling approximately 12 miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. Most of the winter use occurs at higher elevations as backcountry and Nordic skiing and snowshoeing. Most of the Wilderness area is within the Salt Lake City Watershed and has numerous restrictions, including dogs, horses, and swimming (Wilderness.net 2006).
- Lone Peak Wilderness** is just south of Twins Peak Wilderness and is jointly managed with WCNF and UNF. Little Matterhorn (11,326 ft) and Lone Peak (11,253 ft) are the highest peaks in the area. Vegetation includes Douglas fir, subalpine fir, and aspen, with dense mountain brush at lower elevations. There are four recreational system trails within the WCNF portion of the Lone Peak Wilderness area, totaling approximately four miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. Most of the winter use occurs at higher elevations as backcountry and Nordic skiing and snowshoeing. Due to the limited number of trails and more difficult access, the Lone Peak Wilderness generally has less use than the Twin Peak or Mt. Olympus Wildernesses.

3.4.3 Effects of the Alternatives: Wilderness

Effects of Alternative 1: No-Action

This alignment uses existing streets and sidewalks located in urban areas. No new trails would be built. This alignment does not occur within the Forest Service boundaries and compliance with WCNF Forest Plan standards and guidelines would not be applicable.

Although the No-Action Alternative has no direct effect on Designated Wilderness areas, several secondary, indirect impacts are likely to occur based on current and projected use. As adjacent populations grow, user-created trails and trail proliferation are expected to increase. User-created trails and trail proliferation may cause minor adverse effects to wilderness character, biological diversity, and overall recreation experience in Wilderness. Since no new trail construction would occur in Designated Wilderness areas under this alternative, it is likely to have the least overall impact to wilderness.

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

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Implementing the BST proposed alignment in this segment may result in the following effects: minor adverse short- and long-term, beneficial, and direct and indirect. Lengths of disturbance are described in table 19.

Table 19. Effects of Alternative 2 on Segment 1.

Segment	Total Segment Length (Miles)	Built	Proposed
1	1.17	0.12	1.05

Minor short-term adverse effects may include disturbance during trail construction. Long-term adverse effects may occur through significant increase of human use in Wilderness areas, consequently, taking away from the Wilderness character. Beneficial effects may occur by satisfying the WCNF sub-goal of recognizing differences in population proximity and providing Wilderness experiences for more people. Direct effects would be short-term and specific to trail construction. Indirect effects may include growth, inducing visitor use in Wilderness both in the short- and long-term.

The Proposed Action would be consistent with Wilderness regulations and the WCNF Revised Forest Plan, though Alternative 1 would be the most consistent in maintaining wilderness character, biological diversity, and overall recreation experience since no new trail construction in Designated Wilderness would occur. Alternative 1 is more compatible with Wilderness regulations and the WCNF Revised Forest Plan. The WCNF Revised Forest Plan states that no additional trails would be built into the Wilderness except to facilitate short segments of the BST and only where absolutely necessary to minimize resource impacts or to better manage visitor use. The plan further states that the creation of additional user-created trails would not be allowed. Major emphasis would also be placed on user education because of high visitor use and adjacency to urban populations.



Figure 13. Effects of Alternative 2 on Segment 1.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 20.

Table 20. Effects of Alternative 2 on Segment 2.

Segment	Total Segment Length (Miles)	Built	Proposed
2	1.29	0.00	1.29

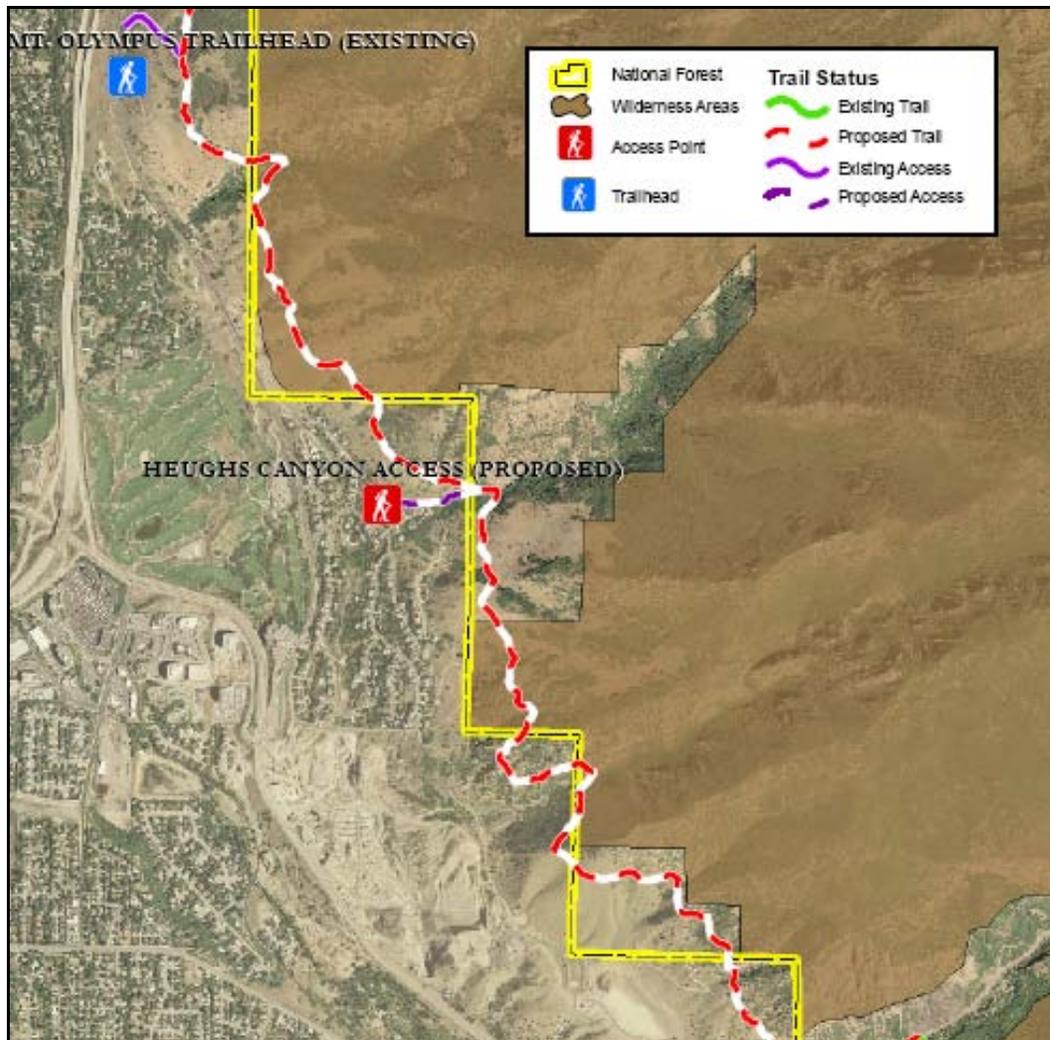


Figure 14. Effects of Alternative 2 on Segment 2.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

This segment of the trail does not traverse designated Wilderness.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 21.

Table 21. Effects of Alternative 2 on Segment 4.

