U.S. Department of the Interior
National Park Service

Great Basin National Park
Nevada

Strawberry Creek Restoration Project
Final Environmental Assessment
September 2021





Cover photo: Clockwise from upper right – stands of native wildrye mixed with nonnative cheatgrass; Bonneville cutthroat trout; channel incision in Strawberry Creek; Canada thistle; and silvery lupine in flower two months after the Strawberry Fire. NPS photos.

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ABBREVIATIONS AND ACRONYMS

ARPA – Archaeological Resources Protection Act
BAR – Burned Area Rehabilitation
BLM – Bureau of Land Management
DOI – Department of Interior
EA – Environmental Assessment
GAWS – General Aquatic Wildlife System
GMP – General Management Plan
GRBA – Great Basin National Park
IPM – Integrated Pest Management
IPMT – Invasive Plant Management Team
LWD – large woody debris
MBTA – Migratory Bird Treaty Act
NAGPRA – Native American Graves Protection and Repatriation Act
NDOW – Nevada Department of Wildlife
NEPA – National Environmental Preservation Act
NHPA – National Historic Policy Act
NPS – National Park Service
NRCS – Natural Resources Conservation Service
NRHP – National Register of Historic Places
PALS – post-assisted log structure
SHPO – State Historic Preservation Office
SNPLMA – Southern Nevada Public Lands Management Act
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
USGS – United States Geologic Survey

CHAPTER 1: PURPOSE AND NEED

1.1 Introduction

Great Basin National Park proposes to implement restoration actions that support the post-fire recovery of native vegetation and fish habitat, control invasive plant species, and maintain or restore fluvial processes in the Strawberry Creek watershed.

The Strawberry Creek watershed lies in the northeast corner of Great Basin National Park (Figure 1). The watershed is approximately 2,800 acres and contains Strawberry Creek, a small, high gradient, perennial stream, that is fed by winter snowpack, a tributary called Blue Canyon, and numerous springs and seeps. Total stream length within the park is 3.9 miles and stream gradient ranges from five to almost 12 percent. Elevation of the project area ranges from 6,800 to 8,900 feet. The watershed supports numerous wildlife species; elk, mule deer, Bonneville cutthroat trout (BCT), Northern goshawk, bats, and sagebrush obligates like yellow-bellied marmots and sagebrush voles. The watershed also supports an array of native vegetation typical of the Great Basin. A mix of vegetation types are found in the project area with distinct differences in species composition and cover between north and south facing slopes and different soil types. Soil parent materials are dominated by colluvium derived from granite and quartzite with most typical soil profiles dominated by mixtures of very coarse sandy loams, very gravelly loams, very stony loams, and very cobbly loams. Several wetland areas were mapped in the project area through the U.S. Fish and Wildlife Service National Wetlands Inventory (USFWS 2021).

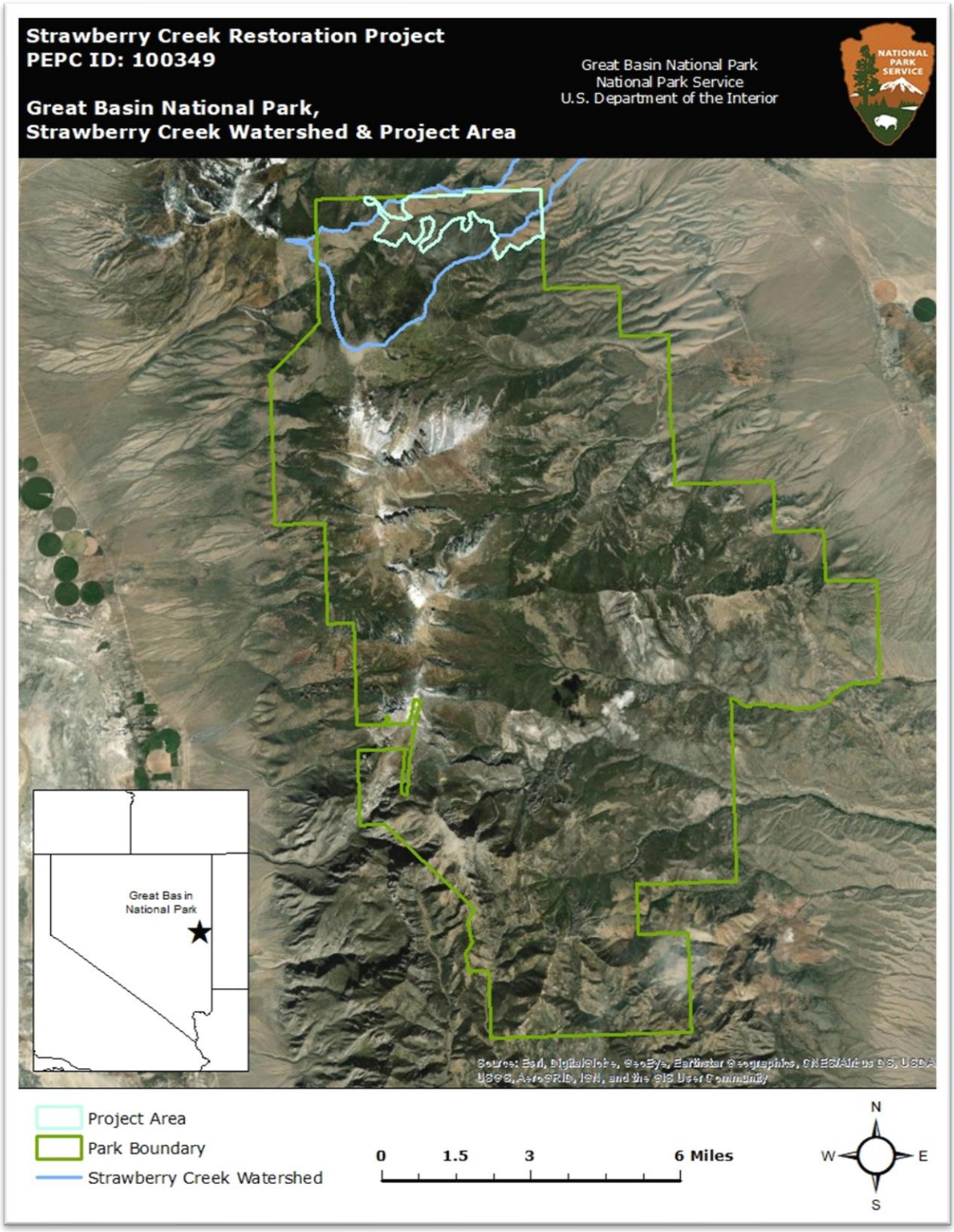

Figure 1. Location of Great Basin National Park (green) in east-central Nevada, Strawberry Creek watershed (light blue) and the Strawberry Creek Restoration Project area (seafoam green).

Habitat types in the watershed include sagebrush steppe, pinyon-juniper woodland, mahogany woodland, aspen forest, aspen-mixed conifer forest, montane riparian habitat, wet meadows, and alpine. Strawberry Creek has known populations of invasive forbs that are surveyed and treated annually. Cheatgrass, an annual invasive grass, is also present, mostly below 8,000 feet, with the highest densities found on south-facing slopes.

In 2016, the Strawberry Fire burned over 4,500 acres; 2,790 acres were on NPS-administered lands within the watershed. The lightning-ignited fire was reported on August 8, 2016 in upper Strawberry Creek. Aided by strong winds, the fire quickly grew, burning a large portion of the canyon and pushing the fire downstream onto BLM and private lands. The fire was declared controlled on August 23, 2016. The fire heavily impacted the middle elevations of Strawberry Creek, completely consuming riparian vegetation and reducing the Strawberry Creek population of BCT to 15% of what it was before the fire (Great Basin National Park, unpublished data, 2016). The fire also had significant impacts on soils and on sagebrush steppe, pinyon-juniper, aspen, mahogany and wet meadow habitat types.

Post-fire, park staff prepared a Burned Area Rehabilitation (BAR) plan to address and mitigate natural resource issues created or exacerbated by the fire. BAR plan resource management objectives were to prevent the establishment of invasive plants to enable the restoration and establishment of a healthy, stable ecosystem and revegetate lands unlikely to recover naturally post-fire. Restoration actions including seeding, invasive plant survey and treatment, and planting of Ponderosa pine were completed over three years, 2017-2019. Restoration objectives, except for planting Ponderosa pine, were largely successful in the higher elevations and north facing slopes. However, additional restoration is needed at lower elevations to address current stream and vegetation conditions.

Populations of BCT and instream habitat have not recovered since the fire. Strawberry Creek lacks the needed channel diversity, streambank vegetation, and nutrients for fish populations to fully recover. Areas of incision are now common along Strawberry Creek which negatively affects floodplain connectivity and impacts riparian vegetation and wetlands found within and along the riparian corridor. Infestations of invasive plants, including noxious weeds listed by the state of Nevada, were exacerbated by the fire and are still present in the watershed. Cheatgrass, present in the watershed before the fire, will continue to be a management challenge at the lower elevations and on south facing slopes. Native vegetation is recovering but is being impacted by invasive plant populations, including cheatgrass. Recovery of native vegetation takes time and can be slowed by climate and annual variation in precipitation. Seeding and planting treatments would promote the establishment and persistence of native, upland vegetation, increase resilience to future disturbances, and improve resistance to invasion by nonnative plants.

In 2020, the park received funding through the Bureau of Land Management SNPLMA (Southern Nevada Public Land Management Act) program to implement the Strawberry Creek Restoration Project. This project was developed to address post-fire conditions that continue to impact resources within the Strawberry Fire perimeter.

1.2 Purpose and Need for the Project

The National Park Service proposes to implement actions that would reestablish natural fluvial processes and support the post-fire recovery of native flora and fauna in the Strawberry Creek watershed. Although most communities in the Great Basin evolved with fire, watershed-level effects from the Strawberry Fire are still impacting stream condition, fish habitat, and the condition and extent of native upland and riparian vegetation.

Five years post-fire, native vegetation is still recovering with full recovery expected to take decades. Riparian areas suffered the highest burn severities but have started to recover with fire and disturbance adapted species (e.g., aspen and willow) regenerating at a faster rate. Without the establishment and persistence of native plant communities, accelerated soil loss, increased fire potential, loss of wildlife habitat, and increases in nonnative species will impact stream conditions, wildlife, and plant diversity. Invasive plant populations continue to persist in Strawberry Creek with additional populations and new species detected post-fire. Soil disturbance from areas of high burn severity created optimum conditions for establishment of invasive plants. Infestations will continue to spread without active management, altering native plant communities and limiting forage for wildlife. Ongoing impacts to stream condition (channel incision, lack of structural diversity, downcutting and loss of floodplain connectivity) degrade fish habitat and negatively impact limited riparian vegetation. Impacts to fish, fish habitat and riparian vegetation will continue or worsen if restoration actions are not implemented.

National Park Service policy directs parks to reestablish natural functions and processes and restore biological and physical resources to accelerate the recovery of landscape and biological structure and function (NPS 2006). By completing this project, the park would meet these directives and the post-fire restoration objectives outlined below.

1.3 Project Goals and Objectives

The goals of the project are to support the post-fire recovery of riparian vegetation and fish habitat in the watershed, promote the persistence and establishment of native vegetation, limit the impacts of invasive plants, and restore stream function and condition. Restoration actions, maintenance of restoration actions, monitoring and follow-up treatments are expected to occur over the next ten years.

Project objectives are as follows:

- Slow or reverse channel incision.
- Reestablish connectivity between the stream and floodplain.
- Maintain or restore the extent and condition of riparian vegetation.
- Assist in the post-fire recovery of habitat for Bonneville cutthroat trout.
- Control the spread of nonnative species and eliminate invasive plant populations where possible.
- Promote the establishment and persistence of native vegetation.

- Monitor restoration treatments for their effectiveness.
- Maintain stream restoration treatments.
- Monitor fish populations, stream flow, channel morphology, vegetation recovery, and changes in invasive plant populations.

