

National Park Service
U.S. Department of the Interior

Whiskeytown National Recreation Area
California



ENVIRONMENTAL ASSESSMENT

Abandoned Mine Lands Safety Installations
and Crystal Creek Quarry Site Reclamation

Whiskeytown National Recreation Area, California

April 2010

PUBLIC COMMENT

If you wish to comment on the environmental assessment, you may mail comments to the name and address below or post comments online at <http://parkplanning.nps.gov/whis>. This environmental assessment will be on public review for 20 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment - including your personal identifying information - may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we would be able to do so. We would make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspections in their entirety.

Please address written comments to:

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Environmental Assessment
Abandoned Mine Lands Safety Installations
and Crystal Creek Quarry Site Reclamation

WHISKEYTOWN NATIONAL RECREATION AREA, CALIFORNIA

The National Park Service proposes recontouring slopes and establishing drainage improvements at the Crystal Creek Quarry site, and installing mine safety treatments at abandoned mine lands in Whiskeytown National Recreation Area. The purpose of this project is to mitigate safety hazards in the park.

The project is needed because of hazards posed by steep slopes and unstable materials at the Crystal Creek Quarry site, and old, deteriorated, accessible, abandoned mine features at other Recreation Area locations. Abandoned mine hazards were documented in a report by the Office of the Inspector General. NPS regions have been directed to identify and implement quick-response measures for high-risk abandoned mine land features to ensure visitor safety.

Three alternatives were analyzed for meeting these objectives:

- **Alternative A: No Action.** This alternative would continue existing management practices for Crystal Creek Quarry and abandoned mine land sites in Whiskeytown National Recreation Area. New mine safety installations would be implemented as funding became available; the timing and number of safety installations would vary according to funding. These installations would be accomplished under a continuation of current management and would not be part of the proposed action. Safety measures installed earlier in mine openings would be retained. Unsafe conditions would continue to exist at the Crystal Creek Quarry site and at sites with unclosed mine openings.
- **Alternative B: Erosion and Safety.** Alternative B would install or improve safety treatments at up to 20 abandoned mine land sites in the Recreation Area. At the Crystal Creek Quarry site, this alternative would regrade steep slopes, stabilize highly erodible areas, and install drainage improvements. Other features would include a new parking lot, handicapped parking, and removal of the rock sorter.
- **Alternative C: Erosion, Safety, and Restoration.** Alternative C, the preferred alternative, would be similar to alternative B but would include more topographic variation and improved infiltration along parts of the trail/road. Other differences would include changing the location of the gate for bicycle and pedestrian access, and not having a separate area for handicapped parking.

The adverse effects on park resources would be negligible to moderate. None of the alternatives analyzed in this environmental assessment would result in major or unacceptable environmental impacts or impairment of park resources or values.

The project may be funded under the American Recovery and Reinvestment Act of 2009.

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PURPOSE AND NEED FOR ACTION

PURPOSE AND NEED

The National Park Service proposes recontouring slopes and establishing drainage improvements at the Crystal Creek Quarry site and installing mine safety treatments at abandoned mine lands in Whiskeytown National Recreation Area (figure 1). The purpose of this project is to mitigate safety hazards in the park which result from abandoned mines and conditions at Crystal Creek Quarry.

The project is needed because of hazards posed by steep slopes and unstable materials at the Crystal Creek Quarry site, and old, deteriorated, accessible, abandoned mine features at other Recreation Area locations. Abandoned mine hazards were documented in a report by the Office of the Inspector General. NPS regions have been directed to identify and implement quick-response measures for high-risk abandoned mine land features to ensure visitor safety.

The purpose of the proposed project, to mitigate safety hazards, is an integral part of the Recreation Area's General Management Plan and Environmental Impact Statement (1999). The General Management Plan also addresses the need to preserve and protect natural and cultural resources.

OBJECTIVES

The objectives of the proposed project are to recontour and reclaim the Crystal Creek Quarry site, resulting in a more natural-looking landscape, and to prevent visitors from entering hazardous mine features while providing for protection of natural and cultural resources, and minimizing potentially adverse effects on visitor experience.

Preventing human access to mines may involve permanent closure of mine features, including non-reversible methods such as earthen backfill, constructing rock and mortar walls into mine features, and recontouring the landscape. The National Park Service, in consideration of wildlife and/or historic resources, can also employ reversible methods such as bat gates, cupolas, grates, nets, polyurethane foam plugs with a surface layer of earthen backfill, or fencing (chain-link or barbed). Installation methods that consider the needs of wildlife have been extensively researched (Vories and Throgmorton 2002; Sherwin *et al.* 2009), and the National Park Service would rely on installation techniques that have been developed to allow wildlife use for those mine openings where wildlife use is acknowledged or anticipated.

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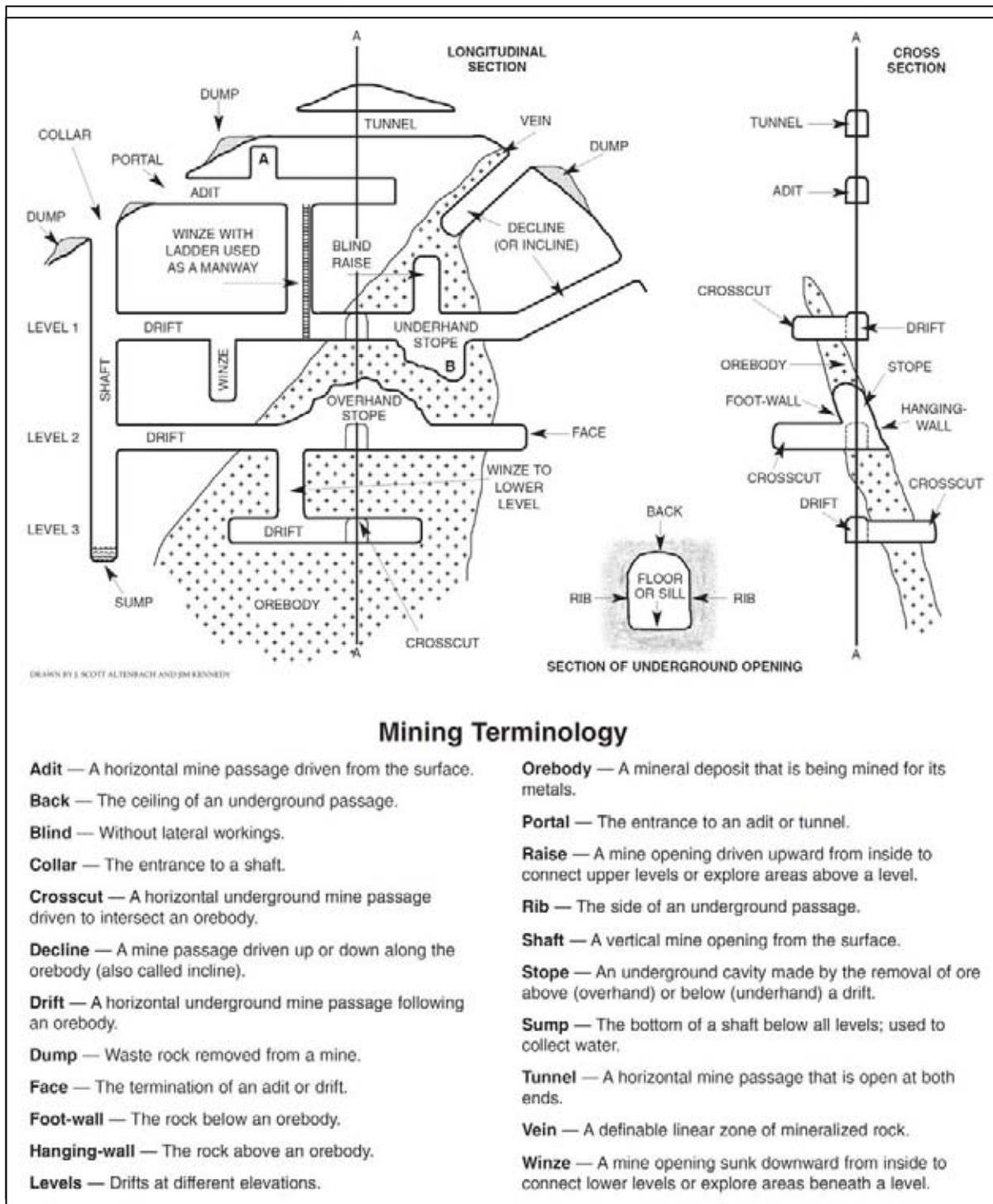


Figure 2. Typical Types of Mine Openings and Features

Used with permission from Bat Conservation International - <http://www.batcon.org/> (Tuttle and Taylor 1998).

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The objectives of the proposed activities are as follows:

- Protect visitors and park staff from sheer drop-offs, steep slopes, and unstable material associated with the Crystal Creek Quarry site and from abandoned mine safety hazards and minimize adverse effects on visitor experience: Properly design safety structures and re-grading / recontouring of site topography to protect visitors from unsafe conditions at the quarry site and abandoned mine land sites.
- Protect natural resources during construction and after structures are installed and recontouring and revegetation is completed: Wildlife may use areas for shelter, nesting, and/or denning; improve site conditions for aquatic resources and water quality.
- Improve site conditions and prevent further erosion and sedimentation of Crystal Creek: Revegetate and grade Crystal Creek Quarry site to improve the stability of the steep slopes and unstable material while improving the visual aesthetics of the landscape.
- Protect cultural resources during construction activity and once structures are in place and recontouring is completed: Maintain the historic fabric and the visual character of extant cultural landscapes.
- Maintain a good working relationship between the National Park Service and stakeholders and partners associated with Whiskeytown National Recreation Area: Many stakeholders and partners are involved with the Crystal Creek Quarry site and abandoned mine lands at the park. In addressing site recontouring and abandoned mine land safety issues, the objective of the National Park Service is to achieve good working relationships with stakeholders and partners and implement a balanced approach for resolving issues.

NEED FOR PROPOSED ACTION

Prior to establishment of Whiskeytown in 1965, a 10.7-mile tunnel was constructed to link Lewiston Reservoir in the Trinity watershed with Whiskeytown Lake in the Clear Creek watershed to supply water to the Central Valley. As a result of tunneling, approximately 350,000 cubic yards of waste rock is stored at the Crystal Creek Quarry site, which covers about 25 acres. The need for the proposed recontouring is to improve safety at the site and reduce erosion hazards created by the waste rock piles present at the site. Visitors have access to the quarry site immediately adjacent to Crystal Creek Road. The waste rock piles have created sheer drop-offs of up to 25 feet on unstable material, and visitors have been observed climbing on these piles. The soils at the site are associated with the Shasta Bally Batholith, which are some of the most erodible soils in the country. The lack of nutrients in the granite fines supports little vegetation. The lack of vegetation, coupled with deeply incised drainages results in erosion and sedimentation of Crystal Creek. The park and the state have both identified the need to address these concerns.

The need for the proposed mine safety installations is related to safety hazards created by a number of old and deteriorated abandoned open mine shafts, declines, stopes, and horizontal openings such as adits and tunnels that exist in the park. These types of hazards were recently documented in five national parks and selected Bureau of Land Management areas in a report by the Office of the Inspector General (2008). The report concluded that because abandoned mine land sites in the western United States represent a remnant of the region's rich history, they are popular destinations for park unit visitors, and an associated safety risk is created. To assure abandoned mine land sites are secured for visitor safety, each NPS region has been directed to identify and implement quick-response measures for high-risk abandoned mine land features. Park units were directed to identify those abandoned mine land features that pose a high risk for visitor safety, and to develop initial cost estimates for mitigation or safeguarding of

PURPOSE AND NEED FOR ACTION

those features. Park units were also directed to fulfill needed compliance responsibilities and implement plans for quick response measures (for example, fences and warning signs) on a prioritized basis (National Park Service 2009b).

There is an immediate and long-term need to recontour and reclaim Crystal Creek Quarry site and to close high priority abandoned mine land sites at Whiskeytown National Recreation Area, because of the safety hazards posed by abandoned mine land sites.

PURPOSE AND SIGNIFICANCE OF THE PARK

The purpose and significance of Whiskeytown National Recreation Area are important components of the basis for management decisions and planning. Decisions about the management of resources are generally measured against these factors to determine activities that may be acceptable in a park.

DESCRIPTION OF THE PARK

Whiskeytown National Recreation Area was established by the Act of November 8, 1965 (79 Stat. 1295) "... to provide ... for the public outdoor recreation use and enjoyment of the Whiskeytown reservoir and surrounding lands ... by present and future generations and the conservation of scenic, scientific, historic and other values contributing to public enjoyment of such lands and waters ..." Whiskeytown is a unit of the Whiskeytown-Shasta-Trinity National Recreation Area. It is located in the Klamath Mountains in Shasta County, California, about 8 miles west of downtown Redding (figure 1). The park can be reached from both the east and west by California Highway 299. The Whiskeytown area is generally characterized by steep mountainous terrain with isolated alluvial valley fills in some of the larger drainages.

The park covers 42,503 acres, approximately 70 square miles, and includes the 3,220-acre Whiskeytown Lake. Whiskeytown Lake lies at the confluence of seven perennial streams that form one of the largest watersheds of the Sacramento River, and provides drinking water for several municipalities. Nearly six million people live within a day's drive of the park. Most of the park's 46 mile boundary is bordered by private land, with some bordering lands administered by the Bureau of Land Management. There is one state-owned tract of 29 acres and six private tracts totaling 15 acres in the park. A recreational easement extending along lower Clear Creek from the park boundary to Placer Road is in mixed public/private ownership and, currently, the park does not exercise management over this easement. The authorizing legislation includes provision for mining. A portion of the unit has been designated as available for mineral leasing since 1988 but no leases are currently in effect.

Elevations in the park are between 625 feet at the southern end of lower Clear Creek to 6,209 feet at the summit of Shasta Bally. The park consists of many varied habitats for a unique and diverse assemblage of plant and wildlife species. Vegetation is a mixture of pine forest, riparian associations, and chaparral. The park is in an area of Mediterranean climate with hot, dry summers, and cool winters with moderate rainfall. The average annual precipitation at park headquarters is 60 inches, nearly all of it in the form of rain. The south side of the lake receives higher rainfall totals than the north side. Seventy-five to ninety percent of the total annual rainfall occurs between November 1 and April 30 (National Park Service 2005).

The power and water supply functions of Whiskeytown dam and reservoir are managed by the Bureau of Reclamation. The lake, created by an earth-filled dam on Clear Creek, has a surface area of approximately 3,200 acres. Whiskeytown Lake provides high-quality reservoir recreation opportunities because of its forested mountain setting, and its lake-like appearance due to a mode of operation which keeps the reservoir full throughout the primary extended recreation season.

PARK PURPOSE AND SIGNIFICANCE

The purpose statement includes the reasons Congress set the area aside for protection as a unit of the national park system. As a unit of the national park system, Whiskeytown must be ma-

naged in accordance with the National Park Service preservation mission as provided in the Organic Act of 1916; 16 USC 1, which provides that the primary purpose of park units is:

... to conserve the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.

The park's primary significance is encompassed by Whiskeytown Lake and its surrounding lands for the provision of acceptable recreation activities to achieve the purpose of the enabling act which includes, but is not necessarily limited to boating, swimming, water skiing, sailing, fishing, hunting, hiking, horseback riding, motor trail driving, camping, picnicking, gold panning, interpretive programs and very limited winter sports. In order to provide for these recreation uses a strong conservation ethic must be exercised to protect the scenic, scientific, historic, and other values intrinsic in public enjoyment. Other uses, consistent with recreation and/or reclamation purposes, may be authorized under Secretarial regulation for utilizing leasable and non-leasable minerals and other renewable resources (National Park Service 1990).

ISSUES AND IMPACT TOPICS

Internal and external scoping comments were considered in the choice of impact topics and were used in the development and evaluation of alternatives discussed in this environmental assessment. Table 1 presents the impact topics, the reasons for retaining the topic, and relevant laws, regulations, and policies. The section located on page 85 entitled Consultation and Coordination provides information on the organizations and agencies contacted during scoping and a summary of the public scoping efforts that helped identify relevant issues and impact topics'.

| Table 1. Impact Topics Retained for Further Evaluation and Relevant Laws, Regulations, and Policies | | |
|--|---|---|
| Impact Topic | Reasons for Retaining Impact Topic | Relevant Laws, Regulations, and Policies |
| Public Health and Safety | Existing mine openings, vandalized safety installations, and existing material stockpiles pose a substantial safety hazard for visitors. The project would result in a long-term beneficial improvement in safety due to site recontouring at the Crystal Creek Quarry site and closing of mine openings. Therefore, this topic will be further analyzed in the environmental assessment. | National Park Service Management Policy 8.2.5, 2006 |
| Visitor Experience | There is a potential for construction and operation of site recontouring and mine safety installations to have short-term, minor adverse effects on visitor use and experience. The proposed activities would have both beneficial and adverse, negligible to minor effects, depending on the point of view and values of the visitor. Therefore, this topic will be further analyzed in the environmental assessment. | National Park Service Organic Act; National Park Service Management Policy 8.2, 2006 |
| Water Quality | Soil disturbance and associated erosion of soils into adjacent drainages would result during construction of the proposed activities. This would cause short-term, negligible, adverse effects on water quality during wet weather. Reducing sedimentation and erosion and improving site conditions at the Crystal Creek Quarry site would cause long-term, beneficial effects to Crystal Creek and the watershed. Mitigation measures would be employed to assure potential construction-related effects are avoided and minimized. Therefore, this topic will be further analyzed in the environmental assessment. | Executive Order 12088; Executive Order 11990; National Park Service Management Policy 4.6.3, 2006; Federal Water Pollution Control Act [The Clean Water Act of 1972 (as amended in 1977)] |
| Park Operations | The project would have a short-term, minor, adverse effect on park operations during construction activities. This action would require existing park staff to allot time to supervise the projects, requiring time away from other duties. The project would have a long-term, beneficial effect on park operations by avoiding the need to respond to safety issues associated with mine opening related incidents in the future. Therefore, this topic will be further analyzed in the environmental assessment. | National Park Service Management Policy 1.8 and 4.1.1, 2006 |

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IMPACT TOPICS DISMISSED FROM DETAILED ANALYSIS

Impact topics considered, but not evaluated further, are discussed below.

CULTURAL RESOURCES

A “Programmatic Agreement between the National Park Service (U.S. Department of the Interior) and the California State Historic Preservation Officer Regarding Mitigation of Physical Safety Hazards at Historic Abandoned Mineral Lands within the National Parks in California” was developed in anticipation of funding under the American Recovery and Reinvestment Act of 2009. It was signed by both parties on August 18, 2009 (appendix B). The purpose of this programmatic agreement is to establish an alternate pathway for compliance with Section 106 of the National Historic Preservation Act and set forth a streamlined consultation process when agreed upon criteria are met and specified procedures are followed in the installation of physical hazard mitigation treatments at abandoned mine sites. As part of the development of the programmatic agreement, the National Park Service established guidelines, standards, and technical information applicable to the treatment of these physical hazards in ways that would, to the extent possible, minimize the impacts of such treatments on the historic fabric and historic character of abandoned mine lands features at these sites.

The park would adhere to the programmatic agreement during implementation of this project and would treat all of the mine structures as potentially eligible for listing in the National Register of Historic Places. The National Park Service would install only reversible safety installation treatments unless the unsafe condition of the feature is of such severity that a reversible option is not viable. The standard treatments described in attachment A to the programmatic agreement, because of their non-permanent and reversible nature, are deemed to produce “no adverse effect” for purposes of the programmatic agreement. As soon as NPS staff determine that a required alternative safety treatment would have an unavoidable and irreversible adverse effect on one or more historic properties, that portion of the project would be suspended and the National Park Service would immediately enter into consultation with the State Historic Preservation Officer to identify other installation types that avoid, minimize, or mitigate the adverse effect. As a result of following the programmatic agreement and the mine safety installation types it proposes, the impact on cultural resources in Whiskeytown National Recreation Area would be negligible to minor. Impacts are discussed in detail below.

The park also proposes to recontour and reclaim the Crystal Creek Quarry site. The project would include recontouring the previously disturbed surface to create a more natural appearance, reducing steep slopes on the edges of the quarry to prevent erosion, revegetating with native species, and removing and recycling a large concrete slab.

Archeological Resources

Prior to undertaking safety installations at any mine site, the Recreation Area would determine the area of potential effects for the project and would consult its Archeological Site Management Inventory System database to determine whether previously recorded sites are present in each area of potential effects. Previously recorded sites in the area of potential effects would be protected in place during construction through the use of exclusionary fencing or other measures. In areas of potential cultural sensitivity, an archeological survey and site identification would take place prior to installations, and the protection measures outlined above would be implemented if archeological resources were located. The same procedure would be followed in cases of inadvertent discoveries of archeological resources.

The Crystal Creek Quarry site was subjected to an intensive pedestrian survey and no cultural resources were identified. The Archeological Site Management Inventory System database has also been searched and no previously recorded sites were identified within the Crystal Creek Quarry site area of potential effects.

As a result, impacts to archeological resources would be no more than negligible and archeological resources were dismissed from further analysis.

Cultural Landscapes

The Crystal Creek Quarry site consists of waste rock stockpiled during the late 1950s and early 1960s by the construction of the diversion tunnel connecting the Trinity River impoundment with Whiskeytown Lake. About 350,000 cubic yards of granitic waste rock were placed at the site, and portions of the top were flattened. Since then, this intensively impacted area has been periodically quarried for rock that has been used for fill at other sites. A drainage channel that bisects the site from the west to the east has caused substantial erosion along the east margin of the surface above Crystal Creek. The site is neither listed, nor eligible for listing in the National Register of Historic Places as a cultural landscape.

The mine safety installations would introduce new visible elements to the landscape, such as fences or structures over shafts. Conversely, some openings would be buried so they would no longer be visible to visitors. Impacts would be minimized by the use of materials that would blend into the mining landscape, such as non-reflective metal, and by recessing safety installations into the shaft or adit where possible.

Virtually all mine safety installation options would be reversible. All mine openings to be closed would be photo-documented before and after the work was completed. The photographs would illustrate the historic construction / engineering features and techniques of the treated portions of each site and would provide an overview depicting its setting in the general landscape. Where permanent mine safety installation techniques are necessary, representative mines would be closed by reversible means to convey the sense of the greater mining landscape.

The project would result in minor impacts on cultural landscapes that would be mitigated by documentation and the installation techniques described above. Because greater than minor impacts would not occur, this topic was dismissed from analysis.

Ethnographic Resources

Native American groups traditionally associated with the park were consulted on May 29, 2009 and March 4, 2010 regarding this project. No comments were received by the National Park Service from any Native American groups about traditional sites or resources that might be affected by the proposed actions outlined in the work plan and programmatic agreement. Because the project would not impact ethnographic resources, this topic was dismissed from further analysis.

Historic Structures

Mine safety installation techniques would be designed to avoid impacts on the historic fabric of the structures associated with the mine sites to the greatest extent possible. Visual impacts to the historic character of the mine openings, such as entrance ways, doors, and wooden supports and collars, would be minimized by recessing safety installations. In some cases, structural ele-

ments would be dismantled and then reconstructed after installations were complete. Where recessing is not possible, mine safety installations would be worked into and around historic structures so their visual presence would be minimized to the extent practical. As a result, impacts would be negligible to minor depending on the installation technique chosen.

An intensive cultural resource inventory completed on February 3, 2010 encountered no historic structures or intact cultural remains at the Crystal Creek Quarry site.

Because there would be no impacts greater than minor, this topic was dismissed from further analysis.

Museum Objects

Objects related to mining operations can be found at most mine sites. These objects consist of equipment used in mining or personal objects used by the miners. The programmatic agreement developed with the California State Historic Preservation Officer requires the project to leave all potential museum objects in place where they are located and take care not to disturb them during safety installations at mine openings.