Segment	Total Segment Length (Miles)	Built	Proposed
4	1.29	0.00	1.29

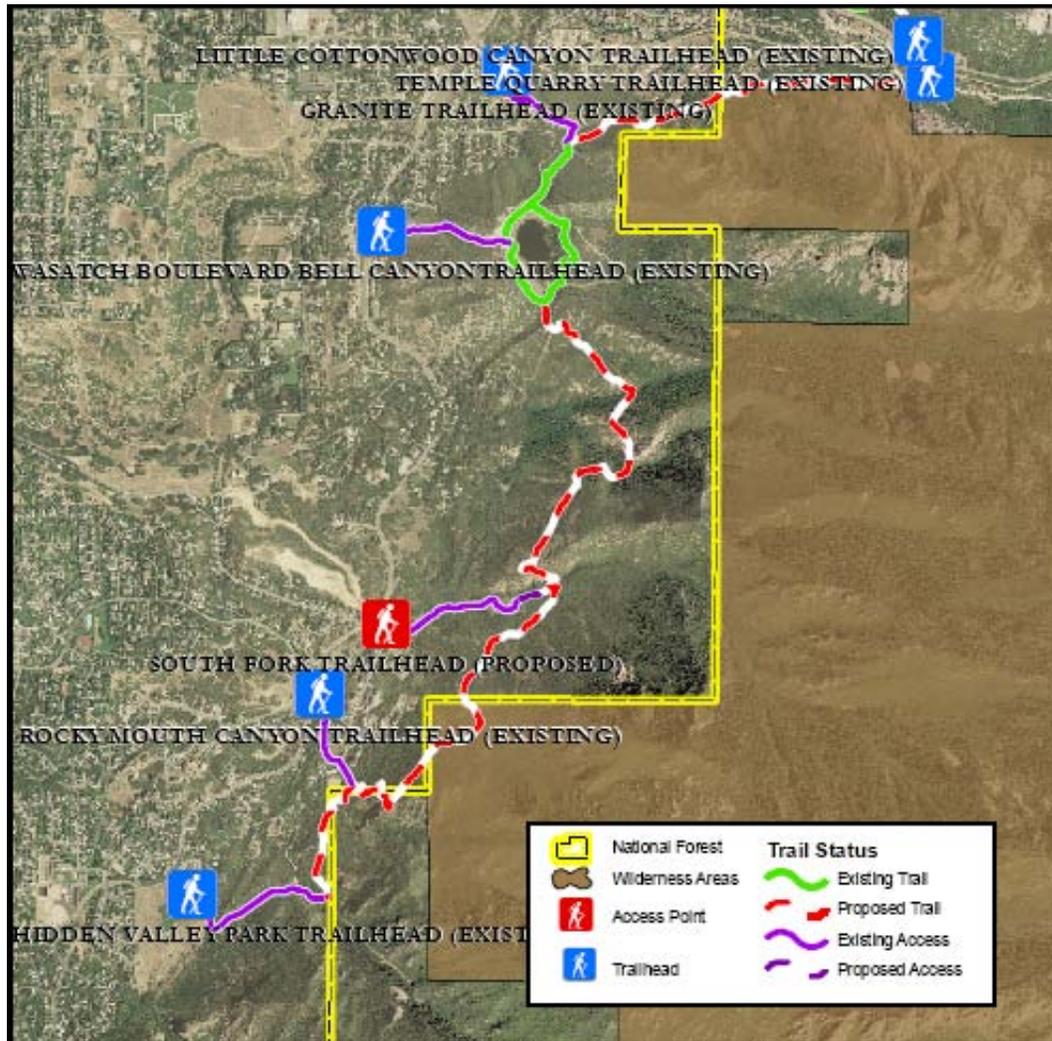


Figure 15. Effects of Alternative 2 on Segment 4.

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

This segment of the trail does not traverse designated Wilderness.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

This segment occurs almost entirely on Wilderness. Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 22. Impacts related to Segments 3 and 4 are the same as those described for Alternative 2.

Table 22. Effects of Alternative 3 on Segment 2.

Segment	Total Segment Length (Miles)	Built	Proposed
2	3.68	0.09	3.59

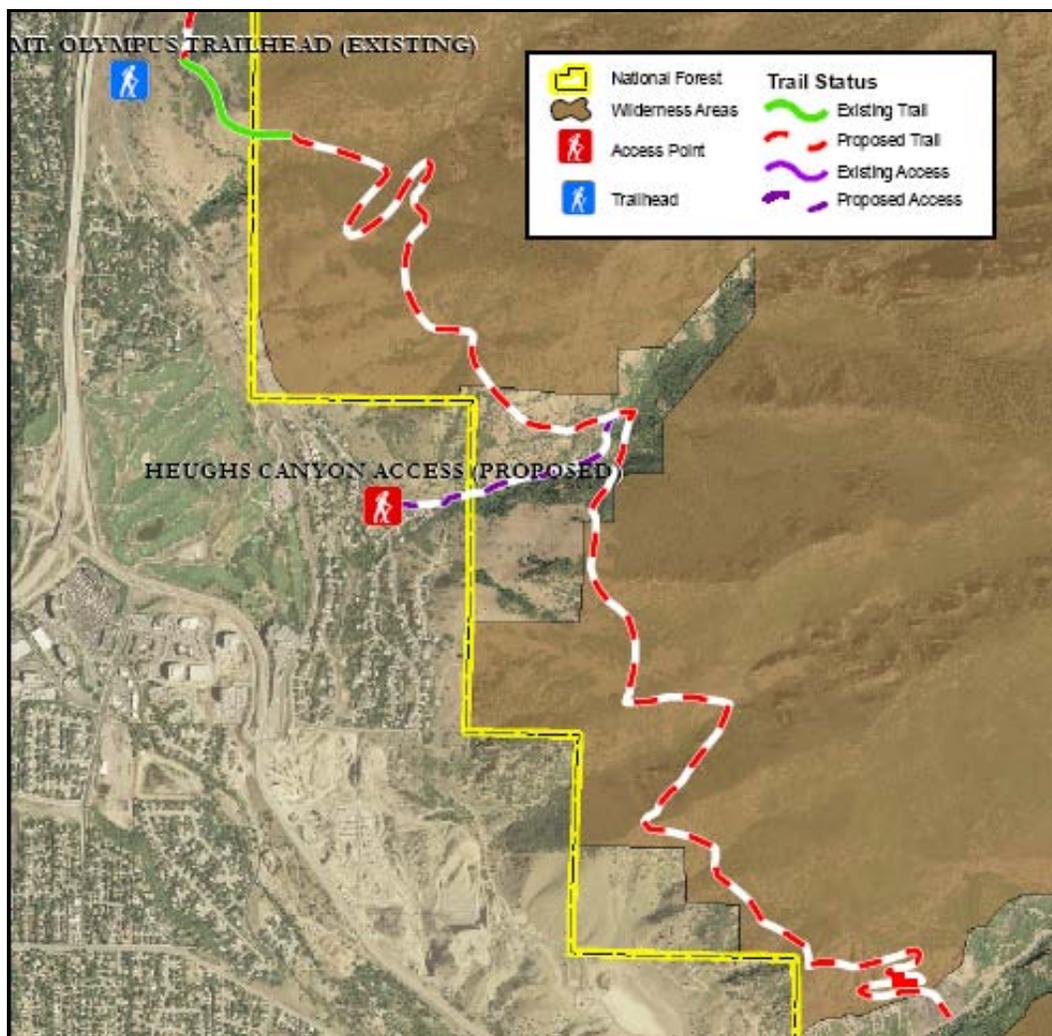


Figure 16. Effects of Alternative 3 on Segment 2.

3.4.4 Cumulative Effects

Past, Present, or Reasonably Foreseeable Future Actions

The cumulative effects of additional trail on Wilderness areas involve assumptions and uncertainties. The Project Area's close proximity to urban areas strongly suggests an increase in use regardless of alternative. Any action decision on designated Wilderness must comply with the Wilderness Act of 1964 and Forest Plans.

Past Actions

Past actions include designation of the Wilderness areas, various types of recreation use (hiking, dog walking, and others) on short segments of designated and user-created trails, and trail proliferation.

Present Actions

Present actions in the project area include continuing recreational use on designated and user-created trails, trail proliferation, urban encroachment on NFS land, 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.

Because these present actions occur within close proximity or within Wilderness boundary, they all may potentially impact Wilderness character, including biological diversity, naturalness, wildness, and solitude.

Reasonably Foreseeable Future Actions

Actions that may occur in the reasonably foreseeable future include increased recreation activities within and around Wilderness, urban encroachment on Wilderness, and construction projects such as the potential Neff's Canyon detention basin. These actions will also likely affect Wilderness values, biological diversity, naturalness, wildness, and solitude.

The WCNF Revised Forest Plan states that no additional trails would be built into the Wilderness except to facilitate short segments of the BST and only where absolutely necessary to minimize resource impacts or to better manage visitor use (USDA 2003a). The plan further states that the creation of additional user-created trails would not be allowed. Major emphasis would also be placed on user education because of high visitor use and adjacency to urban populations.

Approximately 2.74 miles of proposed trail would be built on Wilderness under Alternative 2 while Alternative 3 would have approximately 5 miles of proposed trail. Effects are considered to be minor based on the user restrictions set forth in the Wilderness Act and Forest Plan. Also, the segments of proposed trail are considered to be minor when compared to the entire Wilderness area (approximately 36,464 acres).

As use continues to increase, permit systems, designated sites, and use restrictions may be incorporated in order to preserve Wilderness characteristics.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 23.