1.4 Related Laws, Legislation, and Management Guidelines

The Strawberry Creek Restoration Project is consistent with the park's enabling legislation, the Great Basin National Park Act of 1986, as well as park management documents:

- Great Basin National Park General Management Plan (1991)
- Great Basin National Park Resource Management Plan (1999)
- Great Basin National Park Invasive Plant Management Plan (2014)
- Great Basin National Park Foundation Document (2015)

Additionally, this project is consistent with NPS and federal policy including:

- Executive Order 13571: Safeguarding the Nation from the Impacts of Invasive Species (2016)
- NPS Management Policies (2006)
- NPS Directors Order #77-1: Wetland Protection (2002)
- NPS Directors Order #77-2: Floodplain Management (2003)
- National Parks Omnibus Management Act (1998)
- Native American Graves Protection and Repatriation Act (1990) (NAGPRA)
- The Archaeological Resources Protection Act (1979) (ARPA)
- Clean Water Act (1972)
- Federal Environmental Pesticide Control Act (1972)
- National Environmental Policy Act (1970) (NEPA)
- National Historic Preservation Act (1966) (NHPA)
- Federal Insecticide Fungicide and Rodenticide Act (1947) (FIFRA)
- The Migratory Bird Treaty Act (1918) (MBTA)
- National Park Service Organic Act (1916)

CHAPTER 2: ALTERNATIVES

This chapter discusses two alternatives, the Proposed Action Alternative and the No Action Alternative, as well as alternatives considered but dismissed. The Proposed Action was developed by an interdisciplinary team of park staff, NPS Water Resource Division staff, and modified in response to agency and public scoping comments.

2.1 Alternative 1 –Proposed Action (Preferred Alternative)

The Proposed Action would use three habitat restoration strategies: stream restoration treatments, revegetation treatments, and invasive plant management. Monitoring each of the strategies is also included in the Proposed Action. Each restoration strategy has a defined project area that falls within the larger project area or area of potential effect. The Proposed Action covers 1,654 acres in total (Figure 2). Restoration actions would be implemented over the next ten years.

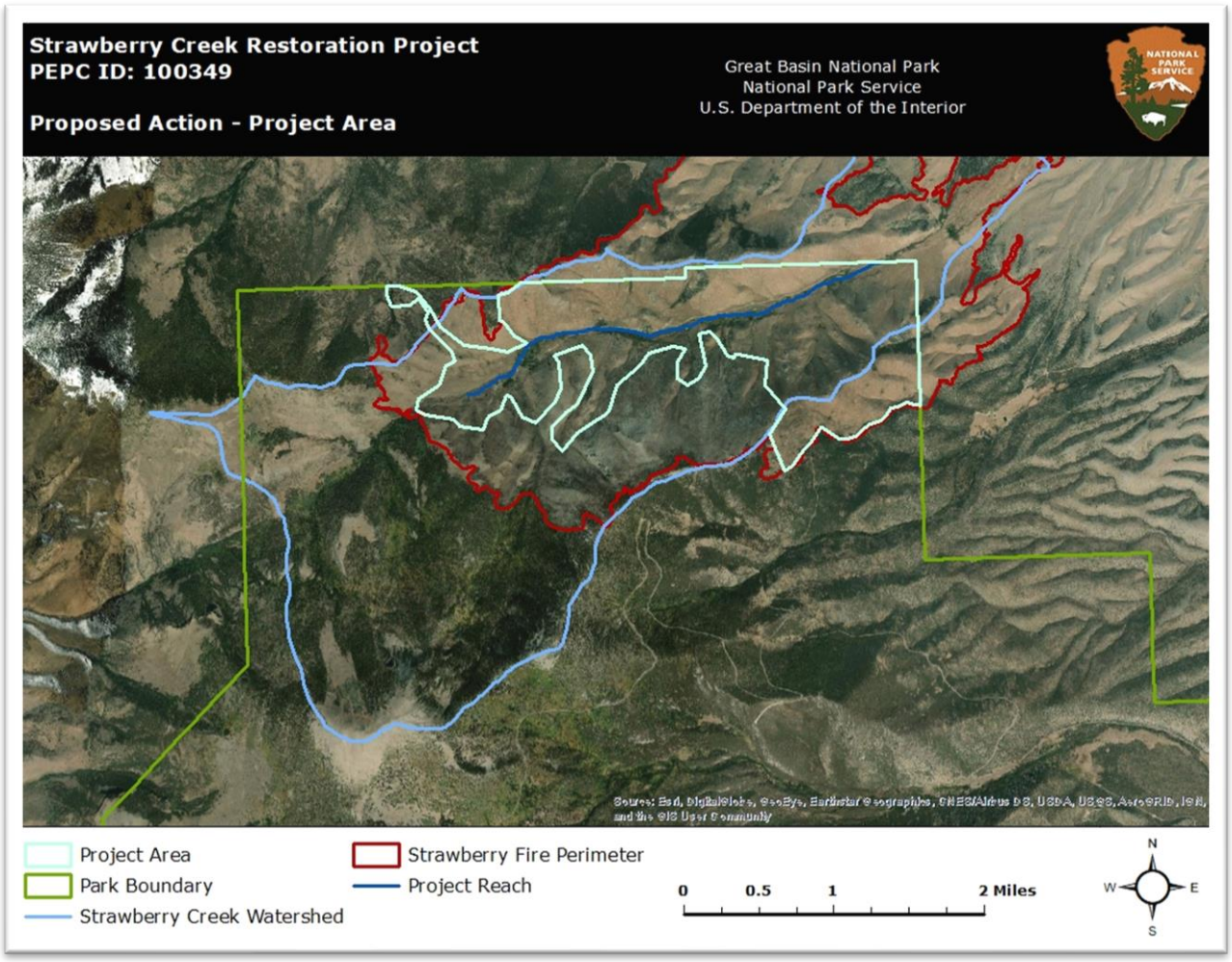

Figure 2. The Strawberry Creek watershed (light blue) with the Strawberry Fire perimeter (red), project area (seafoam green), and project stream reach (dark blue line).

2.1.1 Stream Restoration

The park proposes to implement two types of instream treatments to meet stream restoration objectives: 1) post-assisted log structures (PALS, Wheaton et al. 2019) (Figure 3) and 2) incorporation of large woody debris (LWD). Both are temporary, low-tech, and 'process based' meaning they are not highly engineered or costly and rely on fluvial processes such as variable stream flows, sediment transport, and bank erosion to promote a dynamic and naturally functioning stream.

Post-assisted log structures consist of untreated wooden posts driven into the streambed with local material such as boughs, limbs, and sticks woven in between them as well as existing instream cobbles and rocks placed against the posts. Posts up to four inches in diameter would be installed in the stream channel with a hand-operated hydraulic or air post pounder. No heavy equipment would be used for installation, only hand tools. Each post-assisted log structure would have three to fifteen posts depending on channel geometry. Final post height would depend on the depth posts are driven, depth of the stream channel, and height of the streambank. Large woody debris incorporation consists of local woody material (large stumps, logs or boles of pinyon pine, Utah juniper, water birch, white fir, or aspen) strategically placed in the stream. The width of PALS and LWD would vary depending on type, stream gradient, and stream width.

Local materials would be gathered on site from dead and downed vegetation or cut with chainsaws and hand tools. Thousands of dead and downed trees are available near the stream because of the Strawberry Fire. Both PALS and incorporation of LWD would increase channel diversity, reintroduce nutrients into the aquatic system, and facilitate natural fluvial processes greatly diminished since the fire.

Figure 3. Two examples of post-assisted log structures or PALS (Wheaton et al. 2019).

Stream restoration treatments would be limited to a 3-mile project reach along Strawberry Creek between the park boundary and 0.3 miles upstream of the Strawberry Creek Trailhead (Figure 4). All actions will occur in the riverine wetland between the tops of the banks of the creek, within the natural channel. The park would select multiple 100-m treatment reaches within the 3-mile project reach to install PALS and LWD. Multiple PALS would be installed within each 100-m treatment reach to be compatible with the linear nature of streams and to provide redundancy. Treatment reaches would be selected each year based on their level of channel incision, lack of structural diversity, and potential loss of floodplain connectivity. A maximum of 350 PALS would be installed over the life of the project.

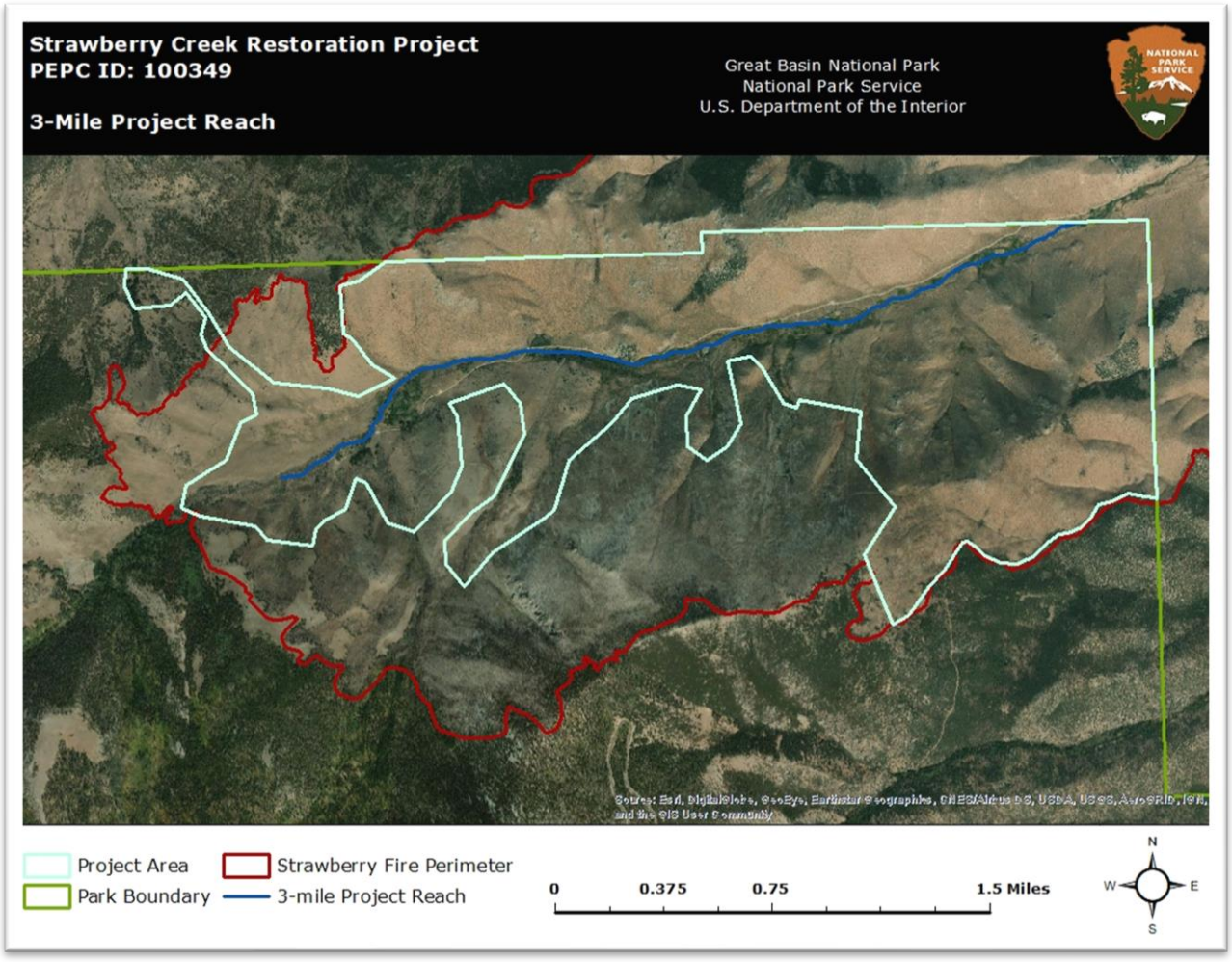

Figure 4. The 3-mile project reach (blue line) within the Strawberry Creek Restoration Project area (seafoam green).