An intensive cultural resource inventory completed on February 3, 2010 of the Crystal Creek Quarry site did not encounter historic properties, intact cultural deposits, or museum objects.

Because potential museum objects would not be impacted or added to the Recreation Area collections at this time, there would be no impact to museum objects or collections. As a result, this topic was dismissed from further analysis.

WILDERNESS

There are no areas currently designated as wilderness at Whiskeytown National Recreation Area. It is also unlikely that any lands would meet the criteria established in the Wilderness Act of 1964 (16 USC 1131, et seq.) – that the “imprint of man’s work substantially unnoticeable” – because of existing development, historic structures, and a history of human occupation of the area. This impact topic was, therefore, dismissed from further analysis.

FLOODPLAINS AND WETLANDS

Proposed project activities would not be conducted in floodplains or wetlands and would not affect the functions and values of floodplains and wetlands. This impact topic was, therefore, dismissed from further analysis.

GEOLOGIC RESOURCES

Impacts to geologic resources associated with the installation of mine closure activities would be limited to anchoring of safety installations and minor shaping of bedrock limited primarily to the dimensions of each mine opening. The small geological area affected would result in negligible adverse effects on geological resources.

The geologic features and original contours of the land surface at Crystal Creek Quarry site were previously disturbed during the 1950s when approximately 350,000 cubic yards of waste granite material was stockpiled on the site, covering an estimated 25 acres. The proposed action would recontour the existing site to obtain a more natural appearance. The effects would be long-term and beneficial. This impact topic was, therefore, dismissed from further analysis.

PRIME AND UNIQUE FARMLANDS

The proposed project activities would be located in steep and rocky areas that would not sustain farming. This impact topic was, therefore, dismissed from further analysis.

NATURAL SOUNDSCAPE

In accordance with National Park Service Management Policies and Director's Order – 47: Soundscape Preservation and Noise Management, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human sound.

Shasta County is characterized as rural with ambient noise conditions less than 50 decibels acoustic (dBA) (Shasta County 2004). Activity and road traffic along Crystal Creek Road produce sources of noise above background levels that affect ambient conditions. The noise levels increase with proximity to source-generating activities. Whiskeytown Dam is also a source of elevated background levels that affect the ambient conditions (Bureau of Land Management and Whiskeytown National Recreation Area 2008). Noise along Crystal Creek Road would be expected to increase due to transportation of construction equipment, including the potential use of helicopters, to the site during construction, as well as onsite during the use of heavy equipment. The proposed project would have negligible to minor, short-term, adverse impacts on soundscapes from construction equipment and vehicle noise, including the use of helicopters, to transport equipment. These short-term activities would also affect visitor experience.

Potential impacts associated with construction activity are described and evaluated under the visitor experience impact topic, which has been retained for further analysis. Because short-term construction impacts on soundscapes would not exceed a minor threshold, and the short-term construction noise impacts to visitor use and experience are described and evaluated under the visitor experience impact topic, soundscapes was dismissed from further analysis as a separate impact topic.

INDIAN TRUST RESOURCES

Sacred sites are managed according to requirements of Executive Order 13007 and National Park Service Management Policy 5.3.5.3.2 (National Park Service 2006). The proposed project would not affect any sacred sites or Indian Trust Lands. This impact topic was, therefore, dismissed from further analysis.

AIR QUALITY

Emissions of particulates that could affect air quality, including visibility in the general vicinity of the park, would temporarily increase during construction from the use of vehicles at the site, and from exhaust from gasoline- or diesel-powered vehicles and equipment. This equipment would also temporarily emit air pollutants. However, a typical mine safety installation would take two to three days to complete. Additionally, particulates associated with recontouring at the Crystal Creek Quarry site would temporarily increase during the construction period. Mitigation measures described in more detail in the "Alternatives" section (such as dust suppression) would be employed to assure that potential associated effects on air quality are avoided and minimized. Because of the short-term, localized nature of the operation, mine safety installation activities would not affect the attainment status of the airshed that encompasses Whiskeytown National Recreation Area and would not affect the airshed designation (Class II designa-

tion under the Prevention of Significant Deterioration program) at the park (National Park Service 2005). This impact topic was, therefore, dismissed from further analysis.

CLIMATE CHANGE

Proposed project activities would have an incremental but negligible effect on climate change through the emission of additional carbon dioxide and other potential global-warming gasses from construction activities and operations of gasoline- or diesel-powered vehicles. The proposed planting of native vegetation at the Clear Creek Quarry site would have beneficial, incremental but negligible effect on climate change through carbon-dioxide capture. This impact topic was, therefore, dismissed from further analysis.

SOILS

The total area of soil disturbed by mine safety installations would be limited primarily to the dimensions of each mine opening. Mine safety installations would have short-term, negligible, adverse effects on soil during construction and operation.

Many of the sites have little original soil remnants, and all of the substrate types within the project area are considered highly erodible. The Crystal Creek Quarry site was previously heavily disturbed. That disturbance essentially destroyed the original soils and left an existing substrate that consists of granitic (chiefly granodiorite) waste rock, in sizes ranging from fines up to large boulders. The materials at the Crystal Creek Quarry site in particular, are associated with the Shasta Bally Batholith, which are some of the most erodible soils in the country (personal communication, Russ Weatherbee, October 2009). Weathered granites are structurally weak and easily broken down. The result is coarse textured, easily eroded substrate and a predominance of weak bedrock that is easily broken down into sands with very little silt and clay. The coarse texture and steep slopes at the Crystal Creek Quarry site create a high erosion potential. Site recontouring and revegetation would have long-term, beneficial effects on soil by rounding and removing steep slopes where possible, and providing vegetated cover which would reduce the potential for erosion.

The project would not include any measureable new disturbance to original site soils and because impacts would be predominately beneficial to no impacts greater than negligible and adverse, this topic was dismissed from further analysis.

AQUATIC RESOURCES

Soil disturbance and associated erosion of soil into Crystal Creek or adjacent dry or ephemeral-flow drainages during construction would result in short-term negligible adverse effects on water quality during wet weather (should rain events occur during the construction period). Mitigation measures described in more detail in the "Alternatives" section would be employed to ensure that potential effects on water quality and associated aquatic life communities would be avoided and minimized. Recontouring and revegetation of the Crystal Creek Quarry site would improve site conditions and reduce the potential for erosion and sediment transport into nearby streams. Because the effects would be temporary and negligible to long-term and beneficial, this impact topic was dismissed from further analysis.

WILDLIFE

There may be temporary disruptions to wildlife during construction activities; however, the effects would be considered short-term, negligible and adverse. The primary reasons for these conclusions include the negligible wildlife habitat and use associated with the barren and largely unvegetated Crystal Creek Quarry site and the very small and short term disturbance typically associated with installing a mine opening safety device. The park has limited documentation on wildlife or bat usage of mine openings. However, park staff suspects bat usage in some areas and has therefore used a conservative approach for mine safety installations. This approach involves favoring the installation of bat gates to encourage bat and other wildlife species use of the openings and to exclude human disturbance from the tunnels and other underground mine features.

The majority of wildlife use at the Crystal Creek Quarry site is limited to the fringes of the site because of the unvegetated condition and lack of habitat on the exposed waste rock. Recontouring and revegetation of the Crystal Creek site would result in long-term, beneficial effects, as vegetation would provide cover and habitat for some wildlife species. Because impacts would be beneficial at the quarry site and negligible and adverse to beneficial at the mine openings, this topic was dismissed from further analysis.

SPECIAL - STATUS SPECIES

The bald eagle (*Haliaeetus leucocephalus*) is federally protected under the Bald and Golden Eagle Protection Act of 1940. Bald eagles were first documented as nesting at Whiskeytown Lake in 1973. Whiskeytown currently hosts two nesting pair of bald eagles as well as a substantial wintering population (National Park Service 2004). Bald eagle activity such as perching, foraging, nesting, and roosting is generally limited to the lower elevations of the park and occurs mostly within 2 miles of Whiskeytown Lake (National Park Service 2005). U.S. Fish and Wildlife Service guidelines recommend keeping a distance of ½ mile or greater from current or historic bald eagle nest sites within line-of-site, or ¼ mile or greater from current or historic bald eagle nest sites outside of line-of-site to avoid adverse impacts to nesting bald eagles.

One federally threatened wildlife species is known to occur in the park, the northern spotted owl (*Strix occidentalis caurina*). There is only one known nesting pair of northern spotted owls within the park. Spotted owl habitat does not occur at any of the proposed project areas. No federally listed species of bats occur in the park; however, there is the potential for four California bat species of special concern to occur in the proposed project areas. These species include the spotted bat (*Euderma maculatum*), western red bat (*Lasiurus blossevillii*), Townsend's bi-eared bat (*Corynorhinus townsendii*) and the pallid bat (*Antrozous pallidus*). Whiskeytown National Recreation Area would use a conservative approach in mine safety installations and would use bat compatible installations whenever possible to accommodate bat use of the mine openings.

Two federally threatened fish species occur in Clear Creek, in the southwest portion of the park and below Whiskeytown Dam. These are the spring-run chinook salmon (*Oncorhynchus tshawytscha*) and Central Valley (Evolutionary Significant Unit) steelhead trout (*Oncorhynchus mykiss*). The Crystal Creek Quarry site is located in the northwest portion of the park and above the Whiskeytown Dam and therefore has no direct flow into Clear Creek. Therefore, the proposed activities would not be expected to adversely affect Clear Creek or the fish species in it.

The special-status bat species would be the only species with a potential to be affected at the proposed project areas. Mitigation measures, described in more detail in the "Alternatives" section combined with the installation of bat gates, would be employed to avoid and minimize potential adverse effects to special-status species. Effects from temporary disruptions during con-

struction activities would be considered short-term, negligible and adverse. This impact topic was, therefore, dismissed from further analysis.

VEGETATION – NATIVE AND NON-NATIVE PLANT COMMUNITIES

Numerous non-native or invasive plant species have become established in some park areas. Invasive plant species currently account for approximately 25-30 percent of the plants in the park. Many of these species are highly invasive, able to out-compete native species, and disrupt native plant communities and processes. Non-native plant species are a pressing threat to park resources because they jeopardize the park's ability to preserve and protect natural resources and cultural landscapes.

Biological inventory of non-native plant species has been ranked as one of the highest priorities among the Klamath Network Parks. An accurate and complete assessment of the abundance and extent of exotics in Whiskeytown was completed in 2003. Several infestations have been successfully treated and control efforts for the next several years are expected to achieve a significant reduction in exotic plant populations in the park. Treated areas would require monitoring and retreating indefinitely. The park works cooperatively with the Shasta County Weed Management Area to eradicate exotics across boundaries (National Park Service 2005).

Of greatest concern is that the proposed construction and recontouring at the Crystal Creek Quarry site could introduce a new invasive plant species to the park and/or exacerbate existing infestations at the site, if the site activities are not properly managed. The park resource management staff is acutely aware of the potential invasive plant threat and has developed control measures to minimize this potential adverse effect. Because of effective surveillance and control measure results incorporated into the reclamation activities, effects to native plant communities in adjacent areas and the long-term recovery of the Crystal Creek Quarry site would be long-term and beneficial. Development of pocket tree and shrub areas, the application of a commercial low-nitrogen soil amendment and or the application of an invasive species free organic soil amendment would help stabilize the substrate and allow for the reintroduction of native species including the development of native ground cover. Any soil amendments used would allow the slow release of nutrients that would not over enrich the substrate. Such amendments would better promote the growth of native species while limiting the potential for undesirable or invasive species. These products have been used successfully in high altitude, sterile sites in the National Park Service. Use of various control measures, including the burial of some non-native species (such as yellow star thistle (*Centaurea solstitialis* L.) would minimize the spread of invasive plant species.

Mine safety installation activities would be almost completely limited to the mine opening or to a very limited area associated with structural improvements. Construction at these mine openings would not involve planting of non-native species of plants or otherwise cause the spread of these species. Native materials would be used for all revegetation and backfill closure activities. Mitigation measures outlined in the "Alternatives" section would be followed by construction contractors to avoid the spread of non-native species. The project would, therefore, have no more than short-term, negligible adverse effects on vegetation with the potential for long term beneficial effects. This impact topic was, therefore, dismissed from further analysis.

SOCIOECONOMICS

The proposed project would provide local contractors jobs to construct the mine safety installations and conduct construction activities at the Crystal Creek Quarry site, as well as, benefits through the local purchase of materials needed for the mine safety installations which would

PURPOSE AND NEED FOR ACTION

result in short-term, beneficial effects on the local economy in the vicinity of the park. This impact topic was, therefore, dismissed from further analysis.

NATURAL LIGHTSCAPE (NIGHT SKY)

The project would be constructed during daytime hours and would have no adverse effects on natural lightscape quality. Similarly, the proposed mine safety installation structures would have no effects on natural lightscape (night sky). This impact topic was, therefore, dismissed from further analysis.

ENERGY CONSERVATION

The project would require a negligible amount of oil, gas, and electrical energy during the construction phase of the proposed activities. This impact topic was, therefore, dismissed from further analysis.

ENVIRONMENTAL JUSTICE

Impacts associated with the proposed activities would not disproportionately affect any minority or low-income population or community. This impact topic was, therefore, dismissed from further analysis.

ALTERNATIVES

DESCRIPTION OF ALTERNATIVES

The National Park Service identified and evaluated three alternatives for addressing the Crystal Creek Quarry site and mine safety installations at abandoned mine land sites in Whiskeytown National Recreation Area:

- Alternative A: No Action
- Alternative B: Erosion and Safety
- Alternative C: Erosion, Safety and Restoration (the preferred alternative)

The concepts and features of abandoned mine closures would be the same for the action alternatives - B and C, and are therefore described once as features common to both action alternatives. This discussion precedes the description of each action alternative's proposed activity at the Crystal Creek Quarry Site. Each alternative is described in the sections that follow. Descriptive tables are provided at the end of this section.

Abandoned mine land safety installation techniques are described in table 4. The information in table 4 is modified from *A Plan to Minimize the Impacts of Physical Safety Hazard Mitigation Treatments at Abandoned Historic Mines* (National Park Service no date). This and all other tables in this chapter are included at the end of this chapter.

Table 5 presents examples of typical mine openings and some of the factors that would be considered when determining what safety installation technique would be most appropriate. The table identifies many, but not all, possible combination safety installation techniques.

Table 6 presents a summary of the impacts associated with each of the impact topics proposed under alternatives B and C. Details of the analyses are presented in the Environmental Consequences section. Only adverse impacts are assigned intensity thresholds.

Table 7 presents a comparison of the environmental effects of alternative A: No Action, and the two action alternatives, for each impact topic. The impact assessments summarized in table 7 are based on the detailed analyses that follow in the "Affected Environment / Environmental Consequences" section. A determination of whether the alternative meets the purpose and need of the proposed action is also included in the last row of the table. Only adverse effects are assigned an impact intensity threshold. In cases where the effects of alternative B and alternative C vary, the range of effects is presented.

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ALTERNATIVE A: NO ACTION

The no action alternative would continue existing management practices and conditions at the Crystal Creek Quarry site and for abandoned mine land sites at the park. New safety installations would be implemented as funding becomes available on a site by site basis; the timing and number of openings to be closed during a specific period would vary according to availability of funding. Existing abandoned mine closures that have been compromised would be repaired as funding became available. Mines already closed in the park would remain closed, and would continue to provide long-term safety improvements for visitors at those locations. Unsafe conditions would continue to exist at unclosed mine openings. Closures and repairs would be accomplished under a continuation of current management and would not be part of the proposed action.

Current conditions at the Crystal Creek Quarry site would likely not change under the no action alternative (figure 3). Steep slopes with highly erodible banks and overhanging stockpiles would continue to cause unsafe conditions for visitors and park staff. Additionally, erosion and sedimentation into Crystal Creek would continue from the Crystal Creek Quarry site, as the drainages would continue to erode and deepen. Access to the site would not change, with a parking lot and gate to Crystal Creek Falls Trail. Access along the approximately 12-foot wide, unpaved trail to Crystal Creek Falls would continue to be provided, with vehicle access for the Bureau of Reclamation. Utility corridors on the site would not change. Helicopters would continue to use the landing area at the site for emergency purposes. Non-native vegetation would continue to occupy the site until such time as funding became available to address the area. Should the no action alternative be selected, the National Park Service would respond to future needs and conditions associated with Crystal Creek Quarry site and abandoned mine land sites without taking major actions or making changes in the current management approach.



Figure 3. Alternative A: No Action
Whiskeytown National Recreation Area
 United States Department of the Interior / National Park Service

CONCEPT AND FEATURES OF ABANDONED MINE CLOSURES, COMMON TO ALTERNATIVE B AND ALTERNATIVE C

Both action alternatives would close multiple abandoned mine openings in the park using one or more installation techniques that are described in subsequent sections. Mine safety installations would be the same for alternative B and alternative C and are described in this section.

Mine openings already safely closed would continue to exist in their present state, similar to the no action alternative. Other openings that were closed, but in need of repair would be evaluated and repaired and/or different closure types would be installed depending on site specific conditions.

Mine safety installations are anticipated for up to, but no more than 20 abandoned mine land sites in the park. Typical sites to be addressed include the Ganim Mine site and the North Star Mine site. Descriptions of these mines are provided as examples of the operations and safety installations needed.

Ganim Mine started out as a gold mine and was later used as the only talc mining site in the region. The area has been mined off and on until approximately the mid 1960s. The area is not heavily visited because it is accessible only after a long hike through areas of overgrown shrubs, poison oak, and stream crossings that are difficult to cross during and after heavy storms. Road access to the site is gated. There are several adits at the Ganim Mine site, one of which has known acid mine drainage. Existing mine safety installations at Ganim consist of fencing that has been breached and vandalized.

The North Star Mine was an unpatented lode claim quartz mine that began in the 1940s. However, gold was the only commodity produced from the site. The North Star Mine site is up a steep gradient along an unpaved, former access road to the mine site. The road is gated for safety reasons. Two adits would require safety installations to close or repair existing gates that have been breached or vandalized. Materials used for mine safety installations such as Ganim Mine and North Star Mine would be brought in by helicopter because of the remote nature of the mine site and difficulty of access.

Photographs of the types of installation techniques that would be used and the types of mine openings that would be treated are provided in Appendix A. The mine safety installation techniques can be grouped based on their similar effects. These groups of installation techniques include:

- Temporary and permanent fencing;
- Bat gates, screens, grates, and cupolas;
- Polyurethane foam closures covered with backfill;
- Backfill alone; and
- Combined applications of above methods to treat complex situations.

The number and types of installation techniques vary according to site circumstances. For a simple abandoned mine land open feature situation, only one technique might be needed, for example a bat gate at the North Star Mine site adit. For a complex site closure, several installa-

tion techniques may need to be combined, for example the use of polyurethane foam and bat gates. Selection of safety installation techniques for specific openings would be based on a number of factors, including physical features and conditions of the opening, types of structures present, safety hazards, use of the mine by wildlife including small mammals such as the ringtail, and the presence and condition of historic features.

Alternatives B and C would be limited to mine openings deemed to be unsafe and potentially dangerous by the National Park Service. Prior to implementation of a safety installation, each mine would be evaluated to determine the stability and condition of the opening and, where possible, left intact to facilitate potential future visitor understanding of the features and historical conditions. At selected sites, the structural integrity of historic structures would be preserved to enhance potential future visitor understanding and appreciation of mine operations and working conditions. Interpretive signs may be installed at select locations as part of each action alternative.

Alternatives B and C would provide a mechanism for closing abandoned mine openings in the park over the long term, using proven, accepted techniques. Safety installations at abandoned mine openings would mitigate basic safety hazards at mine sites while simultaneously providing habitat by bats and other forms of wildlife that utilize the mines, as well as historic cultural resources.

Table 5 presents examples of typical mine openings and some of the factors that would be considered when determining what safety installation techniques would be most appropriate. The table identifies many, but not all, possible combination safety installation techniques.

ALTERNATIVE B: EROSION AND SAFETY ALTERNATIVE

In addition to the abandoned mine safety treatments described in the preceding section, Alternative B: Erosion and Safety Alternative would address erosion and safety concerns at the Crystal Creek Quarry site. This would include stabilizing the most dangerous and highly erodible areas to prevent further erosion and provide for safer visitor experiences. The features of this alternative are depicted in figure 5. In particular, the areas of key consideration for stabilization and recontouring are:

- The large stockpile area along the entranceway at the northern end of the site (area A in figure 5) would be regraded to reduce the slope of the stockpile. The concrete cap would be recycled. Approximately 6,100 cubic yards of granite material would be regraded or moved to other areas onsite.
- Rock piles with steep slopes along the eastern edge of the site (between areas A and C on figure 5) would be regraded. This action would attempt to preserve the existing trees.
- Deeply incised channel (area B on figure 5) would be regraded to improve the drainage channel and reduce slopes. The banks would be stabilized with rip rap and vegetation. The existing corrugated metal culvert under the trail would be removed and replaced, and the site would be recontoured to improve storm water conveyance.
- Slopes along the steep drainage (area C on figure 5) would be regraded and stabilized with rip rap or vegetation. A berm would be installed at the top of the slope along the road/trail and a rip rap channel could be created for drainage.
- Excess materials from areas A, B, and C would be deposited in areas D and E and graded to control runoff and erosion and to match the new contours in other parts of the site.
- Other areas of the site would be regraded to reduce slopes, blend piles of granite, round and smooth piles of material, and create a more natural appearance.

Site drainage features would be restored to address erosion control and sedimentation concerns. Steep slopes would be smoothed, and heights reduced to provide for safer conditions and reduce grades to better address site storm water flow. Stockpiled materials would be graded across the site to create more natural looking features on the site. The approximate areas of materials to be graded are presented in table 2, based upon the preliminary concept presented in figure 5. These values would be refined as final designs were developed.

Construction equipment that may be used on the site includes back hoe, front-end loader, dump truck, excavator, and concrete breaker. This equipment may be modified during final design to address site specific requirements. This equipment would be stored at a staging area on the site. Construction activity at the site would begin in the summer of 2010, with earthwork being completed by late October 2010. Seeding and vegetation planting would be completed in late fall or early winter of 2010. The timing of planting activities would be controlled by the start of the rainy season, which is important for successfully establishing new vegetation. During construction there may be periods when the Crystal Creek Falls Trail would not be accessible by visitors to ensure their safety. Park notices would be posted on the park website and in the visitor center to inform visitors of any closures because of construction activity.

| Area Named on Figure 5 | Area (sq. ft.) | Area (acres) |
|-------------------------|----------------|--------------|
| A | 14,069 | 0.32 |
| B | 44,635 | 1.02 |
| C | 25,200 | 0.58 |
| D | 48,527 | 1.11 |
| E | 73,849 | 1.70 |
| F | 7,425 | 0.17 |
| G | 3,190 | 0.07 |
| Handicap Parking Spot | 320 | 0.01 |
| Main Parking Lot | 2,748 | 0.06 |
| Helicopter Landing Area | 22,500 | 0.52 |

In addition to site recontouring and regrading, this alternative would change the site to maintain future access to the Crystal Creek Falls Trail. Site actions would include the following:

- The upper parking lot would be restored. Access to the upper parking lot would be prevented by relocating the existing gate to the new parking lot location. A combination of grading and boulder placement would prevent private vehicles from accessing this area.
- A parking lot would be installed along the northern edge of the site, adjacent to the entrance from Crystal Creek Road. The grade would be similar to what currently exists. This parking lot would replace the upper lot, and would be closer to Crystal Creek Road. The upper parking lot would no longer be accessible or used.
- The helicopter landing area would remain at its current location. This helicopter landing area is currently used during emergency situations, and this practice would continue into the future. The helicopter landing area would be similar to the existing area. It would be unpaved, and would provide a level landing area approximately 150 feet by 150 feet.
- A handicap parking space would be developed closer to the gated hiking trail to Crystal Creek Falls. The gate to the hiking trail would remain in the same location beyond the proposed handicap parking space. The surface would be pavement or gravel. This slope would improve access for those with impaired mobility.
- The Crystal Creek Falls Trail would continue to be maintained for use by the Bureau of Reclamation per the existing agreement with the National Park Service for this right-of-way. Approximately 500 feet of the trail would be realigned and shifted to the west to accommodate the changes being made to the helicopter landing area and finished with a compactable and pervious material.
- Utility access roads would be maintained.
- The rock sorter would be removed, and the surrounding area (D on figure 5) would be filled with site material moved from other areas, and then graded. Upon completion of grading, area D would be stabilized by replanting with native vegetation that would be planted in pockets as described below. This would provide a more appealing view for visi-

tors passing by on Crystal Creek Road as well as visitors entering the site. The landscape would be recontoured to create a gentle slope that is more natural in appearance.