Table 23. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Wilderness	No direct effects. Indirect effects include potential change in Wilderness character through minor increased use and user-created trails.	Impacts include increased access to and use of Wilderness areas and 2.74 miles of proposed trail traversing Wilderness. Visitor use is expected to increase, but user-created trails and trail proliferation would be reduced.	Increased access to Wilderness areas and 5.24 miles of proposed trail traversing Wilderness. Additional impacts are similar to Alternative 2.

3.5 Open Space, Scenery Management, and Aesthetics

3.5.1 Introduction

Scenery is an important natural resource of the WCNF and the surrounding area. It has been shown that high-quality scenery can enhance people's lives and benefit society, particularly natural scenery such as is associated with National Forests (USDA 1995). It is primarily through their visual sense that most visitors perceive the Forest and its interrelated components. Benefits derived from scenic settings include identity, self-image of communities and individuals, and enhanced quality of life. Sight-seeing, driving for pleasure, and outdoor photography are among the nation's leading recreational activities. And as demand continues, the need to preserve high quality scenic resources would also increase.

The proposed additions to the BST would increase the public's ability to enjoy the high-quality scenery available on the WCNF by improving access while providing sufficient protection for the area's valuable visual resources. However, the construction of new trail sections, trailheads, access points, signage, and bridges are expected to have a minor adverse impact on scenic integrity of the viewed landscape.

Methodology

Sources of existing information on scenic resources came from the following:

- Forest Plan (USDA 2003a)
- USDA, Agriculture Handbook Number 701, Landscape Aesthetics: A Handbook for Scenery Management (USDA 1995)
- BST Alignment Plan for Salt Lake County (BST 2005)

The WCNF has used the Scenery Management System (SMS) *Landscape Aesthetics A Handbook for Scenery Management; 1995 Agriculture Handbook # 701* (USDA 1995) since the late 1990s as a management tool to describe, allocate and provide direction for arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings. SMS is one of four management direction elements with maps and descriptions in this Revised Forest Plan, the others being Management Prescription Categories (MPC), Winter Recreation Classes, and summer Recreation Opportunity Spectrum (ROS). SMS is a guideline intended to assist managers and help the public understand the scenic resource management framework for project-level decisions and larger area analyses. The system is applied in combination with other management direction such as desired future conditions, standards, guidelines, goals, and objectives to define expectations about management of a particular area of the forest (USDA 2003a).

Effects upon the visual environment are defined as changes to the visual environment that would not be in accordance with existing scenery. Impact evaluations for visual and scenic resources were based primarily on a determination of the anticipated change in the character of the existing

landscape, in comparison with existing conditions and observations made during the site visit in April of 2007. The amount of area disturbed, the resulting landscape character at the site of disturbance, and the ability to reclaim/revegetate disturbed areas were used as indicators of the level of impacts on the visual and scenic resources along proposed routes for the BST. The impact categories represented in table 24 are used in the analysis.

When assessing impacts to scenic resources, there are three distance zones that are commonly used by the Forest Service: foreground (0 to ½ mile), middleground (½ mile to 4 miles), and background (4 miles to horizon). Because most people who are concerned about the scenic impacts of the proposed trail will be viewing the trail from the valley, the middleground distance zone will be used in assessing the scenic impacts of the trail.

Table 24. Impact Category Descriptions.

Impact Category	Definition
Beneficial Effect	An action that would improve scenic resources compared with current conditions.
Negligible or No Effect	An action that would have a low risk of causing degradation of scenic resources. Such an action would not result in degradation of landscape character.
Minor Adverse Effect	An action that would result in only minor impairment of scenic resources or minor changes to landscape character.
Moderate Adverse Effect	An action that represents an intermediate risk to the scenery of the Project Area. Such an action might result in moderate degradation of the natural scenery and landscape character along the proposed routes for the BST.
High Adverse Effect	An action that would have a high risk of resulting in considerable degradation of scenic resources. Such an action would result in major changes to the nature and character of the Project Area.
Short-Term Effect	An action that would result in the change of a scenic resource's condition, use, or value lasting less than one year.
Long-Term Effect	An action would result in the change of a scenic resource's condition, use, or value lasting more than one year and probably much longer.

Scenery Management: Laws, Regulations, and Guidelines

WCNF Forest-wide Sub-goals for scenery management include:

- Recognize and manage for the importance of scenic forest landscapes to overall recreation settings as well as to the quality of life for communities adjacent to the Forest.
- Restore, maintain, or enhance landscape scenic integrity across the variety of landscape character themes found on the Forest (USDA 2003a).

Standards for scenery management include:

- Management actions that would result in a scenic integrity level of Unacceptably Low are prohibited in all Landscape Character Themes (USDA 2003a).

Guidelines for scenery management include:

- Manage Forest landscapes according to Landscape Character Themes, and Scenic Integrity Objectives (SIOs) as mapped.

- Resource management activities should not be permitted to reduce Scenic Integrity below Objectives stated for Management Prescription Categories.
- For management activities viewable from Concern Level 1 (defined site-specifically):
 - Scenic Byways (viewshed corridors 0-4 miles) and use areas, travelways, and Scenic Backways (viewshed corridors <1/2 mile) apply the Landscape Character Theme in which the management activity occurs and apply a SIO of high.
 - For management activities viewable from Concern Level 2 (defined site-specifically):
 - Use areas and travelways (viewshed corridors <1/2 mile) apply the Landscape Character Theme in which the management activity occurs and apply a SIO of at least moderate.
- Duration of visual impacts to allow for herbaceous and woody plants are established would be determined during project planning by the following criteria:
 - Capability of the landscape to recover
 - The relationship of management activity to the seen area of sensitive use areas and travel ways.
- Establishment of herbaceous vegetation may extend to 3 years after project completion for foreground and middle ground in Concern levels 1 and 2 use areas and travel ways. Consider immediate initiation of reseeded in these areas where natural recovery is questionable (USDA 2003a).

3.5.2 Affected Environment: Open Space, Scenery, and Aesthetics

The proposed route of the BST is located along the foothills of the Wasatch Mountains in Salt Lake County. Salt Lake County is the most populous county in the State and the foothills area already contains a large amount of housing and other development. Therefore, visual quality is already significantly compromised along the proposed BST route. However, the proposed route follows closely along the border of the WCNF, which has an increasingly natural scenic quality as one travels higher in elevation, beyond the development in the foothills. The landscape affected by the proposed trail is a transition area between the forest and the local communities.

The scenic environment of the WCNF varies by location and is largely influenced by existing natural features, including vegetation, water, landforms, and geology. Scenic resources are important to the Forest and help maintain the WCNF's popularity as a recreation destination. The natural setting, of which aesthetics is a key component, can influence the quality and effectiveness of the recreation experience. Natural settings and cultural features are valued for their ability to stimulate the senses and nurture the mind (USDA 1995). Common recreational uses in the area are directly related to the quality of scenic resources. The most popular activities identified by visitors, general use to escape urban lifestyles and viewing natural features, are dependent upon preserving the natural landscape of the WCNF and the surrounding area.

The WCNF and the surrounding area provide a balance of diverse landscapes and natural settings. The scenic environment within the forests ranges from landscapes with high scenic quality displaying little or no evidence of management activities, to landscapes with different

scenic quality that have dominant visible evidence of management activities. The high scenic quality in areas of outstanding value, and other highly used recreation areas and corridors are protected or enhanced (USDA 2003a).

The scenery of the Central Wasatch Management Area is a valuable and pleasurable natural backdrop for the urban area. Views up and within the canyons of natural and developed areas are carefully managed to sustain scenic resources. Views from the Scenic Byways in Emigration, Big Cottonwood, and Little Cottonwood Canyons are managed for their recognized values. Guidelines for scenery management are applied to project undertakings (USDA 2003a). The following landscape character themes would be found along the proposed trail route:

- Natural Evolving
- Natural Appearing

Segment 1

The first segment of the proposed trail begins at the mouth of Parley's Canyon and ends at the Mount Olympus trailhead. The Forest's Landscape Character for this area is Natural Evolving and the Scenic Integrity Objective (SIO) for this area is Very High. "The natural evolving landscape character originates primarily from natural disturbances and succession of plants, with subtle changes due to indirect human activities. The existing landscape character generally continues to change gradually over time through natural processes." Very High SIO means "the valued landscape character is intact with only subtle if any deviations. The Natural Evolving landscape character and sense of place is expressed at the highest possible level." The Very High SIO allows for trails and rustic signing within immediate foreground.

Segment 2

The second segment of the proposed trail begins at the Mount Olympus trailhead and ends at Big Cottonwood Canyon. The Forest's Landscape Character for this area is Natural Evolving and the SIO for this area is Very High. The Very High SIO allows for trails and rustic signing within immediate foreground.