The exact location and size of each post-assisted log structure would depend on site conditions (width and height of channel), desired outcome for that location or treatment reach, and availability of local material. Large woody debris would be added as needed along the entire project reach. There would be sections within the 3-mile project reach where no treatment actions would be implemented because these sections are adequately functioning reaches, have incompatible gradient or geomorphic constraints, or contain cultural resources. Installations would be completed in phases focusing on at least one treatment reach per year. Installations could occur throughout the year when road and site conditions allow safe access and mitigation measures are met (Appendix 1).

In high gradient streams like Strawberry Creek, the effect of a single post-assisted log structure only extends tens of feet along the stream channel. Future runoff and resulting channel effects are unknown so utilizing multiple structures with different designs adds strength and provides redundancy. A rigid, pre-determined design is not recommended because small details (e.g., availability of local material) would influence field-adapted design decisions. Further, desirable

future locations for installations would likely change as the stream channel evolves after annual runoff and high flow events. Selecting and analyzing the entire 3-mile project reach provides needed flexibility for changing site conditions and future site selection. Final decisions on placement within each treatment reach would be made in the field with input from subject matter experts and experienced practitioners while avoiding any sensitive cultural or natural resources or recreation infrastructure.

The proposed stream restoration treatments were developed in collaboration with NPS Water Resources Division staff and a subject matter expert practitioner from Utah State University. The approach is considered low risk because it would be low cost, easily implemented, adaptable, uses natural materials, mimics natural processes, and poses little risk to existing infrastructure (Wheaton et al. 2019). The project reach and potential treatment reaches were identified through site visits and modeling of valley bottom, stream gradient, areas of existing channel incision, wetland delineation data, and riparian vegetation presence and condition.

2.1.2 Native Plant Revegetation

Revegetation treatments would focus on upland habitat types. Revegetation would be accomplished through aerial seeding, hand seeding, and planting of native, upland species. The park would utilize a native seed mix composed of shrubs, grasses, and forbs that is tailored to site conditions and similar to the seed mix successfully used as part of the Strawberry Fire BAR plan (Table 1). Riparian habitat would not be targeted with upland seed mixes. Locally adapted seed and plant material would be used whenever possible. Only native species would be used, and only seed that has undergone and passed recent purity and viability tests would be accepted.

Table 1. Seeded species from Burned Area Rehabilitation (BAR) Plan used within the Strawberry Fire perimeter. Other native species may be considered for seeding under the Proposed Action based on availability and local suitability to match soil and vegetation types.

Common Name	**Species Name**
basin wildrye	*Leymus cinereus*
bluebunch wheatgrass	*Pseudoroegneria spicata*
Sandberg bluegrass	*Poa secunda*
Indian ricegrass	*Achnetherum hymenoides*
bottlebrush squirreltail	*Elymus elymoides*
needle threadgrass	*Hesperostipa comata*
muttongrass	*Poa fendleriana*
mountain big sagebrush	*Artemisia tridentata* spp. *vaseyana*
redroot buckwheat	*Eriogonum racemosum*
arrowleaf balsamroot	*Balsamorhiza sagittata*
Palmer’s penstemon	*Penstemon palmeri*
firecracker penstemon	*Penstemon eatonii*

Aerial seeding would be completed through a contract on up to 1,060 acres within the fire perimeter focusing on elevations below 8,600 feet, south facing slopes and excluding riparian habitat. Hand seeding and planting would be completed on up to 200 acres in the valley bottom where vegetation condition, soils and terrain warrant, and limitations on ground disturbance allow (Figure 5). The park anticipates aerial seeding would occur in 2022 with a second aerial seeding in 2023. Revegetation treatments would promote the establishment and persistence of native, upland vegetation, increase resilience to future disturbances and improve resistance to invasion by nonnative plants.

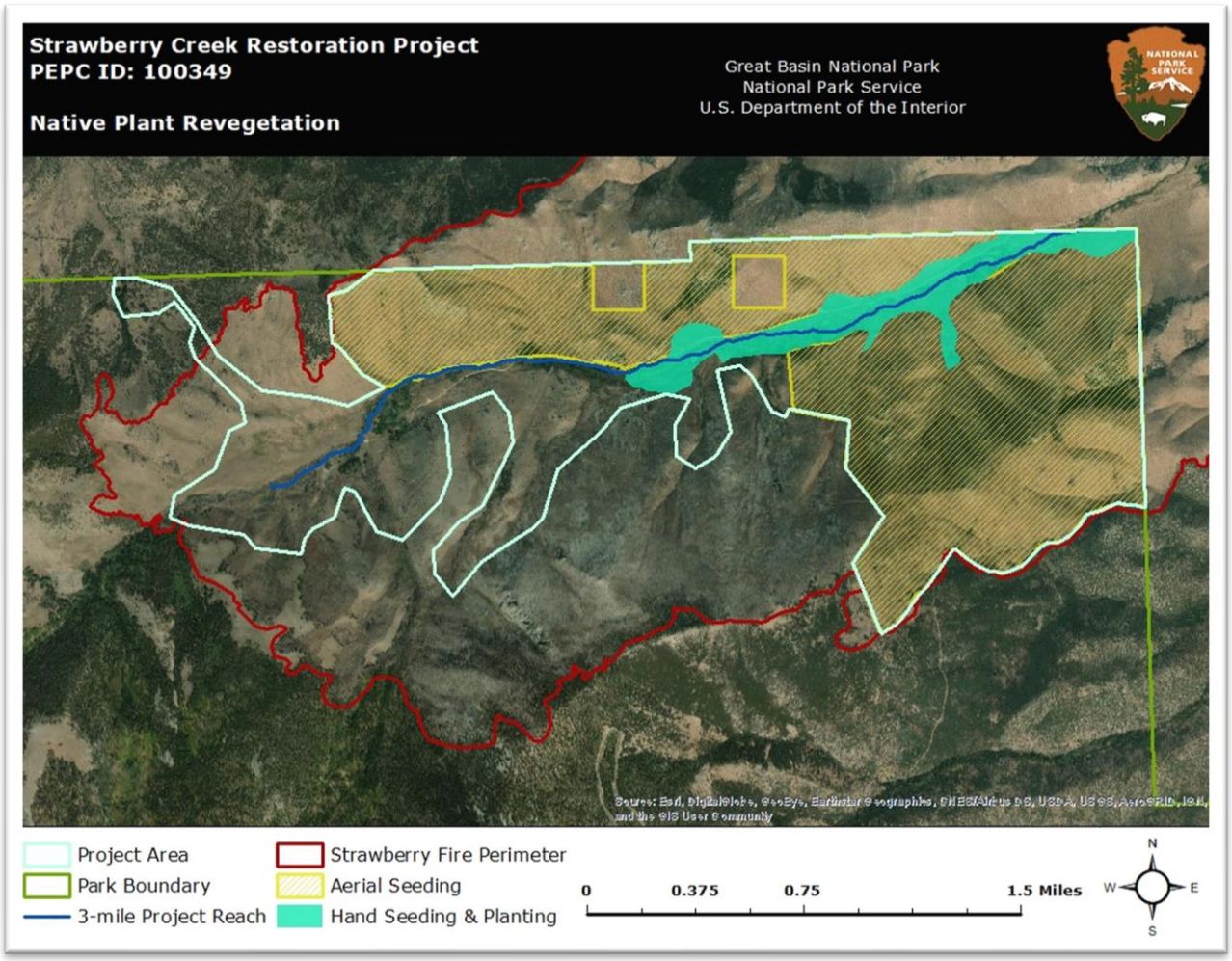

Figure 5. Proposed areas for aerial seeding (yellow) and hand seeding and planting (turquoise).

The proposed seeding areas were selected to promote the establishment and persistence of upland vegetation, decrease erosion and soil loss, help stabilize cultural resources and control the spread of annual grass. The species selected for revegetation treatments would be chosen based on Natural Resources Conservation Service ecological site guides (Major Land Resource Area 028A, available https://edit.jornada.nmsu.edu/catalogs/esd/028A), soils, local knowledge of plant composition pre-fire, and vegetation surveys from plots established pre-fire.

2.1.3 Invasive Plant Management

All invasive plant management actions outlined in the Proposed Action are covered in the 2014 Great Basin National Park Invasive Plant Management Plan (GRBA IPM Plan), EA, and FONSI (ParkPlanning - Invasive Plant Management Plan (nps.gov).

Invasive plant management would include survey and treatment of target invasive forbs and annual grass following an integrated pest management approach (GRBA IPM Plan 2014, pgs. 7,10, and 21). 720 acres would be targeted for survey (Figure 6). Known infestations of bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), whitetop (*Cardaria draba*), houndstongue (*Cynoglossum officinale*), spotted knapweed (*Centaurea stoebe*), and sow thistle (*Sonchus sp.*) would be treated. Novel invasive plant species or invasive plant populations would also be treated. Treatment methods would include manual (physical) treatments (seed head removal, grubbing or pulling) and chemical treatments of herbicide applied by backpack sprayer (GRBA IPM Plan 2014, pg. 22-23). Cheatgrass (*Bromus tectorum*) is ubiquitous in many areas of Strawberry Fire perimeter, especially south facing slopes below 8,000 feet. The park would perform targeted herbicide treatments for cheatgrass focused on reducing fine fuels and supporting establishment and persistence of native vegetation. If a biological control became available to effectively treat any invasive species, the park would obtain the necessary approvals and create a treatment plan before use (GRBA IPM Plan 2014, pg. 23).

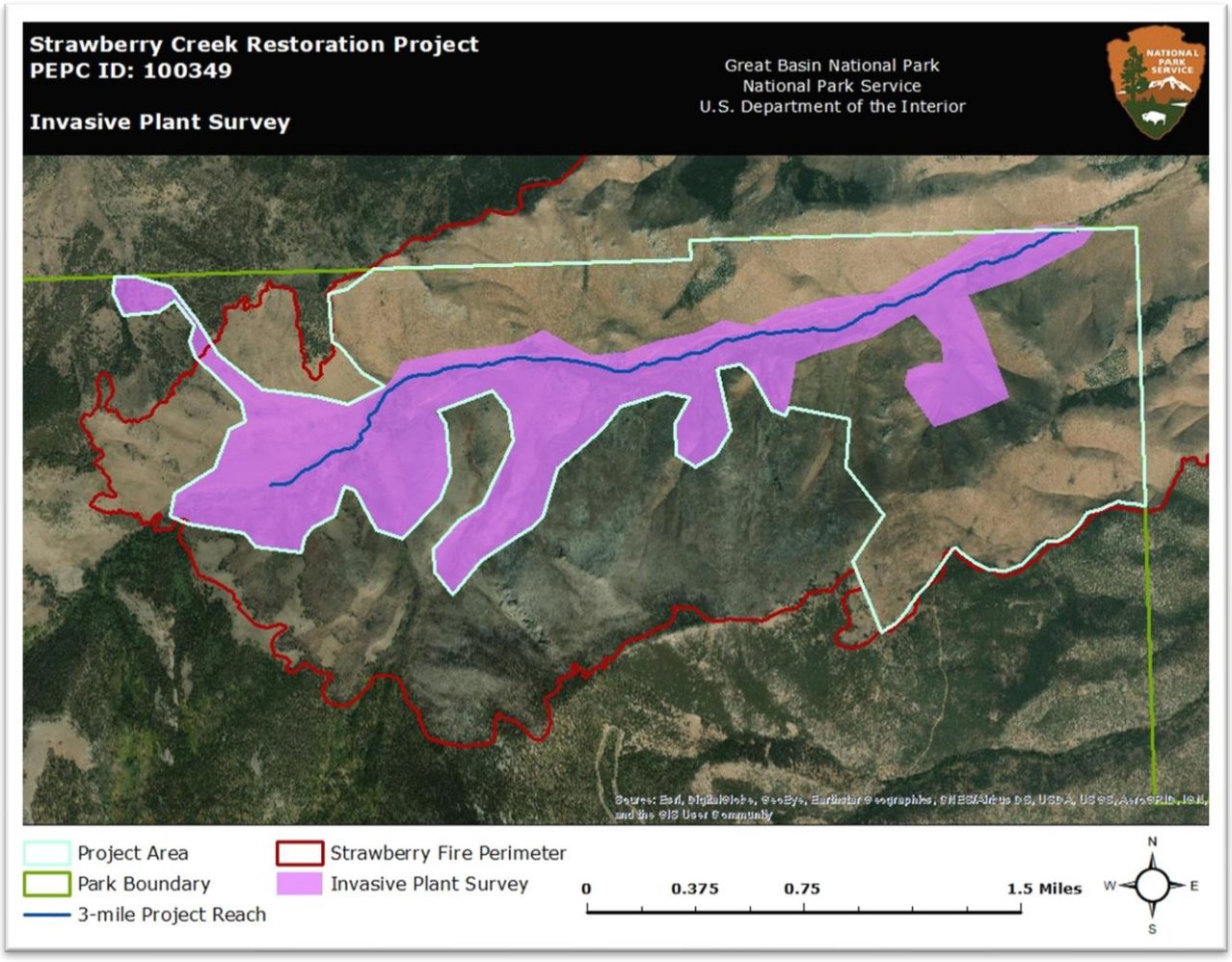

Figure 6. Proposed area for invasive plant survey (purple). Infestations of target invasive species and Nevada noxious weeds encountered during survey would be treated.