An important component to the reclamation of this site would be the revegetation strategy for the 25 acres. Establishment of plants on this site is expected to be very difficult. To enhance plant survival, densely planted patches or pockets would be created across the site. A sample cross-section of this pocket planting approach is provided in figure 4. The dense planting would allow for areas of improved microclimate, including reduced soil temperature, improved soil moisture and areas within the site of closed canopy within a few years. The shade provided by the closed canopy would help control invasive plants, which are a problem on this site. Overstorey tree canopy would also provide a litter layer, which is critical in suppressing such invasive plant species as cheat grass. Planting pockets would also provide additional sources of native seed to accelerate natural vegetation of the site. Additionally, the highly compacted site should be scarified, or dug up, to approximately 36 inches in depth to accommodate the tree species native to the area, especially oaks.



Figure 4. Typical Cross Section of Planting Pockets Under both Alternatives B and C

Trees and shrubs would be planted in pockets measuring approximately 1,200 square feet. Most planting pockets would be concentrated on slopes disturbed by this project at an average of 5 planting pockets per acre or 500 plants per acre. Seeding would occur as appropriate in areas B and C (see figure 5). These areas are sloped and if not protected with a vegetation ground cover, would present the highest potential for eroded soils reaching the creek. Planting and establishment activities would occur concurrent or shortly after recontouring, grading and earth-moving activities. Only native trees, shrubs, forbs and grasses would be planted or seeded. Self-sustaining species would include but not be limited to ponderosa pine, canyon live oak, interior live oak, black oak, redbud, Manzanita, toyon, yerba santa, and bush lupine. A commercial soil amendment product, like Biosol, appropriate for use with native plant materials would be used to improve nutrient and organic matter values at the previously highly compacted planting areas. Wood chips/mulch would be spread as part of the stabilization and revegetation plan. Wood chips serve as a mulch to keep the exotic seed bank down and to help retain moisture for planted trees and shrubs during the hot dry summers in the Recreation Area. Native chips would be used if available, and if not, fir bark from a local native landscaping company would be used. Recreation Area staff would inspect the source of the bark for the presence of nonnative and invasive plant species. A 40% survival rate after 3 years, a survival rate which has been used

ALTERNATIVES

for other restoration projects in the Recreation Area, would be used as a measure for planting success (Regional Revegetation Directive).

The park would salvage about 200 boulders from the site for use for future park projects. The boulders would range in diameter from about 2 feet to 4 feet and would be stored at the National Park Service storage site adjacent to Highway 299, approximately 2.5 miles east of Crystal Creek Road. Any metal debris found on site, including the rock sorter, would be removed and disposed of in accordance with state, federal, and local regulations. Staging for construction vehicles would occur onsite.

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ALTERNATIVE C: EROSION, SAFETY, AND RESTORATION ALTERNATIVE

Alternative C, the Erosion, Safety, and Restoration alternative, is the National Park Service preferred alternative because it offers the highest degree of site reclamation, natural and cultural resource protection and improved public health and safety. Additionally, a safer environment would enhance National Park Service operations because incident response at abandoned mine openings and the Crystal Creek Quarry site would be reduced and the park’s protective staff would be available more frequently in other areas of the park. Visitor experience would also be enhanced because improvements to the landscape and topographic alterations would provide a more scenic viewshed.

Alternative C would be similar to alternative B in many ways in that it would address erosion and safety concerns at the Crystal Creek Quarry site. As with alternative B, abandoned mine land closures in the park are addressed in the previous section. The focus of alternative C, with regard to the Crystal Creek Quarry site, would be to stabilize the most dangerous and highly erodible areas to prevent further erosion; smooth rock piles throughout the site to recreate a more natural appearance and improve the landscape and viewshed; and provide for safer visitor experiences. The features of this alternative are depicted in figure 6.

In general, site drainage features would be restored to address erosion and sedimentation concerns. Table 3 lists the approximate size of each area to be graded based on the concept presented in figure 6. More precise estimates of the areas to be graded would be generated once the design is further developed.

The level of reclamation would be greater under alternative C than alternative B. A larger area would be graded south of the helicopter landing area, and along the berms east of the trail as compared to alternative B. This would improve visitor’s views along the trail because the area would have a more natural appearance.

| Table 3. Estimated Graded Quantities for Alternative C Compared to Alternative B | | | | |
|---|----------------|--------------|----------------|--------------|
| Area Named on Figures 5 and 6 | Area (sq. ft.) | Area (acres) | Area (sq. ft.) | Area (acres) |
| A | 14,069 | 0.32 | 14,069 | 0.32 |
| B | 44,635 | 1.02 | 44,635 | 1.02 |
| C | 25,200 | 0.58 | 25,200 | 0.58 |
| D | 48,527 | 1.11 | 48,527 | 1.11 |
| E | 73,849 | 1.70 | 73,849 | 1.70 |
| Sub-Area E1 | 14,031 | 0.32 | 7,425 | 0.17 |
| F | 7,425 | 0.17 | 3,190 | 0.07 |
| G | 3,190 | 0.07 | 320 | 0.01 |
| Parking Lot | 4,798 | 0.11 | 2,748 | 0.06 |
| Helicopter Landing Area | 22,500 | 0.52 | 22,500 | 0.52 |

In addition to the recontouring and regrading of the site to stabilize areas of concern, this alternative would include additional site changes to maintain access to the Crystal Creek Falls Trail in the future. In addition to the actions of alternative B, alternative C would provide the following:

- Installation of a parking lot to accommodate 12 vehicles that would be located off Crystal Creek Road and regraded to reduce the slope compared to alternative B (2 % versus 5%). This parking lot would require tapering of the large rock stockpile in area A to drain away from the parking area and trail (see figure 6). The surface would be pavement or gravel. This slope would improve access for those with impaired mobility.
- The entrance road would be resurfaced up to a newly placed gate. This would allow pedestrian and bicycle access to the trail to Crystal Creek Falls.
- The existing parking area would be regraded to restrict access. This area would also be revegetated. The gate would be moved to the newly created and regraded path from the parking lot.
- The area south of the helicopter landing area would also be recontoured to create differing topographic relief for a more natural variation in the landscape. Drainage of this area would also be taken into consideration so as not to affect the trail.
- Berms located west of the Crystal Creek Falls Trail would be regraded to become more natural in appearance. This would address the area up to the existing tree line, and improve the area in the vicinity of the trail as well as the appearance of the landscape in this area.
- Revegetation of the site would occur consistent with strategies described under alternative B. However, in this alternative wood chips/mulch would be spread over the entire site as part of the stabilization and revegetation plan using the same inspection strategies and survival rate as described under alternative B.

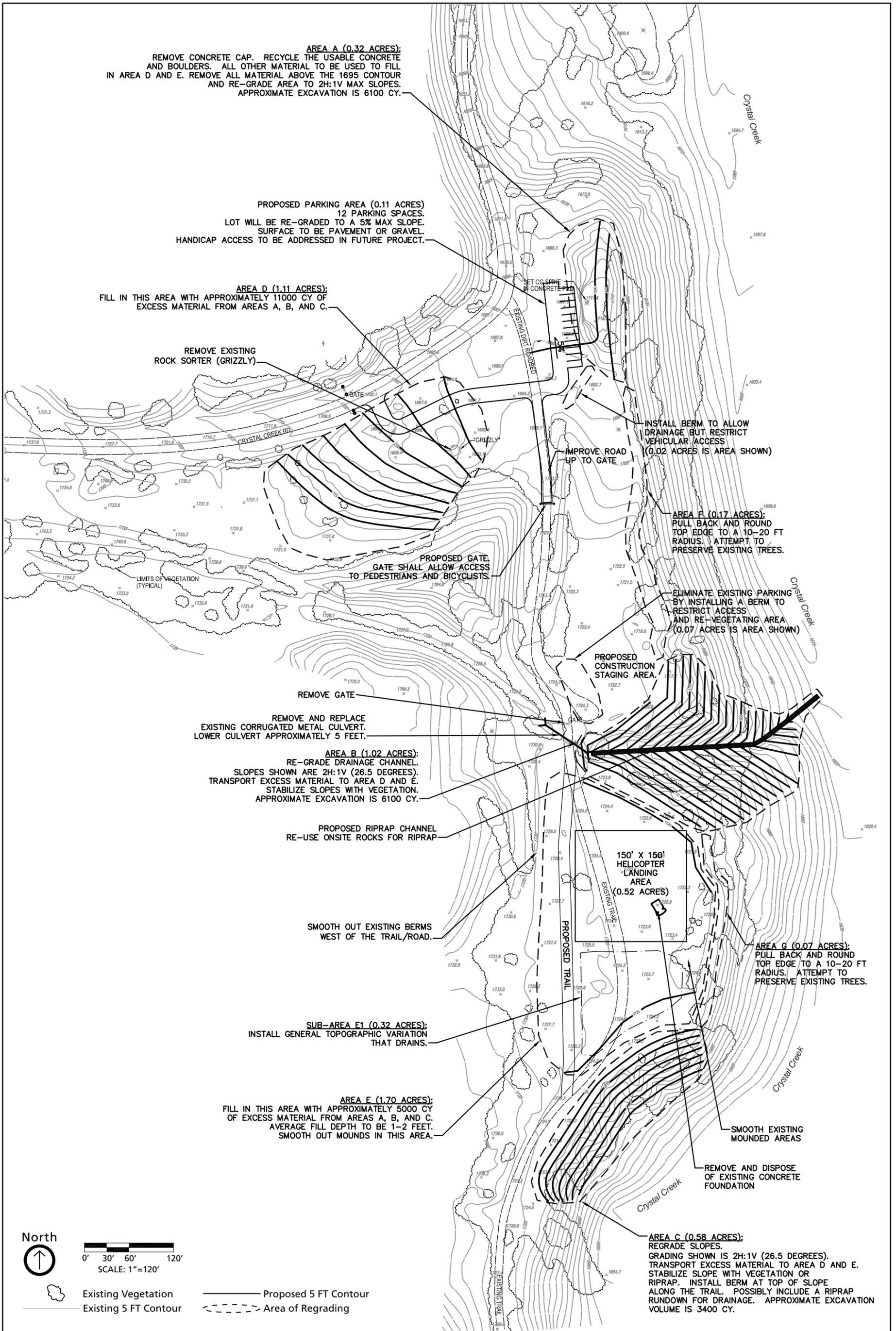


Figure 6. Alternative C: Erosion, Safety, & Restoration
Whiskeytown National Recreation Area

United States Department of the Interior / National Park Service

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PROPOSED MITIGATION MEASURES

During construction activities, mitigation measures would be included to ensure that adverse environmental effects would be either avoided or minimized. The most appropriate mitigation measures to be employed at a given site would be determined by an evaluation of site-specific factors. Measures would be selected based on determinations of what measures would be most effective in avoiding or minimizing impacts. Mitigation measures focus on preventing and controlling soil erosion and vegetation loss or damage. These actions would protect water quality and any associated aquatic communities in situations where a surface water body occurs next to activities involving disturbance of soil and plant communities.

The following mitigation measures would be used as appropriate to control soil erosion and vegetation loss after installation and recontouring / reclamation activities are completed.

General Construction Measures

- Construction limits would be delineated by the park prior to any construction activity. Workers would be instructed to restrict project activities and ground disturbing activities to the construction limits.
- All tools, equipment, barricades, signs, surplus materials, demolition debris and rubbish would be removed from the project work limits on project completion.
- Contractors would be required to properly maintain construction equipment and generators (for example, the mufflers) to minimize air emissions and noise.
- The contractor would not leave vehicles idling for more than five minutes when not in use.
- All equipment would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids. All equipment would be checked daily.
- Materials would be stored, used, and disposed of in a proper manner.
- All needed fill, rock, would be obtained from the project site.
- A hazardous spill plan would be approved by the park prior to construction. This plan would state what actions would be taken in the case of a spill, notification measures, and preventive measures to be implemented, such as the placement of vehicles and generators.
- Pressure wash and/or steam clean all construction equipment to ensure that all equipment, machinery, or other materials are cleaned and weed free before entering the park. A wash station is located at park headquarters. Construction equipment would be inspected by NPS staff prior to entering the park to ensure compliance with cleanliness requirements and inadequately cleaned equipment would be rejected.
- Limit vehicle parking to existing roadways, access routes, or the designated staging area.

Soil Erosion and Vegetation Loss

- A revegetation plan would be developed for the purposes of restoring native vegetation to the project site, minimizing erosion, and stabilizing highly disturbed areas.
- Wait until just before beginning construction to clear vegetation and to disturb the soil.
- Maintain a buffer of natural vegetation around the work area to slow runoff and trap sediments.
- Minimize the area of bare soil in the approved work zone near mine openings.
- Dust control would occur, as needed, on active work areas where dirt or fine particles are exposed.
- Consider phasing construction to minimize the extent of disturbance.
- Use existing roads and trails to access mine closure locations to maximum extent practicable.
- Park vehicles and equipment and temporarily store materials on locations that are already devoid of vegetation and/or compacted from previous mine activities. Staging area would be clearly identified.
- If vegetation disturbance cannot be avoided at mine closure sites and conditions warrant, reseed the disturbed area with a mixture of native, self-sustaining native plant species in accordance with known, successful local techniques as pre-approved by the park. If seed is not available, mulch the disturbed area with native leaf litter from nearby areas to provide a seed source.
- Ensure the final land form is stable, minimizes soil erosion, and is hydrologically compatible with the surrounding area.
- Provide slope and land form stability by reducing slope angles.
- Natural resources staff would inspect sources of materials that pose a risk, either by their end use or storage requirements, of allowing invasive nonnative plants (also known as noxious weeds) to establish in the park. Supplier would certify the material doesn't contain non-native plants.
- Native materials would also be transported and stored such that they would not acquire invasive non-native plant seeds from adjacent vegetation.
- Initiate revegetation of disturbed sites immediately following construction activities.
- In an effort to avoid introduction of non-native plant species, no hay or straw bales would be used during revegetation or for temporary erosion control.
- Native vegetation removed during construction would be replanted on site wherever feasible.
- Recontoured areas would be monitored after construction to determine if reclamation efforts are successful or if additional remedial actions are necessary. Recontouring actions may include installation of erosion-control structures, reseeding, topsoil placement,

and/or replanting the area, hand-pulling, and controlling non-native plant species with herbicide.

- Disturbed areas would be monitored for up to three years following construction to identify growth of noxious weeds or non-native vegetation. Treatment of non-native vegetation would be completed in accordance with National Park Service 77-7, Integrated Pest Management Manual.

Water Quality Resources

- Maintain a buffer zone between the construction activities and the edge of the water feature. A minimum separation distance of 100 feet is typically preferred for mine closure installations.
- Water needed for construction and dust control would come from the existing developed water systems in the park or Whiskeytown Lake, but would not be diverted from Crystal Creek or other surface waters.
- At all upland cut and fill areas, erosion and sedimentation control measures would be implemented to minimize impacts on water quality. These measures would remain until final site stabilization has been achieved.
- If rain is anticipated, install temporary silt fence between the construction activity and the water feature and remove the fence after the work is completed. Install erosion and sedimentation control measures along the construction area boundary with Crystal Creek.
- In situations where a silt fence may not be adequate, create a temporary diversion or containment berm between the construction activity and the water feature to intercept and manage storm water runoff.
- Remove and reshape temporary containment berms once installation activities are completed.
- Restore any drainage channels that may have been altered by installation activities to pre-disturbance shape, size, capacity, stability, and contours.

Visitor Experience

- Provide interpretation of safe mines to illustrate the facilities and techniques relied on to mine mineral resources and to provide a sense of the conditions encountered by miners.
- Minimize adverse visual experiences by using fences and other safety installation structures that are colored to resemble native soils and vegetation, allowing gates and installation structures to weather to resemble of old mine structural features, and keeping installation structures hidden from view, low profile, and inconspicuous.
- Provide signage that explains the reclamation process at Crystal Creek Quarry site.
- Notify visitors, park employees, and others when road closures or traffic delays would occur. Provide information on the project schedule to neighboring communities, on the park website, at visitor centers, and at entrance stations.

Wildlife and Special-Status Species

- Use designs in gates, fences and other installation techniques that allow bat and small mammals access to mines.
- Conduct bat and other wildlife surveys of openings to be closed before the installation is implemented to ensure that access is maintained and that the installation techniques produce minimal adverse effect.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with the criteria in the National Environmental Policy Act, the alternative that best meets the following criteria must be identified as the environmentally preferred alternative:

- Criterion 1: Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Criterion 2: Ensure for all Americans, safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- Criterion 3: Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- Criterion 4: Preserve important historic, cultural, and natural aspects of national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- Criterion 5: Achieve a balance between population and resource use that would permit high standards of living and wide sharing of life's amenities; and
- Criterion 6: Enhance the quality of renewable resources and approach the maximum attainable recycling of resources.

Alternative A does not protect visitors and park staff from abandoned mine safety hazards, dangerous steep slope and other hazards at the Crystal Creek Mine Site, or minimize potentially adverse effects on visitor experience. Neither does alternative A provide aesthetically pleasing site conditions. Therefore, it does not meet criteria 2, 3, and 5. Alternative A does not protect wildlife and special-status species from becoming trapped in open mine shafts, so it fails to fully meet criteria 1 and 4. It partially meets criterion 4 by preserving important historic and cultural aspects of national heritage, and maintaining an environment that supports a variety of individual choice. Regarding criterion 6, the disturbance and general lack of vegetation around most mine openings limits the ability of alternative A to enhance the quality of renewable resources or approach the maximum attainable recycling of resources. However, the park does use boulders from the Crystal Creek Quarry site for other projects in the park.

Alternative B protects visitors and park staff from abandoned mine safety hazards, improves site conditions at Crystal Creek Quarry site and minimizes potentially adverse effects on visitor experience, so it better meets criteria 2, 3, and 5 compared to alternative A. It also better meets criteria 1 and 4 by protecting wildlife and special-status species from being trapped in open shafts. While it preserves important historic, cultural, and natural aspects of national heritage and maintains an environment that supports diversity, it does not allow the same variety of individual choice provided in alternative A. Because there would be an increase of vegetation at the Crystal Creek Quarry site, alternative B would enhance the quality of renewable resources or approach the maximum attainable recycling of resources (criterion 6) better than alternative A.

Like alternative B, alternative C protects visitors and park staff from abandoned mine safety hazards, improves site conditions at Crystal Creek Quarry site and minimizes potentially adverse effects on visitor experience, while also improving the aesthetics and visual appeal of the Crystal Creek Quarry site, so it best meets criteria 2, 3, and 5 compared to alternatives A and B. Alternative C is similar to alternative B in meeting criteria 1 and 4 by protecting wildlife and special-status species from being trapped in open shafts. While it preserves important historic, cultural,

and natural aspects of national heritage and maintains an environment that supports diversity, it does not allow the same variety of individual choice provided in alternative A. Because there would be an increase of vegetation at the Crystal Creek Quarry site, alternative C would also enhance the quality of renewable resources or approach the maximum attainable recycling of resources (criterion 6) better than alternative A.

Because alternative C would ensure safe surroundings for all Americans, provide a greater opportunity for achieving a wide range of beneficial uses of the environment without risk of health or safety, and achieve a balance between population and resource use that would permit high standards of living and wide sharing of life's amenities, alternative C is the environmentally preferred alternative.

The environmentally preferred alternative would provide a mechanism for closing abandoned mine openings in the park over the long term, using proven, accepted techniques. It provides for the reclamation and stabilization of Crystal Creek Quarry site for the enjoyment by future generations. Mine safety installations and recontouring activities at Crystal Creek Quarry site would mitigate safety hazards while simultaneously protecting natural and historic cultural resources.

ALTERNATIVES CONSIDERED BUT DISMISSED

The installation of bat gates at all mine openings was considered as one alternative to improve public health and safety at mine openings. However, the universal application of bat gates was determined not to be a good allocation of resources for the following reasons. In some cases an inordinately large gate would be required and could be infeasible and/or costly; and a bat gate may not be suitable because of site configuration constraints or other site specific conditions. As a result of the inefficient use of resources that would occur with the installation of bat gates to close all openings, this alternative was dismissed from further consideration.

Additionally, the components that consist of a variety of mine safety installation techniques would be considered in relation to a specific mine opening in deciding the best method to be used. When the variables are evaluated, including bat and wildlife use, the presence of historic cultural resources, and the physical nature of the mine opening, some techniques would be dismissed because they do not provide adequate public safety and resource protection.

Roadbed decommissioning/removal actions for some mine sites were considered for inclusion in the abandoned mines safety installations proposed activity, however this activity was dismissed because it was considered to be beyond the scope of the purpose of the proposed action. Whereas the removal of former roadbeds would restore natural resources, the purpose of the project is to mitigate human and physical safety hazards. The use of funds and resources necessary to remove mine access roads was also considered excessive. Other park funding mechanisms could be used to address hydrology, storm water and erosion concerns along these roadbeds. Therefore, this proposal was dismissed from further consideration.