Segment 3

The third segment of the proposed trail begins at Big Cottonwood Canyon and ends at Little Cottonwood Canyon. The Forest's Landscape Character for this area includes both Natural Evolving and Natural Appearing. The SIOs for these Landscape Characters are Very High and High, respectively. The Very High SIO allows for trails and rustic signing within immediate foreground.

Natural appearing means the "landscape character has been influenced by both direct and indirect human activities, but appears natural to the majority of viewers. Natural elements such as native trees, shrubs, grasses, forbs, rock outcrops, and streams or lakes dominate the views. While there is evidence of human influence from historic use, campgrounds, small organization camps, rustic structures, and management activity, it is part of the valued built environment in the landscape to the majority of viewers." The High SIO applies to "landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely, and at such scale, that they are not evident." Cultural features allowed in these areas include parking lots, roads,

trailheads, bridges, campgrounds, and restrooms, so long as these amenities appear to be part of the natural appearing landscape by eliminating the geometry of the built feature upon the landscape.

Segment 4

The fourth segment of the proposed trail begins at Little Cottonwood Canyon and ends at Hidden Valley. Part of this segment crosses land categorized with “Natural Evolving” Landscape Character, for which the SIO is Very High. The Very High SIO allows for trails and rustic signing within immediate foreground.

3.5.3 Effects of the Alternatives: Open Space, Visual Quality, and Aesthetics

Effects of Alternative 1: No-Action

Under the No-Action Alternative, the BST would remain in its current management state and no new sections of trail would be constructed. Therefore, there would be no effect on the scenery of the area.

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

Where possible, the proposed trail alignment follows existing trails and uses existing trailheads and access points. However, impacts to scenery would result from the construction of the new trail sections proposed in the Salt Lake County Proposed Alignment. The new trail sections would average three feet in width and would be consistent with USFS trail construction standards. These new trail sections may be visible from areas within the valley and from higher elevations. Scenic impacts would also be caused by the construction of new trailhead areas, signage, and bridges.

Primary forms in the proposed project area are the foothills and mountains of the central Wasatch Range. The Wasatch Range exhibits strong angled lines throughout the project area. Roadways and development below the project area also exhibit strong horizontal and vertical lines. The color variety in the proposed project area includes the various greens, grays, and browns of different vegetation types, as well as the grays and browns of rock outcrops. There are also areas that are brown because of exposed soil.

Where new trail is cut, the line it makes across the landscape would be visible in certain areas. This visibility would be most pronounced immediately following the trail’s construction, since it would take time for the vegetation to grow back and provide a more natural appearance along the trail. There would also be a distinct color difference between the trail and the greener vegetated areas that the trail passes through in places. Again, this color difference would be most pronounced immediately following construction of the trail, before revegetation has created a more natural appearance.

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

New trail construction would take place in several places along the Salt Lake County Proposed Alignment. A small section of trail would be constructed near the Parley’s Canyon Trailhead. A series of switchbacks would be built to connect the BST to Mexican Ridge. A section of trail would also be built from Mexican Ridge to the Pipeline Trail. New trail would be constructed from Mill Creek Bridge to South Ridge Mill Creek Canyon, and then to Neff’s Canyon. Trail

construction would continue from Neff's Canyon to "Z" Trail, and then to Mile High Drive. New trail would then be constructed from Mile High Drive to the Bonneville Bench. This section of the BST would actually pass below houses on the Bonneville Bench.

Along with the scenic impacts caused by new trail construction in Segment 1, there would also be impacts from new trailheads, signage, and areas for parking. This would include parking near Water Tank Road on Teton Drive, a trailhead at Rattlesnake Gulch, parking at Neff's Canyon Trailhead, parking at a cul-de-sac on Thousand Oaks Drive, and a trailhead and parking at the end of Mile High Drive. Some examples of what the new parking areas and trailheads may look like can be seen in figures 17–19. These photos are of existing parking areas and trailheads that are already being used for the trail.



Figure 17. Granite Trail Head.



Figure 18. Mt. Olympus Trail Head.



Figure 19. Bell Canyon Trail Head.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in this Landscape Character and SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes quarry areas, open grassy slopes, areas heavily wooded in oak and maple, rocky outcrops, and scree slopes.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing roads (e.g., Power Line Road, Mill Creek Road, Neffs Canyon water tank road), trails (e.g., Pipeline Trail, Rattlesnake Trail, Mount Olympus Trail), and ridgelines where this is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

New trail construction, signage, and access points would cause minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

Examples of what the proposed trail may look like when viewed from the trail itself, and from lower elevations, can be seen in figures 20–24. These photos are of existing portions of the BST. Notice that the thick vegetation makes it very difficult to see the trail in the two photos taken from a lower vantage point.



Figure 20. Hidden Valley Park Trail Head.



Figure 21. Segment of Hidden Valley Park Trail.



Figure 22. Segment of Hidden Valley Park Trail.



Figure 23. **Golden Oaks Access (Proposed).**



Figure 24. **Aqueduct Access (Proposed).**

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

A significant portion of the trail from Mount Olympus trail to Heughs Canyon would cross through the Mount Olympus Wilderness Area. The section of trail from Heughs Canyon to Big Cottonwood Canyon would also cross a 40-acre parcel of the Mount Olympus Wilderness Area as well.

Proposed trailheads and access points in this segment include a trailhead at Heughs Canyon, an access point at Dry Hollow, parking on Oak Canyon Drive, and a trailhead at the Oak Ridge picnic area.

Bridges are proposed to be constructed across the creek in Tolcats Canyon and Heughs Canyon Creek. These bridges would likely cause minor adverse impacts to the natural appearance of the area.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in this Landscape Character and SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes areas heavily wooded in tall oak and maple brush, groves of conifers, rocky outcrops, quarry areas, mahogany groves, and various brush and grasses.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing paths (e.g., the Granite Aqueduct, a footpath next to a stream in Heughs Canyon, and the power line corridor) and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

A section of trail would be constructed from Big Cottonwood Canyon to Ferguson Canyon Trail to Deaf Smith Canyon, and then to the Temple Quarry Trailhead in Little Cottonwood Canyon.

Proposed access points in this segment include parking on Golden Oaks Drive and the Aqueduct access point.

Bridges are proposed to be constructed across Deaf Smith Canyon Creek and Little Cottonwood Creek. These bridges would likely cause minor adverse impacts to the natural appearance of the area.

The Forest's Landscape Character for this area includes both Natural Evolving and Natural Appearing and the SIOs for this segment are Very High and High, respectively. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing. Examples of modifications allowed in the Natural Appearing Landscape Character and High SIO include parking lots, roads, trailheads, bridges, campgrounds, and restrooms, so long as these amenities appear to be part of the natural appearing landscape by eliminating the geometry of the built feature upon the landscape. The landscape that this segment passes through includes heavily wooded areas, talus slopes, grassy slopes, and tall oak and maple brush.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing trails (e.g., Ferguson Canyon Trail), roads (e.g., Ferguson Canyon water tank road, old mine road, aqueduct road), and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving and Natural Appearing Landscape Characters of this area would be left intact and the Very High and High SIOs would be met.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

A section of trail would be constructed from Little Cottonwood Creek to Upper Corner Canyon Road. The part of this new section of trail that is constructed from South Fork Dry Creek to Big Willow Canyon would cross the Lone Peak Wilderness Area.

BST signs would be posted at Little Cottonwood Canyon, and a trailhead is proposed on a cul-de-sac in the Corner Canyon subdivision. Another trailhead is proposed at South Fork. Most of the BST would be a primitive trail located in natural areas. Therefore, signs would be simple and unobtrusive, but strategically placed to provide trail users with confidence in their location and direction of travel.

Bridges are proposed to be constructed across South Fork Dry Creek and Little Willow Canyon Creek. These bridges would cause a minor adverse impact to the natural appearance of the area.

Part of this segment crosses land categorized with Natural Evolving Landscape Character, for which the SIO is Very High. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes wooded areas, rocky outcrops, and some of the steepest descents along the proposed route.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing trails (e.g., Bells Canyon Trail and the existing BST), roads (e.g., the water company access road), and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing

a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

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

Because two of the four trail segments are the same, the Forest Service Alignment would have many of the same scenic impacts as Salt Lake County Proposed Alignment. The proposed trailheads and access points for Segments 1 and 2 are the same as those proposed in the Salt Lake County Proposed Alignment, but the proposed routes for the trail remains on Forest Service land.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

3.5.4 Cumulative Effects

Significant alteration of the natural landscape has already occurred as a result of development along the foothills of the Wasatch Mountains. Therefore, the relatively minor alterations of the landscape resulting from implementation of Alternatives 1, 2, and 3 would not be anticipated to have significant cumulative effects on the area's scenery.

