



Environmental Assessment

Strawberry Creek Resource Restoration & Recreation Enhancement Project



Cover Sheet

Responsible Agency: U.S. Department of Interior, National Park Service, Great Basin National Park

Proposed Action/Location: The proposed action is to enhance recreational opportunities in the northern portion of Great Basin National Park (GRBA) while eliminating existing effects to park resources. The proposed action includes: Redesign and rebuild portions of the main access route to correct drainage problems; Upgrade the existing road to provide two-wheel drive access; Develop a small parking area at the park boundary with a new entrance sign and information kiosk; Delineate and construct a variety of single use and group campsites with picnic tables and fire grates; Install Americans with Disabilities Act (ADA) accessible vault toilets. Two or more of the campsites will be made compliant with ADA accessibility guidelines. In addition, a parking area, small corral and hitching rack will be constructed as an equestrian facility. Construct the Strawberry Creek - Blue Canyon trailhead to include: A parking area, signing and a vault toilet. Restoration actions include reclamation of numerous sites associated with undefined dispersed recreation and pull-outs; culvert replacement and removal to eliminate barriers to native fish populations; and reclamation of user created roads.

Type of Statement: Environmental Assessment

Contact Person: Chief of Resource Management, 775/234-7331 ext. 223 or Superintendent, 775/234-7331 ext. 202.

Abstract: The park proposes to implement a project to develop recreational infrastructure in the Strawberry Creek watershed and restore natural resources impacted by dispersed recreation and prior road construction. Public scoping and consultation with Native American tribes was conducted to develop issues to drive the process. Seven issues were developed from the scoping process. The assessment of environmental consequences for the action alternatives found a mix of negligible to minor short-term adverse effects to minor to moderate long-term beneficial effects. Minor cumulative effects were found and were classified as beneficial. No resource impairment of was found. Minor irretrievable commitments of resources were found. No irreversible commitment of resources was found. Indirect effects included the potential increase in visitation to the Strawberry Creek watershed above the existing level of use as a result of signing and infrastructure development. No significant effects to the human environment were identified leading to the development of this Environmental Assessment (EA).

Summary

Proposed Actions: GRBA proposes to implement a project to develop recreational infrastructure in the Strawberry Creek watershed and restore existing natural resources impacted from years of unregulated dispersed recreation and prior road construction activities. The proposed action includes: Redesign and rebuild portions of the main access route to correct drainage problems and restore natural conditions while providing two-wheel drive vehicle access; develop a small parking area at the park boundary with a new entrance sign and information kiosk; delineate and construct a variety of single use and group campsites with picnic tables and fire grates; develop several new trails; construct a small equestrian facility; install Americans with Disabilities Act (ADA) accessible vault toilets; and develop the Blue Canyon trailhead. Restoration actions include reclamation of numerous sites associated with undefined dispersed recreation and pull-outs; culvert replacement and removal to eliminate barriers to native fish populations; and reclamation of user created roads.

Scoping: On February 28, 2008, a scoping notice was sent to all individuals on the GRBA NEPA mailing list, a scoping notice was sent to all consulting Tribes, and a press release was published in the legal section of the Ely Times. The notice informed the public that the NPS intends to prepare an EA for a proposal to enhance recreational opportunities and mitigate resource damage in the Strawberry Creek watershed. Three letters were received. Two of the letters expressed support for the project. The third letter recommended that the park utilize composting toilets and hire more law enforcement rangers to protect the resources in Strawberry Creek.

Issues: The following are the issues developed from the information gathered through the scoping process and used to drive the NEPA analysis: Issue #1 - Effects on Cultural/Historic Resources; Issue #2 – Effects on Wildlife Species of Management Concern; Issue #3 - Effects on Elk; Issue #4 – Effects on Fish Species of Management Concern; Issue #5 – Effects on Riparian Ecosystems; Issue #6 – Effects on Shrub-Steppe Habitat; and, Issue #7 – Effects on Invasive Exotic Plant Species

Alternatives: Based upon the issues, GRBA has developed three action alternatives and the No Action Alternative.

Summary

Action	No Action	Alternative 2	Alternative 3	Alternative 4
Group Campsites	0	2	5	3
Single Campsites	0	4	6	4
Dispersed Campsites	8	3	0	0
Restrooms	0	2	3	2
Trailheads	0	1	1	1
Horse Facilities	No	Yes	No	No
New Trails (miles)	0	2.8	2.8	3.1
Foot Bridges	0	2	2	2

Restoration Actions: Along the main Strawberry Creek road, 7 of the existing campsites sites associated with undefined dispersed recreation and pull-outs will be evaluated for resource impacts and reclaimed. Those found to be having no impacts will be hardened as described under single use campsites. Approximately 2,800 sq. ft. of user created road will be reclaimed at the park boundary. Approximately 16,896 sq. ft. of road from the Blue Canyon trailhead to the upper crossing of Strawberry Creek will be converted into a trail. Approximately 8,600 sq. ft. of road leading to the dispersed campsite in Blue Canyon will be converted to a trail. All disturbed sites will be mulched and seeded with a native seed mix. The existing road to the Robison Corral area will remain open for undeveloped camping opportunities.

Environmental Consequences: Based upon the issues identified, the following environmental consequences were identified through the analysis process.

Comparison of Effects by Alternative

Issue	Alternative 1 No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
Issue #1. Archeological Resources	Current conditions will be unaltered.	Negligible, adverse, long-term indirect effects due to increased visitation. .	Negligible, adverse, long-term indirect effects due to increased visitation. .	Negligible, adverse, long-term indirect effects due to increased visitation. .
Issue #2 Wildlife SOMC	Current conditions will be unaltered. Effects are adverse, moderate, and long-term.	Beneficial, minor and long-term due to restoration actions.	Beneficial, minor and long-term due to restoration actions.	Greatest Long- term, beneficial effects of the alternatives. More acres of habitat restored then adversely impact
Issue #3 Elk	Current conditions will be unaltered. Effects are adverse, moderate, and long-term.	Beneficial, minor and long-term due to restoration actions	Beneficial, minor and long-term due to restoration actions	Beneficial, moderate and long-term due to restoration actions
Issue #4 Fish Species of Management Concern	Effects are moderate, adverse and long-term.	Beneficial, moderate, and long-term due to road improvements and barrier removal.	Beneficial, moderate, and long-term due to road improvements and barrier removal.	Beneficial, moderate, and long-term due to road improvements and barrier removal.
Issue #5 Riparian Ecosystems	Minor adverse effects to the riparian zone will continue.	Effects are beneficial, minor and long-term from restoration actions	Effects are beneficial, minor and long-term from restoration actions	Greatest long-term beneficial effects All dispersed campsites reclaimed allowing habitat to recover.
Issue #6 Shrub-Steppe Habitat.	Existing loss of habitat would be maintained and is adverse minor and long-term.	Long-term effects minor and beneficial due to restoration actions..	Long-term effects minor and beneficial due to restoration actions.	Least adverse effects and greatest beneficial effects from reclamation and development placement.
Issue #7 Invasive Exotic Plant Species	Greater long-term minor adverse direct effects than other alternatives.	Effects adverse moderate in the long-term. .	Effects adverse moderate in the long-term.	Effects adverse moderate in the long-term.

Resource Impairment: In addition to determining the environmental consequences of the preferred and other alternatives, NPS Management Policies (NPS, 2000b) and Director's Order-12 (Conservation Planning, Environmental Impact Analysis, and Decision-Making), require

analysis of potential effects to determine if actions would impair park resources. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment will as occur.

Preferred Alternative: The National Park Service (NPS) preferred alternative is Alternative 2, the proposed action.

Environmentally Preferred Alternative: Based upon Section 101b of NEPA, Alternative 2 is considered the environmentally preferred alternative. The alternatives cause the least damage to the biological and physical environment. They attain the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences. This alternative achieves a better balance between population and resource use that will permit high standards of living and a sharing of life's amenities.

Table of Contents

Chapter 1 - Introduction	
1.0 Purpose	6
1.1 Need for Action	6
1.2 Location/Watershed Information	6
1.3 Project Objectives	7
1.4 Decision to be Made	7
1.5 Scoping	7
1.6 Issues	9
1.7 Issues Dropped from Analysis	10
Chapter 2 - Alternatives	
2.0 Alternative 1 – No Action	12
2.2 Actions Common to the Alternatives	13
2.2 Alternative 2 – Proposed Action	15
2.3 Alternative 3	17
2.4 Alternative 4	18
Chapter 3 - Affected Environment	
3.0 Issue 1: Effects on Cultural Resources	25
3.1 Issue 2: Effects on Wildlife Species of Management Concern	26
3.2 Issue 3: Effects on Elk	26
3.3 Issue 4: Effects on Fish Species of Management Concern	26
3.4 Issue 5: Effects on Riparian Ecosystems	27
3.5 Issue 6: Effects on Shrub-Steppe	27
3.6 Issue 7: Effects on Nonnative Plants	28
Chapter 4 – Environmental Consequences	
4.0 Methodology	29
4.1 Impairment of Park Resource Values	32
4.2 Alternative 1 – No Action	33
4.3 Alternative 2 – Proposed Action	35
4.4 Alternative 3	48
4.5 Alternative 4	55
Chapter 5 – Compliance/Participants/Review	
5.0 Compliance	63
5.1 List of Preparers	64
5.2 List of Recipients	64
5.3 List of Abbreviations	65
5.4 Glossary of Terms	65
References	67
Figure 1 Map of Strawberry Creek Watershed	8
Figure 2.1 Alternative 1 – Conceptual Diagram	20
Figure 2.2 Alternative 3 – Conceptual Diagram	21
Figure 2.3 Alternative 4 – Conceptual Diagram	22
Table 2.1 Alternatives Summary	19
Table 2.2 Comparison of Effects by Alternative	23
Table 4.1 Mitigation Measure Matrix	62

CHAPTER 1

INTRODUCTION: PURPOSE OF AND NEED FOR ACTION

1.0 PURPOSE

GRBA General Management Plan (GMP) states that Strawberry Creek has traditionally been used by visitors to the Great Basin Region who enjoy rustic car camping experiences and recommends a course of action for recreational infrastructure development. This EA develops alternatives to implement the GMP and discloses the environmental consequences associated with the proposed action and alternatives to the proposed action.

1.1 NEED FOR ACTION

Management actions are needed to provide increased recreational opportunities for the visiting public consistent with the direction in the park's GMP while eliminating the potential effects to park resources from unregulated dispersed recreation and the construction of new facilities within the park.

Increased visitation has resulted in the development of dispersed campsites adjacent to the stream within riparian areas. The increased visitation combined with the inability to maintain the main access road on a yearly basis has resulted in deterioration of the roadbed with soil loss and erosion. The upper 1.75 miles of the 3 mile main access road is poorly designed. The roadbed is out-sloped towards the stream and lacks drainage structures. In places, the road is within 5 feet of the main stream channel allowing sediments to bleed into the stream. Two pipe culverts are poorly placed and present fish blocks effectively segmenting fish populations. The eight dispersed campsites and their associated access roads are all located in riparian areas within 10 to 15 feet of the stream. In use for the last 50 or more years, these sites are void of herbaceous vegetation and soils are highly compacted. Water quality, fisheries habitats and riparian areas have been greatly impacted.

Since the completion of the park's GMP and accompanying Environmental Impact Statement in 1993, some conditions have changed in the Strawberry Creek watershed. These changes include:

- 1) As cooperators on the White Pine County Elk Management Plan, the species has now been restored to the park and the Strawberry Creek area now serves as an important summer range and fall breeding area.
- 2) Four species of formally extirpated fish have been restored. These species are the Bonneville cutthroat trout (BCT), mottled sculpin, speckled dace and redbreasted sunfish. All four are considered NPS species of management concern. BCT have been petitioned twice for listing as threatened under the Endangered Species Act. The species is currently under a Conservation Agreement with the U.S. Fish & Wildlife Service.

1.2 LOCATION/WATERSHED INFORMATION

Great Basin National Park was established in 1986. Located in east central White Pine County, Nevada, the park encompasses 77,100 acres of the Southern Snake Range. The park is 300 miles north of Las Vegas, 250 miles southwest of Salt Lake City, and only a few miles south of U.S. Highway 50. The nearest town is Baker, about 5 miles from the current park headquarters.

The Strawberry Creek watershed is in the northeast corner of GRBA totaling 4,820 acres (see Figure 1.1). A seldom maintained three mile dirt road provides access to the canyon and the 8 primitive campsites, 2 trails, fishing, and wildlife viewing. The watershed contains 60 springs, 26 saturated wetlands, and one stream with a tributary called Blue Creek. The watershed contains some of the largest areas of montane shrub steppe habitats remaining in the park and is home to numerous wildlife and fish species of management concern.