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Table 4.
Procedures for Mitigating Physical Hazards at Abandoned Mine Land Sites

| Safety Installation Technique | Description | Typical Safety Installation Techniques |
|--------------------------------------|--|--|
| Bat gates and cupolas | <p>Bat gates and cupolas are specially designed metal structures that allow bats access to a mine through slots of a specific width, typically between 5.75 and 6 inches. They are typically constructed of heavy-duty angle iron constituting an adaptation of the American Cave Conservation Association/Bat Conservation International, Inc. bat gate design (Vories and Throgmorton 2002). Strong recommendations from biologists, low materials cost, and relative ease of construction have contributed to the selection and current incorporation of this design. One advantage of these installations is that bat gates and cupolas fitted with locking access panels guarantee future access to the mine features by biologists, geologists, and archeologists.</p> <p>Bat gates and cupolas are often designed to include access openings for other species of animals, if they are known or suspected to inhabit a particular mine. In some cases, gates could be installed in culverts that would be placed in mine openings to enhance the physical integrity of mine openings that may be degrading.</p> |  |
| Metal grates | <p>Rigid metal frame enclosures typically used when bats are not present or anticipated include horizontal and vertical grates with relatively small openings. However, in some cases, grates may be constructed so that bars are properly spaced to allow bat passage; installation flush or nearly flush with the ground over shafts would be acceptable for bats. Grates may be combined with bat cupolas (see Bat Gates and Cupolas in this table). Horizontal and vertical grates can replace nets when systematic vandalism is probable or evident. Each device is individually tailored to fit the intended site. The devices can be constructed of several types of metal products including square or rectangular steel tubing or round rod material. They would most often be constructed of angle iron and infrequently combined with extruded expanded mesh construction as in the tops of bat cupolas. A grate over a shaft not used by bats is shown in the photograph.</p> |  |

**Table 4.
Procedures for Mitigating Physical Hazards at Abandoned Mine Land Sites**

| Safety Installation Technique | Description | Typical Safety Installation Techniques |
|---|---|---|
| Fencing (permanent or temporary) | <p>Fencing has been commonly employed as an enclosure method in abandoned mine land management programs. Barbed wire, smooth wire, or chain-link fencing have been used to establish barriers to human entry, generally to mine shafts. However, fences are highly subject to vandalism, are difficult to maintain, and constitute less effective deterrents than rigid barriers. Fences can also draw unwanted attention and visitation to a site by increasing its visibility. Fences do prevent unintentional entry and constitute a physical barrier that must be purposely evaded by an intruder. Generally, fencing would be employed only in specific circumstances, such where other techniques are unsuitable.</p> |  |
| Cable mesh nets | <p>Installation of safety cable nets was one of the earliest methods developed to close mine openings to visitors. The design concept allowed visitor appreciation of the feature, provided for air passage in the opening, and allowed small wildlife passage. Safety nets of various designs can be compatible with historic structures because they can be readily recessed or inset in the mine opening to allow more suitable rock drilling conditions and render the installation less visible.</p> <p>They are no longer widely used where wildlife need continued access to the mine openings and are no longer preferable for installations where bats are present or anticipated as bats can have difficulty navigating through them. Cable mesh can also pull on structural elements that are loose or in bad condition and possibly hasten their deterioration.</p> |  |

| Table 4. Procedures for Mitigating Physical Hazards at Abandoned Mine Land Sites (continued) | | |
|---|--|--|
| Safety Installation Technique | Description | Typical Safety Installation Techniques |
| Polyurethane foam plugs covered with backfill | <p>Polyurethane foam plugs have closed mine sites in remote areas, sites with access restrictions, and sites that do not have sufficient backfill material. The plugs are typically installed a few feet below the collar of the shaft and a few feet are backfilled with soil or waste rock available near the site because the plug is subject to ultraviolet light degradation and vandalism, thus, it needs to be protected (Burghardt 1994). Polyurethane foam plugs have a considerable weight-bearing capacity and are partially reversible installations because when necessary they can be burned, cut, and/or dug out for future access, however it is almost impossible to completely remove the foam, which adheres directly to the surrounding rock. If removal is attempted some evidence of its use would always remain at the site.</p> <p>The photograph shows a shaft filled with foam and backfilled with local material.</p> |  |
| Back-filling alone | <p>Back-filling may utilize either mechanical or manual earth-moving methods depending on the size of the mine or prospect and require that sufficient back-fill materials are present at the site material would not be imported). A need for future maintenance of historic mining features may preclude back-filling as an appropriate installation method. If mechanized equipment is required, ingress, egress, and operation of earth moving equipment may result in unacceptable environmental impacts. In front-country situations well above the water table, back-filling may be an appropriate installation technique for trenches and prospects.</p> <p>The photograph shows an adit that was permanently closed using backfill.</p> |  |

| Table 4. Procedures for Mitigating Physical Hazards at Abandoned Mine Land Sites (continued) | | |
|---|--|--|
| Safety Installation Technique | Description | Typical Safety Installation Techniques |
| Combination applications of above methods to treat complex situations | <p>Complex mine openings, including stopes, glory holes, and especially large openings, may require combinations of installation techniques to adequately protect visitors, allow potential wildlife access and support safe conditions at mine openings.</p> <p>Photograph shows a combination of bat cupola, grate, and concrete base.</p> |  |

| Table 5. Typical Mine Opening Features with Factors Involved in Determining Mine Safety Installation Techniques. | | | |
|---|---|---|---|
| Typical Site Feature | Wildlife Use | Other Considerations | Safety Installation Technique (see appendix A and table 4 for photographs of these techniques) |
| Shaft opening with sloping and unstable slopes | Potential for bat use | None | Bat gate or culvert with bat gate |
| Unstable timbers in opening, adit | No | Historical features | Vertical gate |
| Ladder leading into shaft, collapsing edges | No | Historical features | Horizontal gate |
| Shaft | Potential for bat use | None | Fence with owl perches |
| Adit | Potential for bat use | None | Bat gate with entrance for wildlife |
| Adit (20 feet) with portal | Potential for bat use | Historic features with collapsing portal timbers | Repair/stabilize timbers & portal. May use culvert gate held in place with foam. |
| Adit (200 feet) stable portal | Potential for bat use | Historic feature. Known public use. | Install bat gate 10 feet in from the portal. |
| Shaft 50 feet, deep collapsing | None | No timbers. Eroded to 20 feet wide. | Foam plug and backfill. |
| Open stope 80 feet by 10 feet, depth unknown. | Potential for bat use | Near road | Install bat compatible grate over steel framework |
| Decline (with timbers) | Unknown | Historic, considerable public use | Stabilize timbers and install bat gate inside |
| Open trench with decline 30 feet down. | No | Historic, near road | Install expanded metal mesh on steel frame in the trench and over deep area. |
| Deep shaft with drifts at various levels. | Unknown | Historic water at 350 feet, opening in waste pile | Bat cupola on concrete footing |
| Decline 75 feet deep | Potential for use by small mammals, no bats | Historic, stable portal | Exclude bobcat and pack rats, install steel grate |

Note: This table represents some, but not all possible combinations for closing a mine opening.

**Table 6.
Abandoned Mine Land Safety Installation Techniques
and Impact Intensities for Each Impact Topic**

| Safety Installation Technique ⁽¹⁾ | Public Health and Safety | Visitor Experience ⁽²⁾ | Water Quality | Park Operations |
|---|---------------------------------|--|---|------------------------|
| Fencing | Long-term, beneficial | Long-term, minor and adverse | Long-term negligible to long-term minor to moderate and adverse | Long-term, beneficial |
| Bat gates, grates, cupolas, and nets | Long-term, beneficial | Long-term, minor and adverse | Long-term negligible to long-term minor to moderate and adverse | Long-term, beneficial |
| Polyurethane foam with backfill ⁽¹⁾ | Long-term, beneficial | Long-term, minor and adverse | Long-term beneficial | Long-term, beneficial |
| Backfill | Long-term, beneficial | Long-term, minor and adverse | Long-term negligible to long-term minor to moderate and adverse | Long-term, beneficial |
| Combined methods | Long-term, beneficial | Long-term, minor and adverse | Varies by opening | Long-term, beneficial |

Note: Additional details are provided in the respective environmental consequences sections.

(1) Only used at locations where bat, owl, or other wildlife uses of mine openings do not occur.

(2) Adverse effect on visitors who place a high value on visiting mine sites. Beneficial effect associated with improved safety at closed mine sites. An intensity (negligible, minor, moderate, major) is not applied to beneficial effects.

Table 7. Impacts of the Alternatives

| Impact Topic | Alternative A: No Action | Alternative B: Erosion and Safety | Alternative C: Erosion, Safety, and Restoration |
|--|---|--|--|
| Public health and safety | | | |
| Crystal Creek Quarry site recontouring / reclamation | Long-term, moderate, adverse effects would remain because steep slopes and unstable materials would continue to pose risks to visitors and park staff. Cumulative effects would be long-term, minor, and adverse. | Long-term, beneficial effects would result from reducing risks caused by steep, unstable slopes and improving law enforcement monitoring capabilities. Cumulative effects would be long-term and beneficial. | Long-term, beneficial effect would result from reducing risks caused by steep, unstable slopes and improving law enforcement monitoring capabilities. Cumulative effects would be long-term and beneficial. |
| Mine safety installations | Long-term, moderate, adverse effects would remain because many mine openings would continue to pose risks to visitors and park staff. Cumulative effects would be long-term, minor, and adverse. | Long-term, beneficial effect on public health and safety would result from reducing risks associated with open abandoned mine openings. Cumulative effects would be long-term and beneficial. | Long-term, beneficial effect on public health and safety would result from reducing risks associated with open abandoned mine openings. Cumulative effects would be long-term and beneficial. |
| Visitor experience | | | |
| Crystal Creek Quarry site recontouring / reclamation | The effects of this alternative would be long-term and negligible. Cumulative effects would be long-term and beneficial. | Long-term beneficial effects would result from improving site aesthetics and enhancing the potential for seeing wildlife. There would be short-term, moderate, adverse effects from noise associated with construction equipment and the temporary closure of the site. Cumulative effects would be long-term and beneficial. | Long-term beneficial effects by improving site aesthetics and the potential for wildlife viewing experiences at the Crystal Creek Quarry site. There would be short-term moderate adverse effects from noise associated with construction equipment and the temporary closure of the site to visitors. Cumulative effects would be long-term and beneficial. |
| Mine safety installations | The effects of this alternative would be long-term negligible and adverse. Cumulative effects would be long-term and beneficial. | Effects would be negligible for visitors who engage in other activities away from mine sites. Limits on the ability to access some features at mine sites could have long-term, minor, adverse impacts for visitors who value this access. The continued opportunity to enjoy areas around mines with an increased sense of safety would be a beneficial effect. Beneficial impacts would result from expanded interpretation. Cumulative effects would be long-term and beneficial. | Effects would be negligible for visitors who engage in other activities away from mine sites. Limits on the ability to access some features at mine sites could have long-term, minor, adverse impacts for visitors who value this access. The continued opportunity to enjoy areas around mines with an increased sense of safety would be a beneficial effect. Beneficial impacts would result from expanded interpretation. Cumulative effects would be long-term and beneficial. |

Table 7. Comparison of the Alternatives (continued)

| Impact Topic | Alternative A: No Action | Alternative B: Erosion and Safety | Alternative C: Erosion, Safety, and Restoration |
|--|--|---|---|
| Water quality | | | |
| Crystal Creek Quarry site recontouring / reclamation | Long-term, moderate, adverse effects on water quality would occur because site conditions would continue to contribute sediment to Crystal Creek. Cumulative effects would be long-term, minor, and adverse. | Long-term, beneficial effects would result from reducing site erosion and sediment loading of Crystal Creek. There would be short-term, minor, adverse effects during recontouring and vegetation development. Cumulative effects would be long-term and beneficial. | Long-term, beneficial effects would result from reducing site erosion and sediment loading of Crystal Creek. There would be short-term, minor, adverse effects during recontouring and vegetation development. Cumulative effects would be long-term and beneficial. |
| Mine safety installations | Long-term, moderate, adverse effect would occur because suspected acid mine drainage would continue to contribute metals contamination to the watersheds. Cumulative effects would be long-term, minor and adverse. | Long-term, beneficial effect on water quality would result from reducing the amount of acid mine drainage entering the watershed in the park. Cumulative effects would be long-term and beneficial. | Long-term, beneficial effect on water quality would result from reducing the amount of acid mine drainage entering the watershed in the park. Cumulative effects would be long-term and beneficial. |
| Park operations | | | |
| Crystal Creek Quarry site recontouring / reclamation | Long-term, minor, adverse effects on park operations would occur because site conditions would continue to cause challenges for law enforcement and emergency services staff. Cumulative effects would be long-term, negligible and adverse. | Long-term, beneficial effect on maintenance, law enforcement, and emergency service would result from improved site conditions and site accessibility. Short-term, minor, adverse impacts would occur during construction because of the temporary closure of the site. Cumulative impacts would be long-term and beneficial. | Long-term, beneficial effect on maintenance, law enforcement, and emergency service would result from improved site conditions and site accessibility. Short-term, minor, adverse impacts would occur during construction because of the temporary closure of the site. Cumulative impacts would be long-term and beneficial. |
| Mine safety installations | Long-term, minor, adverse effects would occur because untreated and vandalized mine openings in remote locations would continue to cause challenges for law enforcement and emergency services staff. Cumulative effects would be long-term, negligible, and adverse. | Long-term beneficial effect on maintenance, law enforcement, and emergency service park operations from mine safety installations in the park. Cumulative impacts would be short-term minor and long-term beneficial. | Long-term beneficial effect on maintenance, law enforcement, and emergency service park operations from mine safety installations in the park. Cumulative impacts would be long-term and beneficial. |
| Meets purpose and need | No, alternative A would not meet the purpose and need because the public and staff would continue to face safety risks at the Crystal Creek Quarry site and at mine openings. | Yes, alternative B would meet the purpose and need because recontouring and revegetation at the Crystal Creek Quarry site and the closure of mine openings would eliminate safety risks to visitors and staff, improve site conditions, reduce erosion and control sedimentation, and improve the visitor experience. | Yes, alternative C would best meet the purpose and need because recontouring and revegetation at the Crystal Creek Quarry site and the closure of mine openings would eliminate safety risks to visitors and staff, improve site conditions, reduce erosion and control sedimentation, and improve the visitor experience and viewshed. |

Note: Additional details are provided in the respective environmental consequences sections.

AFFECTED ENVIRONMENT / ENVIRONMENTAL CONSEQUENCES

This section describes the characteristics of the affected environment that could be impacted by the proposed Crystal Creek Quarry site recontouring and revegetation and mine safety installations at abandoned mine sites, and the estimated environmental effects of these activities. This analysis is presented for each of the impact topics listed in table 1.

The affected environment discussion is followed by Environmental Consequences, or the impact assessment. The assessment is limited to key aspects of existing conditions that relate to potential adverse effects or conditions that are of potential concern. In addition, only those aspects of the existing conditions that relate directly to the impact conclusion or form the basis for the impact conclusion are described.

A variety of different mine safety installation techniques would be applied to abandoned mine land sites, depending on individual mine features. Because there are several sites in the park, this environmental assessment provides a programmatic assessment of potential environmental effects based on typical safety installation techniques that would be applied to sites with different combinations of features (for example, adits, vertical shafts, and so forth). These were presented in table 5.

METHODS

The methods used to assess impacts of the site recontouring and mine safety installation techniques include:

- Impact intensity thresholds for each impact topic were defined and include negligible, minor, moderate, and major adverse impact definitions as well as a beneficial impact definition and terms of duration. Impact threshold definitions are provided for each of the four impact topics at the start of their respective Environmental Consequences section.
- Each alternative was evaluated for each impact topic using the threshold definitions to determine the intensity of effect.
- Table 1 presents regulations and policies relating to each impact topic.
- Table 6 presents a summary of the range of impact intensities associated with each safety installation technique for each impact topic. Detailed analyses are presented in the Environmental Consequences section for each impact topic. Table 7 summarizes and compares the impacts of the alternatives, as well as noting how well each alternative meets the project purpose and need.
- Impact analyses are programmatic for mine safety installations in that they assess the impacts associated with “scenarios” that illustrate the range of safety installation approaches that would typically be used.
- When a range of impact intensities (for example, negligible to minor impact) result, the most severe (or highest) impact intensity is used for descriptive and evaluation purposes. This ensures a conservative evaluation.

CUMULATIVE IMPACT ANALYSIS METHOD

The environmental assessment also includes an assessment of cumulative impacts. The Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act require assessment of cumulative effects in the decision-making process for federal projects. 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 *Code of Federal Regulations* 1508.7). Cumulative effects are considered for the no action and both of the action alternatives, and are presented at the end of each impact topic discussion analysis.

Cumulative effects were determined by qualitatively estimating the effects of the alternatives with other past, present, and reasonably foreseeable future actions relevant to mine safety installations in Whiskeytown National Recreation Area. The following is a summary of past, present, and reasonably foreseeable actions taking place in Whiskeytown National Recreation Area that would have a relationship to the proposed mine safety installations. The cumulative impact analyses in the environmental consequences section refer to the plans and projects described below as contributors to cumulative effects.

Fire Management Plan

The Whiskeytown National Recreation Area Fire Management Plan was completed in 2004 and addresses ongoing activities related to prescribed fire, mechanical fuel reduction, and actions associated with suppression of wildland fires. The fire management plan strives to use fire to improve wildlife habitat, stimulate biodiversity, maintain healthy watersheds, reduce exotic plants, restore circa 1800 landscapes, and improve forest health while reducing fire risk adjacent to developed areas, urban interface boundaries, and cultural/historical sites. Activities described in the fire management plan would be done in the vicinity of the abandoned mine land sites impacting resources on these sites. Impacts associated with the fire management plan vary significantly depending on the type of action.

Shasta – Trinity Trail Plan

The Shasta – Trinity trail plan consists of the construction of various trail segments in the park to provide trail access from the southeast corner of Whiskeytown to the northwest corner. The conceptual design is for this trail to eventually provide access from the Sacramento River Trail in Redding to the Trinity Alps Wilderness in Trinity County. To date, approximately 6 miles of trail have been completed in Whiskeytown National Recreation Area, and several more miles are planned in the next few years. Activities described in the Shasta-Trinity Trail Plan would be done in the vicinity of the abandoned mine land sites impacting resources on these sites. The primary impacts are related to minor increases in erosion due to trail construction and use.

Ongoing Projects Related to the Control of Non-Native and Invasive Plant Species throughout the Recreation Area

At present, the park utilizes project funds to inventory, assess, and control (utilizing integrated pest management practices) high-priority invasive plant populations. Control strategies account for staff experience, target species biology, and current research recommendations from experts. The park's integrated pest management approach for controlling invasive species includes manual, mechanical, and chemical control methods. Treatment priorities have been established for known and potential infestations based on the species' abilities to invade un-infested lands within the park and how difficult they are to control. Treatment areas are mapped and data are collected on the number, percent cover, phenology of invasive species and extent of the area treated. Park staff track the types of herbicides or mechanical treatments used, concentration, quantity, effort, and treatment effectiveness. Activities described in the ongoing non-native and invasive plant species projects would also be done in the vicinity of the abandoned mine land sites impacting resources on these sites. The impacts would be the removal of vegetation potentially causing a minor increase in erosion.

Rehabilitation of Crystal Creek Road

This project was completed in the summer of 2008 and improved 7 miles of an unpaved section of Crystal Creek Road from the Crystal Creek Boys Camp area south to the Coggins Park area. Goals of the project were to reduce sedimentation to Crystal Creek and its tributaries and to reduce maintenance needs. The road segment was outsloped, armored with gravel, and several poorly functioning culverts were replaced. The park also removed several culverts and replaced them with low-water crossings. Activities associated with this project would have been done in the vicinity of the abandoned mine land sites impacting resources on or near these sites.

Restoration and Removal of Portions of Brandy Creek, Queen Mary and Kanaka Roads

This project is in progress and involves the removal of road segments that are remnants of old mining or logging operations, and have been deemed no longer necessary. These road segments total approximately 3 miles and occur in the Crystal Creek, Brandy Creek, and Kanaka Creek watersheds. The primary purpose of the project is to reduce erosion associated with these road segments. Some road segments are totally restored and some segments only focus on the areas where the road crosses a stream, which is where most erosion occurs. Activities associated with this project would be done in the vicinity of the abandoned mine land sites impacting resources on or near these sites.

Modifying Crystal Creek Falls Trail to Meet the Architectural Barriers Act Accessibility Standard

This project would begin upon completion of recontouring at the Crystal Creek Quarry site. Crystal Creek Falls Trail would be modified for access in accordance with the Architectural Barriers Act Accessibility Standard while maintaining access by the Bureau of Reclamation to the valve house. Activities associated with this project would be done in the vicinity of the Crystal Creek Quarry site impacting resources on or near this site.

Other Abandoned Mine Land Safety Installations

Safety installations have previously been installed at several mine openings in Whiskeytown National Recreation Area, and include bat gates and fencing enclosures. Activities associated with this project would have been done in the vicinity of the abandoned mine land sites impacting resources on or near these sites.

RESOURCE IMPAIRMENT

In addition to determining the environmental consequences of the no action and preferred alternatives, *Management Policies 2006* (National Park Service 2006) and Director's Order #12 and Handbook (National Park Service 2001) require analysis of potential effects to determine if actions would impair resources in the park.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would more likely constitute impairment where it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- Identified as a goal in the park unit's general management plan or other relevant National Park Service planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated (National Park Service 2006).”

The potential for impairment was estimated by qualitatively applying the three criteria listed above as required by National Park Service guidelines and policies (National Park Service 2001; National Park Service 2006). Professional judgment and available information on the baseline conditions and features of the alternatives were relied on to determine whether there would be resource impairment to the parks cultural or natural resources. Public health and safety and visitor experience are not considered park resources and are therefore not analyzed for impairment.

UNACCEPTABLE IMPACTS

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service applies a standard that offers greater assurance that impairment would not occur. The National Park Service does this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable in a particular park unit's environment. Unlike impairment analysis, unacceptable impact determinations are made for all impact topics. For the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would:

- Be inconsistent with a park unit's purposes or values; or
- Impede the attainment of a park unit's desired future conditions for natural and cultural resources as identified through the park unit's planning process; or
- Create an unsafe or unhealthful environment for visitors or employees; or
- Diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values; or
- Unreasonably interfere with park programs or activities; or
 - An appropriate use; or
 - The atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations in the park; and
 - National Park Service concessioner or contractor operations or services.

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PUBLIC HEALTH AND SAFETY

AFFECTED ENVIRONMENT

Whiskeytown National Recreation Area is responsible for maintaining safe conditions that protect the health and safety of employees and the public in the park. Statutory and regulatory provisions applicable to units of the National Park Service require the park to not only provide safe facilities, utilities, and grounds in the park but also promote safety in park programs and project operations (National Park Service Management Policies Section 8.2.5).

As a result of the tunneling of the Clear Creek tunnel in the late 1950s and early 1960s, approximately 350,000 cubic yards of waste rock is stored at the park at the Crystal Creek Quarry site, which covers about 25 acres. The waste rock piles present a visitor safety hazard. Visitors have access to the quarry site immediately off of Crystal Creek Road. The waste rock piles have sheer drop-offs of up to 25 feet on unstable material. Visitors have been observed climbing on top of these piles. Additionally, the steep slopes, unstable material, and little vegetation cause the area to change sporadically as a result of storm events, landslides, and drainage patterns, altering conditions and hazards on an irregular basis.

There is a large stockpile of material with remnants of a concrete cap, northeast of the entrance to the site off of Crystal Creek Road. The height of the material is approximately 15 to 18 feet above the road. Erosion of the stockpiled material and recent storm events recently caused the material to shift and fall to the ground. Remnants of the concrete cap remain in place. The material surrounding the cap would continue to erode over time. Visitors have access to this unstable area, which presents a safety hazard. Stockpiled materials were pushed up along the edges of the site bordering Crystal Creek, creating steep berms. Visitors have been seen climbing on these berms. The drop-off down to Crystal Creek is extremely steep (with a grade over 45 degrees up to almost vertical in some instances), and dangerous as the material is unstable, creating slide hazards. Crystal Creek Falls Trail and vehicle access for the Bureau of Reclamation parallel the berms, and there is no barrier to dissuade visitors from climbing on the berms.

Park staff have noted inappropriate park use after hours at the Crystal Creek Quarry site. This mainly occurs after sunset. The parking area is not visible from Crystal Creek Road which creates enforcement and public safety concerns.

As part of the National Park Service Geologic Resources Division Abandoned Mine Land program in 1984, the National Park Service conducted a comprehensive inventory of all Abandoned Mine Land sites in the park to serve as the basis for future planning and reclamation program implementation. The program goals included elimination of physical safety hazards and hazardous materials; mitigation of adverse environmental impacts to park resources; protection of important wildlife habitat such as bat habitat; and preservation of historic and cultural resources. Additionally, the Office of Inspector General Audit Report on Abandoned Mine Lands in the Department of Interior (2008) identified the need to address abandoned mine openings and associated risks to visitors in the National Park Service.

Mine hazards identified by the National Park Service (National Park Service 2007) and present at mine openings in the park include the following:

- **Vertical Mine Openings** – The mines in the park including, but not limited to, the Ganim and North Star sites have open, vertical mine openings. Falling down vertical openings is the most common cause of death and injury in abandoned mines. Loose debris, hidden edges, and false floors can hide vertical openings.