The proposed trail would likely have a beneficial effect on the scenic resources of the area through the revegetation and reclamation of disturbed areas such as old four-wheel-drive routes and user-created trails. This task would take place concurrently with new trail construction. The proposed trail would also have a positive impact on scenic resources by focusing recreational activity on one trail rather than allowing user-created trails to proliferate across the mountainside as people attempt to hike from one trail to another.

Past, Present, or Reasonably Foreseeable Future Actions

Past and present development along the proposed BST route has caused significant alteration of the visual quality of the natural landscape. Possible future development in the area is reasonably foreseeable as well. Although it is unlikely that future development would occur on nearby Forest Service lands, it is reasonably foreseeable that development would continue to occur on private lands below the proposed BST route. This development would likely affect the scenery of the area.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 25.

Table 25. **Cumulative Effects of the Alternatives.**

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Open Space, Scenery Management, and Aesthetics	No direct effects. Trail is in highly urbanized area. No new facilities would be constructed. Indirect effects include potential change in visual quality through increased user-created trails.	Minor, adverse effects caused by the new sections of trail in addition to existing effects.	Same as for Alternative 2.

3.6 Soils and Erosion

3.6.1 Introduction

The purpose of this analysis is to describe the current resource conditions for soil resources within the Project Area. This analysis also evaluates effects for a range of alternatives on soil resources as required by NEPA, NFMA, other applicable laws and regulations, Forest Service directives, and the Forest Plan.

Restoration and maintenance of soil resources is a priority in all management decisions. Desired future conditions of soil resources as outlined in the Forest Plan (USDA 2003a) are listed below. It should be noted that these desired future conditions are not meant to be part of the trail system.

- Most soils have at least minimal protective ground cover, soil organic matter, and coarse woody material.
- Soils have adequate physical properties for vegetative growth and soil-hydrologic function.
- Physical, chemical, and biological processes in most soils function similarly to soils that have not been harmfully disturbed.
- Degradation of soil quality and loss of soil productivity is prevented.
- Soil-hydrologic function and productivity in riparian areas is protected, preserving the ability to serve as a filter for good water quality and regulation of nutrient cycling.
- Soil productivity, quality, and function are restored where adversely impaired and contributing to an overall decline in watershed condition.

Soils and geology are an integral component of watersheds and ecological groupings. They influence vegetation, watershed condition, mineralogy, and land uses. Soils and geology have been used to determine the suitability of forestlands for timber sales and the effects that land management projects may have on watersheds (USDA 2003).

Methodology

Analysis of Project Area soils includes a 50-foot corridor in which the proposed trail would be located. Based on soil properties of soils found within the Project Area, it was determined that highly erodible soils are found on slopes greater than 30 percent. 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.
- United State Department of Agriculture Soil Conservation Service. 2002. Soil Survey of Summit Area, Utah, parts of Summit, Salt Lake, and Wasatch Counties.

- United State Department of Agriculture Soil Conservation Service. 1974. Soil Survey of Salt Lake Area, Utah.

Laws, Regulations, and Guidelines

Numerous legal directions pertain to soil and water resources 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): Recognizes watersheds as systems that have to be managed with care to sustain their hydrologic function. It states that one purpose for establishing national forests is to secure favorable conditions of water flow.

The Federal Water Pollution Control Act (1972): Commonly known as “The Clean Water Act”, 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 non-point sources of water pollution through conservation or “best management practices;” Federal agency leadership in controlling non-point source pollution from managed lands; and rigorous criteria for controlling pollution discharges into waters of the United States.

The National Forest Management Act (1976): Directs national forests to protect watershed conditions from irreversible damage and to protect streams and wetlands from detrimental impacts. Amended RPA by adding sections that stressed the maintenance of productivity and need to protect and improve the soil and water resources, and avoidance of permanent impairment of the productive capability of the land. Fish habitat must maintain viable populations of existing and desired non-native vertebrate species.

The Forest and Rangeland Renewable Resources Planning Act (RPA)(1974): Requires an assessment of the present and potential productivity of the land. Regulations are to specify guidelines for land management plans developed to achieve the goals of the program that ensure “...that timber will be harvested from NFS land only where...soil, slope, or other watershed conditions will not be irreversibly damaged.”

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.

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.

Executive Orders 11988 and 11990: Direct Federal agencies to avoid to the extent possible the impacts associated with the destruction or modification of floodplains and wetlands. Agencies are directed to avoid construction and development in flood plains and wetlands whenever there are any feasible alternatives.

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

Forest Service Manual, Soil Management Handbook (FSH R4 Supplement 2509.18- 95-1): Provides direction for the protection and monitoring of long-term soil productivity through the establishment of soil quality standards.

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

3.6.2 Affected Environment: Soils and Erosion

The objective of soil resource management is to improve or maintain inherent long-term soil productivity. Soil productivity is the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. In order to improve or maintain long-term soil productivity, soil disturbance should be kept to a minimum and adequate measures need to be implemented to protect the surface soil, keep the soil in place, reduce compaction, and maintain nutrient and organic matter levels.

The soils of the Forest provide the medium for all plant growth and the support base for all other activities that occur in the Forest. Maintenance of soil productivity is required to achieve the Forest Goals. Sustainable commodities can only be achievable if the key component, soil productivity, is maintained. This section discusses the affect on the soil resource. The alternatives are listed with a prediction as to which would have the most and least effects on the soil resource.

Soil formation is an ongoing process, and erosion, with its subsequent deposition, is a natural process associated with geologic weathering. Erosion constantly occurs, although the amount depends upon the nature of the soil and the type and amount of vegetation. Natural levels of erosion and gully formation can be increased by natural causes. Changes in weather patterns can lead to an increase in erosion and gully formation. Several years of drought, for instance, can reduce vegetative ground cover. If the drought is followed by intense spring rains, increases in erosion and gully formation can be expected.

Thirty-six soil types are found within the Project Area (figure 25). Select properties of these soils are included in table 26. Within the Project Area, the most erosive soils are typically found on slopes greater than 30 percent (USDA 1974, USDA 2002). The hazard of erosion on roads and trails on these soils is classified as "Severe". All analysis is based on Natural Resource Conservation Service Soil Survey of Salt Lake Area, Utah (USDA 1974) and Soil Survey of Summit Area, Utah, parts of Summit, Salt Lake, and Wasatch Counties (USDA 2002).