Annual treatments would be required to reduce or eliminate infestations of target species. Selection of treatment method would be based on location and phenology of target species. Areas of invasive plant survey and treatment would be documented with GPS and archived in a spatial database.

Survey and treatment would be conducted by experienced park staff or NPS Invasive Plant Management Teams (IPMT) supervised by a licensed and certified, non-commercial pesticide applicator. All NPS pesticide reporting and application requirements (e.g., strict adherence to label instructions) would be followed. Our proposed survey and treatment areas were selected using legacy invasive plant treatment data (2015 to present) and knowledge of current site conditions.

2.1.4 Monitoring and Adaptive Management

The park would conduct monitoring for each of our habitat restoration strategies to determine their effectiveness and need for adaptive management.

Stream Restoration

The park would GPS each instream structure and record categorical and quantitative descriptions of each. Categorical descriptions would include the type of structure (PALS or LWD), its anticipated geomorphic impact (e.g., increase lateral mobility, raise channel bed, promote overbank flow), and any evidence of recent overbank flow, aggradation, or degradation at that location. Quantitative descriptions would include height, width, number of vertical posts, and size of LWD.

The park would plan to monitor channel cross-sections within each treatment reach to detect annual geomorphic changes associated with each structure type and its relative location. Rebar would be placed at each cross-section endpoint, which would be removed at the end of the project. A sag-tape assessment or similar method would be used to measure ground surface elevation changes across the cross-section. We would also collect channel measurements including height, width, and clast size immediately upstream and downstream of the structure. Paired photo points would be installed (GPS location, semi-permanent marker that would be removed at the end of the project) for each post-assisted log structure to document initial placement and design, upstream and downstream conditions and qualitatively monitor future changes.

The effects of each structure type would be evaluated starting in year 2. Results would guide future design decisions and maintenance. Subject matter experts would be consulted to finalize monitoring and adaptive management approaches.

Stream flow measurements would be collected at two locations: 1) the established stream gage location at the NPS boundary and 2) above the top (upstream end) of the 3-mile project reach. Measurements would be taken between four and 12 times per year at these two locations. All measurements would be instantaneous wading measurements using a top-set wading rod, Price pygmy meter and the 0.6-depth methodology outlined in Discharge Measurements at Gaging Stations (Turnipseed and Sauer 2010).

Annual fish population surveys would be completed at up to nine previously established sites to document presence, abundance, and reproduction of Bonneville cutthroat trout. Surveys would follow standard three-pass depletion methodology utilizing a backpack electrofisher with at least two dip netters and upper and lower block nets installed. Each surveyed reach would be 50 meters long. General Aquatic Wildlife Systems (GAWS) habitat surveys would be completed at these same nine sites approximately once every five to ten years. No additional equipment, structures or objects would be installed at survey locations.

Stream temperature would be monitored by installing thirteen temperature loggers (HOBO Pendent® Data Logger or similar) every 0.25 miles along the project reach and at the upper gaging station. Installation would consist of hammering a cement stake into the streambed and

then attaching the logger to the stake with wire or parachute cord. The loggers would be submerged in flowing water and record water temperature every hour or as often as battery life allows. Temperature loggers would be inspected and downloaded at least four times per year and ideally after every high flow event. Any loggers found out of the water due to channel migration or buried in sediment would be reinstalled as close to their original location as possible. All cement stakes and temperature loggers would be removed at the end of the project.

Local climate variables (e.g., precipitation, air temperature) would be monitored at a minimum of two sites within the project reach using stand-alone, automated rain gages or data loggers capable of onboard data storage. Installation would consist of driving a t-post into the ground to attach the data logger. Precipitation loggers would be inspected and downloaded at least four times per year. T-posts and loggers would be removed at the end of the project.

Native Plant Revegetation

The establishment and persistence of native vegetation and seeded species would be documented through vegetation surveys. Thirty-seven vegetation plots were established within the project area in 2015 and 2017 with a semi-permanent marker installed at each plot center. Plots or a subset of plots would be sampled at least two times over the life of the project. Vegetation sampling methods would follow Herrick et al. (2005) with modifications from Forbis et al. (2007). Species composition, canopy cover, basal cover, herbaceous density and tree density would be measured.

Invasive Plant Management

The park would conduct annual invasive plant surveys and map infested acres to document changes in the extent of invasive plant infestations over the life of the project. Photo points would be installed (GPS location, no permanent marker) for a subset of our target species that are classified as noxious weeds by the State of Nevada: houndstongue, whitetop, spotted knapweed, and Canada thistle. Vegetation monitoring outlined above would document the success of invasive plant treatments and the extent of cheatgrass by documenting the presence, cover, and density of target species vegetation plots.

2.2 Alternative 2– No Action Alternative

The No Action Alternative would continue normal park operations in the Strawberry Creek watershed.

Stream restoration treatments would not be implemented. Incision, erosion, and other stream channel impacts, including loss of floodplain connectivity, would continue or become worse. Eventually, some level of equilibrium would be met, but the timeframe needed to reach that point could be decades or centuries, preventing the recovery of Bonneville cutthroat trout populations and persistence of riparian vegetation in the interim.

The park would not perform revegetation treatments such as seeding or planting of native species. Current conditions would persist without additional restoration actions to promote the establishment and persistence of upland vegetation, help stabilize cultural resources or control the spread of cheatgrass and other invasive species. Existing seedbanks of native vegetation would remain in the soil, but would eventually be overwhelmed by cheatgrass, especially in the lower elevations of the project area and on south facing slopes.

Limited survey and treatment of invasive plants would continue following the park's Invasive Plant Management Plan. The park would continue to monitor and implement treatment actions to control invasive forb species but would not implement any treatments to combat cheatgrass. These actions would be limited to areas of known infestations for target invasive forbs, an area totaling 165 acres.

Park staff would continue to periodically monitor BCT populations and in-stream habitat in Strawberry Creek. Three pass depletion electrofishing surveys and General Aquatic Wildlife System (GAWS) habitat surveys would be completed at nine sites every five to ten years. Discharge would be measured at the existing stream gage located near the park boundary with approximately six instantaneous wading measurements taken per year. Discharge would not be monitored in the upper reaches of Strawberry Creek. Water quality parameters may be monitored near the park boundary if stream conditions allow, but temperature loggers would not be placed throughout the length of the project area.

Under the No Action Alternative, one project objective would be partially met through limited survey and treatment of targeted invasive plant species. The project's monitoring objectives would be partially met with only periodic monitoring of BCT populations and stream discharge.

2.3 Alternatives Considered but Dismissed

Options which were inconsistent with NPS policy and mandates, which did not meet the purpose and need of the project, which would have significant impacts on park resources, or which were unlikely to be successful due to logistical or technical reasons were eliminated from further analysis. They include:

No Instream Structures (PALS)
This alternative, implementing all actions listed in the Proposed Action except for installation of PALS, was considered but dismissed because it does not meet the purpose and need of the project; is inconsistent with NPS policy to reestablish natural functions and processes and accelerate the recovery of the structure and function of NPS landscapes; and would allow adverse impacts on park resources.

Restore or Release Beavers in the Project Area
This action was dismissed because it is outside the scope of the project and unlikely to be successful due to inadequate forage, low water levels, and high risk of predation. GRBA would support beaver if they were to move into the park naturally from lower Strawberry Creek or Weaver Creek where they are believed to be extant, pending protection of infrastructure.

Tree Planting
Tree planting as part of the revegetation strategy was dismissed because it is unlikely to be successful. Previous tree planting in the Strawberry Creek watershed (> 1,000 Ponderosa pine; 2017-2018) was not successful with estimates of less than one percent seedling survival, likely due to insufficient soil moisture, age of seedlings, and herbivory. Additional tree plantings would not be cost effective and revegetation objectives can be met by other treatment actions (e.g., seeding).

Implement Treatments on Side Drainages
Treatment actions to address downcutting, erosion and movement of sediment into Strawberry Creek from side drainages with check dams and erosion control matting were dismissed. These actions were dismissed because they are unlikely to be successful based on the extreme slope of proposed drainages and expert opinion. These treatments are cost prohibitive and would require upkeep and maintenance that is outside the scope of this project. Additionally, fiber matting has the potential to significantly affect park resources through introduction of invasive weed seed and direct mortalities to park wildlife (e.g., snakes) getting caught in the plastic netting in erosion control matting.

Seeding side drainages was retained and included in the Proposed Action Alternative under native plant revegetation.

Use of Fiber Matting or Wood Straw for Streambank Stabilization
This action was dismissed because it would have significant impacts on park resources. Under this action, natural fiber matting (erosion control matting) would be applied to banks, and wood straw would be spread over a 150-foot-wide corridor along Strawberry Creek. Riparian vegetation along Strawberry Creek has started to recover making these actions unnecessary.

Fiber matting and wood straw would cover existing native vegetation that has started to reestablish and adversely affect its continued recovery. Fiber matting has high potential to contain invasive weed seeds, and the netting can cause wildlife mortalities.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENRIVONMENTAL CONSEQUENCES

This chapter describes the existing environment and the environmental impacts associated with the Proposed Action and No Action Alternatives.

A list of resource issues related to the Proposed Action were identified through internal park scoping, consultation, and the public scoping process. Section 3.1 lists issues that were dismissed from further analysis and the reason for their dismissal. Section 3.2 contains the list of resource issues retained for further analysis.

The park also identified mitigation measures that would reduce, eliminate, or minimize adverse effects from implementing the Proposed Action. These measures are included with the analyses in Section 3.3 and combined for future reference in Appendix 1.

3.1 Resource Issues Considered but Dismissed from Further Analysis

The following issues were considered but dismissed from further analysis because they do not meet the following criteria from the NPS-NEPA Handbook (2015): 1) the environmental impacts associated with the issue are central to the proposal 2) a detailed analysis of environmental impacts related to the issue was necessary to make a reasoned choice between alternatives 3) the environmental impacts associated with the issue are a point of contention and 4) there are potentially significant impacts to resources associated with the issue.

Human Health and Safety

This issue was considered because of the potential risk to health and safety from using chainsaws to fell trees and prepare woody material for stream restoration treatments. However, this resource issue was dismissed from further analysis because potentially significant impacts to human health and safety would be eliminated by following certification requirements and standard safety protocols as required by the NPS.