- **Deadly Gases and Oxygen Deficiency** - Lethal concentrations of methane, carbon monoxide, carbon dioxide, and hydrogen sulfide can accumulate in underground passages. Pockets of still air with little or no oxygen can be encountered. Some mines in Whiskeytown also used mercury, which may persist in tailings at the mine.
- **Cave-Ins** - Mines can cave in at any time. The effects of blasting and weathering destabilize once-competent bedrock through time.
- **Unsafe Structures** - Support timbers, ladders, cabins, pump jacks, tanks, and other related structures may seem safe but can easily crumble under a person's weight.
- **Unstable Explosives** - Unused or misfired explosives are deadly. Because old explosives become unstable, minimal vibrations from a touch or footfall can trigger an explosion.
- **Water Hazards** - Many abandoned mines become flooded. Shallow water can conceal sharp objects, drop-offs, and other hazards.
- **Designed for the Short-Term** - Mines were constructed and maintained to be safe only while they were in operation. When the miners departed, they left vertical openings uncovered and removed the water pumping and ventilation systems. Support structures, timbers, and ore pillars were removed or left to rot.
- **Rescues** - Mine rescues are extremely hazardous. Mine rescue teams, despite their extensive training, are at risk every time they enter an abandoned mine. The tragic and unfortunate reality is that most mine rescues turn into body recoveries.

North Star Mine and Ganim Mine are considered as “typical” mine sites within the park. The park has identified several known mine sites and anticipates the discovery of as many as 20 additional sites in various locations that would require safety installations to protect public safety.

ENVIRONMENTAL CONSEQUENCES

Impact Criteria and Thresholds

The following definitions of impact intensity are used in the analysis of effects on public health and safety:

Negligible: Public health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on public health or safety.

Minor: The effect would be detectable, but would not have an appreciable effect on public health and safety. If mitigation were needed, it would be relatively simple and likely successful.

Moderate: The effect would be readily apparent, and would result in substantial, noticeable effects on public health and safety in the park on a local scale for typical visitor activities. Changes in rates of accidents or injuries could be measured. Mitigation measures would probably be necessary and would likely be successful.

Major: The effects would be readily apparent, and would result in substantial, noticeable effects on public health and safety in the park and in the county around the park. Effects could lead to changes in the rate of mortality. Extensive mitigation measures would be needed, and their success would not be assured.

Beneficial Effects: Beneficial effects would reduce the potential for accidents and limit hazard exposure.

Short-Term: Occurs only during project implementation.

Long-Term: Persists beyond the period of the project implementation.

Impacts of Alternative A: No Action

Under the no action alternative, conditions at the Crystal Creek Quarry site would continue to pose visitor safety hazards in the form of steep slopes and unstable material. Conditions would continue to change and possibly become more dangerous as a result of storm events, landslides, and drainage patterns deepening existing ditches and other drainage features. The parking area would remain out of sight from Crystal Creek Road and the site would continue to be challenging for park rangers to monitor, especially after sunset. Inappropriate uses of the site may continue and associated enforcement and public safety concerns would remain.

Unclosed mine openings would continue to create dangerous safety hazards because visitors would continue to have the opportunity to enter mines. Visitors to these mines would continue to encounter open vertical shafts, crumbling adits and portals, and other highly dangerous conditions. Existing closures that have been vandalized and breached would be addressed as funding became available. Mines with existing, non-vandalized mine safety installations would continue to reduce the potential for accidents. Additional mine safety installations would be implemented as funding became available through other funding programs, but the timing and number of openings to be addressed during a specific period would vary according to funding amounts and details. These safety installations would be accomplished under a continuation of current management and would not be part of the proposed action.

The likelihood of a visitor fall or a slide of unstable material at Crystal Creek Quarry site may be relatively low and would be restricted to those visitors who leave the designated access road/trail. However, such accidents would continue to pose high risks associated with rescue. Additionally, the likelihood of a mine opening-related accident would be low and restricted to visitors who enter mine openings, but such accidents would continue to pose a high risk from a health and safety perspective because of the high potential for harm at mine openings, the remote location of most mine openings, and the high risks associated with rescue. As a result, the no action alternative would continue to have a long-term, moderate, adverse effect on visitor health and safety.

Cumulative Effects. The past, present, and reasonably foreseeable actions included in the projects identified in the section titled “Cumulative Impact Analysis Method” would not generally have effects on public health and safety, except for the fire management plan, previous mine safety installations at other abandoned mine lands, and modification of the Crystal Creek Falls Trail to meet the Architectural Barriers Act Accessibility Standard.

The fire management plan would benefit public health and safety as a result of better coordination with and preparation for wildland fires and prescribed burns. Ranger staff would be better able to respond to safety issues under the plan. New mines sites would be closed as funding became available. The other abandoned mine land safety activities implemented in the past and expected to continue as funding became available would have beneficial effects on health and safety because risks throughout the park would be reduced. Modification of the Crystal Creek Falls Trail to comply with the Architectural Barriers Act Accessibility Standard would have beneficial effects on the health and safety of those visitors with impaired mobility by reducing the slope and the risk of traveling on the trail.

The incremental impacts of the no action alternative, which would be long-term, moderate, and adverse, when combined with the beneficial effects of other plans and projects would result in long-term, minor, adverse cumulative effects on public health and safety.

Conclusions. Safety conditions for visitors engaging in activities other than visiting Crystal Creek Quarry site and abandoned mines would continue to be similar to existing conditions. Because visitors to the Crystal Creek Quarry site would continue to encounter steep slopes and unstable material, and because mine openings would continue to pose risks to the public and park staff, the no action alternative would have a long-term, moderate, adverse effect on visitor safety. When the beneficial impacts of other plans and actions were combined with the impacts of this alternative, there would be long-term, minor, adverse, cumulative impacts on public health and safety.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on public health and safety under alternative A.

Impacts of Alternative B: Erosion and Safety

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative B, stabilization and recontouring would take place at the Crystal Creek Quarry site and mine openings would receive safety installations. Details of the individual components and areas of the recontouring actions are presented in the "Alternatives" section.

Recontoured Areas. Reducing the slope gradient and heights of rock piles on approximately 5.56 acres at the site would reduce the potential for falls by visitors. The reduction of stockpile heights and slopes, and the removal of the precarious concrete cap atop one of the stockpiles, would have long-term, beneficial effects on visitor safety by providing safer, more stable slopes and ground conditions at the site.

Regrading of steep drainage slopes in areas B, and C (figure 5) would reduce the potential for and severity of storm water runoff and represent a long-term, beneficial effect because safety risks associated with uncontrolled erosion, deepening drainages, and unstable slopes would be decreased.

Vegetation. Establishing tree and shrub pockets at strategic locations to intercept storm water runoff from the Crystal Creek Quarry site would benefit public health and safety by reducing storm water runoff and soil erosion, increasing water infiltration, and stabilizing soils to reduce the potential for landslides and the threat of unstable material. The increased vegetation cover and plant density would decrease erosion potential, resulting in a long-term, indirect, beneficial effect on public health and safety.

Parking Lot. Installation of a new parking lot on the northern edge of the site adjacent to the entrance from Crystal Creek Road would improve public health and safety by enabling park rangers to more easily access and patrol the area for inappropriate uses of the site, especially at night. The surface of the new parking lot would be pavement or gravel and the slope would improve access for those with impaired mobility. In addition one handicap parking space would be maintained south of the current parking lot location to enable access to the trail for visitors with impaired mobility. The new parking lot would have a long-term, beneficial effect on public

Mine Safety Installations. Mine openings in the park would be closed using a variety of techniques tailored to each mine site, based on the previously described considerations. Whiskeytown National Recreation Area would use bat gates in all instances where bats were either suspected or anticipated in the future. Details of the individual techniques are presented in the “Alternatives” section. The following is a summary of the estimated effects of each of the treatments on public health and safety.

Fencing. Temporary fencing could be employed at mine openings scheduled to be closed by other safety installation techniques. Temporary fencing would protect visitors from entering dangerous openings such as shafts or adits. The fences would be removed once the final safety installation techniques were applied. Temporary fencing would represent a short-term, beneficial effect because safety risks would be reduced.

Permanent fences would reduce risks to human health and safety by preventing visitors from entering dangerous openings. This would have a long-term, beneficial effect. Mitigation measures would be used to reduce the visibility of permanent fences. These measures could include, but may not be limited to, keeping the fenced area as small as possible, constructing the fence so its height would be as low as possible while still being effective in discouraging visitor access, and using colored or weathered fence materials to blend with the site and reduce fence visibility.

Other Safety Installation Techniques. Other mine safety installation techniques would include bat gates, nets, screens, grates, cupolas, polyurethane foam closures covered with backfill, backfill alone, and combination applications of the above methods to treat complex situations. All these measures would have similar beneficial effects on public health and safety in that they would result in permanent closure of mine openings and would reduce risks to human health and safety. Because all of these techniques would accomplish the same objective, they would all have similar effects on public health and safety, including:

- Preventing visitors from stumbling into holes (which would be filled or barricaded by the safety treatments);
- Protecting visitors from the collapse of decayed timbers (which could be replaced to provide continued access, or barricaded to prevent visitors from climbing on them;) and
- Barricading the openings of tunnels that might contain toxic gases or other hazards to prevent visitors from entering.

Alternative B would have a long-term, beneficial effect by reducing risks to human health and safety caused by the continued existence of openings in abandoned mines.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The fire management plan would benefit public health and safety as a result of better coordination with and preparation for wildland fires and prescribed burns. Abandoned mine land safety activities implemented in the past would continue to have beneficial effects on health and safety because risks posed at mine openings would be decreased. Modification of the Crystal Creek Falls Trail to comply with the Architectural Barriers Act Accessibility Standard would have beneficial effects on the health and safety of those visitors with impaired mobility by reducing the slope and the risk of traveling on the trail.

The long-term, beneficial, incremental effects of alternative B, when combined with the long-term, beneficial, incremental effects of other actions, would have long-term, beneficial effects on public safety in the Crystal Creek Quarry area and in the vicinity of mine sites that received treatments.

Conclusions. Alternative B would have a long-term, beneficial effect on public health and safety by reducing risks caused by steep, unstable slopes, improving law enforcement monitoring capabilities at the Crystal Creek Quarry site, and eliminating the risks associated with open abandoned mine openings. When the beneficial impacts of the other plans and actions were combined with the long-term, beneficial impacts of this alternative, there would be long-term, beneficial impacts on public health and safety.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on public health and safety under alternative B.

Impacts of Alternative C: Erosion, Safety, and Restoration

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative C, stabilization and recontouring would take place at the Crystal Creek Quarry site and mine openings would receive safety installations. Details of the individual components and areas of the proposed recontouring actions are presented in the "Alternatives" section. The following sections describe the effects of individual components of the proposed alternative on public health and safety.

Recontoured Areas. Approximately 5.92 acres of material would be regraded in locations across the Crystal Creek Quarry site. Estimated effects of regrading on public health and safety would be the same as those described for alternative B.

Vegetation. Estimated effects of revegetation on public health and safety would be the same as those described for alternative B.

Parking Lot. Installation of a new parking lot with a reduced slope at the northern edge of the site, adjacent to the entrance from Crystal Creek Road, would improve site conditions and provide a more gentle slope for access. The surface would be pavement or gravel and the slope would improve access for those with impaired mobility. As described for alternative B, moving the parking lot closer to Crystal Creek Road would increase public health and safety because park rangers would have easier access and visibility to monitor the area for inappropriate uses of the site, especially at night. The newly placed gate also would restrict vehicular access by people intent on unauthorized activities. The new parking lot and gate locations would have a long-term, beneficial effect on public health and safety by enabling park rangers to more easily monitor and reduce inappropriate uses at the site.

Mine Safety Installations. Under alternative C, mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. The park would use bat gates in all instances where bat use either was suspected or anticipated in the future.

Details of the individual techniques are presented in the "Alternatives" section. Estimated effects of each of the treatments on public health and safety would be the same as those described for alternative B.

Cumulative Effects. The cumulative effects of other plans and projects under alternative C would be similar to those described for alternatives A and B. Alternative C would have the same types of long-term, beneficial, cumulative effects that were described for alternative B.

Conclusions. Alternative C would have a long-term, beneficial effect on public health and safety by reducing risks caused by steep, unstable slopes and improving law enforcement monitoring capabilities at the Crystal Creek Quarry site and by eliminating the risks associated with open abandoned mine openings. When the beneficial impacts of the other plans and actions were combined with the long-term, beneficial impacts of this alternative, there would be long-term, beneficial impacts on public health and safety.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on public health and safety under alternative C.

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VISITOR USE AND EXPERIENCE

AFFECTED ENVIRONMENT

Visitor experience is a term used to describe what a visitor senses physically, mentally, and emotionally in a park unit. A visitor's expectations, impressions, and memories contribute to the experience. How a visitor interacts with the resources, staff, and other visitors are part of the visitor experience. The recreational opportunities that are available and the quality of programs, facilities, and services all contribute to the park experience. Visitor safety in the park is critical to an enjoyable visit. The measure of visitor experience is visitor satisfaction.

Approximately 775,000 visitors come to the park each year to enjoy the natural resources, participate in recreational and educational opportunities, and to enjoy a social experience. Primary recreational opportunities in the park include camping, hiking, swimming, boating, horseback riding, fishing, and wildlife viewing. The vast majority of visitors to Whiskeytown come in the hot summer months to recreate by and in the lake. This is the time of year when campgrounds are open and more families visit the park on vacations. The average length of a visitor's stay also increases dramatically in the summer due to the overnight stays. Day use visitors in the summer also tend to stay longer due to relatively cooler temperatures and extended daylight hours, which provide visitors with the opportunity to seek relief from the heat for a longer period of time (National Park Service 2004).

While Whiskeytown National Recreation Area was originally focused on lake-based recreational opportunities, the public has expanded their interest and use of other areas of the park. The park seeks to accommodate the additional visitor needs associated with this expanded interest. Trail use and access to park lands is a goal for the park, consistent with the nationwide mission of the National Park Service (National Park Service 2005). With the population of the City of Redding and surrounding Shasta County on the increase, more visitors, looking to enjoy the park's natural and cultural resources, can be expected. There are no data on the use of individual trails in the park. However, increased interest in and use by members of the public of Whiskeytown National Recreation Area's trails have prompted park staff to begin planning for long range improvements. With the completion and improvement of the Bureau of Land Management trails network on the park's southeast boundary, the Mule Mountain Trail now provides a "gateway" for trail users to enter Whiskeytown National Recreation Area and to enjoy the well-developed trail system in the southeast section of the park (National Park Service 2005). Many trails in Whiskeytown National Recreation Area traverse very steep, rugged areas and were not designed and built to the Architectural Barriers Act Accessibility Standard. The Crystal Creek Falls Trail that crosses through the Crystal Creek Quarry site also does not meet this standard.

The Crystal Creek Quarry site receives frequent visitor use due to its close proximity and visibility from Crystal Creek Road. Park staff estimate the site receives about 1,500 visitors annually with most visitors coming to the site to hike the 1/4 mile up to Crystal Creek Falls. The trail also serves as access for Bureau of Reclamation vehicles traveling to the valve house located at Crystal Creek falls.

The park maintains a helicopter landing area south of the parking area at the Crystal Creek Quarry site that is infrequently used to support fire management actions as well as drug enforcement activities. The area is closed to visitor use during these emergency situations when helicopters are landing at the site. Additionally, the site is sometimes closed to visitors during storm events when there is an increased threat of landslides.

Sites with abandoned mine openings at the park are often remote and accessible only on foot. Formerly used mining roads accessing some mine sites are now gated, closing off vehicular access. Park staff do not have visitor statistics for the more remote mine sites, and estimate that 10 people access some of the proposed project sites per year. Vandalism has occurred at some of the abandoned mine sites where the park had previously installed fencing and/or gates at mine openings, evidence that the sites receive visitors and that some visitors are entering the mine openings.

The park's historic mining districts and the Crystal Creek Quarry site display the area's history of mining techniques for visitors to see. Most of these sites are day-use areas that do not allow camping, are open to the public, and accessible by foot.

ENVIRONMENTAL CONSEQUENCES

Impact Criteria and Thresholds

The following definitions of impact intensity are used in the analysis of effects on visitor use and experience:

Negligible: Changes in visitor use and the quality or nature of the visitor experience would not occur as a result of proposed project activities. There would be no noticeable changes in visitor experience or in defined indicators of visitor satisfaction or behavior.

Minor: Changes in visitor experience as a result of proposed project activities would be small but detectable. Visitors could be aware of the effects, but the changes would not appreciably alter important characteristics of the visitor experience or visitor satisfaction.

Moderate: Some changes in important characteristics of the experience in the area as a result of proposed project activities would be readily apparent, or the number of visitors engaging in an activity or in the use of areas would be substantially altered in comparison to historical trends. Most visitors would be aware of changes, and many would be able to express an opinion regarding the difference. Visitor satisfaction would change as a result of the proposed project activities.

Major: Changes in multiple important characteristics of the desired experience as a result of proposed project activities would be readily apparent. Most visitors would be aware of the effects and would likely express a strong opinion about the changes. Participation in desired experiences or in visitation would be considerably altered, and would result in substantial changes in the defined indicators of visitor satisfaction or behavior.

Beneficial Effects: Proposed project activities would have demonstrable beneficial effects on visitor experience, including, but not limited to a better understanding of the historical conditions and demands associated with each site, the ability to view and explore abandoned mine sites, to view and experience scenery and wildlife, and to experience solitude or quiet.

Short-Term: Effects of proposed project activities on visitor enjoyment and recreational or educational opportunities would be associated with the construction period of the site recontouring and safety installations. The effect would end concurrent with or shortly after the end of the construction period.

Long-Term: Effects of proposed project activities on visitor enjoyment and recreational or educational opportunities would be evident for a period exceeding five years.

Impacts of Alternative A: No Action

Visitors would continue to visit and explore the Crystal Creek Quarry site and abandoned mine land sites at the park. Visitors would also continue to have the ability to participate in the most common types of visitor activities associated with Whiskeytown Lake. Physical conditions at Crystal Creek Quarry site would continue to change periodically as a result of storm events, landslides, and drainage patterns deepening existing ditches and other drainage features, leading to periodic closures of the area to visitors.

Additional mine safety installations would be implemented as funding became available, but the timing and number of openings to be treated during a specific period would vary according to funding amounts and details. Existing mine safety installations would be retained. Existing closures that have been vandalized and breached would be addressed as funding became available. Additional safety installations would occur under continued current management as funding and resources became available on a site-by-site basis.

Interest in and use by members of the public of Whiskeytown National Recreation Area's trails, including the Crystal Creek Falls Trail, would continue into the future. The number of visitors interested in seeing open mine sites would increase as interest in these park features increases (Office of the Inspector General 2008).

The effect that current conditions at the Crystal Creek Quarry site and at open abandoned mine sites would have on visitor experiences would depend on the values and perceptions that individual visitors place on visiting these locations versus other types of experiences available in the park. Under the no action alternative, mine openings already closed could continue to be viewed negatively by visitors who place a high value on entering and investigating unclosed mines without supervision. Visitors who participate in activities such as auto-touring, sightseeing, nature study, hiking, camping, and lake-based recreation would not be affected by the no action alternative. Other visitors may prefer to experience trail sights and sounds of areas not impacted by prior use such as the Crystal Creek Quarry site's stockpiled mounds of material and lack of vegetation. Visitors who are concerned with safety may choose not to go near steep slopes or other hazards at the Crystal Creek Quarry site or abandoned mines because of the safety risk.

Changes in visitor use and the quality or nature of the visitor experience would not occur as a result of the no action alternative. Because visitors would continue to have access to the Crystal Creek Quarry site and to open mine sites within the park, there would be no noticeable changes in the visitor experience, so the result would be a long-term, negligible effect.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled "Cumulative Impact Analysis Method." The effects of past, present, and reasonably foreseeable actions would benefit visitor experience. Visitors who place a high value on hiking in the park would experience beneficial effects from the Shasta-Trinity Trail Plan and the extended trail access across and in the park. The modification of the Crystal Creek Falls Trail to comply with the Architectural Barriers Act Accessibility Standard would have beneficial effects on the visitor experience of those visitors with impaired mobility by providing additional trail access. The reclamation of Crystal Creek Road enhances the auto-touring experience, decreases maintenance needs, and decreases closures and delays to visitors traveling on this road. Restoration and removal of portions of Brandy Creek, Queen Mary, and Kanaka Roads would contribute minor, adverse effects to visitors who place a high value on access to these roads. Despite the component of the visitor community that would continue to experience a long-term, minor, adverse impact from past safety installations, the previous mine safety installations would have continue to have beneficial effects on visitor experience by allowing access to most of the mines in the park, with improved safety at particularly dangerous

mines. The effects of the no action alternative would contribute little to the impacts of other plans and actions, and the cumulative effect on visitor use and experience would be long-term and beneficial.

Conclusions. Visitor use and experience would continue to be similar to existing conditions, and the impact of this alternative would be long-term and negligible. The combined effects of past, present, and reasonably foreseeable future actions with the incremental contribution of the no action alternative would result in a cumulative, long-term benefit to visitor use and experience.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on visitor use and experience under alternative A.

Impacts of Alternative B: Erosion and Safety

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative B, stabilization and recontouring would take place at the Crystal Creek Quarry site. Details of the individual components and areas of the proposed recontouring actions are presented in the "Alternatives" section. The following is a summary of the effects of individual components on visitor use and experience.

Recontoured Areas. Reducing the slope gradient and heights of stockpiles on approximately 5.56 acres across the Crystal Creek Quarry site would create more natural-looking features and improve the visitor experience by creating a more aesthetically pleasing site. Steep slope angles associated with various rock piles and a large stockpile along the entranceway of the site would be reduced and their heights would be diminished, improving the landscape and reducing the risk of potential falls by visitors. Regrading activities, in addition to the removal of the visible concrete cap atop one of the stockpiles, would have long-term, beneficial effects on visitors. Regrading of steep drainage slopes in areas B, and C (figure 5) would improve storm water control and slope stability. These improvements would represent a long-term, beneficial effect on visitor experience because safety risks associated with erosion and unstable slopes would be reduced and the frequency of site closures from the threat of slides would be diminished, especially during storm events. Regrading of these areas would also benefit visitor experience by improving views from within the site.

The increased noise associated with construction equipment and the temporary closure of the site to visitors during the construction and regrading period would result in short-term, moderate, adverse effects to visitor use and experience.

Parking Lot. Installation of and regrading associated with a new parking lot at the northern edge of the site adjacent to the entrance from Crystal Creek Road would benefit visitor experience by providing improved parking facilities and improved views of the site from Crystal Creek Road. One handicap parking space would be maintained at the current parking location to enable easy access to the trail for those visitors with impaired mobility. The new parking lot location would represent a long-term, beneficial effect on visitor experience by improving site aesthetics and ease of access, because the parking lot would be better defined.

Vegetation. Revegetation of the Crystal Creek Quarry site would benefit visitor experience by improving the aesthetic quality of the site. The planting pockets and native, self-sustaining

ground cover would increase vegetation density and improve views along the Crystal Creek Falls Trail and could eventually create a buffer from traffic noise along Crystal Creek Road. Increased native vegetation density may also increase the frequency of wildlife and associated sightings at the site, indirectly resulting in increased visitor enjoyment. Increased vegetation density at the Crystal Creek Quarry site would represent a long-term, beneficial effect on visitor experience by improving site aesthetics and the potential for wildlife viewing experiences.

Mine Safety Installation Techniques. Effects from closing abandoned mine openings using the safety installation techniques described in the “Alternatives” section would depend on the preferences and interests of individual visitors. Bat gates would be used in all instances where bats are either suspected or anticipated in the future. Under alternative B, most mine features would be left in place for future visitors to enjoy and experience. There would be little or no change in the ability of visitors to participate in these experiences, use trails, access park lands, or recreate on or around the lake. Benefits to visitors would accrue because exhibits associated with alternative B would enhance interpretive opportunities.

Safety installations in remote areas of the park may be constructed with the aid of helicopters to deliver materials. Helicopters are frequently observed in the park associated with air traffic to hospitals in the region, drug enforcement activities, and fire management activities. Therefore, the few helicopter trips proposed in support of the mine safety installations would not be appreciably greater than existing conditions and would have a negligible effect on visitor experience.