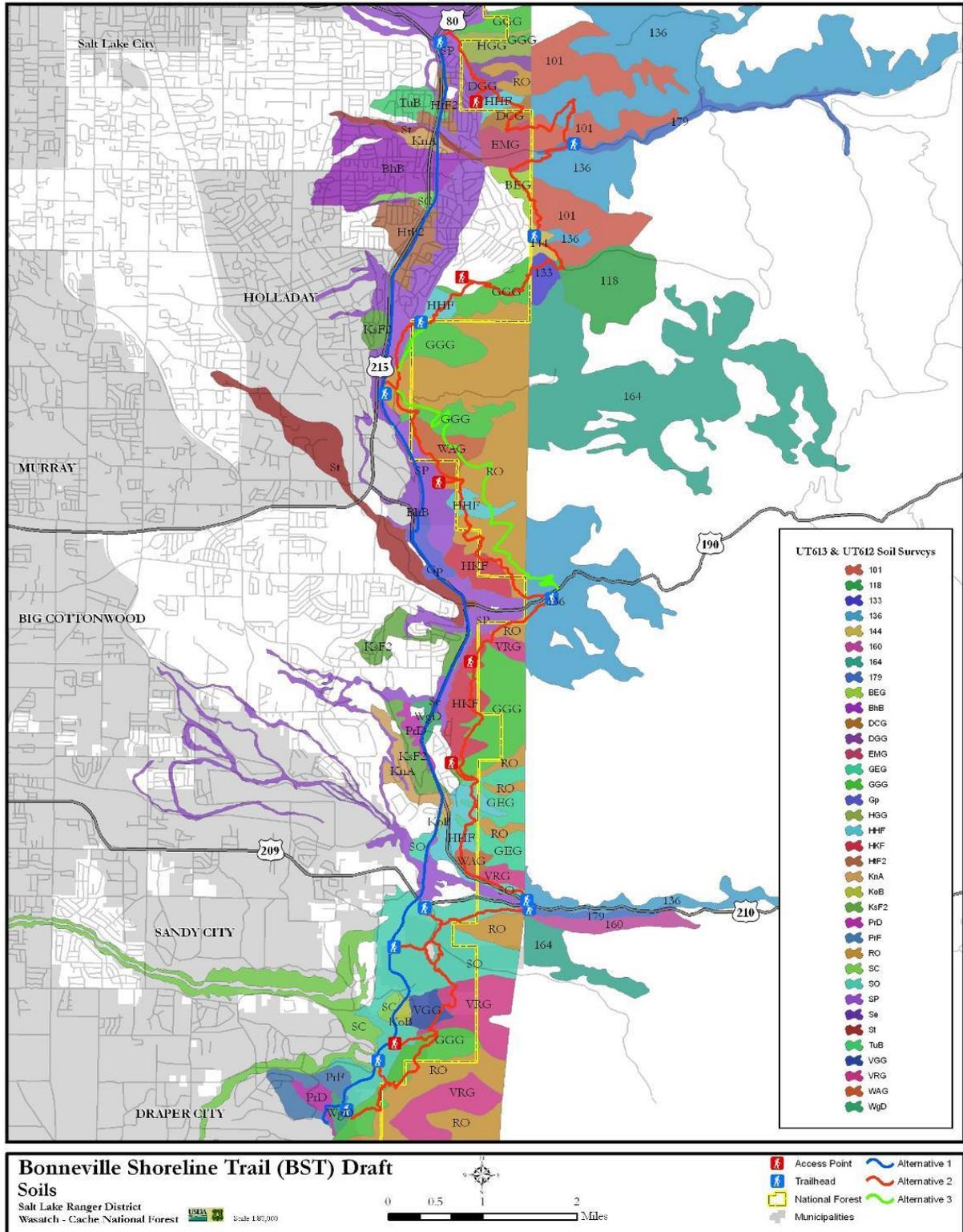


Figure 25. Project Area Soils.

Table 26. Project Area Soil Units and Properties.

Soil Unit Number/Symbol	Soil Unit Name	Percent Slope	Hazard of Erosion on Roads and Trails
BEG	Bradshaw-Agassiz association	40-70	Severe
BhB	Bingham gravelly loam	3-6	Slight
DCG	Deer Creek loam	30-60	Severe
DGG	Deer Creek-Picayune association	30-60	Severe
EMG	Emigration very cobbly loam	40-70	Severe
GEG	Gappmayer very cobbly loam	30-60	Severe
GGG	Gappmayer-Wallsburg association	30-60	Severe
Gp	Gravel pits	N/A	N/A
HGG	Harkers-Wallsburg association	6-40	Severe
HHF	Harkers soils	6-40	Severe
HKF	Henefer-Harkers association	10-40	Severe
HtF2	Hillfield-Taylorville complex	6-30	Severe
KnA	Knutsen coarse sandy loam	1-3	Slight
Kob	Knutsen gravelly coarse sandy loam	1-6	Slight
KsF2	Knutsen-Preston complex	10-30	Severe
PrD	Preston sand	1-10	Moderate
PrF	Preston sand	10-30	Severe
RO	Rock land	N/A	N/A
SC	Sandy terrace escarpments	N/A	N/A
Se	Sandy borrow pits	N/A	N/A
SO	Stony land	N/A	N/A
SP	Stony terrace escarpments	N/A	N/A
St	Stony alluvial land	N/A	N/A
TuB	Timpanogos loam	3-6	Moderate
VGG	Van Wagoner gravelly sandy loam	40-70	Severe
VRG	Van Wagoner extremely rocky sandy loam	40-70	Severe
WAG	Wallsburg very cobbly loam	30-70	Severe
WgD	Wasatch loamy coarse sand	1-10	Moderate
101	Agassiz-Rock outcrop complex	30-70	Severe
118	Dromedary-Rock outcrop complex	30-70	Severe
133	Fewkes-Hades complex	30-60	Severe
136	Hades-Agassiz-Rock outcrop complex	30-70	Severe
144	Horrocks-Cutoff complex	15-30	Severe
160	Parkcity-Dromedary gravelly loams	30-70	Severe
164	Rock outcrop	N/A	N/A
179	Wanship-Kovich loams	0-3	Slight

N/A: Not Applicable.

User-developed trails are a common feature within many portions of the Project Area. Erosion associated with these trails already exists. Erosion is also currently found throughout the Project Area in areas with steep slopes and on highly erosive soils.

3.6.3 Effects of the Alternatives: Soils and Erosion

Effects of the Alternatives: Soil Erosion

Soil erosion is the detachment and transport of soil particles by wind, water, and gravity. When soil is disturbed or compacted and the vegetative cover is removed, erosion increases, infiltration is reduced and site productivity declines.

Soil formation is an ongoing process, and erosion, with its subsequent deposition, is a natural process associated with geologic weathering. Erosion constantly occurs, although the amount depends upon the nature of the soil and the type and amount of vegetation. Natural levels of erosion and gully formation can be increased by natural causes. Changes in weather patterns can lead to an increase in erosion and gully formation.

Within the Project Area, the most erosive soils are typically found on slopes greater than 30 percent (USDA 1974, USDA 2002). The hazard of erosion on roads and trails on these soils is classified as “Severe”. Impact analysis in this document is based upon these criteria. Adverse impacts to soil productivity through soil erosion could occur under Alternatives 2 and 3 if mitigation measures are not implemented. The greatest impacts from soil erosion through trail construction and use are directly proportional to the number of disturbed acres. Alternatives, in descending order of acres to be impacted, 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 effect to soil erosion within the Project Area in relation to the construction of the BST.

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 soil erosion because use of the Project Area will increase on user-created trails.

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

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed during construction and use of 2.65 miles of trail. Table 26 indicates that 21 soil units within the Project Area are classified with severe trail erosion hazards. Therefore, soil erosion may occur from trail construction and use. Implementation of the 2003 Revision for the WCNF Plan (USDA 2003), including Best Management Practices (BMP), would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 1.23 acres of soil would be disturbed during construction and use of 2.54 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the 2003 Forest Plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Within this segment, 0.52 acres of soil would be disturbed during construction and use of 1.08 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Within this segment, 0.61 acres of soil would be disturbed during construction and use of 1.25 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect effects include loss of soil nutrients as a result of soil erosion.

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

Within this segment, 1.3 acres of soil would be disturbed during construction and use of 2.65 miles of trail. Soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 2.30 acres of soil would be disturbed during construction and use of 4.75 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segments 3 and 4

Within segments 3 and 4, direct and indirect effects would be the same as those listed in each of the respective segments in Alternative 2.

Effects of the Alternatives: Soil Compaction and Soil Nutrients

Soil compaction is a rearrangement of soil porosity (decreases amount of larger pore spaces to smaller pore spaces) that may result in an overall decrease of soil porosity. Compaction leads to poor aeration and decreased water infiltration, which reduces moisture available to plants and reduces root penetration through the soil, and often results in reduced long-term rates of tree growth. To the degree that soil compaction reduces vegetative growth, there are likely to be increases in soil erosion and water runoff, leading to reductions in soil productivity.

Loss of soil nutrients lowers site productivity. Nutrients are added to the soil by atmospheric contributions (mostly from snow and rain) and by the decomposition of vegetation (leaves, needles, slash, logs, etc.). Nutrient loss occurs when the organic matter on the ground is removed, the surface soil layer is removed, or the standing vegetation is removed. The surface layers of soil contain the most nutrients, and these nutrients (often because of mycorrhizal associations with plants) are in a form that is readily available for plant uptake. The deeper soil horizons also contain some nutrients in a chemical form that are less available for plants to use. Nitrogen, which is the one nutrient that is in most demand by vegetation, is only found in the soil's surface layers.

Adverse impacts to soil productivity through soil compaction and soil nutrient loss could occur under any of the Action Alternatives. These impacts are a by-product of the Forest Service Trail System. The greatest impacts from soil compaction and nutrient loss through trail construction and use are directly proportional to the number of disturbed acres. Alternatives, in descending order of acres to be impacted, 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, no effects to soil compaction or nutrient loss within the Project Area would occur in relation to the construction of the BST.