Soundscapes

Chainsaws and a hydraulic post pounder would produce noise that could affect wildlife behavior and visitor experience. These noises would be limited in duration (hours long), and comparable to other human noise common in the project area (e.g., vehicles) which generally do not affect wildlife or visitor experience. Soundscapes and associated resources would not be significantly impacted, and no further analysis is required.

Water Rights

Although valid existing rights exist outside of the park, Strawberry Creek has never been adjudicated. The NPS believes that the Proposed Action would maintain existing favorable conditions for water flows as discussed below in the water quantity and quality section. As the NPS neither plans to appropriate waters nor anticipates the need to secure additional water rights for this project, this issue has been dismissed from further analysis.

Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects all federal actions may have on cultural resources eligible for listing in the NRHP. The identification and NRHP eligibility evaluations of cultural resources located within the Strawberry Creek Restoration Project's Area of Potential Effect (APE) was completed by park archeologists between July 2020 and June of 2021.

In accordance with 36 CFR 800, the park consulted with the Nevada State Historic Preservation Office (SHPO) concerning effects the Strawberry Creek Restoration Project may have on cultural resources eligible for listing in the NRHP. Cultural resources within the APE that have been determined eligible for listing in the NRHP will be avoided by project actions that could adversely affect NRHP eligibility status. Eligible sites would have a 20-meter buffer placed around their site boundaries, and proposed actions that could adversely affect NRHP eligibility status would not be allowed within the 20-meter buffers or the site boundaries. Therefore, no NRHP eligible cultural resources would be adversely affected as a result of the Proposed Action, and there are no potentially significant impacts associated with this issue.

If buried and/or previously unidentified cultural resources are discovered, or if any unanticipated effects to NRHP eligible properties as a result of this action are observed, the park archeologist would be notified immediately and all necessary steps in accordance with 36 CFR 800.13(b) would be adhered to.

3.2 Resource Issues Retained for Further Analysis

The following issues were retained for further analysis:

- Bonneville Cutthroat Trout (BCT)
- Native Plants
- Invasive Plants
- Wildlife and Wildlife Habitat
- Wetlands
- Geologic Processes
- Water Quantity and Quality

3.3 Affected Environment and Environmental Consequences

This section includes a description of the affected environment (existing conditions) for each of the resource issues listed in Section 3.2 and the environmental consequences or impacts of the Proposed Action and No Action Alternatives for each of the resource issues. The analysis considers short and long-term effects; adverse and beneficial effects; and effects that would violate Federal, State, Tribal or local laws protecting the environment. The environmental trends discussion considers past, current, and reasonably foreseeable future actions and their impacts for each of the resource issues. 'Short-term' is used for impacts lasting only for the project duration or during the construction period for an action. 'Long-term' impacts occur beyond the date the

project is considered fully implemented. 'Beneficial' is a positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition. 'Adverse' is a change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

3.3.1 Bonneville Cutthroat Trout

Affected Environment

Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) are native to the Bonneville Basin. They are not listed as federally threatened or endangered. Their historic range includes most of western Utah and small portions of eastern Nevada, southeastern Idaho, and southwestern Wyoming. The only Nevada streams within its historic range that still contain BCT are located in the North and South Snake Ranges, including Great Basin National Park. Strawberry Creek is one of only sixteen streams that support BCT in the state of Nevada, and one of three recently devastated by wildland fire.

BCT are a species of management concern in Great Basin National Park. They are native to park streams that originate in the South Snake Range and flow eastward into Snake Valley. Before the 2016 Strawberry Fire, BCT were found throughout Strawberry Creek and had an average density of 755 BCT per mile (Great Basin National Park, unpublished data, 2011). However, population surveys conducted in the fall of 2016 showed that the Strawberry Fire reduced BCT distribution and estimated population size to 25% and 15% of their pre-fire levels, respectively. Population surveys conducted in 2017 and 2018 showed that BCT were still confined to the uppermost reaches of Strawberry Creek and were not expanding their distribution downstream into the areas of high burn intensity. The most recent population surveys conducted in 2021 showed that small numbers of BCT have begun to recolonize the lower reaches of Strawberry Creek and are currently present at six of the nine established survey sites.

Habitat surveys conducted in 2009 and again in 2016, 2017, and 2018 showed that the uppermost reach of Strawberry Creek, where BCT survived the fire, remained unchanged. The quality of BCT habitat in the lower two reaches, however, decreased dramatically for the first-year post-fire. Most notable was the presence of downcutting and channel incision, the lack of large woody debris, and infilling of pools. These post-fire changes altered the stream from heterogeneous and diverse to a stream of almost entirely shallow riffles. The population and habitat surveys conducted in 2018 showed that BCT habitat in the lower reaches of Strawberry Creek was beginning to slowly recover but was still poor.

Environmental Consequences

Alternative 1 – Proposed Action – The Proposed Action's stream restoration treatments would produce long term, beneficial effects on BCT. The incorporation of LWD and the installation of PALS would increase stream channel complexity and have a beneficial effect on BCT habitat by creating pools, riffles, and cover. By improving the quality of BCT habitat in the project area, the Proposed Action would increase the rate at which BCT are able to recolonize the lower reaches of the stream and increase overall carrying capacity. If the installation of PALS occurs during or immediately after spawning season there could be some minor, short-term, adverse effects to

BCT caused by sedimentation and streambed disturbance. This increase in sedimentation and streambed disturbance is not expected to have a measurable effect on adult fish. However, PALS installed directly upstream of or on top of redds (nests where BCT lay their eggs) during or recently after the spawning season could suffocate, dislodge, and/or crush BCT eggs and alevins (recently hatched BCT still carrying yolk sacs and living within the gravel). This would result in a reduction in recruitment and slow the rate at which BCT expand their population size and distribution. The mitigation measures outlined below would eliminate or minimize these potential impacts to a level with no measurable differences in BCT recruitment or distribution.

Revegetation, through seeding and planting of native species, would decrease overland flow and sediment transfer from uplands into the stream channel. Treatment of invasive plant species would support the recovery of the riparian plant community increasing bank soil stability. These actions would have long-term, beneficial impacts on BCT habitat.

In summary, potential adverse effects on BCT under the Proposed Action would be short-term sedimentation and streambed disturbance. However, these effects would be eliminated or reduced to below significant with mitigation measures in place. The Proposed Action would have long-term, beneficial effects on the Strawberry Creek BCT population resulting in increased distribution and population growth. This would have beneficial effects on other Nevada BCT populations if BCT from Strawberry Creek are used as a source population for future reintroductions and augmentations.

Alternative 2 – No Action – Under the No Action Alternative, the stream would be left to recover from the Strawberry Fire on its own. Over time, LWD and channel complexity would eventually return to Strawberry Creek and BCT would, over time, recolonize the entire stream. However, this would occur at a much slower rate, over decades, and allow some of the detrimental effects from the fire to worsen. Channel incision would increase disconnecting the water table from adjacent wetlands, reducing the extent of riparian vegetation, and preventing instream habitat from reaching its potential. This would result in fewer fish per mile and an overall decrease in population size and BCT distribution. It would also result in some of the available habitat in Strawberry Creek to remain fishless for longer. These conditions would create long-term adverse effects on the BCT population within Strawberry Creek and could have adverse effects on the range-wide population of BCT if the Strawberry Creek population is too small to use as a source population for future reintroductions.

Environmental Trends – Management and restoration actions implemented in Strawberry Creek over the last few decades have been positive. Livestock grazing ceased, nonnative fish were removed, BCT were reintroduced, and road improvements were completed, including the installation of fish-friendly vehicle and pedestrian bridges, that minimized the road's negative impacts on BCT. These past actions support the expansion and persistence of BCT throughout the project area. Potential future actions include installation of additional PALS and translocating BCT into the lower reaches of Strawberry Creek as the habitat improves. These future actions would be long-term and beneficial with mitigation measures applied. No other actions are being considered that would adversely affect BCT in Strawberry Creek.

Mitigation Measures

- Population surveys would be conducted annually to determine the distribution of BCT within the project area.
- Installation of post-assisted log structures would be prohibited between June 1 and August 31 in stream reaches occupied by BCT to protect any eggs or alevins present. Other restoration treatments, including large woody debris incorporation, would not be subject to these seasonal restrictions.
- The hydraulic lines that run from the power-pack to the hydraulic post pounder would be filled with the most environmentally friendly, nontoxic fluid possible.
- The power-pack for the hydraulic post pounder would be placed on a tarp to contain any potential fuel or oil leaks and spills. A spill kit containing absorbent pads would be located on site to clean up a spill should one occur.
- Refueling would take place on the road whenever possible.

3.3.2 Native Plants

Affected Environment

Strawberry Creek is representative of many of the canyons in the park that support different plant communities determined by varying elevation, soil types, slope, and aspect. Habitat types in the project area include sagebrush steppe, basin wildrye, aspen, pinyon-juniper, mixed conifer, mahogany, wet meadow (wetland), and montane riparian. The riparian zone in Strawberry Creek provides important habitat for wildlife, birds, fish, and macroinvertebrates and helps maintain proper stream processes and instream habitat. Upland habitat types such as sagebrush steppe, mountain mahogany, aspen, and mixed conifer provide habitat for woodland bird species, deer, elk, and sagebrush obligates like the sagebrush vole and yellow-bellied marmot. No federally threatened or endangered plant species occur in Strawberry Creek.

Vegetation management in the park is guided by Landscape Conservation Forecasting®. Satellite imagery, remote sensing and predictive ecological models were used to map current vegetation and guide decisions on vegetation and habitat management (Provencher et al. 2010). The park has used this information to identify and complete several habitat restoration projects to restore sagebrush steppe, riparian, and aspen habitat types.

The project area includes the entire 2,790 acres of NPS lands impacted by the 2016 Strawberry Fire. Montane sagebrush steppe, pinyon juniper, seral aspen, and mountain mahogany were the dominant plant communities pre-fire (Provencher et al. 2010). The fire completely consumed riparian vegetation in the middle elevations of the watershed and had substantial impacts on sagebrush steppe, pinyon-juniper, aspen, mountain mahogany, and wet meadow habitat. The park was able to conduct several restoration treatments through its Burned Area Rehabilitation (BAR) Plan to support the post-fire recovery of native vegetation including seeding of native species (Table 1) and invasive plant survey and treatment.

Most Great Basin plant communities evolved with fire; however, management issues still exist after the Strawberry Fire. Native vegetation is still recovering with full recovery expected to take

decades. Invasive plant species are present in the watershed with additional populations and new species detected post-fire. Cheatgrass is now abundant in the lower elevations and south facing slopes in Strawberry Creek. Without the establishment and persistence of native plant communities, accelerated soil loss, increased fire potential, loss of wildlife habitat, and increases in nonnative species will impact stream conditions, wildlife, and plant diversity.

Environmental Consequences

Alternative 1 – Proposed Action – No significant adverse effects to native vegetation are expected under the Proposed Action. If local seed is not available, closely related, native species would be used. Revegetation treatments would increase the available seedbank for native upland species increasing the potential for those species to establish and/or persist within the project area. Two aerial seedings over the next ten years would increase the likelihood of seeding success. Increases in native plant productivity and continued recovery of native vegetation is expected to occur. Treatment of invasive species would decrease competition between native and nonnative plants. Stream restoration treatments would increase or maintain connectivity between the floodplain, stream, and wetlands and improve riparian vegetation condition and persistence in those areas. Gathering local woody material for PALS and LWD treatments would target dead and down trees reducing or eliminating effects to living, native trees.

Seeding, planting, stream restoration treatments and invasive plant survey and treatment would have long-term, beneficial effects on native plant species. The Proposed Action would increase the resilience and resistance of native plant communities in Strawberry Creek to future disturbances and presence of invasive plants.