All safety installation techniques would effectively prevent visitors from entering dangerous mine openings. Each type of safety installation technique would have the following additional types of effects on visitor experience:

Fencing. The physical appearance of a mine site would be changed by the presence of permanent or temporary fences. Visitors could still view mine openings from a relatively close distance, and would be able to view into the depths of a mine opening, but would not be able to physically enter the feature. This would allow visitors to safely view and appreciate the historical values of the mines and surrounding mine camp or other historical features from a reasonably close distance. To minimize adverse visual effects on visitor experience caused by fencing, naturally colored fences and fence supports would be used to match the geology or vegetation. Temporary and permanent fencing would have long-term, minor, adverse effects on visitor experience in the case of visitors who desire to enter a mine because access to a mine would be prevented.

Bat Gates, Cupolas, and Nets. These structures would change the visitor experience by partially blocking or limiting the view into the opening. In situations where external frames or other mine structures are still intact, and where other features make it suitable, sunken bat gates would be employed. Visitors would still be able to view into the interior areas of the mine features by looking through the 5.75- to 6-inch openings in the bat gates, nets, or cupolas. These mine features are highly visible to the public. Even with safety installation structures in place, the visitor could still see and appreciate the miners’ construction activities and techniques for mining minerals in the environment. If a bat gate or cupola featured access openings for owls or small mammals, visitors would be provided with an opportunity to learn about and appreciate other species and wildlife that use mine openings and caves. Bat gates, nets, and cupolas could have long-term, minor, adverse effects on some visitor experiences because these treatments would prevent visitors from having full access to the sites, but other visitors could perceive them as beneficial because they would feel safer in the vicinity of the mine sites.

Polyurethane Foam with Backfill. Foam plugs would typically be used in areas where there is a high safety risk. Application of this safety installation technique would result in complete filling of a mine opening with foam and several feet of dirt / rock fill. This would permanently eliminate the visitor’s view into the affected mine opening. However, the visitor would still be able to

appreciate the nature and character of the camp or mine site conditions. Polyurethane foam with backfill would have long-term, minor, adverse effects on some visitor experiences because these treatments would prevent visitors from having full access to the sites, but other visitors could perceive them as beneficial because they would feel safer in the vicinity of the mine sites.

Backfill. The effect of backfilling a mine opening on visitor experience would be similar to those resulting from foam plugs. Backfill would have long-term, minor, adverse effects on visitor experience because these treatments would prevent some visitors from having full access to the sites. Backfill would have long-term, minor, adverse effects on some visitor experiences because these treatments would prevent visitors from having full access to the sites, but other visitors could perceive them as beneficial because they would feel safer in the vicinity of the mine sites.

Horizontal and Vertical Grates. Grates and screens have a smaller mesh diameter than bat gates or cupolas and would further restrict the visitor's view into a mine opening. The effects on visitor experience would otherwise be similar to those resulting from bat gates. Horizontal and vertical grates would have long-term, minor, adverse effects on some visitor experiences because these treatments would prevent visitors from having full access to the sites, but other visitors could perceive them as beneficial because they would feel safer in the vicinity of the mine sites.

Combined Safety Installation Methods. These types of treatments would include using two or more methods at a mine opening. Combined techniques could include, for example, using a horizontal gate with a bat cupola to close an open mine shaft while allowing bat use of the mine opening. Similar to bat gates and cupolas, combined safety installation structures are highly visible, obviously modern changes that affect the physical appearance of the mining site. However, because historical structures would be retained rather than removed or hidden, the visitor would still experience the nature and character of the mine camp or mine site conditions. Similar to bat gates and cupolas, the visitor would still see and appreciate the miner's construction activities and techniques, even though some mine site features would be affected by safety installation activities. Combined methods to treat complex situations would have long-term, minor, adverse effects on some visitor experience because the combined treatments would prevent visitors from having full access to the sites, but other visitors could perceive them as beneficial because they would feel safer in the vicinity of the mine sites.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled "Cumulative Impact Analysis Method." The cumulative effects of other plans and projects under alternative B would be the same as those described for alternative A and would generally benefit visitor experience. When combined with the most beneficial effects from implementing alternative B, the cumulative impact on visitor use and experience would be long-term and beneficial.

Conclusions. Alternative B would have long-term, beneficial effects on visitor experience by improving site aesthetics through recontouring and increased vegetation density, and by increasing the potential for wildlife viewing experiences at the Crystal Creek Quarry site. There would be short-term, moderate, adverse effects on visitor experience from noise associated with construction equipment and the temporary closure of the site to visitors. Alternative B would restrict visitors from entering dangerous mine openings, which some could perceive as adverse, but would provide most visitors with a continued opportunity to enjoy areas around mines with an increased sense of safety, a beneficial effect. Beneficial effects would result from implementation of interpretive programs regarding mine closures, public safety, and wildlife.

The combined effects of past, present, and reasonably foreseeable future actions with the incremental contribution of alternative B would result in a cumulative, long-term benefit to visitor use and experience.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on visitor use and experience under alternative B.

Impacts of Alternative C: Erosion, Safety, and Restoration

Crystal Creek Quarry Site Recontouring / Reclamation. Effects of the stabilization and recontouring that would take place at the Crystal Creek Quarry site are described below. Details of the individual components and areas of the proposed recontouring actions are presented in the "Alternatives" section.

Recontoured Areas. Approximately 5.92 acres would be recontoured in locations across the Crystal Creek Quarry site. Estimated effects of regrading activities on visitor experience are the same as those described for alternative B, with some increased benefit because additional areas would be graded. The area south of the helicopter landing area would be recontoured to create differing topographic relief for more natural variation in the landscape and to reduce drainage across the Crystal Creek Falls Trail, resulting in long-term, beneficial effects to visitor experience.

Parking Lot. Installation of a new parking lot with a reduced slope at the northern edge of the site, adjacent to the entrance from Crystal Creek Road, would benefit visitor experience by providing improved parking facilities, reducing the slope of the parking lot, and providing improved views of the site from Crystal Creek Road. Moving the gate farther north would extend the trail for pedestrian and bicycle use, also a long-term beneficial impact. Other beneficial effects of the new parking lot and gate location on visitor experience would include improved site aesthetics and more effective monitoring of the site by park rangers.

Vegetation. Effects of revegetation on visitor use and experience would be the same as those described for alternative B.

Mine Safety Installations. Mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. Bat gates would be used in all instances where bats were either suspected or anticipated in the future. Details of the individual techniques are presented in the "Alternatives" section. Effects of each of the treatments on visitor use and experience would be the same as those under alternative B.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled "Cumulative Impact Analysis Method." The cumulative effects of other plans and projects under alternative C would be the same as those described for alternative A and would generally benefit visitor experience. When combined with the most-beneficial effects from implementing alternative C, the cumulative impact on visitor use and experience would be long-term and beneficial.

Conclusions.

The types of effects of alternative C on visitor use and experience would be the same as those describe for Alternative B. However, because this alternative would provide additional reclamation at the Crystal Creek Quarry site, the long-term benefits at this site would be slightly greater. In concert with other past, present, and reasonably foreseeable future actions, the incremental

contribution of alternative B would result in a cumulative, long-term benefit to visitor use and experience.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on visitor use and experience under alternative C.

WATER QUALITY

AFFECTED ENVIRONMENT

Whiskeytown National Recreation Area is a water-based park with significant water resources that attract many visitors who enjoy the cool, clear water. Whiskeytown Lake covers 3220 surface acres with 240,000 acre-feet of water at full capacity, 1210 feet above sea level. Whiskeytown Dam impounds the Clear Creek watershed on the southeast end of the park and the lake is fed by seven major watersheds, Clear Creek, Brandy Creek, Crystal Creek, Boulder Creek, Mill Creek, Willow Creek, and Whiskey Creek. During the dry summer months, Whiskeytown Lake receives most of its water from Trinity Lake through a 10.7-mile underground tunnel which empties into Whiskeytown Lake at the Carr Powerhouse at a maximum rate of 3200 cubic feet per second. Below the dam, the major tributary to Clear Creek is Paige Boulder Creek which drains into Clear Creek about 1 mile downstream from the Whiskeytown Dam. Additionally, many intermittent streams drain into Whiskeytown Lake. Several streams, most notably Cottonwood Creek, drain outside of the Clear Creek watershed. Whiskeytown Lake supplies power generation at the Spring Creek Powerhouse along the Sacramento River through an underground tunnel, irrigation for the California Central Valley crops, and drinking water for the Lower Clear Creek Water District. As the tunnel was being built, the granite material excavated from the tunnel was stockpiled on the Crystal Creek Quarry site.

Water quality in the park is generally of very high quality, although some watersheds are affected by acid mine drainage from past mining practices. The streams on the southern side of the park flow through virtually pristine watershed conditions with a large snow pack component from higher elevations. Watersheds on the north side of the park all have past mining activities that have impaired or have the potential to impair water quality. Base metal and gold mining inside and outside of park boundaries has left a legacy of acid mine drainage problems, and currently the National Park Service is quantifying the extent of the damage to these watersheds and the water that flows from them. Whiskeytown Lake, which receives runoff from these watersheds, was listed on the 303(d) list in 2009 for mercury contamination in fish tissue (Rasmussen pers. comm. 2010). Watersheds being analyzed include Willow Creek and Whiskey Creek and other smaller tributaries on the north side also have potential for acid mine drainage. The only watershed that has been quantified is Willow Creek, which has its headwaters to the west of Whiskeytown and enters Clear Creek near the Tower House Historic District. Large amounts of iron, zinc, aluminum, and lesser quantities of cadmium and other metals drain from the old Greenhorn Mine into Willow Creek and the waters of Whiskeytown Lake. Willow Creek is listed on the California State 303(d) list for non-attainment of water quality standards (National Park Service 2004).

There are no surface water bodies or perennial streams present on the Crystal Creek Quarry site, although Crystal Creek is immediately adjacent to the east. The upland site is crossed by several ephemeral drainage channels that convey runoff after storm events. There is no site specific water quality data for Crystal Creek in the vicinity of the Crystal Creek Quarry site; however, a 2007 study on aquatic vertebrate assemblages of the upper Clear Creek watershed sampled two sites along Crystal Creek, one upstream of the Crystal Creek Quarry site and one downstream (Brown and May 2007). Species found at these two sampling locations include; brook and rainbow trout, riffle sculpin, pacific giant salamander, Sacramento sucker, tailed frog, and Sacramento pikeminnow. Crystal Creek has a steep and varying gradient, varying water velocity, and a substrate ranging from course gravel to small cobble at the sites sampled (Brown and May 2007).

The Crystal Creek Quarry site consists of extreme steep slopes, up to 45 degrees, and eroded drainage ways that continue to erode and slough off, creating steeper embankments and continuous erosion, especially during storm events. Runoff from the site flows to Crystal Creek. Crystal Creek Falls are located above the Crystal Creek Quarry site and are accessible by a trail/road that is gated to allow vehicular access to only National Park Service and the Bureau of Reclamation staffs, who maintain a valve house near the falls. The waste rock stockpiles at the site consists of granitic rock that is low in nutrients and support little vegetation, which, combined with the steep slopes, contributes to erosion and sedimentation of Crystal Creek.

The lower limit of the fill slope is along the west side of Crystal Creek and there is evidence that material eroded from the Crystal Creek Quarry site has been transported downstream over time (Steenon 1992). The fill slope has several debris slide scars along its length. There is an unnamed tributary drainage that has eroded a large gully west of the proposed trail (see alternatives B and C Figures 5 and 6, area B). The gully has stabilized for the most part, although some small scale debris sliding is likely to continue on the banks. The gully headcut is presently prohibited from migrating upstream by a culverted access road that effectively acts as a temporary unerodable berm. However, this condition is unstable from the perspective of the stability of the drainage structure itself (i.e., the culvert). For example, if the culvert were to become plugged with debris during a storm event, the stream flow would likely be diverted away from the existing gully and would therefore cause large amounts of erosion and establish another gully system. Also, without the protection of the culvert, the headcut could migrate quickly upstream and large amounts of sediment could be delivered to Crystal Creek, potentially impacting water quality and aquatic resources (Steenon 1992). A second unnamed drainage is located south of the area described above, that is eroding and sediment is being transported downstream along Crystal Creek. Some small-scale debris sliding is likely to continue to occur on the banks of this gully as well. In the spring of 2008, the Regional Water Quality Control Board identified the Crystal Creek Quarry site as a source of sediment to Crystal Creek that needed to be addressed.

ENVIRONMENTAL CONSEQUENCES

Impact Criteria and Thresholds

The following definitions of impact intensity are used in the analysis of effects on water quality:

Negligible: Impacts would not be measurable. Water quality parameters would be well within all water quality standards. Quality and flows would be within historical normal variability conditions.

Minor: Measurable changes from historical norms would occur, but quality and flows would be within the range of historical variability. All water quality parameters would be within water quality standards. State water quality antidegradation policy would not be violated.

Moderate: Water quality or flows would be outside the range of normal variability. However, while changes to water quality or flows would be readily apparent, water quality parameters would be within water quality standards. Mitigation would probably be necessary to offset adverse effects and would likely be successful. State water quality antidegradation policy would not be violated.

Major: Changes to water quality or flows would be readily apparent and, in the case of adverse effects, some water quality parameters periodically would be equaled or exceeded. Flows would be outside the range of normal variability, and could include a complete loss of water in some

areas or unusual flooding. Extensive mitigation would be needed to offset adverse effects, and its success would not be assured. State water quality antidegradation policy may be violated.

Short-term: Effects would primarily exist during active implementation of a management action, such as construction. Effects would cease within a year following implementation of the action.

Long-term: Effects would extend more than a year beyond implementation of a management action.

Impacts of Alternative A: No Action

Under the no action alternative, no recontouring or revegetation would occur at the Crystal Creek Quarry site and the steep slopes and gullies/drainage ditches would continue to erode and contribute to sedimentation and turbidity of Crystal Creek downgradient of the site. Conditions at Crystal Creek Quarry site would continue to change as a result of storm events, landslides, and drainage patterns, leading to periodic events of erosion and sedimentation of Crystal Creek. Additionally, abandoned mine lands sites with suspected acid mine drainage would remain open and continue to affect water quality in the watershed, especially during storm events. New mine safety installations would be implemented as funding became available through other funding programs, but the timing and number of openings to be closed during a specific period would vary according to funding amounts and program details. Existing mine safety installations would be retained. Additional safety installations would occur under a continued current management and would not be part of the proposed action. Water quality in other park areas would continue to be affected by current conditions.

Effects on water quality from continuing erosion and sedimentation from current site conditions at the Crystal Creek Quarry site would be long-term, moderate and adverse because of eroded sediment loads and resulting water turbidity. The continued release of suspected acid mine drainage at open abandoned mine sites located at various locations in the park, such as the Ganim Mine would have long-term, minor to moderate and adverse effects on water quality depending on storm frequency and how routinely acid mine drainage occurs. Therefore, under the no action alternative, effects on water quality would be long-term, minor to moderate and adverse.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The effects of past, present, and reasonably foreseeable future actions would benefit water quality. The Shasta - Trinity Trail Plan and modification of the Crystal Creek Falls Trail to meet the Architectural Barriers Act Accessibility Standard would, however, contribute short-term, negligible adverse effects to water quality due to trail erosion during construction and use. The fire management plan, restoration of Puccinellia Howellii Springs, Crystal Creek Road, and removal of portions of Brandy Creek, Queen Mary and Kanaka roads would all contribute long-term beneficial effects to water quality through the reduction of erosion and sedimentation of waterways in the park.

The effects of the no action alternative which are long-term, moderate adverse impacts, in combination with the beneficial impacts of other plans and actions would result in cumulative long-term, minor and adverse effects on Crystal Creek water quality downgradient of the site.

Conclusions. The no action alternative would have a long-term, moderate, and adverse effect on water quality because site conditions at the Crystal Creek Quarry site and open mines with suspected acid mine drainage would continue to contribute sedimentation and metals contami-

nation into the watersheds at the park. When the beneficial impacts of the other plans and actions are combined with the long-term, moderate, adverse impacts under this alternative, there would be long-term, minor, adverse cumulative impacts to Crystal Creek water quality down-gradient of the site.

The impact analysis for Alternative A identifies less than major impacts for water quality. For the reasons described in the impact analysis, alternative A would not result in impairment of park resources or values. Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on water quality under alternative A.

Impacts of Alternative B: Erosion and Safety

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative B, stabilization and recontouring would take place at the Crystal Creek Quarry site. Details of the individual components and areas of the proposed recontouring actions are presented in the alternatives section. The following is a summary of the estimated effects of individual components of the proposed alternative on water quality.

Recontoured Areas. Reducing the slope gradient on approximately 5.6 acres of steep terrain would reduce the potential for and severity of storm water runoff entering Crystal Creek. Except for Area B, which extends to the creek, recontouring areas would be separated from the Crystal Creek channel by distances ranging from about 60 to 180 feet. This separation distance would help reduce the potential for sediment discharges reaching the creek. Highly effective and proven erosion and storm water control mitigation measures would be used around all construction areas and between potential sediment sources and Crystal Creek to intercept and contain potential sediment discharges. These measures (described previously in the "Alternatives" section) would include silt fences, low containment berms, vegetated buffer zones, strategically located tree and shrub pockets, and other erosion control features. The most extensive recontouring in area B would include riprap and a stable channel to convey storm water flows to Crystal Creek. Native grass cover would be established on high-importance disturbed slopes (for example, areas B and C) to ensure slope and soil stability and increase storm water infiltration that would minimize runoff entering crystal Creek. The primary goal of all these activities would be to minimize storm water discharges entering Crystal Creek. Because of these measures, the potential short-term adverse effect of construction activities to Crystal Creek water quality would be minor. This reduction of erosion and increased storm water control would result in long-term beneficial effects to water quality by reducing the transport of sediments to Crystal Creek.

Vegetation. Establishing tree and shrub pockets at strategic locations to intercept potential site storm water runoff the Crystal Creek Quarry site would benefit water quality by reducing storm water runoff and soil erosion, increasing water infiltration, and stabilizing soils and eroding banks. Native species seeding would occur at areas B and C. These areas are sloped and would present the highest potential for eroded soils reaching the creek, if not protected with a vegetation ground cover. Details for establishing a plant cover on this challenging site would be developed before construction activities would begin. Vegetation planting and establishment activities would occur concurrent or shortly after recontouring grading and earth-moving activities were completed. The increased vegetation cover and plant density would decrease erosion potential resulting in a long-term, indirect beneficial effect on Crystal Creek water quality.

Mine Safety Installations. Under alternative B, mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. Whiskeytown National Recreation Area would use a conservative approach and utilize bat gates in all instances where bats are either suspected or anticipated in the future. The proposed mine safety installations would not contribute to mercury contamination to the watershed or Whiskeytown Lake.

Details of the individual techniques are presented in the alternatives section. The following is a summary of the estimated effects of each of the treatments on water quality.

Polyurethane foam with backfill. Foam would be used at mine openings with suspected acid mine drainage and no suspected bat use. At these sites, impacts to water quality would be long-term and beneficial because, although some seepage could still occur around the edges of the foam plug, the amount of ground water discharge to nearby surface waters from a mine opening would be significantly reduced (Weasma pers. comm. 2009).

Other Safety Installation Techniques. Other mine safety installation techniques would include fences, bat gates, nets, screens, grates, and cupolas, backfill alone, and combinations of the above methods to treat complex situations. At most mine openings where there is no suspected acid mine drainage; all these measures would have similar negligible effects on water quality. However, at those sites where there is suspected acid mine drainage, all of these measures would allow for the continued release of drainage into the watershed which would result in long-term, minor to moderate and adverse effects on water quality depending on storm frequency and how routinely water is flowing from these openings.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The cumulative effects of alternative B would be similar to those described for alternative A and would generally benefit water quality. The Shasta - Trinity Trail Plan and modification of the Crystal Creek Falls Trail to meet the Architectural Barriers Act Accessibility Standard would, however, contribute short-term, negligible to minor adverse effects to water quality due to realignment of Crystal Creek Trail erosion during construction and use. The fire management plan, restoration of Puccinellia Howellii Springs, Crystal Creek Road, and removal of portions of Brandy Creek, Queen Mary and Kanaka roads would all contribute long-term beneficial effects to water quality through the reduction of erosion and sedimentation into waterways in the park.

The incremental effects of alternative B would contribute long-term, beneficial water quality conditions of both Crystal Creek and the water quality resources of the park because of reduced eroded soil transport, streambed sedimentation, and turbidly conditions in Crystal Creek. Discharges of acid-mine water into nearby drainages would be eliminated or substantially reduced by plugging the openings that have mine water discharges, which would be a long-term beneficial effect.

Conclusions. Alternative B would have a long-term, beneficial effect on water quality by reducing site erosion and sediment loading of Crystal Creek and reducing the amount of acid mine drainage entering the watershed in the park. There would be short-term, minor, adverse effects to water quality during recontouring and vegetation development activities at the Crystal Creek Quarry site. When the beneficial impacts of the other plans and actions are combined with the long-term, beneficial impacts and short-term, minor and adverse impacts under this alternative, there would be long-term, beneficial, cumulative impacts on water quality.

The impact analysis for Alternative B identifies less than major impacts for water quality. For the reasons described in the impact analysis, alternative B would not result in impairment of park resources or values. Because the previously described impacts (1) are consistent with Whiskey-

town National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on water quality under alternative B.

Impacts of Alternative C: Erosion, Safety, and Restoration

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative C, stabilization and recontouring would take place at the Crystal Creek Quarry site. Details of the individual components and areas of the proposed recontouring actions are presented in the alternatives section. The proposed mine safety installations would not contribute to mercury contamination to the watershed or Whiskeytown Lake. The following is a summary of the estimated effects of individual components of the proposed alternative on visitor experience.

Recontoured Areas. Approximately 5.9 acres would be recontoured in various locations across the Crystal Creek Quarry site. Estimated effects of regrading activities on water quality would be the same as those described for alternative B. Construction activity would have a short-term, minor adverse effect to water quality because of increased sediment transport to Crystal Creek.

Vegetation. Estimated effects of establishing the tree and shrub plantings and vegetation ground cover on water quality would be the same as those described for alternative B.

Mine Safety Installations. Under alternative C, mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. The park would use a conservative approach and utilize bat gates in all instances where bats are either suspected or anticipated in the future.

Details of the individual techniques are presented in the alternatives section. Estimated effects of each treatment on water quality would be the same as those under alternative B.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled "Cumulative Impact Analysis Method." The cumulative effects of other projects under alternative C would be the same as those described for alternatives A and B and would constitute a long-term benefit to water quality.

The incremental effects of alternative C would contribute long-term, beneficial water quality conditions of both Crystal Creek and the water quality resources of the park because of reduced eroded soil transport, streambed sedimentation, and turbidly conditions in Crystal Creek. Discharges of acid-mine water into nearby drainages would be eliminated or substantially reduced by plugging the openings that have mine water discharges, which would be a long-term beneficial effect.

Conclusions. Alternative C would have a long-term, beneficial effect on water quality by reducing site erosion and sediment loading of Crystal Creek and reducing the amount of acid mine drainage entering the watershed in the park. There would be short-term, minor, adverse effects to water quality during recontouring and vegetation development activities at the Crystal Creek Quarry site because of grading activities. When the beneficial impacts of the other plans and actions are combined with the long-term, beneficial impacts of this alternative, there would be long-term, beneficial, cumulative impact on water quality.

The impact analysis for Alternative C identifies less than major impacts for water quality. For the reasons described in the impact analysis, alternative C would not result in impairment of park resources or values. Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on water quality under alternative C.