The park's GMP land zoning concept placed the road portion of the watershed in the Rural Sub Zone designation. This is defined as a mix between the developed Modern Sub Zone and the minimally developed Semi-primitive Sub Zone. The Rural Sub Zone permits maintained gravel roads, trail development for hikers and horse use, low profile information signing, trailhead construction, and hardened campsites to include picnic tables, fire rings and vault toilets. Developments are to be low key and not extensive.

1.3 PROJECT OBJECTIVES

Objectives include:

- 1) Implement the GMP by designing and developing recreational infrastructure that maintains the rustic experience of the Strawberry Creek area.
- 2) Establish visitor opportunities and facilities in GRBA to enhance safe visitor experiences.
- 3) Bring all visitor information signage and facilities up to a consistent standard.
- 4) Redesign and rebuild portions of the access route to mitigate resource damage and safety hazards to visitors and staff.
- 5) Rehabilitate sections along the access route to correct drainage and restore natural conditions.
- 6) Correct and eliminate the existing environmental effects to park resources associated with unregulated dispersed recreation and restore natural conditions.

1.4 DECISION TO BE MADE

Issues derived from the scoping process were used to drive the development of alternatives to the proposed action and disclose the environmental consequences of all. The decision to be made is what is the course of action that allows a mix of recreation developments designed consistent with the GMP and NPS management policies while managing resources unimpaired for future generations?

1.5 SCOPING

On February 28, 2008, a scoping notice was sent to all individuals on the GRBA NEPA mailing list and a press release was published in the legal section of the Ely Times. The notice informed the public that the NPS intends to prepare an EA for a proposal to enhance recreational opportunities and mitigate resource damage in the Strawberry Creek watershed. The letter disclosed the proposed action in detail with an accompanying map. The letter initiated the scoping process and gave a March 28, 2008, response deadline.

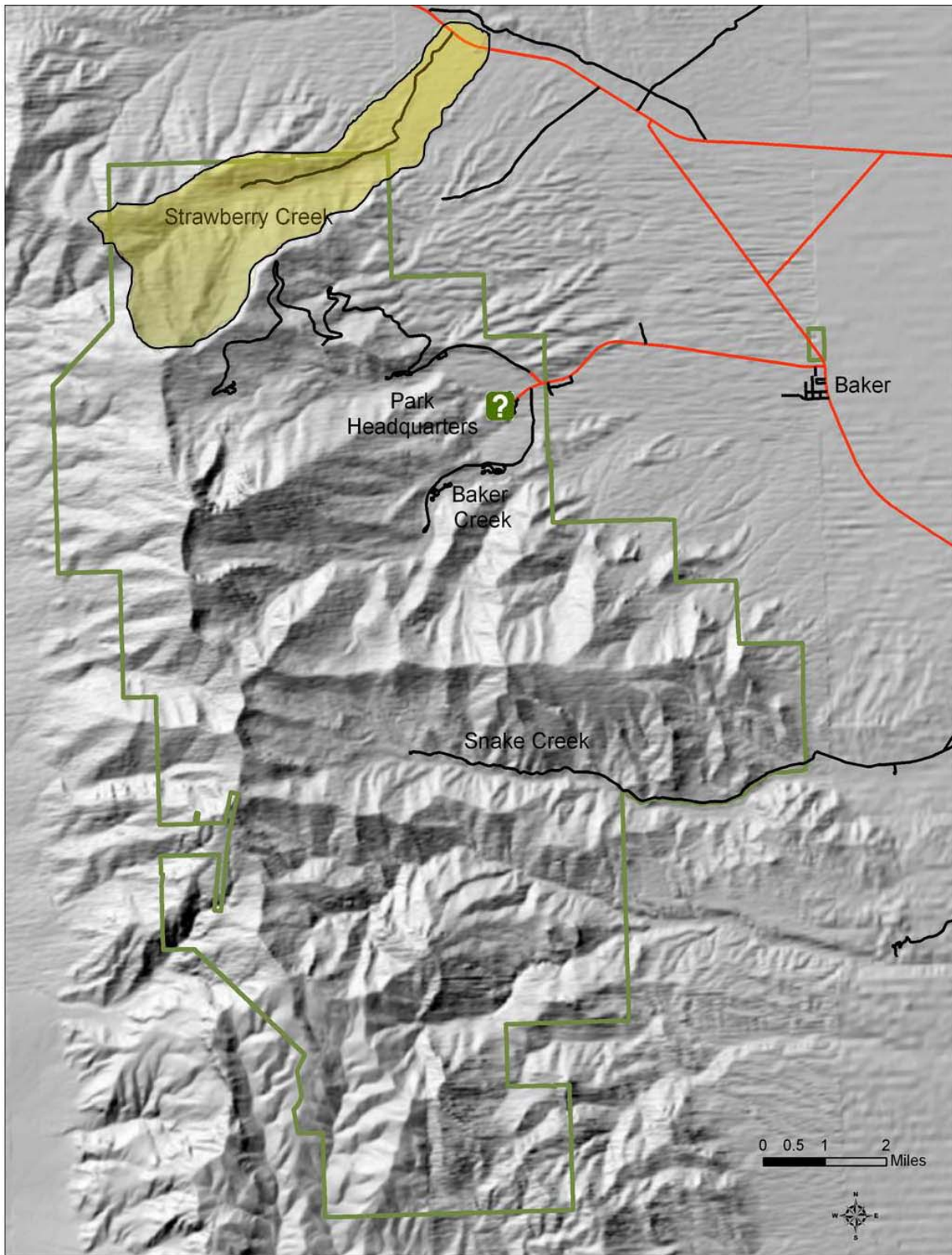


Figure 1 - Strawberry Creek Watershed

Consultation with Native Americans

On February 28, 2008, a scoping notice was sent to all consulting Tribes. This included the Ely Shoshone Tribe, Kanosh Band of Southern Paiute Tribe, Confederated Tribes of the Goshute Reservation, Kaibab Paiute Tribe, and the Southern Paiute Tribe of Utah. The notice informed them that the NPS intends to prepare an EA for a proposal to enhance recreational opportunities and mitigate resource damage in the Strawberry Creek watershed. The letter disclosed the proposed action in detail with an accompanying map. The letter initiated the scoping process and gave a March 28, 2008 response deadline.

From the scoping process, three letters were received. Two of the letters expressed support for the project. The third letter recommended that the park utilize composting toilets and hire more law enforcement rangers to protect the resources in Strawberry Creek.

1.6 ISSUES

The following are the issues developed from the information gathered through both the internal and external scoping processes and will be used to drive the NEPA analysis.

Issue 1: Effects on Cultural Resources - Numerous Cultural sites occur within the Strawberry Creek drainage to include artifact scatters, rock art sites, cultural landscapes, historic structures and dendroglyph sites. The park's GMP states that the objective of cultural resource management would be to protect and interpret the park's Cultural, historical and ethnographic resources in accordance with Park Service policies. The NPS will give consideration to and apply appropriate protection measures to these sites in their development plans consistent with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

Issue 2: Effects on Wildlife Species of Management Concern - The park maintains a list of these wildlife species of management concern and manages them and their habitats for their continuity (NPS 77 Natural Resources Management Guidelines). The park's list includes 22 mammals, 19 birds, and 5 reptiles and amphibians all of which occur or potentially occur in Strawberry Creek watershed. The GMP emphasizes that these species will be given special consideration in all future planning activities. NPS Management Policies (2006, Section 4.4.1) state that the Service will maintain as part of the natural ecosystems of parks, all plant and animals native to park ecosystems. This will be successfully accomplished by minimizing human effects on native plants, animals, populations, communities, and ecosystem processes that sustain them.

Issue 3: Effects on Elk - Elk were extirpated from GRBA in the 1800's. Due to reintroductions, population growth, and range expansion, elk have now re-colonized the park. Strawberry Creek watershed is important habitat for breeding, calving, and foraging. The GMP states that elk will be protected and allowed to establish a viable herd. NPS Management Policies (2006, Section 4.4.1) state that the Service will maintain as part of the natural ecosystems, all plant and animals native to park ecosystems. This will be successfully accomplished by minimizing human effects on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.

Issue 4: Effects on Fish Species of Management Concern - Strawberry Creek is home to four Fish Species of Management Concern that were formally extirpated. The GMP emphasizes that these species will be given special consideration in all future planning activities. NPS Management Policies (2006, Section 4.4.1) state that the Service will maintain as part of the natural ecosystems all plant and animals native to park ecosystems. This will be successfully accomplished by minimizing human effects on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them, and restoring native plant and animal populations in parks when they have been extirpated by past human caused actions. In addition, Bonneville cutthroat trout (BCT) and under a Conservation Agreement (CA) with the U. S. Fish and Wildlife Service. The goal of the CA is to ensure the long-term existence of BCT within its historic range in Nevada by coordinating conservation efforts with the above listed agencies. Threats to BCT and their habitat should be significantly reduced or eliminated through implementation of the CA.

Issue 5: Effects on Riparian Habitats - The Park's GMP states that because of the relative scarcity of water in the South Snake Range, riparian areas represent a small but important percentage of the park. These areas are of ecological significance supporting a greater quantity of species than adjoining uplands. The Strawberry Creek watershed contains 6.6 miles of riparian habitats. The GMP directs the park to "maintain the greatest degree of biological diversity and ecosystem integrity within the provisions of the authorizing legislation" and to "monitor and evaluate biological diversity in relation to the influence of major changes." NPS management policies state that the Service will protect watershed and stream features primarily by avoiding effects on riparian processes and by allowing natural fluvial processes to proceed unimpeded.

Issue 6: Effects on shrub-Steppe Ecosystems - Although shrub steppe plant communities define the boundaries of the biologic Great Basin, they are one of the most threatened plant communities in the United States. Changes in wildfire frequency and extent, non-native annual, invasive plants, livestock grazing, and climate change have resulted in a rapid conversion of shrub steppe communities into less productive woodlands and annual grasslands. Within GRBA, 16,400 acres of shrub steppe have been converted to pinyon juniper in the last 150 years and it is estimated that only 3,050 acres of pristine, shrub steppe habitat currently remain. NPS Management Policies (2006, Section 4.4.1) state that the Service will maintain as part of the natural ecosystems of parks all plant and animals native to park ecosystems. This will be successfully accomplished by minimizing human effects on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.

Issue 7: Effects on invasive exotic plants - The Strawberry Creek watershed contains five invasive exotic species including populations of cheatgrass (*Bromus tectorum*), common mullein (*Verbascum thapsus*), spotted knapweed (*Centaurea maculosa* - noxious), Bull thistle (*Cirsium vulgare*) and Perennial Pepperweed (*Lepidium latifolium* - noxious). The park's GMP states that nonnative plant species will be eradicated and controlled if they threaten to spread or compete with park resource. NPS Management Policies (2006, Section 4.4.4) state that "Exotic species will not be allowed to displace native species if displacement can be prevented." All exotic plant species can decrease the diversity and resilience of native communities, affect site productivity, and affect hydrologic functioning of a watershed.

1.7 ISSUES DROPPED FROM ANALYSIS

The following issues developed from the scoping process were dropped from further analysis. It was determined by the NPS Interdisciplinary Team that these issues were either beyond the scale and scope of the proposed action, were found to be non-significant based upon existing conditions, or were covered by the existing GRBA GMP.

Issue: Effects on Plants Species of Management Concern - The GRBA Species of Management Concern list contains 22 plant species occurring in the Snake Range and surrounding valleys as rare or sensitive. Of these species, none have the potential to grow in the project areas covered by this document.

Issue: Effects on Unique Areas - The locations described in the proposed action and alternatives to the proposed action are not located within or adjacent to any designated or proposed Research Natural Area or Protected Natural Area Sub Zone. There will be no potential effects to any designated or proposed Research Natural Area or Protected Natural Area.

Issue: Effects on Wild & Scenic River designation - The existing GMP did not recommend or consider any stream system within the boundaries of GRBA for Wild & Scenic River status. The proposed action and alternatives to the proposed action will not result in the possibility of a river or stream being eliminated from consideration as a Wild & Scenic River.

Issue: Effects on Wilderness designation - The current GMP did not recommend any areas for inclusion into the National Wilderness System. This possibility was deferred to a later date in conjunction with the development of a Backcountry Management plan. The proposed action and alternatives to the proposed action are all located within the Rural Sub Zone. This Sub Zone has been designated to accommodate the mix of uses and developments in the park that are less than the Modern Sub Zone but greater than the Semi-primitive and Primitive Sub Zones. Based upon the GMP zoning concept, no lands within the Rural Sub Zone would be eligible for inclusion into the National Wilderness System.