Alternative 2 - No Action – Under the No Action Alternative, revegetation and stream restoration treatments would not be completed and a much smaller portion of the project area would be included in invasive plant survey and treatment. This would result in long-term, adverse effects on native vegetation, habitat and forage for wildlife, and soil stability. Invasive plants would continue to spread and eventually outcompete native vegetation causing long-term, adverse effects to native plant communities. The park would not perform any seeding treatments which would have short and long-term, adverse effects on the establishment and persistence of native plants.

Under the No Action Alternative, some native species would continue or begin to recover and/or regenerate on their own, but the timing and extent of that recovery is unknown, especially with detrimental effects from populations of cheatgrass. Worsening cheatgrass infestations would increase fine fuels in the watershed increasing fire frequency and the potential for fire spread.

In summary, the No Action Alternative would have long-term, adverse effects on native vegetation. The area would remain vulnerable to soil erosion, increased fire risk from annual grasses, and limit the establishment of native vegetation.

Environmental Trends – Previous habitat restoration projects in the Strawberry Creek watershed include thinning, planting, and seeding treatments. These projects have had a beneficial effect on native vegetation as have invasive plant survey and treatments completed in the watershed at some level since 1999. Adjacent landowners and land management agencies also complete

regular survey and treatment for invasive plants. Revegetation treatments outlined in the Proposed Action added to past actions by the park and adjacent landowners and managers would have long-term, beneficial effects on native vegetation. These combined actions would reduce fire risk, promote the recovery of native riparian and upland vegetation, and benefit native plant communities inside and outside of the park boundary.

3.3.3 Invasive Plants

Affected Environment

Lands that are now managed by Great Basin National Park have a history of grazing, logging, mining and other land uses that disturbed soils, altered native vegetation, and served as potential vectors for the introduction of invasive plant species. Cattle grazing was retired in 1999, and sheep grazing ceased in 2009. However, there are still issues with trespassing cattle utilizing NPS lands in Strawberry Creek during the summer months. Logging and mining operations ceased before the park's creation in 1986. Natural disturbances, like fire and recreational uses, have also contributed to the introduction and spread of invasive plants in the Strawberry Creek watershed.

The NPS Management Policies (2006) define invasive or exotic species as "…those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities…Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem..." If left untreated, invasive plants can outcompete native vegetation leading to altered biological communities. The park actively manages invasive plant populations and coordinates with state and federal agencies to meet state and federal regulations to manage invasive species. The Great Basin National Park Invasive Plant Management Plan (GRBA IPM Plan 2014) guides park management of nonnative plant species. The plan analyzed impacts resulting from the implementation of Integrated Pest Management (IPM) techniques such as manual, chemical, biological, and cultural control methods on invasive plants. During treatment, all applicable laws and label instructions are followed to ensure human health and safety and minimize or eliminate effects on native species.

Following the 2016 Strawberry Fire, restoration activities were implemented through a Burned Area Rehabilitation (BAR) Plan. Invasive plant survey and treatment were included in the BAR Plan (2017-2019) to control or reduce invasive plant infestations within the fire perimeter. Before the fire, there were nine known invasive plant species that occurred in Strawberry Creek. After the fire, 13 invasive plant species were detected (Table 2), and the extent and density of some known populations increased post-fire. There is high potential on south-facing slopes below 8,000 feet to convert to cheatgrass monocultures. Large stands of cheatgrass are present along roadsides and in areas of high burn severity. While infestations of invasive forbs in Strawberry Creek watershed are relatively small and isolated, their persistence and the extent of cheatgrass in portions of the project area pose a threat to native vegetation communities if not addressed.

Table 2. Known invasive plant species in Strawberry Creek. Species with an asterisk (*) were not detected in the watershed until after the 2016 Strawberry Fire.

Common Name	Species Name
bull thistle	*Cirsium vulgare*
Canada thistle	*Cirsium arvense*
musk thistle	*Carduus nutans*
cheatgrass	*Bromus tectorum*
houndstongue*	*Cynoglossum officinale*
whitetop (hoary cress)	*Cardaria draba*
sow thistle*	*Sonchus sp.*
spotted knapweed	*Centaurea stoebe*
redstem stork's bill	*Erodium cicutarium*
horehound*	*Marrubium vulgare*
Russian thistle	*Salsola tragus*
African mustard*	*Malcolmia africana*
common mullein	*Verbascum thapsus*

Environmental Consequences

Alternative 1 – Proposed Action – Under Alternative 1, invasive plants would be surveyed on 720 acres and treated using methods analyzed and approved in the park's Invasive Plant Management Plan (GRBA IPM Plan 2014, pgs. 21-24). Manual treatments would not be implemented in or near known cultural sites.

Annual surveys would aid in early detection and rapid response to new or growing infestations of invasive plants. Regular treatment of invasive plant populations over the next ten years would reduce infestations of target species and improve the condition of native plant communities and wildlife habitat in Strawberry Creek. Regular survey and treatment would decrease costs to effectively manage invasive plants and increase the chance of eradication. Populations of cheatgrass would be treated to reduce fine fuels, limit potential fire danger, and reduce competition with native species. Soils in the project area would also benefit from the reduction in nonnative species and their impacts on soil condition. Implementation of the Proposed Action would fulfill the park's responsibility to control noxious weeds under state statute and follow NPS and DOI policy to prevent the introduction and spread of invasive species.

There is potential to introduce nonnative or invasive plant material from soil, seed, or other planting stock used in restoration treatments. Any material brought from outside the project area (e.g., untreated wooden posts) would be free of soil that could contain invasive species. Most material would be locally sourced from within the project area to minimize the risk of introducing invasive species. Seed and planting material used for revegetation treatments would undergo and pass a recent purity test and be certified weed-free.

In summary, invasive plant treatments would have long-term, beneficial effects. The Proposed Action would reduce or eliminate populations of invasive plants, benefit native plant communities, promote soil stabilization, increase and improve the condition of wildlife habitat,

preserve biological diversity, reduce fire danger, and limit the spread of nonnative plants from the park onto adjacent lands.

Alternative 2 – No Action – Under the No Action Alternative, limited monitoring and treatment of invasive plants would continue. Less than a quarter of the project area would be surveyed (165 acres instead of 720 acres) with invasive species treated when encountered. Partial survey of the project area would allow novel and smaller infestations of invasive species to go undetected and those infestations to spread. With limited staff and time, known infestations may not be surveyed or treated annually. Larger, denser, and more widespread populations of invasive plants are more costly and harder to control. Chances of eradication would greatly decrease. The No Action Alternative would prevent the park from fulfilling its responsibility to control noxious weeds under state statute and follow NPS and DOI policy.

In summary, the No Action Alternative would have long-term, adverse effects on native plant communities, wildlife, wildlife habitat, and soils. Limited or incomplete treatment would increase the infestation rate of nonnative species. This alternative would allow invasive plant species to spread, known infestations to remain untreated, fine fuels to increase, and fire danger to worsen.

Environmental Trends – The park has completed annual survey and treatment in the Strawberry Creek watershed since the 2016 Strawberry Fire. More sporadic invasive plant treatments were completed between 1999 and 2016. These management actions have kept invasive plant populations at a manageable level benefiting native plant communities and wildlife habitat. Periodic invasive plant control by the BLM and private landowners in the Strawberry Creek watershed help to limit the spread of invasive plants onto park lands, and control of invasive species within the park benefits adjacent landowners. Invasive plant survey and treatment actions outlined in the Proposed action coupled with past and future survey and treatment efforts by the park and adjacent land managers would have long-term, beneficial effects by limiting the introduction and spread of invasive plants. However, continued trespass of domestic cattle into Strawberry Creek would increase the potential for novel infestations and continued spread of invasive plants.

Mitigation Measures

- Material used for restoration treatments and brought from outside the project area (e.g., untreated wooden posts) would be free of soil that could contain invasive species.
- All seed and planting material would undergo recent purity tests and/or be certified weed-free.

3.3.4 Wildlife and Wildlife Habitat

Affected Environment

The Great Basin is a vast, largely undeveloped region with abundant and diverse wildlife populations that are in decline. The reasons for these declines are complex but generally related to changes in habitat (Gruell and Swanson 2012). Changes in fire frequencies and intensity and increasing nonnative plant populations such as cheatgrass are causing declines in native plant

communities such as aspen and sagebrush. Streams and riparian areas are also affected by large fires, invasive plants, water diversions, and channel incision which disrupt the natural hydrologic regime. The net result of these changes has been a loss of productivity, resilience, and resistance; loss of wildlife; and loss of ecosystem goods and services that wildlife provide to society.

Great Basin National Park conserves and protects park wildlife representative of the Great Basin region to provide for their public use and enjoyment and to perpetuate these qualities for future generations. Many of the same issues affecting wildlife and wildlife habitat in the larger Great Basin region impact wildlife at the local park level. The Strawberry Creek watershed supports a wide array of wildlife species such as elk, mule deer, beaver, shrews, voles, rattlesnakes, birds, and bats. No federally threatened or endangered wildlife species occur in Great Basin National Park. An Executive Order (EO 13186) enacted in 2001 requires federal agencies to consider the effect of projects on migratory birds (The Migratory Bird Treaty Act (MBTA) of 1918), and it directs agencies to review the list of Birds of Conservation Concern for species that may occur in the project area. Thirty-two wildlife species of management concern occur or potentially occur in the project area (Table 3).

Table 3. Wildlife species of management concern that occur or potentially occur in the Strawberry Creek project area.

Common Name	**Species Name**
Merriam's shrew	*Sorex merriami*
water shrew	*Sorex palustris*
Inyo shrew	*Sorex tennellus*
pallid bat	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
spotted bat	*Euderma maculatum*
silver-haired bat	*Lasionycteris noctivagans*
hoary bat	*Lasiurus cinereus*
fringed myotis	*Myotis thysanodes*
long-eared myotis	*Myotis evotis*
long-legged myotis	*Myotis volans*
ermine	*Mustela erminea*
beaver	*Castor canadensis*
sagebrush vole	*Lemmiscus curtatus*
porcupine	*Erethizon dorsatum*
yellow-bellied marmot	*Marmota flaviventris*
Northern goshawk	*Accipiter gentilis*
Swainson's hawk	*Buteo swainsoni*
ferruginous hawk	*Buteo regalis*
peregine falcon	*Falco peregrinus*
three-toed woodpecker	*Picoides tridactylus*
Lewis's woodpecker	*Melanerpes lewis*
flammulated owl	*Otus flammeolus*

short-eared owl	*Asio flammeus*
Brewer's sparrow	*Spizella breweri*
sage sparrow	*Amphispiza belli*
sage thrasher	*Oreoscoptes montanus*
pinyon jay	*Gymnorhinus cyanocephalus*
MacGillivray's warbler	*Oporornis tolmiei*
yellow warbler	*Dendroica petechia*
ringneck snake	*Diadophis punctatus*

Restoration projects have been implemented in the Great Basin and in the park to reestablish native plants, control invasive plants, and restore riparian and stream systems. Habitat restoration projects often have beneficial effects on wildlife. However, wildlife communities are formed by groups of species that respond differently to disturbance, habitat change, and management actions based on their own unique life history strategies. Species differ in traits such as reproduction, habitat preference, and food requirements. Under this paradigm (winners and losers), some species benefit, others are negatively affected, and some species are negatively affected by management actions. Here we consider the effects of the alternatives on the wildlife community as a whole, as groups of species with similar traits, and as individual species that could be negatively affected.

Environmental Consequences

Alternative 1 – Proposed Action – Habitat enhancement and restoration are the primary objectives of the Proposed Action. These actions would have long-term beneficial effects on wildlife. The Proposed Action would increase and improve the condition of native vegetation, decrease invasive plant populations, and improve riparian health, resulting in a net benefit to wildlife. Raptors and ermine would benefit from increased availability of their small mammal prey. Shrews, bats, and most birds would benefit from improved riparian condition and increased insect diversity. Effects on elk, beaver, marmots, and mule deer would be positive, due to increasing riparian vegetation, stream condition, and shrub diversity.