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PARK OPERATIONS

AFFECTED ENVIRONMENT

There are 70 permanent and approximately 40 seasonal staff members at Whiskeytown National Recreation Area. Their responsibilities include resource management and protection, care and maintenance of park facilities, infrastructure, and physical and cultural resources, and other visitor services. The maintenance staff performs a variety of duties ranging from lakeshore cleaning, swim beach preparation, and placement of floating restroom facilities on the lake to erosion control, hazard tree removal, and brushing of trailside vegetation. Besides these responsibilities, maintenance staff performs the daily functions of emptying trash receptacles, cleaning restrooms, inspecting and maintaining picnic areas and campgrounds, and maintaining water and wastewater systems throughout the park. The roads and trails branch of the maintenance staff is responsible for the design, layout, maintenance, and interpretive signage of the park's trail system. Additional trail crew labor is supplied from June to August (8 week program) by the Youth Conservation Corps, comprised of one student leader and six youths between the ages of 15-18 years in age. The maintenance staff is responsible for over 70 miles of existing trails in the park (National Park Service 2005).

Law Enforcement and Fire Management units for the park consist of both permanent, term, and seasonal staff that perform law enforcement, fire management, clerical, fuels crew and engine crew functions. There is also a separate Fire Unit Module whose staff serve as a shared resource that assists in national wildland and prescribed fire management. Responsibilities of these staff members include search and rescue efforts, emergency medical assistance, assistance with traffic accidents, and fire management. Fire management staff also works with maintenance staff in hazard tree removals, cleanup and repair from storm damage, and with the clearing of trails and roads of brush (National Park Service 2005).

The Crystal Creek Quarry site receives frequent visitor use (approximately 1500 visitors per year) due to its close proximity and visibility from Crystal Creek Road. The site consists of an unpaved parking lot area; an unpaved access road directly south of Crystal Creek Road leading to an upper parking area that is gated. The lower portion of the unpaved road is in close proximity to one stockpile of debris that is over 15 feet tall with remnants of a concrete cap. The gate at the upper lot prevents visitors from driving any further up the road/trail but allows visitor access to a trail up to the falls. There are picnic tables and garbage cans located near the falls off the trail. Beyond the gated area at the upper parking lot, is a flat area that is used infrequently as a helicopter landing area that supports fire management actions as well as drug enforcement activities. Park staff close the visitor parking lot when helicopters are landing and taking off at the site. There are no restrooms or other facilities present at the Crystal Creek Quarry site.

Park staff have noted inappropriate park use after hours at the Crystal Creek Quarry site. This mainly occurs after sunset. The parking area is not visible from Crystal Creek Road which creates enforcement concerns.

Several mine site locations in the park, including the Ganim and North Star Mine areas, are remote and accessible only on foot. They are not as heavily visited as the Crystal Creek Quarry site or Whiskeytown Lake areas. Old mining roads are typically present at the mining sites and are often gated to prevent vehicular access. There are no restrooms or facilities present at the proposed sites for mine safety installations. Several existing mine safety installations at these areas have been vandalized, with fences breached and gate locks broken. Due to the remote location of these sites and limited park staff, these areas have been challenging to monitor.

ENVIRONMENTAL CONSEQUENCES

Impact Criteria and Thresholds

The following definitions of impact intensity are used in the analysis of effects on park operations:

Negligible: Park operations would not be affected, or effects would not be noticeable or measurable outside normal variability.

Minor: Effects would be measurable but would not appreciably change park operations. Effects would be noticed by park staff, but probably would not be noted by visitors.

Moderate: Effects would be readily apparent and would result in a substantial change in park operations in a manner that would be noticeable to park visitors. Mitigation would probably be necessary to offset adverse effects and would likely be successful.

Major: Effects would be readily apparent and would result in a substantial change in park operations in a manner that would be noticeable to park visitors as markedly different from existing operations. Extensive mitigation would be needed to offset adverse effects, and its success would not be assured.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with a particular activity such as construction.

Impacts of Alternative A: No Action

Under the no action alternative, no recontouring would occur at the Crystal Creek Quarry site and the parking lot would remain in its current location, secluded from the Crystal Creek Road. The isolated nature of the parking area, out of sight from Crystal Creek Road and not easily accessible for night-patrolling staff, combined with the continued inappropriate activity in the area would continue to create challenges for law enforcement and park operations at the Crystal Creek Quarry site. Conditions at Crystal Creek Quarry site would continue to change as a result of storm events, landslides, and drainage patterns, and require additional staff attention to address erosion control and associated risks to visitors.

New mine safety installations would be implemented as funding became available, but the timing and number of openings to be closed during a specific period would vary according to funding amounts and details and existing mine safety installations would be retained. Additional safety installations would occur under a continued current management and would not be part of the proposed action. Existing unclosed or vandalized mine openings would continue to create dangerous safety hazards for visitors who continue to have the opportunity to enter the mines. Due to the remote nature of most of the mine openings and the low visitor use at these sites, monitoring and patrolling is both challenging and infrequent. As a result, any vandalism or accident requiring attention or rescue at these remote locations would continue to consume time and resources from limited park staff and put a strain on park operations. Park operations in other portions of the park would continue under current management practices.

Effects on park operations from maintaining current site conditions and current maintenance, law enforcement, and emergency service operations at both the Crystal Creek Quarry site and abandoned mine land opening sites would be long-term, minor and adverse.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The Fire Management Plan would contribute to beneficial effects by improving fire and emergency service operations and management. The construction and implementation of the remaining plans and projects in the park would result in short-term, minor adverse effects on park operations as a result of the need for increased maintenance, law enforcement, and fire and emergency staff required during implementation of the various plans and projects. However, long-term effects of the rehabilitation, restoration, and improved trails and mine safety installation projects would be beneficial as a result of reduced emergency service requirements and maintenance needs.

Conclusions. Site conditions at the Crystal Creek Quarry site and unclosed and vandalized mine openings in remote locations in Whiskeytown National Recreation Area would continue to cause challenges for law enforcement and emergency services staff and would result in long-term, minor, adverse effects on park operations. When the beneficial impacts of the other plans and actions are combined with the long-term, minor, and adverse impacts of this alternative, there would be long-term, negligible, and adverse cumulative impacts to park operations.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area’s purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on park operations under alternative A.

Impacts of Alternative B: Erosion and Safety

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative B, stabilization and recontouring would take place at the Crystal Creek Quarry site. Details of the individual components and areas of the proposed recontouring actions are presented in the “Alternatives” section. The following is a summary of the estimated effects of individual components of the proposed alternative on park operations.

Recontoured Areas. Reducing the slope gradient and heights of rock piles on approximately 5.56 acres of steep terrain across the Crystal Creek Quarry site would reduce both the risk of falls by visitors and the risks associated with unstable material. These recontouring activities would have long-term, beneficial effects on maintenance and emergency response park operations by reducing the need for erosion control and emergency services needs at the Crystal Creek Quarry site. Under alternative B, the Crystal Creek Quarry site would be closed to visitors during the regrading and construction phase. The temporary closure and coupled need for increased enforcement at the site would result in short-term, minor adverse effects to park operations.

Parking lot. Installation of a new parking lot at the northern edge of the site adjacent and visible from the entrance from Crystal Creek Road would allow park enforcement rangers to patrol the site in less time, more efficiently, and with less risk. The relocation of the parking area would result in a long-term beneficial effect to park operations by enabling park rangers to more easily monitor and reduce inappropriate uses at the site.

Vegetation. Revegetation of the Crystal Creek Quarry site would benefit park operations by reducing the non-native vegetation at the Crystal Creek Quarry site. The increased vegetation

density would help to control invasive plants, which are a problem on the site, and thereby reduce the need for park resource management efforts to control exotic species at the site. The revegetation plan would represent a long-term, beneficial effect on maintenance and resource park management operations by reducing the need for non-native vegetation control at the site.

Helicopter Landing Area. Improvements to the current helicopter landing area at the site would allow for maintained emergency helicopter operations at the Crystal Creek Quarry site. This area is used during fire management and drug enforcement activities. An improved landing area would result in beneficial effects to law enforcement and fire and emergency park operations by allowing for improved landing and take-off conditions.

Mine Safety Installations. Under alternative B, mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. Whiskeytown National Recreation Area would use a conservative approach and utilize bat gates in all instances where bats are either suspected or anticipated in the future.

Details of the individual techniques are presented in the “Alternatives” section. The following is a summary of the estimated effects of each of the treatments on park operations.

Mine Safety Installation Techniques. Mine safety installation techniques would include fences, bat gates, nets, screens, grates, and cupolas, polyurethane foam closures covered with backfill, backfill alone, and combination applications of the above methods to treat complex situations. All these measures would have similar beneficial effects on park operations in that they would result in permanent closure of mine openings and would reduce risks to human health and safety and thereby reduce the need for emergency services. Additionally, new and replaced mine safety installations would be constructed to resist vandalism and thereby reduce the need for maintenance operations. During the construction and installation of mine safety installations there would be short-term, negligible and adverse effects on park operations due to temporary closures and the increased need for enforcement personnel. Because all of the techniques accomplish the same basic objective they would all have similar effects on park operations. Alternative B would have a long-term, beneficial effect on park operations by reducing the need for maintenance and emergency services.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The cumulative effects of other plans and actions under alternative B would be the same as those described for alternative A.

The incremental effects of alternative B would contribute long-term, beneficial impacts to long-term beneficial impacts of other plans and actions such that the cumulative effect on park operations would be long-term and beneficial.

Conclusions. Site conditions at the Crystal Creek Quarry site and mine safety installations in the park would improve maintenance, law enforcement, and emergency services such that effects on park operations would be long-term and beneficial. During construction, areas of the park would need to be temporarily closed resulting in short-term, minor and adverse effects on park operations due to increased enforcement and monitoring activities. When the beneficial impacts of the other plans and actions are combined with the beneficial impacts under this alternative, there would be long-term beneficial cumulative impacts on park operations.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area’s purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere

with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on park operations under alternative B.

Impacts of Alternative C: Erosion, Safety, and Restoration

Crystal Creek Quarry Site Recontouring / Reclamation. Under alternative C, stabilization and recontouring would take place at the Crystal Creek Quarry site. Details of the individual components and areas of the proposed recontouring actions are presented in the “Alternatives” section. The following is a summary of the estimated effects of individual components of the proposed alternative on park operations.

Recontoured Areas. Approximately 5.92 acres would be graded in various locations across the Crystal Creek Quarry site. Estimated effects of regrading on park operations would be the same as those described for alternative B.

The temporary closure and coupled need for increased enforcement at the site would result in short-term minor adverse effects to park operations.

Parking lot. Installation of a new parking lot at the northern edge of the site adjacent and visible from the entrance from Crystal Creek Road would allow park rangers to patrol the site in less time, more efficiently, and with less risk. The relocation of the gate closer to the parking area would further benefit patrollers by preventing vehicles from driving up the road/trail and out of sight from the parking area, especially at night. Relocation of the parking area and gate would result in a long-term beneficial effect to park operations by enabling park enforcement rangers to more easily monitor and reduce inappropriate uses at the site.

Vegetation. Estimated effects of revegetation on park operations would be the same as those described for alternative B.

Helicopter Landing Area. Estimated effects of revegetation on park operations would be the same as those described for alternative B.

Mine Safety Installations. Under alternative C, mine openings in the park would be closed using a variety of techniques, tailored to each mine site, based on the previously described considerations. Whiskeytown National Recreation Area would use a conservative approach and utilize bat gates in all instances where bats are either suspected or anticipated in the future.

Details of the individual techniques are presented in the “Alternatives” section. Estimated effects of each of the treatments on park operations would be the same as those under alternative B.

Cumulative Effects. Details about the other plans and projects contributing to cumulative effects were presented in the section titled “Cumulative Impact Analysis Method.” The cumulative effects of alternative C would be the same as those described for alternative A and B.

Conclusions. Site conditions at the Crystal Creek Quarry site and mine safety installations in the park would improve maintenance, law enforcement, and emergency services such that effects on park operations would be long-term beneficial. During construction, areas of the park would need to be temporarily closed resulting in short-term, minor, adverse effects on park operations. When the beneficial impacts of the other plans and actions are combined with the beneficial impacts under this alternative, there would be long-term beneficial cumulative impacts on park operations.

Because the previously described impacts (1) are consistent with Whiskeytown National Recreation Area's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts on park operations under alternative C.

CONSULTATION AND COORDINATION

LIST OF PERSONS, ORGANIZATIONS AND AGENCIES CONTACTED

Scoping includes early input from any interested agency or any agency with jurisdiction by law or expertise. The National Park Service consulted with federal and state agencies responsible to protect and manage our natural and cultural resources. Initial responses are summarized below. National Park Service consultation letters and agency responses are included as appendix B of this document. The following agencies and organizations were notified of the proposed project.

Federal Agencies

Department of Agriculture

U.S. Forest Service, Shasta Trinity National Forest

Department of the Interior

Bureau of Land Management, California State Office

National Park Service, Denver Service Center

National Park Service, Lassen National Park

National Park Service, Lava Beds National Park

National Park Service, Redwoods National park

U.S. Bureau of Reclamation

Elected Officials

California Assemblyman, Doug LaMalfa

California State Senator, Sam Aanestad

U.S. Senator, Barbara Boxer

U.S. Senator, Dianne Feinstein

State Agencies

California Department of Forestry

Burney Falls State Park

California State Parks

Castle Craigs State Park

Local Agencies

Anderson Chamber of Commerce

Redding Chamber of Commerce

Redding Visitor Center

Trinity County Chamber of Commerce

Weaverville Chamber of Commerce

Organizations and Media

After Five Magazine

Bidwell Mansion

Chico Channel 12

CONSULTATION AND COORDINATION

Chico Enterprise
Chico News
KCVU TV Fox 30
KHSL TV
KIXE PBS-Public Television
KLXR
KNCQ 97.3 FM Q97
KQMS News Talk 1400
KRCR TV News Channel 7 KIWB TV
KVIP Radio
Oak Bottom Marina
Record Searchlight
Red Bluff Daily News
Regent Broadcasting of Redding
Sacramento Bee
Shasta Boy Scouts
Shasta College
Shasta High School
Shasta Historical Society
Shasta State Historic Park
Sunset Marketplace
Valley Post
Weaverville Joss House
Redding Rancheria Tribal Council

Federal Agency Consultation

Because the proposed actions would have no effect to listed species, no consultation with the U.S. Fish and Wildlife Service was necessary.

State Agency Consultation

A programmatic agreement with the California State Historic Preservation Division was established defining a program for compliance with Section 106 of the National Historic Places Act and setting forth a streamlined process where agreed-on criteria would be met and procedures would be followed in the installation of physical safety mitigation treatments at abandoned mine land sites. The National Park Service established guidelines, standards, and technical information applicable to the treatment of these physical hazards in ways that would, to the extent possible, minimize the impacts of such treatments on the historic fabric and historic character of non-archeological historic properties at these sites. See appendix B for a copy of this programmatic agreement.

An intensive pedestrian cultural resources inventory of the 25 acre Crystal Creek Quarry site and the adjacent 16 acre parcel was conducted on February 3, 2010 by Mojave National Preserve archaeologists Dr. Bob Bryson and David Nichols. Because the entire Area of Potential Effects lies on the Crystal Creek Diversion Tunnel waste rock piles, it was not surprising that no cultural resources were encountered during inventory. Therefore, the National Park Service made a determination of no effect for the proposed recontouring of the Crystal Creek Quarry site. Consultation with California State Historic Preservation Officer began March 3, 2010. A copy of the cultural resources inventory report was provided to California State Historic Preservation Officer and the National Park Service requested concurrence with their finding of no adverse effect.

Tribal Consultation

In accordance with National Historic Preservation Act of 1966, as amended, regarding the programmatic agreement with the California State Historic Preservation Division, the National Park Service contacted the Redding Rancheria Tribal Council by letter on May 29, 2009, to initiate consultation and comment on the programmatic agreement and work plan. The consultation letter is included in appendix B. The work plan included a brief description of three typical abandoned mine lands safety installations and of the proposed recontouring of the Crystal Creek Quarry site. The National Park Service provided the Redding Rancheria Tribal Council a copy of the signed programmatic agreement (March 4, 2010) and copy of the California State Historic Preservation Officer consultation letter (March 3, 2010).

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SUMMARY OF PUBLIC SCOPING

Staff of the park and resource professionals of the National Park Service Denver Service Center team initiated internal scoping in a project review meeting in September 2009. On October 14-15, 2009, and February 2-4, 2010, National Recreation Area and Denver Service Center team staff conducted an onsite survey and discussed issues and options.

A scoping notice was sent in late October 2009 in which the National Park Service proposed to complete an environmental assessment to analyze the effects of implementing mine safety installation methods to mitigate visitor and staff safety hazards in Whiskeytown National Recreation Area. The notice was sent to approximately 45 tribal, federal, and state departments and districts including the agencies and organization listed above. The notice also was posted to the National Park Service's Planning, Environment, and Public Comment project management database website, <http://parkplanning.nps.gov/whis>, for public review and comment. No comments were received.

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LIST OF PREPARERS

National Park Service

| Name | Title | Location |
|-----------------|--|--------------------------------------|
| Jennifer Gibson | Ecologist | Whiskeytown National Recreation Area |
| Brian Rasmussen | Geologist | Whiskeytown National Recreation Area |
| Russ Weatherbee | Wildlife Biologist | Whiskeytown National Recreation Area |
| Dave Nichols | Archeologist/NHPA Specialist | Mojave National Preserve |
| Ginger Molitor | Natural Resources Specialist/NEPA Compliance | Denver Service Center |
| Richard Boston | Cultural Resources Specialist | Denver Service Center |

Parsons

| Name | Title | Education | Experience |
|--------------|------------------|--|-------------------|
| Alyse Getty | Task Manager | B.A. Environmental Science dual degree Political Science. Responsible for technical oversight, regulatory compliance. | 29 years |
| Alexa Miles | Senior Scientist | B.A., Environmental Studies and M.S., Landscape Architecture; LEED AP. Responsible for graphics, document preparation, and coordination. | 5 years |
| David Ott | Civil Engineer | B.S., Civil Engineering. Responsible for site reclamation engineering and regrading plans. | 10 years |
| Bruce Snyder | Project Manager | B.S., Biology, and M.S., Wildlife Biology. Responsible for project management and technical support in regulatory compliance and site reclamation. | 40 years |

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Appendix A

Mine Closure Techniques

Photographs of typical abandoned mine openings and types of closures.



Photo 1. Bat cupola over a vertical shaft.



Photo 2. Barn owl opening and perch on bat cupola.



Photo 3. Bat grate.



Photo 4. Temporary fencing at vertical shaft.



Photo 5. Example of a bat gate with passageway for small mammals.



Photo 6. Cable mesh.



Photo 7. Trench mine with shafts and adits, with permanent fencing.



Photo 8. Fenced mine shaft closure.



Photo 9. Bat gate over vertical shaft.



Photo 10. Grate over vertical shaft



Photo 11. Completed polyurethane foam plug.



Photo 12. Grate.

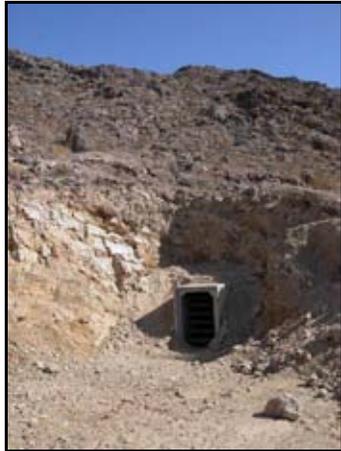


Photo 13. Adit closed with a bat gate, concrete culvert and foam protection outside the culvert. Note minimal disturbance to surrounding area.



Photo 14. Recessed bat gate in a decline. Note minimal disturbance in area surrounding the opening, and preservation of features.



Photo 15. Shaft closed with combination grate, bat cupola and concrete footing. The footing acts as a deterrent for desert tortoises.



Photo 16. Shaft closed with a recessed bat gate. Note undisturbed area surrounding opening.



Photo 17. Net closure recessed in mine shaft.



Photo 18. Cable net mine closure on a mine shaft.



Photo 19. Adit closed with a bate gate.



Photo 20. Unclosed adit.



Photo 21. Unclosed vertical shaft conditions.



Photo 22. Closed vertical shaft with bat gate.



Photo 23. Unclosed vertical shaft.



Photo 24. Grate over a vertical shaft.



Photo 25. Combination bat gate and grate over a vertical shaft.



Photo 26. Unclosed vertical shaft with head frame.



Photo 27. Trench mines with shafts closed with a permanent fence.



Photo 28. Stope with chain covering.

Appendix B

Consultation and Coordination



National Park Service
U.S. Department of the Interior

Whiskeytown National
Recreation Area

P.O. Box 188
Whiskeytown, CA 96095

530-242-3400 phone
530-246-5154 fax

Whiskeytown News Release

October 14, 2009

For Immediate Release

Russ Weatherbee (530) 242-3442

Scoping Notice – Mitigation of Safety Hazards, Reconfiguration, and Restoration at Abandoned Mine Lands Environmental Assessment, Whiskeytown National Recreation Area

The National Park Service (NPS) will be preparing an environmental assessment (EA) which will analyze the environmental effects of implementing mine closures to mitigate visitor and staff safety hazards, addressing water quality and sedimentation issues associated with erosion of tailings and waste rock piles, and restoring the visual aesthetics at Abandoned Mine Land (AML) sites and the Crystal Creek Quarry in Whiskeytown National Recreation Area (NRA).

AMLs are typically defined as any physical feature previously used for the extraction of minerals for which no responsible party can presently be identified. AML sites often pose severe human safety hazards, environmental contamination, and usually have disturbances to land, vegetation, and related ecosystems. Despite the existence of physical and environmental hazards, AMLs in the West represent a remnant of this region's rich history and, in consequence, have long been popular destinations for tourists. Due to their relative age, the physical condition of most historic mining structures has significantly deteriorated. Open mines and associated historic structures provide unusual attractions for increasing numbers of park visitors, despite the varying levels of physical safety hazards, ranging from minimal to life-threatening, presented by these features.

AML sites often also provide habitat for protected and/or sensitive wildlife species, such as bats. Surveys will be completed for each mine site to determine the presence/absence of bats and other sensitive wildlife. The information gathered from these surveys will contribute to the NEPA process that will determine the appropriate safety treatments with consideration for resources protection.

The primary NPS goal is to permanently close mine openings at the North Star and Gannin Mines. Closing mine features from human access can involve permanent closure of mine features (non reversible methods including earthen backfill, blasting to collapse mine features, constructing rock and mortar walls into mine features, and site restoration through re-contouring the landscape and planting vegetation). Because of wildlife and/or historic preservation considerations, the NPS sometimes secures openings with less permanent measures, such as long-term closure (reversible methods including "bat gate" installation and plugging mine openings with polyurethane foam with a surface layer of earthen backfill) or temporary closure (3-strand barbed wire fencing). Long-term closures require periodic monitoring and

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[REDACTED]

maintenance to ensure their efficacy. Temporary closures require frequent monitoring to ensure that they remain secure and effective, as they are subject to vandalism and do not always prevent deliberate intrusion.

In addition to mine closures to address safety issues, the proposed action includes erosion mitigation, landscape re-contouring, and restoration of native plant populations and patterns at the North Star and Ganim Mine tailings and waste rock piles. A main objective of the proposed action is to restore the original contours and hydrologic function of stream channels to the extent possible.

Reconfiguration and restoration actions are also proposed for the Crystal Creek Quarry. Prior to the establishment of Whiskeytown NRA in 1965, the 11.3-mile Clear Creek Tunnel was constructed to link Lewiston Reservoir in the Trinity watershed with Whiskeytown Lake in the Clear Creek watershed. The purpose of the Clear Creek Tunnel is to supply water from the Trinity River to the Central Valley. As a result of the tunneling, approximately 350,000 cubic yards of waste rock is stored at Whiskeytown NRA at the Crystal Creek Quarry site, which covers about 25 acres. The waste rock piles present a visitor safety and erosion hazard. Additionally, the unnatural terrain and lack of vegetation is not aesthetically pleasing. In the spring of 2008, the Regional Water Quality Control Board identified the site as a source of sediment to Crystal Creek and intends to issue a Clean-Up and Abatement Order to reduce sedimentation of Crystal Creek.