Issue: Effects on Threatened and Endangered Species - There are currently no species listed under the ESA inhabiting the action areas or GRBA. In addition, GRBA has not been designated as Critical Habitat for any species listed under the ESA. There are numerous U.S. Fish and Wildlife Service former Candidate species and NPS Species of Management Concern for which the analysis of effects has been prepared under the Species of Management Concern issues.

Issue: Effects on Ethnographic Resources

Ethnographic resources are comprised of features of the landscape that are linked by members of a contemporary community to their traditional ways of life. A traditional cultural property is an ethnographic resource that is eligible for listing on the National Register of Historic Places. There are no known ethnographic resources within the Strawberry Creek drainage.

Issue: Effects to Cultural Landscape Resources

A cultural landscape is a reflection of human adaptation and use of natural resources. It is expressed in the way land is used and organized, patterns of settlement, systems of circulation,

and the types of structures that are built (NPS 1998b:87). Of the known cultural sites in the proposed action area, none have been determined significant under a cultural landscape resource.

CHAPTER 2 ALTERNATIVES

2.0 ALTERNATIVE 1- No Action

Under the No Action alternative, no improvements will be made and the current conditions will be unaltered. The eight dispersed campsites will remain as they are described below. No improvements will occur on the roadway or to culverts. No restroom facilities will be installed.

Park Boundary: The park boundary through Strawberry Creek lies at 6,800 feet in elevation. There is an undesignated pull-out from parked vehicles and an old campsite and accompanying 350 feet of user created road leading north from the pull-out.

Strawberry Creek Campsites: The 8 existing dispersed campsites will remain as described below.

Campsite One: The first campsite within the park lies at 7,200 feet in elevation. There is a user created road, one picnic table and a fire ring. Campsite one is within the riparian zone and 32 feet from Strawberry Creek.

Campsite Two: Campsite two is located at 7,250 feet in elevation. There is a user created road, one picnic table and a fire ring. This campsite is in the pinion-juniper woodland. From campsite two the distance to the creek is 62 feet.

Campsite Three: Campsite three is located at 7,300 feet in elevation. The campsite has a user created pull-in and a fire ring. The campsite is within the riparian zone and 60 feet from Strawberry Creek.

Campsite Four: Campsite four is at 7,400 feet in elevation. There is a user created road, one picnic table and a fire ring. The campsite is within the riparian zone and 12 feet from Strawberry Creek.

Campsite Five: Campsite five is at 7,750 feet in elevation directly adjacent to Robison Corral. There is a user created road, two picnic tables and a fire ring. Campsite five is within the riparian zone and 37 feet from a small creek and spring complex.

Campsite Six: Campsite six is at 7,850 feet in elevation at the end of a user created road along Blue Canyon. There is a user created road, a picnic table and a fire ring. Campsite six is within the White-fir/riparian zone and 17 feet from Blue Creek.

Campsites 7 and 8

Located at the end of Strawberry Creek road at 8,300 feet in elevation, the sites are reached by fording the main stream channel. There are user created roads to each site, two picnic tables and two fire rings. These campsites are within the White-fir/riparian zone and within 25 feet of the main stream.

2.1 ACTIONS COMMON TO ALL ALTERNATIVES

1) Implementation of the selected alternative will be in compliance with Executive Order 13101 “Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition,” September 14, 1998; Executive Order 13123 “Greening the Government Through Efficient Energy Management,” June 3, 1999; and Executive Order 13148 “Greening the Government Through Leadership in Environmental Management,” April 21, 2000; and implementation of the Council of Environmental Quality guidance on pollution prevention as it relates to building construction. The Pacific West Region of the NPS policy titled “100 Best Management Practices, Defining What a Green Park Looks Like” contains actions, practices, and products that will be followed in order to implement the Federal greening Executive Orders.

2) NPS Management Policies (2006, Section 9) provides guidance in development and need for the proposed action to include:

A) Park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience.

B) Trail design will vary to accommodate a wide range of users and be appropriate to user patterns and site conditions. Trails will be designed to protect park resources. Trail bridges may be used as the preferred alternative when necessary to prevent stream bank erosion or protect wetlands or fisheries.

C) Trailheads will be used to facilitate safe and enjoyable trail use and efficient management.

D) Parking areas will be located to not unacceptably impact park resources. When deemed necessary, they will be limited to the smallest size possible and incorporate design elements that reduce negative visual and environmental elements.

E) Signs will be carefully planned and designed to fulfill their important roles in conveying an appropriate park image and providing information and orientation to visitors. Entrance and other key signs will be distinctively designed to reflect the character of the park while meeting Service-wide standards for consistency.

F) When campgrounds are determined to be necessary, their design will accommodate the differences between recreation-vehicle camping and tent camping. Cultural landscapes, terrain, soils, vegetation, wildlife, climate, special user needs, visual and auditory privacy and other relevant factors will be considered. Campgrounds intended to accommodate large recreation vehicles will be located only where existing roads can safely accommodate such vehicles and the resulting increased traffic load.

3) The term group and individual campsite is used in all action alternatives. This does not imply a restriction of use or a reservation system but refers only to a size designation. Group sites will consist of a 22 ft x 15 ft cement pad, two attached picnic tables, a free standing cooking grill and an in-ground fire ring. They will incorporate Americans with Disability Act (ADA) accessibility guidelines. Individual campsites will consist of a picnic table and a fire grate. No cement pads will be utilized. Tables will be cemented into the ground to prevent movement. All campsites will be available on a first come first served basis. They will incorporate ADA accessibility guidelines.

- 4) The following best management practices for roads will be used for all road improvements:
1) Crown and angle roads uphill to drain water to ditches; 2) Use bridges and culverts to cross streams; 3) Place water bars or rolling dips at a 30 to 45 degree angle with a cross drainage grade of 2% and towards the roadside ditch; 4) Ditches will divert water away from roads and side ditches and channel it into vegetation. These structures are often used before stream crossings to ensure that water will be diverted into vegetation and not directly into a stream, lake or wetland.
- 5) The diagrams associated with each of the development alternatives are conceptual in nature. The proposed developments have been measured and staked out on the ground to guide the NEPA process. Upon selection of a preferred alternative, a Landscape Architect will complete all site plans prior to project initiation.

2.2 ALTERNATIVE 2. Proposed Action

The proposed action includes:

Park Boundary: Development consists of a parking area and installation of a new entrance sign. See site A on Figure 2.1. Parking area is approximately 20 ft deep x 30 ft wide. The parking area entrance will have a culvert installed to allow proper drainage and direct any flow into the road side ditch. An information kiosk will be erected that discloses recreational opportunities in the watershed. Flagstone walls will be constructed on the west and north sides of the parking area to serve as a retaining wall to prevent soils loss from the slopes above. Approximately 350 feet of user created road above the purposed parking area will be reclaimed. Pinion pine trees will be removed from the area of development. Slash materials will be chipped on site. All disturbed sites will be mulched and seeded with a native seed mix.

Strawberry Creek Campsites and Equestrian Facility. Site is located approximately one mile west of the park boundary and along the main Strawberry Creek road. See site B on Figure 2.1.

On the north side of the main road, a 50 ft deep x 50 ft wide parking area will be constructed. The parking area entrance will have a culvert installed to allow proper drainage and direct any flow into the road side ditch. An information kiosk and ADA accessible vault toilet will be installed. To the west of the parking area, a 15 ft x 15 ft post and pole corral with manger and hitching rack will be constructed as an equestrian facility. Approximately 110 feet to the west of the corrals, a group campsite will be constructed consisting of a 25 ft long x 15 ft wide pull in, a 22 ft x 15 ft cement pad, two picnic tables, a free standing cooking grill and an in-ground fire ring.

To the south of the main road, four individual campsites that have picnic tables and fire grates will be constructed. Pull-ins will be 17 ft wide x 35 ft long. Each campsite is estimated to be 20 ft x 20 ft. No cement pads will be installed. Tables will be cemented into the ground to prevent movement. Directly to the south of the corral, an ADA accessible group campsite will be constructed consisting of a 25 ft long x 15 ft wide pull in, a 22 ft x 15 ft cement pad, two picnic tables, a free standing cooking grill and an in-ground fire ring. All campsites will be greater than 150 feet from the main channel of Strawberry Creek.

All pull-ins will have a culvert installed to allow proper drainage and direct any flow into the road side ditch. To assure visitor safety, regulatory signing will be installed that will reduce vehicle speeds to 15 miles an hour and notify motorists that they are entering a congested area. Approximately four acres of pinion-juniper woodlands will be lightly thinned to reduce fuel density. Slash materials will be chipped on site. All disturbed sites will be mulched and seeded with a native seed mix.

Strawberry Creek - Blue Canyon trailhead: Approximately 2.5 miles west of the park boundary a 50 ft x 40 ft parking area will be constructed. Flagstone retaining walls will be constructed as needed to control erosion. Signing and an ADA accessible vault toilet will be installed. A trailhead information sign will be erected. Trails accessed will include Strawberry Creek, Strawberry-Sage Loop and the Osceola Ditch trails. A bridge will be installed above the trailhead that crosses Strawberry Creek. See site C on Figure 2.1.

The proposed trailhead will provide access for hikers and horseback riders to Upper Strawberry Creek, Windy Canyon, Blue Canyon and the Osceola Ditch trail. The upper 0.5 mile of existing road will be converted to a trail.

New trails: A 0.8 mile trail up Blue Canyon will allow equestrian access to the road portion of the Osceola Ditch trail. The Strawberry-Sage loop trail will be installed as a road to trail conversion of both the abandoned roadbed on the south side of Strawberry Creek and the upper 0.5 mile of existing road. Trail will be a 1.2 mile loop. Two foot bridges will be installed at creek crossings. Completion of 1.5 miles of the northern portion of the Osceola Ditch trail to the western park boundary.

Road Improvements: The following treatments will be implemented to upgrade and improve the existing road to allow two-wheeled drive passenger vehicle access, minimize resource impacts associated with the road and decrease maintenance requirements. These treatments will be applied from the park boundary to the Strawberry – Blue Canyon Trailhead, a distance of 2.4 miles.

1) **Improve and Stabilize roadway surface and shoulders:** The road will be maintained at the current 14 ft width with a 2 ft shoulder. The roads existing base will be graded and compacted as the preliminary treatment. Approximately 6 to 8 inches of Nevada Department of Transportation (NDOT) Type-2 surface gravel will be applied along the entire length, graded out and compacted. In the section where the road is directly adjacent to the creek, realignment of the road will occur to provide a buffer between the road and the creek. The roadbed will then be graded and angled towards the hillside to divert drainage and sediment away from the creek and into a road side ditch.

2) **Improve culvert crossings:** All culverts along the main Strawberry Creek channel will be replaced by those adequate for hydraulic capacity and stability. Replacement design will be pre-cast three sided open culverts, which will provide a natural bed condition for fish habitat and passage. Scour protection will be provided by upstream wing walls.

3) **Improve roadway drainage:** Along the improved road section a road side drainage ditch will be installed. In conjunction with the ditch, cross culverts and sediment traps will be added in areas where the road is farther from the creek to allow the sediments to settle out. These will require regular maintenance, but are the most effective way to prevent road sediments from entering the creek.

Restoration Actions: Along the main Strawberry Creek road, 7 of the existing campsites sites associated with undefined dispersed recreation and pull-outs will be evaluated for resource impacts and reclaimed. Those found to be having no impacts will be hardened as described under single use campsites. Approximately 2,800 sq. ft. of user created road will be reclaimed at the park boundary. Approximately 16,896 sq. ft. of road from the Blue Canyon trailhead to the upper crossing of Strawberry Creek will be converted into a trail. Approximately 8,600 sq. ft. of road leading to the dispersed campsite in Blue Canyon will be converted to a trail. All disturbed sites will be mulched and seeded with a native seed mix. The existing road to the Robison Corral area will remain open for undeveloped camping opportunities.

2.3 ALTERNATIVE 3.

This alternative includes:

Park Boundary: Development will be identical to that described under Alternative 2. See Site A on Figure 2.2.

Strawberry Creek Campsites: See Site B on Figure 2.2. On the north side of the main road, a 30 ft deep x 40 ft wide parking area will be constructed. The parking area entrance will have a culvert installed to allow proper drainage and direct flow into the road side ditch. An information kiosk and ADA accessible vault toilet will be installed. Two group campsites will be constructed at approximately 30 ft and 110 ft to the west of the parking area. The one adjacent to the parking area will have a 30 ft long ADA accessible sidewalk from the restroom to the site.