The Proposed Action would have an overall net positive effect on birds. Removing standing, dead trees for stream restoration would have a short-term, adverse effect on woodpeckers and certain bat species that use dead trees for roost sites. Impacts, particularly cutting dead standing trees, could have a short-term, adverse effect on cavity nesting birds. However, this would be mitigated by conducting pre-treatment bird surveys, limiting work outside the breeding bird season (April 1 - July 31), and using dead and down trees rather than standing dead trees whenever possible.

Alternative 2 – No Action – Under the No Action Alternative, active restoration and widespread invasive plant control would not occur. Invasive plants would continue to proliferate at the expense of native plant communities. Stream condition, resistance to invasion, resilience from disturbances such as fire, and productivity would continue to decline as invasive species increase and the riparian corridor further degrades. Effects on wildlife would be adverse. Effects would result in a slow, steady loss of wildlife diversity and abundance. Catastrophic fire, annual grasses, and resultant degradation of sagebrush, aspen, and riparian habitat regionally and in the

park would result in long-term, adverse effects to wildlife populations. Sagebrush voles are the only species of management concern expected to benefit from increasing annual grass cover and areal extent.

Environmental Trends – Habitat restoration projects to control annual grasses and to improve native plant communities and riparian health are being implemented across the region and in the park. This work is focused on thinning projects to improve sagebrush steppe habitat, prescribed fire, revegetation through seeding and planting treatments, and invasive plant treatment. In conjunction with these projects, the Proposed Action would have long-term, beneficial effects on wildlife and wildlife habitat. benefits to wildlife.

Mitigation Measures

- Pretreatment bird surveys would be completed annually before cutting or felling trees between April 1 and July 31. No trees with active nesting would be cut.

3.3.5 Wetlands

Affected Environment

Wetlands are areas inundated or saturated by water at a frequency and duration sufficient to support vegetation adapted to grow in saturated soils (USACE 1987). Wetlands can store large amounts of water and function like a sponge, reducing the severity of flooding during storm events and slowly releasing water during drier times. They also support nutrient cycling, filter pollutants, and provide necessary habitat for fish and wildlife. Near-surface water tables and high soil moisture are characteristic of wetlands, two factors that are supported by overbank flows indicative of a healthy stream channel-floodplain system. Riverine wetlands can also create firebreaks that preserve unburned habitats of particularly high ecological value (Wheaton et al. 2019 and Fairfax and Whittle 2020).

Strawberry Creek supports a riverine wetland that cuts through the central axis of the watershed and emergent and forested wetlands that occur in the valley bottom and several side drainages on north-facing slopes. Seventeen wetlands were mapped in the project area that fall within or adjacent to the project reach (USFWS National Wetlands Inventory, 2021). They range in size from 0.3 acres to 6.7 acres; total area is 27.6 acres. Wetlands in the project reach are dominated by riparian species like water birch (*Betula occidentalis*), aspen (*Populus tremuloides*), willow (*Salix* sp.), sedges (*Carex* sp.), rushes (*Juncus* sp.), and other obligate and facultative wetland species. All stream restoration actions will occur in the riverine wetland between the tops of the banks of the creek, within the natural channel.

Strawberry Creek runoff is not impounded by human infrastructure and therefore demonstrates a natural annual flow regime, to which native species are adapted. The riparian vegetation and cooler microclimate near the stream and in wetland habitats create areas of higher biodiversity. Most of the riparian vegetation and wetlands in the project area were burned in the Strawberry Fire, killing riparian vegetation some of which has regrown. The fire also consumed the in-channel wood that provided instream habitat, channel complexity, and facilitated natural stream function.

In response to the 1977 Executive Order 11990 (Protection of Wetlands), the NPS issued Director's Order #77-1: Wetland Protection which requires that the NPS avoid adverse impacts on wetlands to the extent practicable, minimize any impacts that could not be avoided, and compensate for any remaining unavoidable adverse impacts (NPS 2012). NPS Procedural Manual #77-1 identifies restoration projects like at Strawberry Creek as excepted actions under Section 4.2.1.9. Therefore, no additional compliance with Director's Order #77-1 or Wetland Statement of Findings is necessary. This is consistent with NPS Management Policy 4.6.5, which states that the NPS "take action to prevent the destruction, loss, or degradation of wetlands" and "preserve and enhance the natural and beneficial values of wetlands" (NPS 2006). Director's Order #77-2: Floodplain Management directs the NPS to ensure that new facilities are not constructed in floodplains. PALs are temporary, non-construction, non-facility restoration treatments that are exempt from this order.

Environmental Consequences

Alternative 1 – Proposed Action – The Proposed Action would enhance recovery of riparian vegetation and wetland habitat through restoration of some pre-fire wetland conditions. Restoration actions are specifically targeted to:

- Raise the water table via sediment infill behind PALS, which would cause more near-surface water to be accessible to riparian plants as it flows over a higher channel bed.
- Enable some flow to go overbank during very high runoff instead of being confined to the channel where high stream power increases bank shear stress and erosion.
- Overtop banks to create germination surfaces on freshly deposited sediments and widen the wetted stream corridor. This would occur during very high runoff only, but it would have an outsized influence on wetland health.
- Create new germination surfaces in channel-margin depositional zones. Germination surfaces adjacent to flowing water are ideal for wetland plants that are unable to establish in areas where the former floodplain is now located well above the incised channel.

Seeding of upland areas would occur outside of mapped wetlands and not have a measurable effect on condition or recovery. Control of invasive plants would increase the native biodiversity of the wetland and limit competition between native riparian species and invasive species.

The Proposed Action Alternative would have long-term beneficial effects on wetlands by improving habitat and ecological processes, maintaining connectivity, and reducing or eliminating competition and adverse effects from invasive plants. Benefits include lowering water temperature; production and retention of organic matter that creates forage for aquatic invertebrates; bank stabilization; sediment retention; instream and overbank habitat quality; wildlife corridors; and verdancy that generally appeals to human aesthetics.

Alternative 2 – No Action – Under the No Action Alternative, the riverine wetland would undergo a mix of continued decline, rebound, and transition in response to the fire. Some of the riparian plant species burned in the fire have reestablished while other species (e.g., water birch, coyote willow, sedges, and rushes) that rely on a near-surface water table will die and eventually

be replaced by drought-tolerant upland species. With a more deeply incised channel and less overbank flow compared to pre-fire conditions, the riverine wetland is expected to narrow because of disconnection from the stream resulting in a net loss of wetland habitat. Part of the riparian corridor that existed prior to the fire would convert to upland, a habitat type that generally has lower production, nutrient cycling, and habitat compared to a healthy riparian community (Naiman 2010).

The No Action Alternative would have long-term adverse effects on the condition and extent of wetlands in Strawberry Creek.

Environmental Trends – Wetlands have been affected by a history of grazing, logging, invasive vegetation, lack of beaver, fire suppression and encroachment of upland species, and climate change. These factors have contributed to long-term degradation of wetlands as the watershed has deviated from the slowly evolving conditions of properly functioning ecological communities. Potential future actions include installation of additional PALS. The Proposed Action and future actions would have long-term, beneficial effects on wetlands by controlling invasive vegetation, promoting native species, and maintaining hydrological connection between streams and wetlands.

3.3.6 Geologic Processes

Affected Environment

Streams transport both water and sediment. The sediment is composed of entrained small particles like sand and silt, as well as bedload that includes larger particles like gravel and cobbles. Sediment transport is an essential geological erosional process that counteracts tectonic uplift and creates landscapes as we recognize them, including topography that is divided into watersheds (Mackin 1948, Wohl et al. 2015). Sediment production is influenced by lithology, slope, vegetation, and climate. After the Strawberry Fire the magnitude of sediment transported by Strawberry Creek increased largely because of the lack of hillslope vegetation and organic material that could retain it. Further exacerbating sediment export was a reduction in instream wood that had been consumed by the fire. Instream wood promotes channel heterogeneity by influencing flow hydraulics and creating sediment depositional (i.e., storage) zones (Wohl et al. 2019). Wood increases habitat quality for invertebrates and fish, and also encourages localized areas of overbank flow that spread out water into the riparian corridor. Retention of sediment and associated nutrients is important for maintaining in-channel and riparian food webs. Overbank sediment deposition creates germination sites for riparian wetland plants, allowing for the rejuvenation and maintenance of riparian communities.

High flow events after the fire flushed large quantities of sediment through the stream system. The intense runoff scoured out and down cut the channel in many areas, which reduces the ability of subsequent flow to spread overbank where it dissipates energy. Sediment production from the hillsides has subsided with revegetation over the last several years, and there is no longer sediment production from the streambed where the channel incised down to resistant bedrock. Part of a healthy stream is variation in sediment sizes where different areas have relatively fine (e.g., sand, gravel), medium (e.g., coarse gravel, cobble), and large (e.g., boulder,

bedrock) sediments that support various biota and their life stages. High variation in sediment size through space and time is a geological process characteristic of healthy fluvial systems. Generally, instream wood, overbank flows, and channel avulsions interact with and support this process.

Environmental Consequences

Alternative 1 – Proposed Action – The Proposed Action Alternative would aid the recovery of sediment transport processes that support a healthy stream corridor. Seeding and invasive plant control would not have a measurable effect on fluvial geomorphic processes. However, instream work including PALS is designed to create flow separation into areas of fast and slow flow. Zones of slower flow have less stream competence (i.e., ability to transport sediment) so finer sediments are deposited. Where flow goes through, over, or around instream wood structures there would be isolated zones of scour that increase bed sediment size, thereby leading to adjacent areas with different bed material, which improves aquatic habitat. Sediment would continue to be transported into the project reach from upstream, and additional sediment would be sourced from banks within the project reach. The proposed wood structures are designed to work together in a downstream direction, and much of the sediment produced near one structure would be deposited at the next structure. The added instream complexity within the project reach would capture much of the sediment that, without instream wood, would have been flushed through the project area and taken downstream.

Channel incision that developed after the fire is expected to recover faster under Alternative 1. Reversal of channel incision could happen following two paths identified in the channel evolution model (Cluer and Thorne 2014). The first is sedimentation in the channel bottom causing the streambed to rise, effectively lifting streamflow and reconnecting it with surviving riparian vegetation. The second scenario occurs by channel widening that dissipates hydraulic energy, then deposition and sediment storage occur. This would produce germination sites with near-surface water tables. This pathway to stream-overbank reconnection would play out over a longer timescale but would be faster than the No Action Alternative.

The incorporation of large woody debris would promote sediment deposition immediately upstream and scoured pools downstream, thereby increasing hydraulic and habitat variability. There would be short-term increases in sediment fluxes within the project area. Over the long-term, the actions are predicted to decrease channel confinement and entrenchment. The addition of instream wood would create localized bank erosion and sediment production (Wohl et al. 2019). Some fine sediments such as those mobilized through localize scour are essential for the desired streambed variability, and the construction of many structures installed in a downstream fashion means that much of the sediment mobilized by erosion at one structure would be captured in the slow-flow or pool zone created by a subsequent downstream structure (Wheaton et al. 2019). Installation of PALS and LWD should also promote floodplain rejuvenation from sediment deposition within and overbank of the channel. In addition, channel complexity like pools, riffles, and multi-threaded flow is predicted to increase from instream wood structures.

These expected changes would be an improvement to the current condition and expected future condition of the stream and floodplain under the No Action Alternative and result in long-term beneficial effects on the stream channel, aquatic habitat, riparian vegetation and floodplain. A

functioning headwaters stream channel and floodplain would improve stream conditions downstream, as storm runoff and sediment are attenuated.