As part of the scoping process for the EA, we are sending this notice to solicit comments on the proposed actions. The scoping process will define the purpose, need, and objectives of the proposed actions as well as identify the issues associated with the project.

We look forward to public participation in this process and believe that it will help ensure that all resources are adequately considered and evaluated in the EA. The EA will be available for public review and comment when completed in late 2009.

Scoping comments can be sent to:

Superintendent
ATTN: AML/Restoration EA Comments
Whiskeytown National Recreation Area
P.O. Box 188
14412 Kennedy Memorial Drive
Whiskeytown, CA 96095-0188

NPS

**PROGRAMMATIC AGREEMENT
BETWEEN
THE NATIONAL PARK SERVICE
(U.S. DEPARTMENT OF THE INTERIOR) AND
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
MITIGATION OF PHYSICAL SAFETY HAZARDS AT
HISTORIC ABANDONED MINERAL LANDS
WITHIN THE NATIONAL PARKS IN CALIFORNIA**

WHEREAS, the National Park Service (NPS) proposes to complete 85 mine safety mitigation projects (the Undertaking) at park units within the State of California (including Mojave National Preserve, Death Valley National Park, Joshua Tree National Park, Point Reyes National Seashore, and Whiskeytown National Recreation Area) that may be funded under the American Recovery and Revitalization Act of 2009 with the intent of creating jobs for the American people; and

WHEREAS, the NPS has consulted with the California State Historic Preservation Officer (SHPO) pursuant to the 2008 Programmatic Agreement among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act; and,

WHEREAS, the operation, management, and administration of the National Park System entails undertakings that may affect historic properties (as defined in 36 CFR Part 800), which are therefore subject to review under Sections 106, 110(f), and 111(a) of the National Historic Preservation Act as amended (NHPA; 16 USC 470 *et seq.*) and the regulations of the Advisory Council on Historic Preservation (36 CFR Part 800); and,

WHEREAS, the signature and implementation of the 2008 Programmatic Agreement (PA) does not preclude park-, Region-, or project-specific memoranda of agreement (MOA) or programmatic agreements negotiated for Section 106 purposes between the NPS and the California State Historic Preservation Officer (SHPO); and

WHEREAS, the Department of the Interior's Office of Inspector General issued a Final Audit Report: Abandoned Mine Lands in the Department of the Interior dated July 24, 2008 that identified numerous physical safety hazards at Abandoned Mineral Land (AML) sites in National Park Service units that pose a threat to the public and Park staff; and,

WHEREAS, the NPS has a qualified staff of cultural resource specialists who meet, or are under the direct supervision of a person or persons who meet, at a minimum, the appropriate qualifications set forth in the Secretary of the Interior's *Professional Qualifications Standards* (48 FR 44738-39) to carry out programs for cultural resource management; and

WHEREAS, the purpose of this Programmatic Agreement (PA) is to establish a program for compliance with Section 106 of the NHPA and set forth a streamlined process when agreed upon criteria are met and procedures are followed in the installation of physical safety mitigation treatments at AML sites; and

WHEREAS, the National Park Service has established guidelines, standards, and technical information applicable to the treatment of these physical hazards in ways that will, to the extent possible, minimize the impacts of such treatments on the historic fabric and historic character of non-archaeological historic properties at these sites (see Attachment A); and,

WHEREAS, each of the National Park units listed above contain historic properties of religious or cultural significance to a specific set of federally designated American Indian tribes; and

WHEREAS, each of the National Park units listed above may contain historic properties of religious or cultural significance to a specific set of non-designated American Indian tribes or organizations; and

WHEREAS, each of the National Park units listed above and those others interested in following the procedures defined in this agreement therefore have consulted with the specific sets of federally designated tribes and non-designated tribes and organizations affiliated with those parks regarding this agreement in accordance with 36 C.F.R. subsection 800.14(f) and have invited them to concur in this agreement; and

WHEREAS, the NPS has consulted with the SHPO on ways to ensure that individual actions of the Undertaking provide for management of California National Parks' historic properties according to the intent of The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716), NPS Policies and Guidelines, and Section 106 of the NHPA;

NOW, THEREFORE, the National Park Service and the California State Historic Preservation Officer agree that should the NPS proceed with the Undertaking, the NPS will ensure that the following stipulations are implemented to satisfy the NPS's Section 106 responsibilities for all individual actions related to the Undertaking:

STIPULATIONS

The NPS shall ensure that the following measures are carried out:

1. Phasing of the Undertaking

The NPS expects to pursue the Undertaking in phases, wherein safety treatments may be installed at one to several mines at the same or multiple park units. The NPS will have met its obligations under this agreement if it fulfills the requirements listed herein for

each individual phase, independently of future phases. Prior to the initiation of each phase of the undertaking, the NPS shall determine the area of potential effects (APE) for that phase. The APE shall include all areas directly affected by construction, including but not limited to staging and borrow areas and access roads for each. Unless otherwise stated, references to the APE mean the specific APE for a given phase of the Undertaking. The APE for each phase of the Undertaking will be confined to previously disturbed areas to the fullest extent possible.

2. Public Involvement

Upon advance planning and development of a new phase of the Undertaking, the NPS shall seek input from the public pursuant to 36 CFR § 800.2(d)(3) through use of the NPS Planning, Environment, and Public Comment (PEPC) system. Both the public and each park's affiliated tribes have access to this system. The PEPC record for each phase of the undertaking will identify the nature and extent of the proposed project, its location, and the results of inventory survey, if any. Any sensitive information provided by affiliated tribes to NPS units regarding the Undertaking will be held in strict confidence.

3. Identification and Evaluation of Historic Properties

a. Historic Properties (non-archaeological)

Although many of the non-archaeological historic properties that are found at AML sites at NPS units in California have not been evaluated for their National Register of Historic Places (NRHP) eligibility, for purposes of this agreement, the NPS will not undertake full NRHP evaluations of these sites but shall treat all such properties as potentially eligible.

b. Archaeological Sites

Prior to initiation of each phase of the Undertaking, the NPS shall review its Archaeological Site Management Inventory System records for the presence of archaeological sites within the APE for that phase. Previously recorded sites within the APE will be protected in situ during construction through the use of exclusionary fencing or other measures. It is expected that few, if any, intact archaeological sites will be found within the APE of each phase of the Undertaking. If, however, the qualified cultural resources staff of any park determine that prior survey was inadequate to identify archaeological sites that may be present within the APE, the park will undertake that survey prior to initiation of construction and will protect any newly discovered sites in situ through exclusionary fencing or other suitable means.

c. Inadvertent Discoveries

If during construction an archaeological site is inadvertently discovered, construction shall be halted until a qualified NPS archaeologist has visited the site and determined how to best protect the cultural resources in situ. Where avoidance is not feasible,

treatment will be carried out in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation.

4. Assessment of Effects

- a. The NPS shall at all times seek to avoid adverse effects on historic properties through project designs that minimize impacts on historic fabric and on the visual character of the cultural landscape to the extent possible while mitigating physical hazards to the public.
- b. The standard mitigation treatments described in Attachment A to this agreement, due to their non-permanent and reversible nature, will be deemed to produce "No Adverse Effect" for purposes of this agreement.

5. Treatment of Adverse Effects

- a. As soon as the NPS determines that a required alternative safety treatment will have an unavoidable and irreversible adverse effect on one or more historic properties that phase of the Undertaking shall be suspended and the NPS shall immediately notify the SHPO of the precise nature of the adverse effect and why it could not be avoided. The SHPO shall be afforded a period of 15 days to respond to the park point of contact and enter into consultation on the issue. If the SHPO does not respond within that time period, the project will resume on the assumption that the SHPO has no interest in further consultation.
- b. Should any Native American burial sites, human remains, funerary objects, sacred objects, and/or objects of cultural patrimony be encountered, the NPS shall ensure they are treated with appropriate respect and according to federal law, including but not limited to the Native American Graves Protection and Repatriation Act (PL 101-601; hereinafter NAGPRA).

6. Installation and Documentation of Safety Mitigation Treatments

- a. Installation of Safety Mitigation Treatments to Minimize Impacts

It is the expressed intent of this PA that the NPS will manage both evaluated and unevaluated historic mining structures as potentially eligible for listing on the National Register of Historic Places (except in cases where the mines are unquestionably less than 50 years of age). As such, the NPS will make every effort to minimize impacts to historic fabric and visual intrusions into historic mining landscapes when safety mitigation measures are undertaken. The methodology of choice for providing for the safety of visitors and staff at abandoned mines over 50 years of age is the installation of reversible safety features that will produce the least noticeable change or modification to the site. Whenever mine closure devices are installed at mine openings, steps will be taken to minimize impacts to any historic fabric that may still be in place, including the

mine workings. Safety devices will ideally be worked into and around historic structures such that their visual presence is minimized to the extent possible.

b. Documentation of Safety Mitigation Treatments

Any mine opening or other area that will receive AML safety work will be thoroughly photo-documented before and after the work is completed. The photographs will illustrate the historic construction/engineering features and techniques of the treated portions of each site as well as provide an overview depicting the setting of each feature within the mine site. Any identified biological issues that should be addressed would also be recorded as part of the survey data. The site location will be digitally recorded in the park's AML database. Such recording will, at a minimum provide the site location on a digital 7.5 minute USGS topographic map.

7. Reporting Requirements

Each National Park Service unit with AML sites will submit an annual report to the California Historic Preservation Officer (SHPO) at the end of each calendar year regarding AML historic preservation treatments undertaken during that year. The report will at a minimum include overview and before and after photographs, a thorough discussion of the nature and extent of the work completed, a discussion of any archaeological sites found during survey of the APE and how they were protected, and a map showing the location of the site and the project APE. If no activity occurs, the NPS will submit a negative response letter report to the SHPO. No other consultation on the installation of the mine safety treatment between the SHPO and the park unit will be required given the understanding that, to the extent possible considering the need to provide for visitor and staff safety, impacts to historic fabric and the visual character of the sites will be kept to a minimum.

8. Resolving Objections

a. Should the SHPO, the Council, or the NPS object at any time, to the manner in which the terms of this PA are implemented, the NPS will immediately notify the SHPO and the Council, and request that SHPO and the Council submit comments on the objection within 30 days, and then proceed to consult with the SHPO and the Council for no more than 30 days to resolve the objection. The NPS will take any comments provided by the SHPO into account.

If the NPS determines that the objection can be resolved within the consultation period, the NPS may authorize the disputed action to proceed in accordance with the terms of such resolution.

b. If at the end of the 30 day consultation period, the NPS determines that the objection cannot be resolved through such consultation, the NPS will forward all documentation relevant to the objection to the Council per 36 CFR §800.2(b)(2). Any

comments provided by the Council within 30 days after its receipt of all relevant documentation will be taken into account by the NPS in reaching a final decision regarding the objection. The NPS will notify the SHPO, and the Council in writing of its final decision within 14 days after it is rendered. The NPS shall have the authority to make the final decision resolving the objection.

c. The NPS's responsibility to carry out all other actions under this PA that are not the subject of the objection will remain unchanged. The NPS may implement that portion of the Undertaking subject to objection under this stipulation after complying with subsection b. of this stipulation.

d. At any time during implementation of the terms of this PA, should an objection pertaining to the PA be raised by a member of the public, the NPS shall immediately notify the SHPO about the objection and take the objection into account. The SHPO and the Council may comment on the objection to the NPS. The NPS shall consult with the objecting party for no more than 30 days. Within 14 days following closure of consultation, the NPS will render a decision regarding the objection and notify all parties of its decision in writing. In reaching its final decision, the NPS will take into account all comments from the parties regarding the objection. The NPS shall have the authority to make the final decision resolving the objection. Any dispute pertaining to the NRIIP eligibility of historic properties or cultural resources covered by this PA will be addressed by the NPS per 36 CFR §800.4(c)(2).

9. Scope of Agreement

This Programmatic Agreement is limited in scope to those activities associated with the Undertaking and is entered into solely for that purpose. Nothing in this agreement shall limit an individual park from carrying out additional consultation with its affiliated tribes if the park or those tribes consider it necessary and choose to do so.

10. Amendments

Any party to this agreement may request that it be amended. The process of amending the agreement shall be the same as that exercised in creating the original agreement.

11. Failure to Carry Out the Agreement

In the event the NPS does not carry out the terms of this agreement, the NPS will comply with 36 CFR § 800.4 through 800.6 with regard to individual Undertakings covered by this agreement.

12. Review of the Agreement

a. On or before December 31 of each year until the NPS has completed its responsibilities under this programmatic agreement, the each NPS unit will prepare and provide to the SHPO an annual report describing how it is carrying out its

responsibilities. The park shall ensure that its annual report is made available for public and tribal inspection, that potentially interested members of the public and the park's affiliated tribes are made aware of its availability, and that interested members of the public are invited to provide comments to the SHPO as well as to the NPS. The SHPO may review the annual report and may provide comments to the individual parks and/or to Pacific West Regional Cultural Resources staff.

b. At the request of any party to this agreement, a meeting or meetings will be held to facilitate review and comment or to resolve questions.

c. The SHPO may monitor activities carried out pursuant to this agreement, and the ACHP will review such activities if so requested. The NPS shall cooperate with the SHPO in carrying out their monitoring and review responsibilities.

13. Termination

Any party to this agreement may terminate it by providing a 30 calendar day notice, excluding state and federal holidays, to the other parties provided that the parties will consult during the period prior to the termination to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the NPS will comply with 36 CFR § 800.4 through 800.6 for individual undertakings covered by this programmatic agreement.

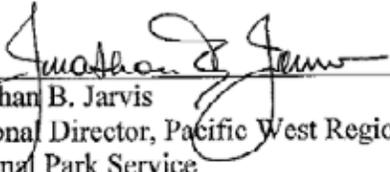
14. Expiration

This Programmatic Agreement will be null and void on September 30, 2015, unless extended by the written agreement of the parties hereto.

SIGNATORY PARTIES

Execution and implementation of this Programmatic Agreement evidences that the NPS has satisfied its Section 106 responsibilities for all individual Undertakings covered by this agreement.

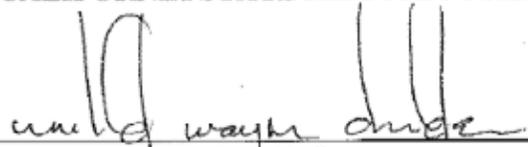
NATIONAL PARK SERVICE:



Jonathan B. Jarvis
Regional Director, Pacific West Region
National Park Service
Department of the Interior

Date: 8/11/09

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER:



M. Wayne Donaldson, FAIA
California State Historic Preservation Officer

Date: 18 AUG 2009



IN REPLY REFER TO:

WHIS L 76

March 03, 2010

Mr. M. Wayne Donaldson, FAIA
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento CA. 94296-0001

Dear Mr. Donaldson,

This letter initiates consultation on an undertaking as defined by the NHPA of 1966 (as amended) to be conducted at Whiskeytown National Recreation Area (NRA) in Shasta County, CA. Whiskeytown has received American Recovery and Reinvestment Act Funding to mitigate visitor safety and erosion hazards and restore the visual aesthetics of an area referred to as the Crystal Creek Quarry. The Crystal Creek Quarry site is located off Crystal Creek Road adjacent to Crystal Creek on the far west side of the Recreation Area (please see Maps 1 and 2) at UTM grid coordinates 0528057E and 4499923N.

The Crystal Creek Quarry area consists of a waste rock stockpile site created during the late 1950's and early 1960's by the construction of the Crystal Creek Diversion Tunnel (a 11.3 mile tunnel), connecting Lewiston Reservoir in the Trinity River watershed with Whiskeytown Lake in the Clear Creek watershed. The tunnel supplies water from the Trinity River to the Central Valley. The excavated material from the tunnel (approximately 350,000 cubic yards) was stockpiled on site covering almost 25 acres. The waste rock piles present a visitor safety and erosion hazard, and the unnatural terrain and lack of vegetation are not aesthetically pleasing. In the spring of 2008 the Regional Water Quality Control Board identified the site as a source of sediment to Crystal Creek and may issue a Clean-up and Abatement Order to reduce sedimentation of Crystal Creek.

The park proposes to rehabilitate Crystal Creek Quarry. The project would include some or all of the following treatments all of which will be conducted on the highly disturbed rock stockpile areas:

- Lower parking lot/stockpile area, pull materials back onto the site; remove and bury the concrete cap, and reduce the overall slope of materials that extends down to Crystal Creek.
- Existing helicopter landing area
 - Smooth existing mounded areas
 - Remove and dispose of on-site (bury) existing concrete foundation
- Remove exotic vegetation
- Revegetate using native plants
- Remove existing non-historic rock sorter
- Remove existing gate between upper and lower area
- Install a new gate to restrict vehicular traffic while allowing pedestrian and bicycle access



- Remove and replace an existing corrugated metal culvert approximately 5 ft. deeper than current configuration
- Relocate the Clear Creek Trailhead
- Construct a paved or gravel, 12 vehicle parking area, with ADA access
- Recontour eroded sections of the bank above Crystal Creek and harden drainage channels
- Round over bermed sections of bank above Crystal Creek to prevent future erosion

An intensive pedestrian cultural resources inventory of the 25 acre quarry and the adjacent 16 acre parcel was conducted on February 3, 2010 by Mojave National Preserve archaeologists Dr. Bob Bryson and David Nichols. The survey was conducted across the entire area in 5 meter transect intervals. Given the fact that the entire Area of Potential Effects lies on the Crystal Creek Diversion Tunnel waste rock piles, it was not surprising that no cultural resources were encountered during survey. The "negative findings report" and Archeological Clearance Survey Form for the inventory is enclosed. These waste rock piles are considerably deeper than any of the proposed recontouring to be done to control erosion at the site and thus any cultural resources which might underlie the waste rock will not be disturbed. Given the nature of the deposits and the results of the survey, the park has concluded that the proposed project will have no affect on cultural resources. We ask that you concur with that determination.

If you have questions about this project please contact the Pacific West Region's Abandoned Mine Lands Program Manager Bob Bryson at 760-352-6145 or by e-mail at robert_bryson@nps.gov.

Sincerely,



Superintendent *acting*
Whiskeytown National Recreation Area

Enclosures:

I Concur:

California State Historic Preservation Officer

Date

cc:
Barbara Murphy, Chairperson
Redding Rancheria Tribal Council
2000 Redding Rancheria Road
Redding, CA 96001

REFERENCES



United States Department of the Interior

NATIONAL PARK SERVICE

WHISKEYTOWN NATIONAL RECREATION AREA

WHISKEYTOWN-SHASTA-TRINITY NATIONAL RECREATION AREA

www.nps.gov/whis

IN REPLY REFER TO:

P.O. BOX 188 WHISKEYTOWN, CA 96095-0188

N1621

May 29, 2009

Barbara Murphy, Chairperson
Redding Rancheria Tribal Council
Redding Rancheria
2000 Redding Rancheria Road
Redding, CA 96001

Dear Mrs. Murphy,

The purpose of this letter is to initiate consultation with your Tribe in accordance with the National Historic Preservation Act of 1966, as amended (NHPA), regarding the enclosed draft "Programmatic Agreement between the National Park Service (US Department of the Interior) and the California State Historic Preservation Officer Regarding Mitigation of Physical Safety Hazards at Historic Abandoned Mineral Lands within The National Parks In California." and the proposed undertaking to install safety treatments at abandoned mine sites within Whiskeytown National Recreation Area. The purpose of the Programmatic Agreement (PA) is to establish a streamlined process for the National Park Service (NPS) to meet its NHPA Section 106 requirements for abandoned mine land (AML) safety projects funded through the American Recovery and Reinvestment Act.

The PA has been developed in consultation with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). The undertaking includes installation of gates and restoration activities to reduce safety hazards to the public that exist at historic abandoned mine and quarry sites. The attached document, "A Plan to Minimize the Impacts of Physical Safety Hazard Mitigation Treatments at Abandoned Historic Mines" (Work Plan), provides descriptions of the types of mine hazards that need to be treated and the types of closures that may be installed to improve public safety. The work plan also discusses how mine closures can be designed to provide for continued use of the openings by wildlife (principally bats) and minimize impacts to these historic sites and the cultural resources that

may be found near them. A list of the specific sites that are included in the project and brief descriptions of what we plan to do to improve public safety at the dangerous features found at each site are also provided for your review and comment.

We at Whiskeytown National Recreation Area would greatly appreciate your Tribe's review and comment on the draft PA and the Work Plan. Each National Park within California with proposed mine safety treatment projects is consulting with American Indian tribes culturally affiliated with their park lands concerning the PA and the Work Plan, simultaneous with this consultation. Tribal comments received by each park will be compiled and submitted for consideration and integrated into the final PA and Work Plan as appropriate. In the event of conflicting comments, consultation will continue to reach resolution. A final copy of the executed PA along with a copy of the Work Plan will be sent to your Tribe for your information and use.

To keep the project on schedule, we respectfully request your Tribe's review and comment on the PA and the proposed Work Plan within 30 days of receipt. We are available to meet with the Tribe to discuss the PA and proposed undertaking at a time and location convenient to your Tribe. Should you have questions or comments concerning the PA or the proposed undertakings described in the Work Plan, or would like to schedule a meeting, please contact Russ Weatherbee, Wildlife Biologist at (530) 242-3442. We look forward to working with you on this important health and life safety project.

Sincerely,

Jim F. Milestone
Superintendent

REFERENCES



IN REPLY REFER TO:
N1621

United States Department of the Interior

NATIONAL PARK SERVICE
WHISKEYTOWN NATIONAL RECREATION AREA
WHISKEYTOWN-SHASTA-TRINITY NATIONAL RECREATION AREA
P.O. BOX 188 WHISKEYTOWN, CA 96095-0188



www.nps.gov/wtk

March 4, 2010

Barbara Murphy, Chairperson
Redding Rancheria Tribal Council
Redding Rancheria
2000 Redding Rancheria Road
Redding, CA 96001

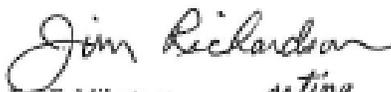
Dear Mrs. Murphy,

The purpose of this letter is to provide you with a courtesy copy of the signed "Programmatic Agreement between the National Park Service (US Department of the Interior) and the California State Historic Preservation Officer Regarding Mitigation of Physical Safety Hazards at Historic Abandoned Mineral Lands within The National Parks In California."

The PA was developed in consultation with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). We previously sought your Tribe's review and comment on a draft of the PA (May 29, 2009). The undertaking includes installation of gates and restoration activities to reduce safety hazards to the public that exist at historic abandoned mine and quarry sites.

We are available to meet with the Tribe to discuss the PA and proposed undertaking at a time and location convenient to your Tribe. Should you have questions or comments concerning the PA or the proposed undertakings, or would like to schedule a meeting, please contact Russ Weatherbee, Wildlife Biologist at (530) 242-3442. We look forward to working with you on this important health and life safety project.

Sincerely,


for Jim F. Milestone *acting*
Superintendent

Enclosure: Signed Programmatic Agreement

Appendix C

Photographs of Crystal Creek Quarry Site

Photographs of Current Conditions at Crystal Creek Quarry Site.



Photo 1. Lower access off Crystal Creek Road, metal debris pile.



Photo 2. Stockpile with remnants of concrete cap.



Photo 3. Upper existing parking lot and gate access to trail.



Photo 4. Upper area; trail (also serves as road to Bureau of Reclamation) to Crystal Creek Falls.



Photo 5. Erosion and drainage channel/gully with exposed culvert.



Photo 6. Center drainage channel.



Photo 7. Culvert at center drainage channel/gully.



Photo 8. Rock sorter located in the north central area of the site.



Photo 9. Steep slope to Crystal Creek on eastern edge of site.



Photo 10. Upper area, north of existing upper parking area, looking north.



Photo 11. Upper area.



Photo 12. Eastern edge of site with steep slope.



As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.

NPS 611/101091 March 2010

United States Department of the Interior ⇨ National Park Service