On the south side of the main road, 6 individual campsites will be constructed. Pull-ins will be 17 ft wide x 35 ft long. Two of the campsites will be made compliant with ADA accessibility guidelines. Directly across from the parking area, an ADA accessible group campsite will be constructed. All campsites will be greater than 150 feet from Strawberry Creek.

All pull-ins will have a culvert installed to allow proper drainage and direct any flow into the road side ditch. Approximately four acres of pinion-juniper woodlands will be lightly thinned to reduce fuel loads. Slash materials will be chipped on site. To assure visitor safety, regulatory signing will be installed to reduce vehicle speeds to 15 miles an hour and notify motorist that they are entering a congested area.

Sage-Steppe Group Campsites: See Site C on Figure 2.2. Approximately 2.3 miles west of the park boundary at the junction with the road to Robison Corral, two ADA accessible group campsites with a small parking area will be constructed. An ADA accessible vault toilet will be installed. All campsites will be greater than 350 feet from Strawberry Creek and 125 feet from the springs at Robison Corral. From the parking area, the existing road to Robinson Corral will be converted to an interpretive trail with 3 low profile signs.

Strawberry Creek - Blue Canyon trailhead: See Site D on Figure 2.2. Approximately 2.5 miles west of the park boundary a 50 ft x 40 ft parking area will be constructed. Flagstone retaining walls will be constructed as needed to control erosion. Signing and an ADA accessible vault toilet will be installed. A trailhead information sign will be erected. Trails access will include Strawberry Creek, Strawberry-Sage Loop and the Osceola Ditch trails. A bridge will be installed above the trailhead that crosses Strawberry Creek. All disturbed sites will be mulched and seeded with a native seed mix.

New trails: Trail development will be identical to that described under Alternatives 2.

Road Improvements: Road maintenance and improvements will be identical to that described under Alternatives 2.

Restoration Actions: Along the main Strawberry Creek road, 8 existing campsites associated with dispersed recreation and pull-outs will be evaluated for resource impacts and reclaimed. Those found to be having no impacts will be hardened as described under single use campsites. Approximately 2,800 sq. ft. user created road will be reclaimed at the park boundary. Approximately 16,896 sq. ft. of road from the Blue Canyon trailhead to the upper crossing of Strawberry Creek will be converted into a trail. Approximately 8,600 sq. ft. of road leading to the dispersed campsite in Blue Canyon will converted to a trail. All disturbed sites will be mulched and seeded with a native seed mix.

2.4 ALTERNATIVE 4.

This alternative includes:

Park Boundary: Development will be identical to that described under Alternatives 2 and 3. See Site A on Figure 2.3.

Strawberry Creek Campsites: On the north side of the main road, a 30 ft deep x 40 ft wide parking area will be constructed. The parking area entrance will have a culvert installed to allow proper drainage and direct flow into the road side ditch. An information kiosk and ADA accessible vault toilet will be installed. Two group campsites will be constructed at approximately 30 ft and 110 ft to the west of the parking area. The one adjacent to the parking area will have a 30 ft long ADA accessible sidewalk from the restroom to the site.

On the south side of the main road, 4 individual campsites will be constructed. Pull-ins will be 17 ft wide x 35 ft long. Two of the campsites will be made compliant with ADA with accessibility guidelines. Directly across from the parking area, an ADA accessible group campsite will be constructed. All campsites will be greater than 150 feet from Strawberry Creek. See Site B on Figure 2.3.

All pull-ins will have culverts installed to allow proper drainage and direct any flow into the road side ditch. Approximately four acres of pinion-juniper woodlands will be lightly thinned to reduce fuel loads. Slash materials will be chipped on site. To assure visitor safety, regulatory signing will be installed that will reduce vehicle speeds to 15 miles an hour and notify motorists that they are entering a congested area.

Sage-Steppe trailhead: Approximately 2.3 miles west of the park boundary at the junction with the road to Robinson Corral, a 40 ft x 40 ft parking area will be constructed. An ADA accessible vault toilet will be installed. Flagstone retaining walls will be constructed as needed to control erosion and prevent vehicle encroachment into adjacent meadow areas. A trailhead information sign will be erected. Trails access will include Strawberry Creek, Strawberry-Sage Loop and the Osceola Ditch trails. A bridge will be installed above the trailhead that crosses Strawberry Creek. The road to Robison Corral will be reclaimed. All disturbed sites will be mulched and seeded with a native seed mix. See Site C on Figure 2.3.

New trails: Trail development will be identical to that described under Alternatives 2 and 3 with the exception that approximately 0.25 of a mile of the Strawberry Creek road to Blue Canyon will undergo a road to trail conversation.

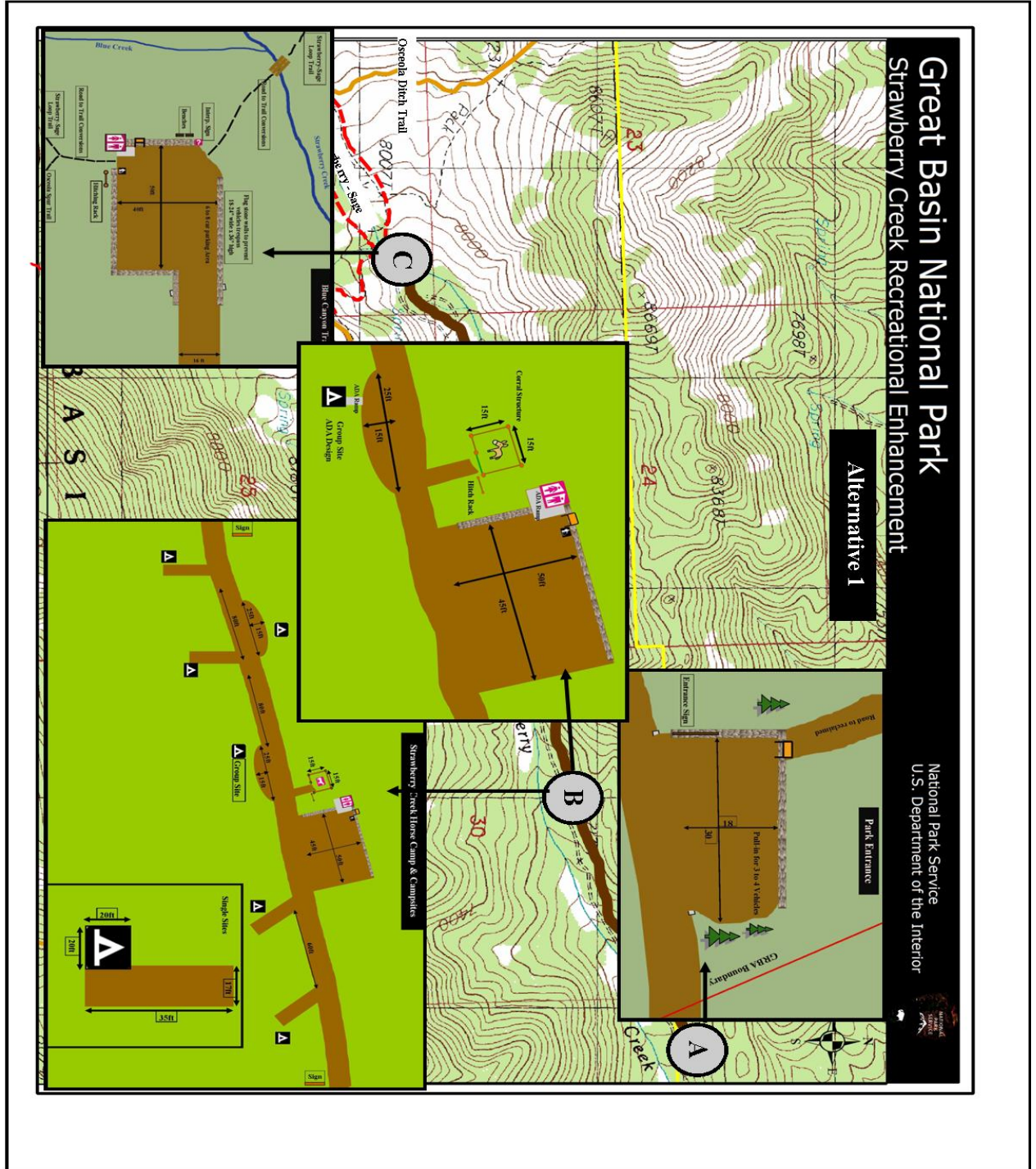
Road Improvements: The treatments are identical to those described under Alternatives 2.

Restoration Actions: Restoration actions are identical to those described under Alternative 2 except that 0.25 mile of the road to Robison corral will be reclaimed.

Alternative development Summary: The following table summarizes the recreational infrastructure development for the alternatives.

Table 2.1 Alternatives Summary

Action	No Action	Alternative 2	Alternative 3	Alternative 4
Group Campsites	0	2	5	3
Single Campsites	0	4	6	4
Dispersed Campsites	8	3	0	0
Restrooms	0	2	3	2
Trailheads	0	1	1	1
Horse Facilities	No	Yes	No	No
New Trails (miles)	0	2.8	2.8	3.1
Foot Bridges	0	2	2	2