Alternative 2 – No Action – Under the No Action Alternative, sediment transport and storage would recover to resemble pre-fire conditions, although this would occur on decadal to century-scale. The wood-starved channel would further incise in unstable areas during future high flow events. Existing incised areas would cause continued dieback of water-stressed plants that rely on hydrologic connections to the stream. On the scale of several decades, streamside vegetation would grow, die, and supply instream wood capable of increasing variability in flow hydraulics. Over the next one to two decades, some woody plants killed in the fire would fall toward the stream, but it would take additional decades for much of the wood to redistribute into a hydraulically effective orientation. In the immediate future, the channel lacks much of the instream structure that induces deposition, scour, and related processes characteristic of healthy streams. This No Action Alternative would have adverse impacts in the short-term and long-term because the entire valley bottom and watershed would go through a centennial-scale adjustment period in response to the incised stream and the lack of hydraulic roughness that dissipates energy and retains sediment.

Environmental Trends – Sediment transport has been affected by a history of grazing, logging, road construction and operation, invasive annual grasses, lack of beaver, fire suppression, and climate change. These factors have had an adverse effect and contributed to unnatural conditions related to the fluvial geomorphic processes of sediment transport and bank erosion. Foreseeable future actions would include additional installation of post-assisted log structures and continued invasive plant treatment. The Proposed Action and potential future actions would help to offset these impacts by reclaiming spatio-temporal heterogeneity in sediment transport, erosion, and deposition and have a long-term, beneficial effect on fluvial processes.

3.3.7 Water Quantity and Quality

Affected Environment

The NPS monitors two hydrological measures on Strawberry Creek: stream discharge (instantaneous and continuous) and seasonal water quality (continuous) following the Mojave Desert Network Inventory and Monitoring Streams and Lakes Protocol (Natural Resource Report NPS/MOJN/NRR—2012/593.1).

Stream discharge is continuously monitored by park staff near the northeastern park boundary in Strawberry Creek using a pressure transducer and staff gauge. The park has data from September 2010 to August 2016 showing the median discharge of 0.77 cubic feet per second (cfs), although these data do contain gaps from equipment malfunction or power loss. The park also takes instantaneous measurements via pygmy meter year-round, pending access to the stream (stream cannot be frozen over).

The park has no continuous discharge measurements from after the 2016 Strawberry Fire to spring 2021 due to high sediment loads that made continuous measurements impossible (Figure 7). The park has only taken periodic instantaneous measurements from 2017 to the present,

insufficient to determine a reliable median discharge. The park plans to reinstall the continuous stream gauge equipment in 2021 and begin collecting continuous data.

Figure 7. Strawberry Creek at the NPS boundary where stream discharge measurements are taken. Photo from after the Strawberry Fire, September 2016.

Drainages impacted by fires typically show an increase in runoff the first several years after a fire. According to Hellema and others, flows increased by more than four percent if greater than 25 percent of the drainage burned and typically lasted for less than 10 years (Hellema et al. 2018). The increase in runoff is caused by a combination of factors including creation of hydrophobic soils after high severity burns, reduction in surface roughness that previously promoted infiltration, and decreased watershed and riparian evapotranspiration from plant mortality.

Continuous water quality data are collected using a water quality sonde from early June to late September and record hourly measurements of temperature, specific conductance, dissolved oxygen, and pH. The water quality sonde is typically located adjacent to the stream gage. The park has data from June 2010 to August 2016 (dissolved oxygen data ended in June of 2016) showing the average temperature of 11.89 degrees Celsius, conductivity of 138.6 micro siemens per centimeter, pH of 7.89, and 77.7% dissolved oxygen. The park does not have any

measurements from after the fire due to high sediment loads that caused the equipment to malfunction. The park plans to reinstall the sonde in 2021.

Environmental Consequences

Alternative 1 – Proposed Action – Under Alternative 1, the added channel roughness would promote natural overbank flows that distribute water across a wider swath of the valley bottom, supporting riparian plants and the in-channel and overbank habitats they create (Gurnell et al. 2016). By increasing the diversity of flow paths, some water would persist in the watershed for longer. This would simultaneously create more flow and cooler stream temperatures later in the runoff season as the hyporheic flow paths of the near-surface groundwater slowly re-enter the stream channel (Burkholder et al. 2008). A similar shift in water quantity would be a decrease in some spring runoff from snowmelt (March-June) with a corresponding increase in the late summer baseflow period. Both changes are expected to be minor but long-term.

Evapotranspiration (ET) rates after fires can be reduced for up to 15 years (Ma et al. 2020) depending on fire severity. Because most of the fire was of moderate intensity, ET within Strawberry Creek drainage is likely to approach pre-fire levels within the next few years as riparian and upland vegetation recolonize the area. However, any change in the quantity of stream water is expected to be insignificant and not measurable given the spatial scale of the proposed actions.

The Proposed Action would promote the important ecological function of nutrient retention within and adjacent to the stream channel (Covino et al. 2010). Creating zones of slow flow and hydraulic complexity would create localized organic matter buildup, macroinvertebrate production, and fish food sources. Overbank flows and slow infiltration also promote retention of biologically essential elements such as nitrogen and phosphorus, which in turn enable increased in-situ biological production. In the long term, more desirable native vegetation could help to filter sediments from uplands, thus reducing instream sediment loads. Improved riparian conditions and raised water tables would help to anchor soils susceptible to wind and water erosion. Water temperatures are expected to decrease as new overhanging vegetation increases and groundwater returns make up a higher proportion of streamflow.

Temporary impacts to water quality would occur over the course of hours or days as PALS and large woody debris are placed into the channel. Sediment would be disturbed as materials are placed, but the impacts would be very localized (tens to hundreds of feet), minor, and short-term.

Alternative 2 – No Action – Under Alternative 2, the stream is would remain incised for decades, which would impact habitat quality and cause additional mortality of riparian vegetation as plants remain disconnected from deepened groundwater (Cluer and Thorne 2014). The channel would remain in a relatively simple and homogenous state for a longer duration, in contrast to more stable and biodiverse streams that have instream complexity and a messy character (Wohl et al. 2019). The simplified morphology of today's Strawberry Creek quickly passes water through the watershed, reducing the width of the stream corridor and the water accessible to riparian communities. The simplified flow path and reduced channel complexity lead to flashier runoff (i.e., faster runoff with higher peak discharges) and increased magnitude of flood events downstream of the park (Ebel 2020). Correspondingly, less water is retained in the watershed to

produce runoff and sustain forage during the late summer months when stream flow is at its lowest and plant transpiration demand is high. Stream channel conditions under the No Action Alternative would have long-term, adverse effects on riparian vegetation which would lead to reduced vegetative shading, organic matter input, and increased water temperature.

The No Action Alternative would have long-term, adverse effects on riparian plant communities, streambanks, and the subsequent re-establishment of new plants at the centennial scale (Cluer and Thorne 2014; Schumm et al 1984). This prolonged timeframe would have additional long-term, adverse effects on habitat for fish and other wildlife species leaving the project area without adequate habitat for much of the 21st century.

Environmental Trends – Past actions impacting water quality and quantity include the 2016 Strawberry Fire, historic loss of beaver, grazing, and logging. Within the Great Basin, human induced climate change has already impacted water quantity and timing by raising average temperatures, increasing interannual variability of precipitation, caused declines in snowpack, and caused spring runoff to occur 10-15 days earlier (Chambers, 2008). Newer data suggests that these trends will all continue for the park (Gonzalez, 2014). Water quality changes from trespass cattle, as well as ongoing road maintenance, would result in minor, short-term impacts.

The Proposed Action would moderate water quantity and timing trends resulting in long-term beneficial impacts. The Proposed Action would have additive impacts to water quality, but the overall impact would still be minor and short-term.

CHAPTER 4: SCOPING AND CONSULTATION

This chapter summarizes the scoping and consultation process for the Strawberry Creek Restoration Project EA.

4.1 Internal Scoping

Internal scoping began in 2019 with the preparation of the SNPLMA Eastern Nevada Landscape Restoration Project proposal. Once funding was approved, periodic meetings with NPS staff were held through 2020 to determine a proposed action and NEPA pathway. The project was entered into PEPC February 11, 2021. Bi-weekly interdisciplinary team meetings have been held since February 25, 2021 and will continue until the EA process is complete.

4.2 Tribal Consultation

The park notified the Confederated Tribes of Goshute, Duckwater Shoshone Tribe, and Ely Shoshone Tribe of proposed actions associated with the Strawberry Creek Restoration Project on December 10, 2020. They were also included in both initial public scoping and comments on the EA. No Tribal concerns have been raised to date. If any Tribes should identify resources that could be affected by project actions, the park will conduct follow-up consultation in accordance with 36 CFR 800.

4.3 Agency Coordination

The US Army Corps of Engineers was contacted in March 2021 and a preliminary response was received in May with ongoing coordination since that time. The Nevada Department of Environmental Protection (NDEP) was contacted in March. The NDEP stated that a permit was not required for installation of PALS as outlined in the Proposed Action. The Bureau of Land Management, U.S. Forest Service, and Nevada Department of Wildlife were contacted via the initial public scoping and scoping for the Environmental Assessment. No comments were received from those agencies.

The park notified the Nevada SHPO of proposed actions associated with the Strawberry Creek Restoration Project on May 25, 2021. SHPO concurred with the park's determination that implementing the Proposed Action with avoidance mitigations would have No Adverse Effect on NRHP eligible cultural resources on June 30, 2021.

4.4 Public Scoping

The initial public scoping period for the Proposed Action was from April 5, 2021 to 5 May 5, 2021 and announced via email, press release, and Facebook post. Four comments were received. One commented that insufficient data was provided in the scoping letter; another recommended adding extensive Beaver Dam Analogs (BDAs) within the stream, followed by introduction of

beavers; a third comment voiced concerns about water rights and impacts to downstream water users; and the fourth comment was in general support of the project proposal.

The public comment period for the Environmental Assessment was from August 9, 2021 to September 6, 2021 and was announced via email, press release, and Facebook post.

A public meeting and site visit were held on August 4, 2021 in the project area.

Substantive comments from all stages of scoping, consultation, and coordination were incorporated as appropriate.

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APPENDIX 1: MITIGATION MEASURES

Mitigation measures from Sections 3.1 and 3.3 to eliminate or minimize effects on cultural resources, Bonneville cutthroat trout (BCT), birds and invasive plants are provided here.

Section	Resource Issue	Mitigation Measure
3.1	Cultural Resources	If buried and/or previously unidentified cultural resources are discovered, or if any unanticipated effects to NRHP eligible properties as a result of this action are observed, the park archeologist will be notified immediately and all necessary steps in accordance with 36 CFR 800.13(b) will be adhered to. Cultural resources within the APE that have been determined eligible for listing in the NRHP will be avoided by project actions that could adversely affect NRHP eligibility status. Eligible sites would have a 20-meter buffer placed around their site boundaries, and proposed actions that could adversely affect NRHP eligibility status would not be allowed within the 20-meter buffers or the site boundaries.
3.3.1	Bonneville Cutthroat Trout	Population surveys will be conducted annually to determine the distribution of BCT within the project area. Installation of post-assisted log structures would be prohibited between June 1 and August 31 in stream reaches occupied by BCT to protect any eggs or alevins present. Other restoration treatments, including large woody debris incorporation, would not be subject to these seasonal restrictions. The hydraulic lines that run from the power-pack to the hydraulic post pounder will be filled with the most environmentally friendly, nontoxic fluid possible. The power-pack for the hydraulic post pounder will be placed on a tarp to contain any potential fuel or oil leaks and spills. A spill kit containing absorbent pads will be located on site to clean up a spill should one occur.

		Refueling will take place on the road whenever possible.
3.3.3	Invasive Plants	Material used for restoration treatments and brought from outside the project area (e.g., untreated wooden posts) would be free of soil that could contain invasive species. All seed and planting material would undergo and pass recent purity tests and/or be certified weed-free.
3.3.4	Wildlife – Birds	Between April 1 and July 31, pretreatment bird surveys will be completed annually before cutting or felling trees.

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