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 soil compaction and nutrient loss because use of the Project Area will increase on user-created trails.

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

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed and compacted during construction and use of 2.65 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term, adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 1.23 acres of soil would be disturbed and compacted during construction and use of 2.54 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Within this segment, 0.52 acres of soil would be disturbed and compacted during construction and use of 1.08 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Within this segment, 0.61 acres of soil would be disturbed and compacted during construction and use of 1.25 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

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

Within this segment, 1.3 acres of soil would be disturbed and compacted during construction and use of 2.65 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 2.30 acres of soil would be disturbed and compacted during construction and use of 4.75 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segments 3 and 4

Within segments 3 and 4, direct and indirect effects would be the same as those listed in each of the respective segments in Alternative 2.

Effects of the Alternatives: Landslides and Slope Failures

According to the surficial geology of the Project Area, landslides and slope failure hazards exist within the Project Area (Personius and Scott 1992). Landslide and slope failure hazards are predominantly found on slopes greater than 40 percent.

Because trails can have the potential effect of slumping or slope failure if trail alignment crosses unstable slopes, effects from landslides and slope failures are directly proportional to the amount of trail being constructed and used. Alternatives, in descending order of miles of trail to be constructed and used, are Alternative 3, 2, and 1.

Effects of Alternative 1: No-Action

Under this alternative, new trail construction would not occur within the Project Area. Therefore, landslide and slope failure potential within the Project Area would not be affected and remain unchanged.

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

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, landslide deposits have been mapped in the area of the proposed trail north of Neffs Canyon (Personius and Scott 1992). Landslide and slope failure hazards created by trail construction within these deposits would be mitigated through the implementation of the forest plan. Specific mitigation measures include limiting trail construction activities to areas (1) with slopes less than 40 percent, and (2) where risk to soils is low. This would result in minor adverse effects to landslide and slope failure hazard for a short period of time.

Indirect adverse minor effects include increased soil erosion in soil units with a high potential for landslides and slope failures, and minimal loss of soil nutrients due to soil erosion in these soil units.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, landslide deposits have been mapped in the Heughs Canyon area (Personius and Scott 1992). Landslide and slope failure hazards created by trail construction within these deposits would be mitigated through the implementation of the forest plan. Specific mitigation measures include limiting trail construction activities to areas (1) with slopes less than 40 percent, and (2) where risk to soils is low. This would result in minor adverse effects to landslide and slope failure hazard for a short period of time.

Indirect adverse minor effects include increased soil erosion in soil units with a high potential for landslides and slope failures, and minimal loss of soil nutrients due to soil erosion in these soil units.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Although landslide deposits have not been mapped within this segment, mitigation measures described in Segments 1 and 2 would be implemented when constructing trail on steep slopes to minimize the possibility of causing slope failure.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Although landslide deposits have not been mapped within this segment, mitigation measures described in Segments 1 and 2 would be implemented when constructing trail on steep slopes to minimize the possibility of causing slope failure.

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.

3.6.4 Cumulative Effects

Alternatives can be evaluated based on the amount of soil disturbed through trail construction activities. Analysis of Project Area soils includes a 50-foot corridor in which the proposed trail will be located. All Action Alternatives have a potential for adverse effects on the soils within the Project Area. The amount of disturbed soil for each Action Alternative would differ according to the amount of trail constructed. The Action Alternatives which include the most trail construction would disturb a greater amount of soils. However, mitigation measures would be implemented, and the overall effect of trail activities on soils through erosion, landslides, and slope failures is expected to be minimal for a short period of time. The overall effect of trail activities on soils through compaction and nutrient loss are expected to be adverse, long-term effects.

Past, Present, or Reasonably Foreseeable Future Actions

User-created trails have existed, currently exist, and will continue to exist within the Project Area. These past, present, and future actions associated with soil resources will affect the Project Area.

Cumulative Effects of the Alternatives

Soil Erosion

Cumulative effects of each alternative from soil erosion within the Project Area include minor soil erosion for short periods of time from trail construction and use on Forest and non-Forest lands, minor soil erosion that currently exists within the Project Area, and a minor loss of soil nutrients as a result of soil erosion.

Soil Compaction and Soil Nutrients

Cumulative effects of each alternative from soil compaction and soil nutrient loss within the Project Area include soil compaction and nutrient loss from trail construction and use on Forest and non-Forest lands, a minor increase in soil erosion and runoff, and the soil compaction and soil nutrient loss that currently exists within the Project Area.

Landslides and Slope Failures

Cumulative impacts include (1) minimal landslide and slope failure hazard for a short period of time from trail construction, (2) minimal increased soil erosion in soil units with a high potential for landslides and slope failure, (3) minimal loss of soil nutrients due to soil erosion in these soil units, and (4) the landslide and slope failure hazard that currently exists within the Project Area.

Cumulative effects of each of the alternatives are listed below in Table 27.

Table 27. Cumulative Effects of the Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
Soils and Erosion	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance of soils. Existing use and proliferation of user-created trails could increase. These types of uses are generally not constructed to FS standards and in areas that are susceptible to erosion.	Minor, adverse effect. Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures would reduce soil erosion, soil compaction and subsequent loss of soil nutrients.	Minor adverse effect. Effects would be slightly higher than Alternative 2 since total new acres of disturbance on NFS lands would be 7.6 acres. As with Alternative 2 impacts would be reduced with proper implementation of mitigation measures.
Landslide and Slope Failures	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance. Existing use and proliferation of user-created trails could increase causing a potential increase in landslide and slope failures.	Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures would reduce the probability of landslides and slope failures.	Minor adverse effect. Implementing Alternative 3 would have more impacts since it would be constructed on steeper slopes and would disturb more acres on NFS lands (7.6).

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 contaminants 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 Use¹	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.

¹1C: 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.

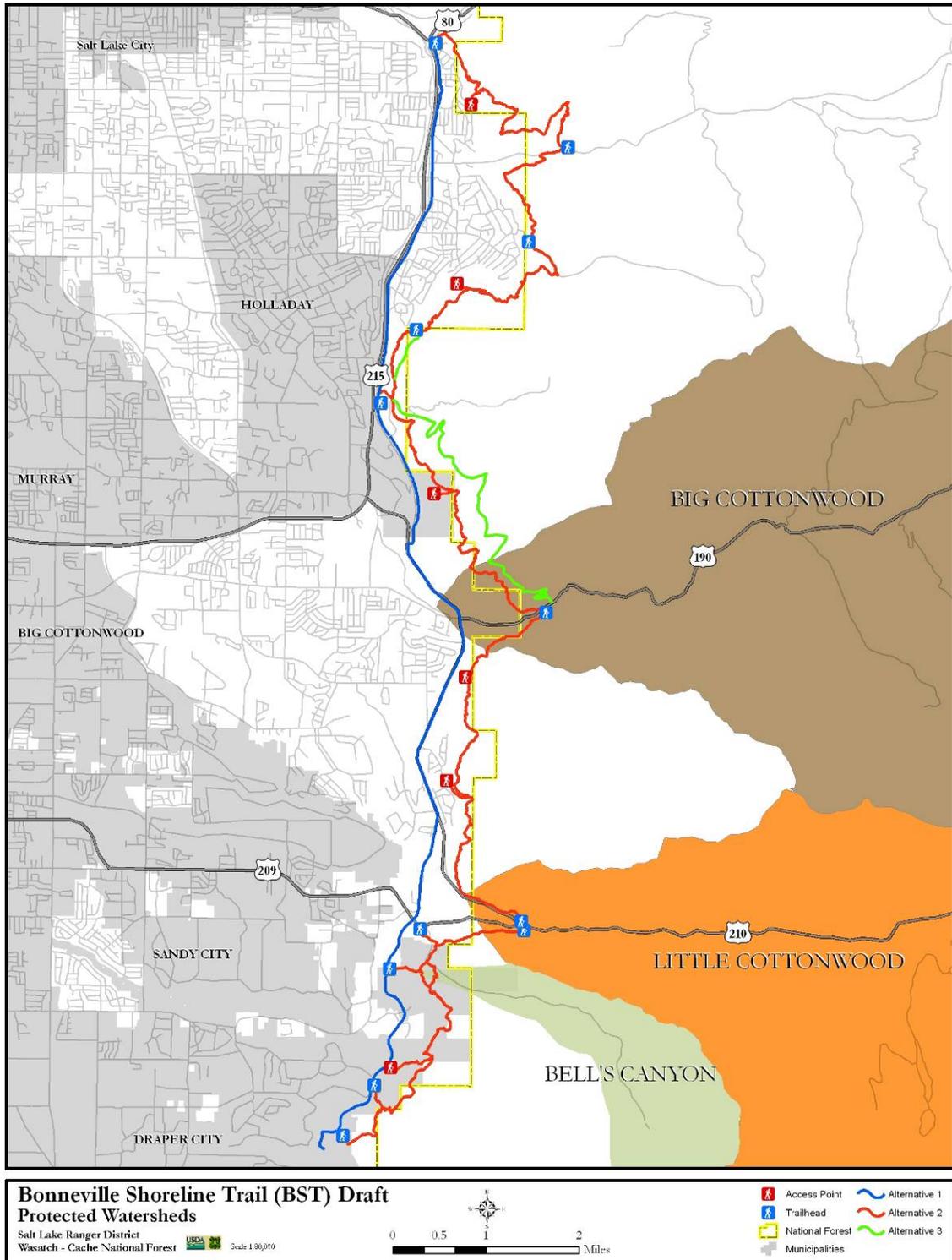


Figure 26. Map of Protected Watersheds in the Project Area.