National Park Service
U.S. Department of the Interior

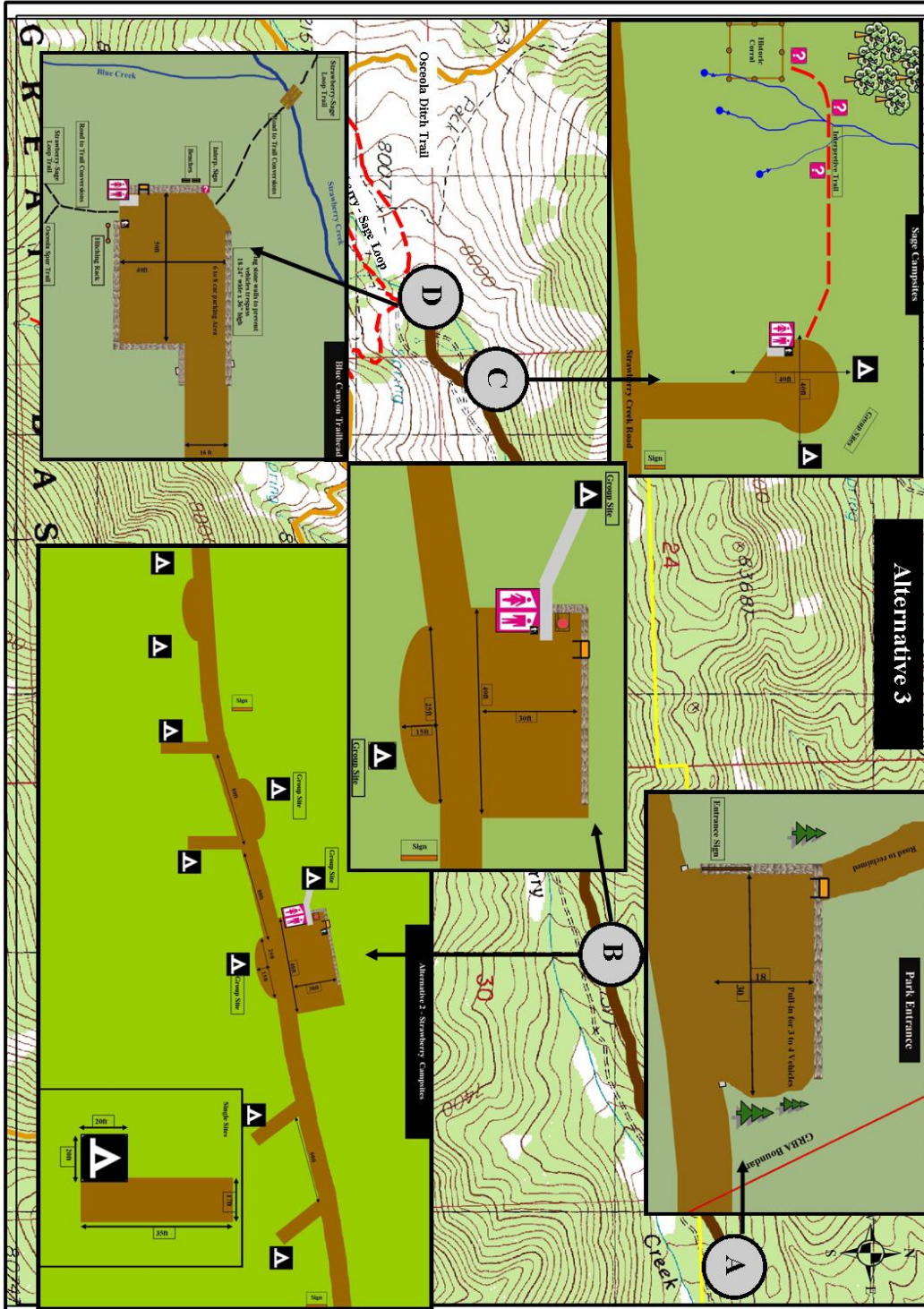


Figure 2.2 Conceptual Diagrams of Alternative 3



22

Table 2.2 Comparison of Effects by Alternative

Issue	Alternative 1 Proposed Action	Alternative2 – No Action	Alternative 3	Alternative 4
Issue #1. Archeological Resources	No adverse effects. Beneficial, minor and long-term at one site from road-to-trail. Negligible, adverse and long-term indirect effects due to increased visitation. Mitigation measure assures the no effect determination.	Current conditions will be unaltered. Since no action will be taken. No effects to cultural resource will occur.	No adverse effects. Beneficial, minor and long-term at one site from road-to-trail. Negligible, adverse and long-term indirect effects due to increased visitation. Mitigation measure assures the no effect determination.	No adverse effects. Beneficial, minor and long-term at one site from road-to-trail. Negligible, adverse and long-term indirect effects due to increased visitation. Mitigation measure assures the no effect determination.
Issue #2 Wildlife SOMC	Overall long-term, beneficial and minor due to restoration actions. Effects from developments ranged from negligible to minor. Irretrievable commitment from areas of habitat occupied by developed sites.	Current conditions will be unaltered. Effects are adverse, negligible, and long-term except around the upper 0.5 miles of existing road are adverse, moderate, and long-term.	Overall long-term, beneficial and minor due to restoration actions. Effects from developments ranged from negligible to minor. Irretrievable commitment from areas of habitat occupied by developed sites.	Least adverse effects and greatest beneficial effects of the alternatives.. Reclamation and infrastructure placement result in more acres of habitat restored then adversely impact Long-term, beneficial, minor effects.
Issue #3 Elk	Overall long-term effects would be beneficial and minor due restoration actions. Adverse, negligible short-term effects due to displacement during breeding season. Mitigated to no effect.	Current conditions will be unaltered. Effects are adverse, negligible, and long-term except around the upper 0.5 miles of existing road are adverse, moderate, and long-term.	Overall long-term effects would be beneficial and minor due restoration actions. Adverse, negligible short-term effects due to displacement during breeding season. Mitigated to no effect.	Has the least effects to the elk population. Moderate beneficial effects. Restoration of an additional 0.25 mile of the road and road to Robison Corral is a greater reduction in road density through key elk habitats.
Issue #4 Fish Species of Management Concern	Overall long-term effects beneficial, moderate, and long-term due to road improvements and barrier removal. Short-term adverse and minor from sediment input during road and culvert work. Mitigation measures minimizes but does not eliminate.	The Alternative does not correct the poorly engineered road or the eight dispersed campsites. Effects are minor to moderate adverse to the native fishes.	Overall long-term effects beneficial, moderate, and long-term due to road improvements and barrier removal. Short-term adverse and minor from sediment input during road and culvert work Mitigation measures minimizes but does not eliminate.	Overall long-term effects beneficial, moderate, and long-term due to road improvements and barrier removal. Short-term adverse and minor from sediment input during road and culvert work Mitigation measures minimizes but does not eliminate.
Issue #5 Riparian Ecosystems	Effects beneficial and minor from restoration actions. Road/culvert work creates negligible short-term adverse. Mitigation minimizes but not eliminate.	Minor adverse effects to the riparian zone will continue.	Effects beneficial and minor from restoration actions. Road/culvert work creates negligible short-term adverse. Mitigation minimizes but not eliminate.	Has the greatest long-term beneficial effects and the least short-term adverse effects. All dispersed campsites reclaimed allowing habitat to recover.

Issue #6 Shrub-Steppe Habitat.	Long-term effects minor and beneficial due to restoration actions. Irretrievable commitment of resources from small areas of shrub-steppe occupied by development. Cumulative effects beneficial with past and future restoration efforts.	Existing loss of habitat would be maintained and is adverse minor and long-term.	Long-term effects minor and beneficial due to restoration actions. Irretrievable commitment of resources from small areas of shrub-steppe occupied by development. Cumulative effects beneficial with past and future restoration efforts.	Least adverse effects and greatest beneficial effects from reclamation with development placement. More acres restored than effected. Long-term, beneficial, minor effects.
Issue #7 Invasive Exotic Plant Species	Effects adverse minor in the short-term and adverse moderate in the long-term. Mitigation measures reduce the short-term effects but not eliminate effects.	This alternative would have the least amount of direct effects and the least amount of visitor use compared to other alternatives. There are no short-term. Greater long-term minor adverse direct effects than other alternatives.	Effects adverse minor in the short-term and adverse moderate in the long-term. Mitigation measures reduce the short-term effects but not eliminate effects.	Effects adverse minor in the short-term and adverse moderate in the long-term. Mitigation measures reduce the short-term effects but not eliminate effects.

CHAPTER 3

AFFECTED ENVIRONMENT

This chapter describes the affected environment within the proposed action area. This chapter deals with the conditions found based on existing management, resource conditions, and data in relation to those issues found significant from the scoping process.

3.0 Issue 1: Effects on Archeological/Historic Resources

Archeological Resources

There are eight known archeological sites are within the Strawberry Creek project area.

Site 26WP1646, Osceola (East) Ditch. About 7.6 miles of this ditch is within the park. Very little of these remain today. The Osceola (East) Ditch was placed on the National Register of Historic Places in 1996 (Unrau 1989). Today the ditch is used as a recreational hiking trail.

Site 26WP2020, Robison Corral. There is indication that this site area may also have been a homestead. Also associated with this site are approximately 88 dendroglyphs that date from 1921 to 1958 which are associated with ranching (sheep and cattle) and recreation (Jageman 2007a and Wells 1990). Site is determined eligible to the National Register of Historic Places.

Site 26WP4336, Strawberry Creek Wagon Remains. Association with the ditch or to ranching is unknown due to the state of deterioration. Site is determined ineligible to the National Register of Historic Places (Bergstresser and Blalack 2006 and Blalack 1998).

Site 26WP4337, Strawberry Creek Dendroglyphs. Comprised of about 409 tree carvings dating from 1911 to 2006. Carvings are associated with recreation and sheep herding (possibly Basque, Scandinavian and Peruvian). Dendroglyphs for this analysis are defined as tree carving older than 1958. Tree carvings date from 1959 to the present and are not considered archeological resources. The site is eligible to the National Register of Historic Places. (Bergstresser and Blalack 2006 and Blalack 2007).

Site 26WP7011, Eva's Scatter. Site is a lithic scatter comprised of several bifaces and debitage that is representative of biface reduction. Date of the site is unknown since no diagnostic artifacts have been recovered (Whiting 2006). Site is determined eligible to the National Register of Historic Places.

Site 26WP8029, Strawberry Creek Meadow Lithic Scatter. The site is a large lithic scatter that has not yet been fully documented. From the information obtained so far, it appears to be a seasonal plant gathering and hunting site dating between 2500 BC – AD 500 (Holmer 1986:105 and Jageman 2007b).

Site 26WP8030, Lower Blue Canyon Dendroglyphs. A few are classified as dendroglyphs with dates from the 1920s – 1958. Most dates are from the 1980s (Jageman 2007c). Site is determined ineligible to the National Register of Historic Places.

Site 26WP8031, Strawberry Creek Dendroglyphs #2. Site is comprised of 30 tree carvings with dates from 1950s to 1990s (Jageman 2007d). A few are from 1958 and older and classified as dendroglyphs. Site is determined ineligible to the National Register of Historic Places.

3.1 Issue 2: Effects on Wildlife Species of Management Concern

NPS Wildlife Species of Management Concern near the proposed action include: sagebrush vole, beaver, ringtail, striped skunk, and sage grouse.

- Sagebrush Voles (*Lemmys curtatus*) were documented from Strawberry Creek in 2006 and 2007 by live trapping. Sagebrush voles are sagebrush obligates and are listed as sensitive in GRBA due to their dependence on shrub steppe habitat. Strawberry Creek currently has the only known populations of sagebrush voles in GRBA.
- Ringtails (*Bassaricus astutus*) were documented from two localities in Strawberry Creek in 2004. The species is listed as sensitive in GRBA due to its low frequency of observation and the position on GRBA at the northern extent of its range.
- Beavers (*Castor canadensis*) were documented in Strawberry Creek in 2004 but has since disappeared. The species is considered an ecosystem engineer and is listed as sensitive due to its dependence on riparian habitat and its low reproductive rate.
- Porcupines (*Erethizon dorsatum*) were documented from Strawberry Creek during track surveys in 2005. Porcupines are listed as sensitive due to a recent enigmatic range wide decline (including GRBA) and their dependence on riparian habitat.
- Sage Grouse (*Centrocercus urophasianus*) were documented in Strawberry Creek in 2000 when an adult male was observed. Although no breeding habitat for sage grouse occurs in GRBA, montane sagebrush habitats such as Strawberry Creek are seasonally important habitat for the species.

3.2 Issue 3: Effects on Elk

Strawberry Creek forms the core home range for GRBA's elk herd. The upper portions of the proposed action include important elk breeding and foraging habitat. Breeding activity occurs from August 25th-October 15th. There is approximately 7,200 acres of elk home range found in GRBA and much of this is in the Strawberry Creek Watershed.

3.3 Issue 4: Effects on Fish Species of Management Concern

Strawberry Creek contains four fish species of Management Concern. BCT are currently petitioned for listing on the Endangered Species List in 2007. BCT, along with the other three fish species (mottled sculpin, redbreasted shiner, and speckled dace), have genetics that are unique to the area. They have been isolated for over 10,000 years in Snake Valley.

BCT were reintroduced in Strawberry Creek in 2002 with a subsequent transplant in 2005. The latest population survey in 2006, found 53 BCT in a 100 m reach, for an estimate of 853 fish per mile.

In October 2006, 150 each of mottled sculpin, speckled dace, and redbside shiner were reintroduced into Strawberry Creek between the park boundary and ½ mile upstream. During two distribution surveys in 2007, all three fish species were found, including young-of-year mottled sculpin. These populations are extremely small and vulnerable to perturbations at this time particularly extra sedimentation.

The fish in Strawberry Creek need clear, cool water in order to thrive. They depend on large woody debris for extra nutrients in the stream, deep pools to over winter, and riffle sections with rounded gravel for spawning. They also need adequate shade to prevent stream temperatures from becoming too high.

3.4 Issue 5: Effects on Riparian Ecosystems

Proper Functioning Condition surveys of Strawberry Creek were completed in 1997. They found that the upper portions of the watershed to be relatively un impacted. Two reaches contained extensive historic beaver activity, which was determined to be a part of the natural valley evolution process for the stream. In several reaches, the conditions of the road are increasing erosion, bank instability, and impacting vegetation. These reaches were classified as Functional-at-Risk. All other reaches in the drainage appeared to be in Proper Functioning Condition (Greene and Mann 1997).

In 2006, 7 physical habitat surveys were conducted on Strawberry Creek between 6,775 ft and 8,579 ft in elevation. Five of the seven survey stations scored in the suboptimal condition category for bank stability, vegetative protection, and width of riparian zone, and three stations were rated as suboptimal for available cover. These suboptimal ratings can be correlated to the location of the current campsites and road within the riparian zone and adjacent to the creek.

The dominant riparian vegetation along the lower reaches of Strawberry Creek consisted of water birch, willow, and rose encroached upon by pinion pine and Utah Juniper. At the higher elevations the dominant species were aspen and Douglas fir. The dominant aquatic vegetation found in the 2006 survey was attached green algae and moss. Frantz (1953) found abundant moss at the upper elevations along with *Prasiola mexicana*. Filamentous algae were found frequently at the lower elevations (Horner 2007). Increased sedimentation into the stream and elimination of adequate shade from loss of the riparian zone can affect the ability of aquatic vegetation to survive by limiting available oxygen and increasing water temperatures.

3.5 Issue 6: Effects on Shrub-Steppe

Some of GRBA's most extensive and pristine shrub-steppe ecosystems are found within the area of proposed action. There are 858 acres of shrub steppe habitat (Inter-Mountain Basins Montane Sagebrush Steppe, ReGap) currently found within GRBA portion of the Strawberry Creek watershed. As mentioned above under the wildlife species of management concern, these areas constitute areas of important habitat for these species. Several hundred acres of shrub steppe habitat in Strawberry Creek have been lost due to pinion-juniper encroachment.

3.6 Issue 7: Effects on Nonnative Plants

Surveys and control treatments for of nonnative plants have been performed in the drainage in since 1999. The Strawberry Creek drainage contains five invasive exotic species including populations of cheatgrass (*Bromus tectorum*), common mullein (*Verbascum thapsus*), spotted knapweed (*Centaurea maculosa* - noxious), Bull thistle (*Cirsium vulgare*) and Perennial Pepperweed (*Lepidium latifolium* - noxious).

Cheatgrass: Cheatgrass is an introduced, cool-season; annual grass which is a highly competitive, noxious weed and aggressively invades disturbed areas depleting the site of moisture and the amount of nitrogen available to plants. Cheatgrass is found throughout the Strawberry Creek drainage, primarily in dry open sites associated with pinion/juniper and sage steppe. It occurs from low to mid elevations beginning at the park boundary up to approximately 8000 feet in elevation. Areas of existing infrastructure that currently have populations of cheatgrass include the park boundary turnaround, existing campsites 1-5, Osceola Ditch (open, dry areas) and most of existing road prism.

Common mullein: Mullein is found in the Strawberry Creek drainage primarily along the roadways and campsites where it benefits from frequent disturbance of the road prism from the park boundary up to approximately 8000 feet. Areas of existing infrastructure that currently have populations of mullein include the park boundary turnaround, existing campsites 1-5, and most of existing road prism.

Spotted knapweed: Spotted knapweed is a biennial or short lived perennial, with a taproot. Seeds can remain viable for up to eight years. Spotted knapweed is a very aggressive species that can infest large areas quickly. Spotted knapweed has historically been found in two locations within the Strawberry Creek drainage; to the north of the road between the first stream crossing and the corral and along the restored road from the Blue Canyon campsite to the Osceola ditch. Due to management actions by the park including mechanical and chemical control, neither population has been documented for 3 years although viable seeds may remain at these locations associated with the Blue Canyon trail and the road improvements.

Bull thistle: Bull thistle is a biennial plant with a short, fleshy taproot. Bull thistle is able to form dense monocultures if not treated and has little to no forage value, although flowers may provide a food source for insects and bird species. Bull thistles are found primarily in riparian and wet meadow areas in the Strawberry Creek drainage but have colonized drier sites in the park after disturbance.

Perennial pepperweed: Perennial pepperweed is a perennial plant, 1-3 feet tall, with deep rootstocks. Pepperweed produces large numbers of seeds and tends to grow in monoculture stands, crowding out native vegetation. Perennial pepperweed has historically been found in one location within the Strawberry Creek drainage, in and near the existing corral.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter provides the analytical basis for comparison of alternatives outlined in the Chapter 2. It discusses the anticipated environmental effects associated with implementation of the various alternatives.

4.0 METHODOLOGY

The following definitions were used to evaluate the context, intensity, duration and cumulative effects associated with project alternatives. They will be adapted to fit the issue being addressed.

Context is the setting in which each effect is analyzed, such as affected region, society as a whole, the affected interests, and/or locality. In this EA, the intensity of effects is evaluated within a project area context. The intensity of the contribution of effects to cumulative effects is evaluated in a watershed and park-wide context.

Intensity is a measure of the scale of the effect, which can be defined as both detrimental as well as beneficial. The intensity of an effect may be:

1. negligible, when an effect is localized and not measurable or at the lowest level of detection;
2. minor, when the effect is localized and slight but detectable;
3. moderate, when an effect is readily apparent and appreciable; or
4. major, when the effect is either severely adverse or of great benefit and highly noticeable.

Duration is a measure of the time period over which the effects of an effect persist. The duration of effects may be:

1. short-term, when effects occur only during the implementation phase or last 2 years; or
2. long-term, when the effect is persistent and longer than two years.

Cumulative effects are effects on the environment that result from the incremental effects of the action when added to the other past, present, and reasonably foreseeable future actions regardless of who takes the action. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

The evaluation criteria have then been adapted to fit the issue being addressed as follows:

4.01 Issue: Effects on Cultural Resources

Type of Effects – any change in the physical attributes of a Cultural site is irreparable and considered adverse and of permanent duration. Adverse effects to an Cultural resource often occur as a result of soil moving activities within a site, soil compaction or erosion, vandalism, or unauthorized surface collection. Beneficial effects can occur when patterns of visitor use or management actions are changed in the vicinity or within a Cultural area in which an ongoing effect, if allowed to continue to degrade the resource, is reduced or arrested.

Intensity of Effects – the intensity of an effect to a cultural resource depends upon the potential of the resource to yield information along with the extent of the physical disturbance or degradation. For example, soil movement within a Cultural site with low data potential might result in a minor, adverse effect. Negligible effects would be barely noticeable or measurable, and would be confined to Cultural sites with low data potential. Minor effects would be noticeable and measurable, and would be confined to Cultural sites with low to moderate data potential. Moderate effects would cause noticeable change and would involve Cultural sites with moderate to high data potential. Major effects would result in highly noticeable and substantial changes, and would involve sites with high data potential.

4.02 Issue: Effects on Wildlife Species of Management Concern

Type of Effects – Adverse effects to these wildlife species include habitat degradation or loss, displacement, decreases in reproductive rate, or direct take. Beneficial effects on these wildlife species include habitat enhancement or enlargement, and increases in reproductive rate. Adverse effects result in net population decreases while beneficial effects result in net population increases.

Intensity of Effects –The intensity of effects to wildlife Species of Management Concern depends on the natural history characteristics of the species and the extent of the physical disturbance or degradation. Some wildlife species are more prone to disturbance or disruption than others. A negligible effect is localized and below the level of detection. The changes are so slight that they would not be measurable or of perceptible consequences to the wildlife species population. A minor effect is detectable but the effects are localized and of small or little consequences to the species populations. A moderate effect is readily detected and apparent with consequences at the population level. A major effect is severe and highly noticeable with obvious and substantial consequences to the wildlife population in the region.

4.03 Issue: Effects on Elk

Type of Effects – Adverse effects to elk include habitat degradation or loss, displacement, decreases in reproductive rate, or direct take. Beneficial effects to elk include habitat enhancement or enlargement, and increases in reproductive rate. Adverse effects result in net population decreases while beneficial effects result in net population increases.

Intensity of Effects –The intensity of effects to elk depends on the extent of disturbance or habitat degradation. A negligible effect is localized and below the level of detection. The changes would be so slight that they would not be measurable or of perceptible consequences to the elk population. A minor effect is detectable but the effects are localized and of small or little consequences to elk populations. A moderate effect is readily detected and apparent with consequences at the population level. A major effect is severe and highly noticeable with obvious and substantial consequences to the elk population in the region.

4.04 Issue: Effects on NPS Fish Species of Management Concern

Types of Effects - Adverse effects to native fish include habitat degradation or loss, decreases in reproductive rate, or direct take. Positive effects on native fish include habitat enhancement and increases in reproductive rate. Adverse effects result in net population decreases while beneficial effects result in net population increases.

Intensity of Effects - A negligible effect is not measurable; it may affect a small number of individual fish within the project area, but not have any measurable effects on the overall fish community. Minor effects are detectable but localized with little effect on fishes within the project area. Moderate effects are detectable and readily apparent with consequences to fish over a wide area or at multiple locations within the project area. A major effect is severe and highly detectable with obvious consequences to fish within the entire watershed.

4.05 Issue: Effects on Riparian Ecosystems

Types of Effects

Adverse effects to riparian habitat include the loss of riparian species or communities, decreased vigor or productivity of riparian species or communities, the loss of available habitat and decreased vegetative cover and stream shading due to construction or restoration actions. Beneficial effects include an increase in riparian species or riparian habitat, improved vigor and productivity in riparian species, an increase in available habitat or increased cover and stream shading as a result of restoration actions.

Intensity of Effects

The intensity of effects can be negligible, minor, moderate, or major depending on the level and extent of disturbance to riparian species, the proximity of the disturbance to riparian habitat and the quality of the habitat affected. A negligible effect is not measurable; it may affect individual plants within the project area, but not have any measurable effects on riparian habitat within the project area. Minor effects are detectable but localized with little effect on riparian habitat within the project area. Moderate effects are detectable and readily apparent with consequences to riparian habitat over a wide area or at multiple locations within the project area. A major effect is severe and highly detectable with obvious consequences to riparian habitat within the entire watershed.

4.06 Issue: Effects on shrub-Steppe

Type of Effects – Adverse effects to shrub steppe habitat include: habitat degradation or loss, soil erosion, direct damage, introduction of non-native weeds, and reductions in productivity. Beneficial effects on shrub steppe habitat include: habitat enhancement or enlargement, soil stabilization, eradication of non-native weeds, and increases in productivity.

Intensity of Effects – The intensity of effects to shrub steppe habitat depends on the extent of the physical disturbance or degradation. A negligible effect is localized at or below the level of detection. The changes are so slight that they would not be measurable or of perceptible consequences to the shrub steppe habitat within the project area. A minor effect is detectable but the effects are localized and of small or little consequences to shrub steppe habitat within the project area. A moderate effect is readily detected and apparent with consequences to shrub steppe habitat in the project area. A major effect is severe and highly noticeable with obvious and substantial consequences to shrub steppe habitat in the region.

4.06 Issue: Effects on invasive exotic plants

Types of Effects -

Negligible effects are localized and not measurable or at the lowest level of detection. Minor effects are slight but detectable. Moderate effects are readily apparent and appreciable. Major effects are either severely adverse or of great benefit and highly noticeable.

Intensity

Beneficial effects on invasive exotic weeds are those that reduce the current population size or extent or will result in a reduced chance of new species infestations either through more resilient natural communities or reduce chances of new species introductions. Adverse effects on invasive exotic weeds are those that result in an increase in population size or extent or result in increased chances of new infestations. Minor effects will result from ground disturbing activities that are less than ¼ acres in size, in locations beyond the transport range of existing invasive species locations; have a low likelihood of new species importations or a high likelihood of native species revegetation after disturbance. Moderate effects will result from areas of ground disturbance between ¼ and 1/2 acre in size, or within the transport range of existing invasive species locations, having an increased likelihood of new species importations or having a decreased likelihood of native species re-vegetation. Major effects will result from areas of ground disturbance greater than 1/2 acre in size, in an area containing existing populations of invasive species, having a high likelihood of new species importation and a low likelihood of native species re-vegetation.

4.1 IMPAIRMENT OF PARK RESOURCES OR VALUES

NPS Management Policies 2006 leave determinations of impairment to the responsible park manager and direct that an action should be considered to constitute impairment if, in the manager's professional judgment, the action "would harm the integrity of the park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values." NPS policies (*Section 1.4.5*) further state that whether an effect meets this definition (i.e. would harm the integrity of the park resources or values) depends on: 1) the particular resources and values that would be affected; 2) the severity, duration, and timing of the effect; 3) the direct and indirect effects of the effect; and, 4) the cumulative effects of the effect in question along with other effects that are in existence.

An effect would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or; 3) identified as a specific goal in the park's general management plan or other relevant NPS planning documents.

An effect would be less likely to constitute impairment to the extent that it is an unavoidable result, which cannot reasonably be further mitigated, of an action necessary to preserve or restore the integrity of park resources or values.

Impairment may occur from visitor activities; NPS activities in the course of managing a park; or activities undertaken by concessionaires, contractors, and others operating in the park as well as from external actions. Impairment can occur from inaction as well as action. For example, failure to prevent the spread of a seriously disruptive alien species may impair park resources.

A determination of impairment is made for each issue under each alternative within each “Conclusion” section under “Environmental Consequences”.

4.2 ALTERNATIVE 1 – No Action

Issue: Effects on Cultural/Historic Resources

Under the No Action Alternative, the current conditions within the Strawberry Creek road corridor will be unaltered. The dispersed campsites will be left in place; no road improvements will be made; and no restroom facilities will be installed. Since no action will be taken, no effects to cultural resource will occur. No resource impairment will occur.

Issue: Effects on Wildlife Species of Management Concern

Under this alternative, the current conditions within the Strawberry Creek project area will be unaltered. The dispersed campsites will be left in place, no road improvements will be made, no restroom facilities will be installed, and the road to trail conversion of the upper portion of road would not occur.

Conclusion - Species of Management Concern are currently affected by vehicle disturbance and habitat loss along roads, culverts, and dispersed campsites. Continued use and erosion at these sites will cause further habitat loss and reduced vegetation productivity. Although these effects are generally adverse, negligible, and long-term, effects to Species of Management Concern from the upper 0.5 miles of existing road are adverse, moderate, and long-term. No resource impairment will occur.

Issue: Effects on Elk

Under this alternative, the current conditions within the Strawberry Creek project area will be unaltered. The dispersed campsites will be left in place, no road improvements will be made, no restroom facilities will be installed, and the road to trail conversion of the upper portion of road would not occur. Effects to elk would continue from the location of the upper road adjacent to wallows and wet meadows for calving and would be considered minor adverse and long-term.