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
Archaeological, 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.

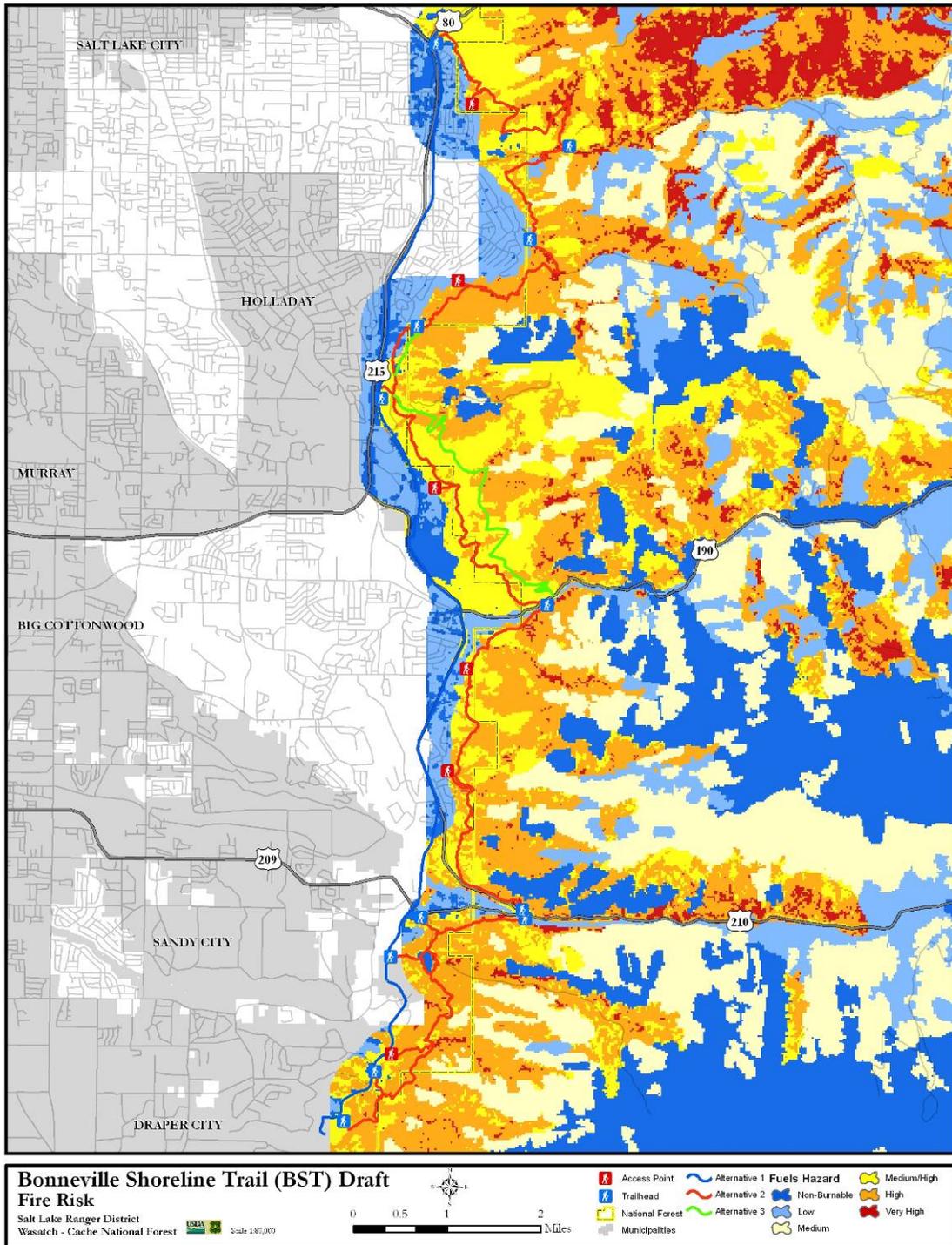


Figure 27. Project Area Fire Risk.

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 Household Income	% Family Households	% of White Residents	% < 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 be 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: <ul style="list-style-type: none"> • 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.

4.0 Consultation and Coordination

The USFS consulted the following individuals; Federal, State, and local agencies; Tribes; and non-Forest Service persons during the development of this environmental assessment:

4.1.1 ID Team Members

Steve Scheid – USFS Environmental Coordinator

Charlie Condrat – USFS Hydrologist

Paul Cowley – USFS Fisheries Biologist

Michael Duncan – USFS Botanist

Paul Flood – USFS Soil Scientist

David Hatch – USFS Landscape Architect

Andy Smith – USFS Natural Resource Recreation Manager

Loren Kroenke – USFS District Ranger

Richard Williams – USFS Wildlife Biologist

Bob Piscopo – USFS Trails Supervisor

Diane Probasco – USFS Wildlife Biologist

Tom Flanigan – USFS Archeologist

Michael Barry – USFS Bonneville Shoreline Trail Coordinator

4.1.2 Federal, State, and Local Agencies

Wasatch Cache National Forest – Salt Lake Ranger District

State of Utah Department of Natural Resources

Salt Lake County Commission

Salt Lake City

City of Sandy

City of Draper

City of Holladay

4.1.3 Others

Bonneville Shoreline Trail Committee

Bonneville Shoreline Trail Coalition

Bonneville Resource & Development Council, Inc.

Wasatch Front Regional Council

4.1.4 List of Preparers

Doug Brewer – The Shipley Group, Technical Editor

Mike Donahoo – The Shipley Group, Wildlife Biologist

Jeremy Eyre – The Shipley Group, Visual Quality

Bruce Glisson – The Shipley Group, Botanist

Suzy Hill – The Shipley Group, Water Resources Specialist

Barry Myers – The Shipley Group, Soils and Groundwater Specialist

Kevin Seegmiller – The Shipley Group, Bioregional Planner

Buck Swaney – The Shipley Group, Wilderness and Roadless

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6.0 Appendices

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6.1 Appendix A: Forest Service RHCA and Riparian Guidelines (From the Glossary of the Forest Plan)

6.1.1 Riparian Habitat Conservation Area (RHCA)

Riparian Habitat Conservation Areas 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 below.

- **Category 1 – Fish-Bearing Streams:** RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to 300 feet slope distance (600 feet, including both sides of the stream channel). (For this project area this would include Mill Creek, Big cottonwood Creek, Deaf Smith, Little cottonwood Creek)
- **Category 2 – Permanently Flowing Non-Fish-Bearing Streams:** RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to 150 feet slope distance (300 feet, including both sides of the stream channel)
- **Category 3 – Ponds, Lakes, Reservoirs, and Wetlands Greater than 1 Acre:** RHCAs consist of the body of water or wetland and the area to 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, (There is no Category 3 habitat in the project area)
- **Category 4 – Seasonally Flowing or Intermittent Streams, Wetlands Less than 1 Acre, Landslides, and Landslide-Prone Areas:** This category includes features with high variability in size and site-specific characteristics. At a minimum the interim RHCAs must include, landslides and landslide-prone areas, 100 feet slope distance in watersheds containing Bonneville or Colorado River cutthroat trout, and 50 feet slope distance for watersheds not containing Bonneville or Colorado River cutthroat trout. (There are numerous category 4 RHCAs in the project area.)

6.1.2 Riparian zone

Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined present and influx of perennial and/or intermittent water, associated high water table, and soils that exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows.

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