Conclusion - Effects to elk are currently due to vehicle disturbances from existing roads. Disturbances during the early summer and fall result in elk abandoning the park during rutting and calving seasons. Vehicle access may result in occasional elk poaching. Effects due to continued use of existing roads are generally adverse, minor, and long-term. However the existing effects to elk from the upper 0.5 miles of existing road are adverse, moderate, and long-term. No resource impairment will occur.

Issue: Effects on Fish Species of Management Concern

Under the No Action Alternative the existing road conditions would continue to have moderate adverse effects to native fish. Sediments would continue to degrade water quality fish habitat and spawning beds. The eight dispersed campsites would remain and the effects to native fish would continue to be adverse and minor. Campers have made dams in the creek for bathing and washing dishes. Soil compaction from vehicle parking next to the stream allows more water to run into the creek, providing excess sedimentation for native fishes during the spring and summer months.

Conclusion - The No Action alternative does not correct the current poorly engineered road or the eight dispersed campsites, which contribute minor to moderate adverse effects to the native fishes. These effects will continue to be adverse and moderate. No resource impairment will occur.

Issue: Effects on Riparian Habitats

In the No Action alternative, seven of the eight dispersed camp sites will remain within the riparian corridor. The current effects from the road and drainage system will not be addressed and remain adjacent to the creek and important wetland habitat. Dispersed camping activities will continue along with associated disturbances within the riparian zone. Continued recreational use of the riparian habitat in Strawberry Creek will adversely affect riparian vegetation and associated wildlife. Bank erosion, sloughing, sedimentation and down-cutting due to current road placement and drainage will continue negatively affecting the riparian zone and stream bank. Effects are and will remain moderate and long-term, adversely affecting an important and rare ecotone within the park. These effects will be long-term because of continued recreational use.

Indirect effects to riparian habitat could occur due to continued ground disturbance and further encroachment into the riparian zone. Loss of riparian species, invasion from non-native species, and encroachment of non-riparian species such as pinion pine and white fir could further effect riparian vegetation, bank stability and dependent wildlife species.

Conclusion - If left in its current condition as prescribed by the no action alternative, effects to the riparian zone along Strawberry Creek will continue. Dispersed camping activities within the riparian corridor, road placement, and erosion and down-cutting from the road surface directly adjacent to the stream bank will persist, negatively effecting riparian habitat and the species dependent on this zone. No resource impairment will occur.

Issue: Effects on shrub-Steppe

Under this alternative, the current conditions within the Strawberry Creek project area will be unaltered. The dispersed campsites will be left in place, no road improvements will be made, no restroom facilities will be installed, no restoration or reclamation would occur, and the road to trail conversion of the upper portion of road would not occur. No effects to shrub-steppe habitats would occur. No resource impairment will occur.

Issue: Effects on invasive exotic plants

Alternative 1 would result in continued effects from invasive exotic weeds that are generally minor in nature and long-term in duration. The implementation of existing control measures reduces the intensity of effects for those species that are treated but long-term effects are still expected from the remaining species. This alternative would have the least amount of direct effects and the least amount of staff and visitor use compared to other alternatives. This alternative also results in no restoration of existing disturbed areas and roads, both allowing vehicular traffic to transport new species further into the drainage and not allowing native species revegetation. This alternative would have less short-term indirect effects but greater long-term indirect effects than other alternatives. No resource impairment will occur.

4.3 ALTERNATIVE 2 – Proposed Action

Issue: Effects on Cultural Resources

Recreational Infrastructure Developments

Park Boundary, Blue Canyon Trailhead & Strawberry Creek Campsites and Equestrian Facility – no cultural resources were observed during the cultural Section 106 survey. There will be no effects to Cultural resources from the action as proposed.

New Trails

Osceola (East) Ditch – no cultural resources were observed during the cultural Section 106 survey of this 1/8 mile trail. There will be no effects to Cultural resources from the action as proposed.

Strawberry-Sage Loop – this proposed road-to-trail is located adjacent to four known Cultural sites. Site (26WP8029) consists of lithic scatter. The existing road is having a negative effect on the site due to erosion. The proposed foot trail and road reclamation will reduce significantly the effect that is occurring to the site now. Direct effects will be beneficial, minor and long-term. Indirect effects could result from increased visitation. Hikers could encounter lithic materials. It is assumed that the majority of visitors are consistent with NPS resource protection policies and enjoy but leave the materials in place. Indirect effects would be adverse, negligible and long-term under this assumption. Site (26WP4337) is a dendroglyph site with a few carving dating from 1930's to 1958. This proposed action will have no effect on the site since no aspens are to be cut and the existing old road is where the trail is to be placed. Indirect effects could result from increased visitation with visitors tempted to leave their mark. Initials carved into aspens are a common occurrence across the park in areas of high to moderate visitation. In direct effects would be adverse, minor being localized and long-term. The other two sites, 26WP7011 and 26WP8030 will have not be effected since the proposal is to stay within the existing road area which is several hundred feet away.

Northern Portion of the Osceola (East) Ditch – the last 1.5 miles of the ditch that are within the park is all that is left to complete the Osceola (East) Ditch Trail. Though this site is listed on the National Register of Historic Places, the removal of brush within the ditch for foot traffic only, will have no effects to the site.

Resource Restoration Actions - Road Improvements - Only one area of the road improvement and stabilization may have an effect to a site. This site, 26WP8031, contains dendroglyphs and tree carvings. Few of the carving are older the 50 years and most would not be classified as dendroglyphs. The one nearest the road date from the 1980s to 1990s and are classified as tree carvings. There will be no effects to Cultural resources from the action as proposed.

Mitigation

- 1) During work in the vicinity of know sites an archeologist will be present to monitor and prevent effects.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments of Cultural resources are associated with this alternative. No irretrievable commitment of Cultural resources associated with this alternative.

Conclusion - Overall there will no adverse direct effects to Cultural resource from the proposed action. Beneficial, minor and long-term direct effects will occur at one site from stabilization of the eroding roadbed and converting it to a trail. This will stabilize the lithic scatter and prevent movement of materials from the site due to soil loss. Indirect effects focus on the potential increase in visitation which would be negligible, adverse and long-term. Implementation of the prescribed mitigation measure will assure the no effect determination. Based upon the analysis of environmental consequences and the effectiveness of the mitigation measure, no resource impairment was identified. No resource impairment will occur.

**Issue: Effects on Wildlife Species of Management Concern –
Recreational Infrastructure Developments – Alternative 1**

Park Boundary – Habitat near the park boundary is unsuitable for sagebrush voles, and sage grouse. There would be no effects to these species. Beaver, ringtail, porcupine, and striped skunk primarily utilize the riparian corridor below this development. The development would not result in any habitat loss. There are no direct or indirect effects from the action as proposed to wildlife species of management concern.

Strawberry Creek Campsites and Equestrian Facility – The site is a former shrub-steppe ecosystem completely encroached upon by pinion with little diversity and no shrub or herbaceous under story. Habitat near this development is unsuitable for sagebrush voles, and sage grouse which do not occur near this development. There are no direct effects from the action to these species. Beaver, ringtail, porcupine, and striped skunk primarily utilize the riparian corridor below this development but may occasionally forage within the development area. The development would result in the loss of a small area of very marginal foraging habitat. No effects to these species would occur from this loss. The four acres of selective thinning will open up the stand and allow herbaceous and shrub vegetation to return to the site. This should improve the ecological function of the area and have minor beneficial long-term effects to all wildlife species including Species of Management Concern.

Indirect effects would potentially result from an increase in visitor use during the summer season from recreational infrastructure development. These effects would be adverse, negligible, and long-term. Animals could be pushed to even more remote areas in the watershed to avoid disturbance at first but would eventually habituate. An increased presence of human foods could attract ringtails and striped skunks resulting in minor adverse effects depending on reaction to the encounter to both the wildlife species and the human.

Blue Canyon Trailhead – Sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which have been documented near this development. The total development area is 2,000

ft² (0.046 acres) and is primarily located in a disturbed site, currently used as a road. Vegetation loss due would be minimal. The development would result in <0.01 acre of habitat loss out of the 858 acres of existing shrub-steppe within the watershed. There is no significant loss of foraging and breeding habitat. No effects to these species will occur based upon a habitat standpoint. There is the potential for minor displacement of a few individuals during construction due to a short period of human cause disturbance. Effects to these species would be adverse, negligible, and short-term.

Indirect effects would potentially result from an increase in visitor use during the summer season. These effects would be adverse, negligible, and short-term. Animals could be pushed to remote areas in the watershed to avoid disturbance at first but would eventually habituate.

New Trails

Blue Canyon to Osceola (East) Ditch – Habitat is suitable for sagebrush voles, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. The development would result in no significant loss of foraging and breeding habitat. No effects to these species would occur.

Strawberry-Sage Loop – Habitat is suitable for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. The development would result in an increase in habitat because the existing road will be converted to a trail. Development activities could temporarily displace individuals during road reclamation and trail construction. Effects to these species would be minor, since the habitat gained is localized but measurable, and long-term.

Northern Portion of the Osceola (East) Ditch – Habitat is suitable for sagebrush voles, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. Since the trail would follow the berm of the ditch, no effects to these species are anticipated.

Resource Restoration Actions

Road Improvements – Roadway surface, shoulder and drainage improvements occur near suitable habitat for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur in the project area. Direct effects would be due to displacement of individuals. Effects to these species would be adverse, negligible, and short-term.

Improve Culvert Crossings – Culvert improvements occur near suitable habitat for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. Due to the small area disturbed for this action, no effects are anticipated to these species.

Park Boundary Road - – Habitat near the park boundary is unsuitable for Species of Management Concern which do not occur near this restoration. There would be no effects to these species.

Dispersed Campsites – Habitat is suitable for these species. In the long-term, reclamation would improve current conditions of riparian areas. This should result in a slight increase in habitat. These effects would be beneficial, negligible, and long-term.

Road-to-Trail – The road to trail conversion of the upper 0.5 mile segment of existing road occurs within the park’s most pristine shrub steppe habitat and supports populations of sagebrush voles, striped skunk, ringtails, porcupine, and sage grouse. In the long-term, reclamation would eliminate potential mortality from vehicles, reduce disturbance from vehicle traffic and increased habitat. These effects would be beneficial, minor, and long-term. The net result would be reduced disturbance and increased foraging and breeding habitat and will ultimately increase wildlife Species of Management Concern populations appreciably and in a readily apparent fashion.

Mitigation Measures– No mitigation measures applied.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of wildlife Species of Management Concern would occur under this action. Irretrievable commitment of resources would constitute the small area of habitat occupied by the developed sites which would no longer serve as habitat for Species of Management Concern.

Conclusion - The long-term, net effects on wildlife Species of Management Concern under alternative 1 (proposed action) would be beneficial but minor. This is primarily due to the road to trail conversion of the upper portion of road and the restoration of riparian habitats associated with dispersed campsites. Direct effects from the developments ranged from no effects to negligible. Reduced vehicle traffic and a net increase of shrub steppe habitat and riparian habitats in this area compared to the small area of habitat affected will result in minor beneficial long-term effects for these Species of Management Concern. Irretrievable commitment of resources would constitute the small area of habitat occupied by the developed sites. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Elk

Recreational Infrastructure Developments

Park Boundary Strawberry Creek Campsites and Equestrian Facility – This area is unsuitable habitat for elk and no effects would occur.

Blue Canyon Trailhead – Habitat is suitable for elk. The total area of proposed development is 2,000 ft² (0.046 acres). This development is primarily located in a disturbed site, currently used as a road, parking area and campsite. Vegetation loss due to this development would be minimal. Minimal habitat loss (>0.1 acre) would occur. Effects to elk from the action as proposed are adverse negligible and long-term in duration. The area serves as an important fall breeding ground. Displacement could occur during construction due to heavy equipment operations and increased human activity. Effects to elk would be adverse, minor, and short-term.

Indirect effects would potentially result from an increase in visitor use during the summer season from recreational infrastructure development. These effects would be adverse, negligible, and short-term. Animals could be pushed to remote areas in the watershed to avoid disturbance at first but would eventually habituate.

New Trails - Blue Canyon to Osceola (East) Ditch –The development would result in the loss of a small area of foraging and breeding habitat and an increase in visitation which could potentially displace individuals. Effects to elk would be adverse, negligible and long-term. Animals could be pushed to remote areas in the watershed to avoid human interaction at first but would eventually habituate.

Strawberry-Sage Loop –The development would not result in the loss of a habitat because the existing road will be converted to a trail. The development would result in minor beneficial effects for the long-term by removing the current road and associated vehicle traffic. Wet meadows for calving and elk wallows are all now several hundred feet from the road. A very small gain in foraging and breeding habitat would also occur.

Northern Portion of the Osceola (East) Ditch – Habitat is suitable for elk. No direct effects would occur. Indirect effects would relate to the increase potential for elk/human interactions. These indirect effects would be adverse, minor, and short-term. Animals could be pushed to remote areas in the watershed to avoid human interaction at first but would eventually habituate.

Resource Restoration Actions

Road Improvements - Habitat for elk is generally unsuitable near the area proposed for road improvements. Elk use declines in areas adjacent to roads. There is a net loss of road density under this alternative in the watershed. Effects to elk would be beneficial, minor and long-term

Improve Culvert Crossings – Habitat for elk is generally unsuitable near this development. No effects to elk would occur.

Park Boundary Road – This area is unsuitable elk habitat and no effects would occur.

Road-to-Trail – The road to trail conversion of the upper 0.5 mile segment of existing road occurs within the park's most pristine shrub steppe habitat which forms the core home range of the park's elk herd. The conversion would result in a small net gain of foraging and breeding habitat. The conversion of the road would eliminate vehicle through calving grounds and adjacent wallows. In the long-term, reclamation would reduce disturbance from vehicle traffic and increase foraging habitat for elk by increasing the available area of foraging and breeding habitat. These effects would be beneficial, minor and long-term. Animals could potentially be displaced during reclamation. Effects to elk would be adverse, negligible, and short-term.

Mitigation Measure

1) To avoid disturbance to elk populations during the breeding periods, no work will occur on the Blue Canyon Trailhead, new trails, or road to trail conversions from August 25th-October 15th.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources as associated with this alternative. Irretrievable commitment of resources is the small area (<0.01 acre) of elk habitat occupied by the Blue Canyon trailhead development. This effect would be negligible.

Conclusion - The overall long-term effects of this alternative on elk would be beneficial. This is primarily due to the road to trail conversion of the upper 0.5 mile segment of road. This portion of the project area contains pristine shrub steppe habitat, wet and dry meadows and wallows that forms the core home range of the park's elk herd. Adverse, negligible short-term effects could occur due to displacement during breeding and calving periods during construction at Blue Canyon trailhead, trail development, and the road to trail conversion. With the incorporation of the above mitigation measure, these short-term adverse effects are eliminated. Irretrievable commitment of resources is the small area (<0.01 acre) of elk habitat occupied by the Blue Canyon trailhead development. Based upon the analysis of environmental consequences and the effectiveness of mitigation measure, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Fish Species of Management Concern Recreational Infrastructure Developments

Park Boundary - Under this alternative, there will be no effects to native fish during construction at the park boundary due to its distance from the stream.

Strawberry Creek Campsites and Equestrian Facility - The construction of the proposed campsites and equestrian facilities within pinion-juniper woodland a sufficient distance from the riparian corridor and stream, will have no direct effects on native fish. Water will not be provided for horses and miniature burros, creating the potential indirect effects from increased traffic to the stream, trampling, and possible stock grazing, potentially increasing sedimentation, contaminants, and invasives. These indirect effects would be adverse, minor and long-term on native fish.

Blue Canyon Trailhead- The Blue Canyon Trailhead and parking area are 200 ft. from Strawberry Creek. No direct effects to fish are anticipated. Indirect effects are the increased possibility of additional human and equestrian use close to the stream that might increase sedimentation or introduce contaminants or invasives into the stream that would be adverse, minor, and long-term.

New Trails

Blue Canyon to Osceola (East) Ditch – Development is primarily outside the riparian corridor and would have no effects to native fish.

Strawberry-Sage Loop - Closing the current road and replacing it would a trail would provide beneficial, minor, long-term effects to native fish by decreasing sedimentation. Indirect effects

include equestrian use in the riparian area, including fording the creek, could cause adverse, negligible, and long-term effects to native fish by increasing sedimentation.

Northern Portion of the Osceola (East) Ditch – Most of this trail is far from the riparian area and will have no effects on native fish.

Resource Restoration Actions

Improve Roadway – By far the single biggest existing effect to fish is the current condition of the Strawberry Creek road. This is particularly true of the Strawberry Creek Narrows where the existing road is within 10 feet of the live stream channel. There are also other portions of the road that are currently within the riparian corridor. No actual engineering of the road improvements has been completed; therefore, the disclosure of consequences is based upon future environmental engineering of the part of the action. Improvements to the road surface and drainage system will have beneficial, moderate, long-term effects on native fish due to decreases in sedimentation from additional riparian vegetation and more stable stream banks. Minor short-term effects involve additional sedimentation that results in increased turbidity in the stream following the initial disturbance.

Improve Culvert Crossings - Removal of old culverts and installation of new culverts will be a short-term action that will create a moderate effect for less than a week involving additional sedimentation that results in increased turbidity in the stream. This increased turbidity decreases dissolved oxygen in microhabitats within the stream, particularly in gravels. Following this initial disturbance, the new open culverts will result in beneficial, major, long-term effects on native fish due to removal of a barrier which currently segments the population.

Park Boundary Road – This road is not located near Strawberry Creek thus there would be no effects to native fish.

Dispersed Campsites - The restoration of the dispersed campsites within the riparian corridor will have a beneficial, moderate and long-term effect on riparian habitat by reversing current adverse effects to riparian vegetation, sedimentation and stream bank stability. During the actual restoration, an adverse, minor, short-term effect is expected due to ground disturbance that may increase sedimentation into the creek.

Road-to-Trail – The road to trail conversion of the upper 0.5 mile segment of existing roads will result in a beneficial, minor, long-term effect to native fish by reducing sedimentation.

Mitigation

1) Road improvements and adding additional road base that take place within 50 feet of the stream, including improving culvert crossings, should only be completed from September 15-March 15, which is outside the spawning and egg hatching period for the native fish. Weed seed free straw bales will be used as sediment traps along the road edge in the Strawberry Creek Narrows.

2) During removal of current culverts, sediment traps should be placed 10 feet downstream of the culvert to minimize sedimentation further downstream.

3) The following best management practices for roads will be used for all road improvements: 1) Crown and angle roads uphill to drain water to ditches; 2) Use bridges and culverts to cross streams; 3) Place water bars or rolling dips at a 30 to 45 degree angle with a cross drainage grade of 2% and towards the roadside ditch; 4) Ditches will divert water away from roads and side ditches and channel it into vegetation. These structures are often used before stream crossings to ensure that water will be diverted into vegetation and not directly into a stream, lake or wetland.

Cumulative Effects – There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. Wildfires may contribute additional sediment to the stream.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of native fish would occur under this action.

Conclusion – The direct effects for native fish would be beneficial, moderate, and long-term. The actions proposed will ultimately improve conditions for native fish by improving small areas of habitat and reducing sedimentation into the stream, thus reducing turbidity and increasing dissolved oxygen. The process of improving these conditions may cause short-term effects, such as additional sediment in the stream during culvert improvements. Through implementation of the mitigation measure as prescribed, short-term effects to native fish will be minimized. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. The restoration actions in combination with the road improvement will assist with the implementation of the Bonneville cutthroat trout CA by improving habitat conditions. No resource impairment will occur.

Issue: Effects on Riparian Habitats

Recreational Infrastructure Developments

Park Boundary - There will be no effects to riparian habitat during restoration or construction at the park boundary due to its distance from the riparian zone.

Strawberry Creek Campsites and Equestrian Facility - The construction of the proposed campground and equestrian facilities within pinion-juniper woodland is a sufficient distance from the riparian corridor and stream and will have no direct effects on riparian habitat. Water will not be provided for pack animals or the campground creating increased effects along the stream and riparian corridor from increased traffic, trampling, possible stock grazing, and non-native species. These indirect effects will be adverse, minor and long-term.

Robison Corral Dispersed Campsite - The current dispersed campsite near the historic Robison corral would not be removed and restored under this alternative. This will allow an area of disturbance within the riparian area of 17,450 sq. ft. (0.4 acres) to remain. The adverse effects to the surrounding riparian habitat including a spring complex, wet meadows, and aspen grove would continue to be minor but long-term.

Blue Canyon Trailhead - Proposed development for this alternative includes the Blue Canyon Trailhead and parking area located within 200 ft. of the riparian corridor. The location of the trailhead and facilities is within an already disturbed area of sagebrush habitat totaling 2000 sq.

ft. (0.05 acres) and over 200 ft. from the riparian corridor. There are no direct effects to riparian habitats from construction of the trailhead.

Indirect effects from the development to the riparian zone there would be the increased threat of trampling, stream bank damage, and the subsequent loss of riparian habitat due to the potential increase in visitation. These indirect effects would be localized to the project area and considered adverse, minor and long-term.

New Trails

Blue Canyon to Osceola (East) Ditch - No riparian habitat would be affected by the development of this trail. The trail would follow an already disturbed road bed adjacent to aspen stands. There are no effects to riparian habitats.

Strawberry Sage Loop - The proposed trail would travel through riparian habitat across Blue Canyon and Strawberry Creek and travel along the south side of Strawberry Creek. The majority of the trail will be constructed along the upper portion of Strawberry Creek road and on an old road on the south side of the creek. Effects to riparian habitat from trail installation and use would be adverse, negligible and long-term due removal of some riparian vegetation during trail construction and trail maintenance. Northern Portion of the Osceola (East) Ditch - No riparian habitat would be effected by this trail.

Resource Restoration Actions

Road Improvements – Portions of the Strawberry Creek road are currently within the riparian corridor and in some sections has channelized the creek. Improvements to the road surface, culverts and drainage system will have minor, adverse effects on riparian habitat over the short-term because of the potential to remove riparian species during road work, and the disruption of the stream bank from culvert removal and replacement installation. When improvement actions are completed, riparian vegetation will recover and stream banks will be more stable benefiting the riparian habitat. Due to the localized nature of these improvements, effects would be beneficial, minor and long-term.

Park Boundary - No riparian habitat would be affected by restoration actions at the park boundary.

Dispersed Campsites - The restoration of the dispersed campsites within the riparian corridor would have a moderate, long-term and beneficial effect on riparian habitat by limiting effects from recreational use within the riparian zone and upper wetland areas. Riparian species in these restored areas would have the opportunity to recover increasing vegetation cover, vigor, and available habitat for riparian species.

Road-to-Trail - The conversion of upper Strawberry Creek Road to a trail would have no effects to riparian habitats.

Pipe Culvert Removal - The removal of existing culverts would have an adverse, minor and short- term affect on riparian species. Less than 0.01 acre would be affected. Once the new box culverts are installed and riparian species have recovered, this restoration action will have a

beneficial and long-term affect on riparian habitat. The riparian zone adjacent to the new culverts will be more stable allowing for better stream bank stability, increased riparian vegetation and less sedimentation.

Mitigation Measures: In order to minimize effects to riparian habitats associated with this alternative, the following mitigation measures will apply:

- 1) Minimal removal of riparian species to gain access and improve road surfaces, no uprooting of riparian species that are providing stream stabilization.
- 2) Use of weed and seed free straw bales and sediments traps to control sedimentation and bank erosion during road improvements within the Strawberry Creek Narrows and culvert replacement.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – There are no irreversible or irretrievable commitments or resources as associated with this alternative.

Conclusion - For the action, the moderate, adverse and long-term effects to the riparian corridor from the existing conditions in Strawberry Creek will be mitigated. Short-term effects from new construction could create negligible but adverse effects that result from the unintended removal of riparian vegetation. With the implementation of the prescribed mitigation measures combined with the restoration of riparian areas disturbed by dispersed campsites, the long-term environmental consequences for the alternative will be beneficial and minor. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Shrub-Steppe Habitat.

Recreational Infrastructure Developments

Park Boundary – No sage steppe habitat occurs near this development and there would be no effects to sage steppe.

Strawberry Creek Campsites and Equestrian Facility – No sage steppe habitat occurs near this development and there would be no effects to sage steppe. The four acres of thinning at the site will allow the reintroduction of shrub-steppe species over the long-term. Effects would be beneficial and minor.

Blue Canyon Trailhead – Extensive sage steppe habitat occurs near this development, part of which includes the existing road. The total area of this development is 0.046 acres. This development is primarily located in a disturbed area, currently used as a road, parking area and campsite. Vegetation loss due to this development would be minimal. For these reasons the development would result in a very small loss of shrub steppe habitat (<0.1 acre). This is a loss of 0.005% of the sage steppe habitat from the watershed. This change is so slight that it would not be of any perceptible consequences to the shrub steppe habitat within the project area. There

will no new effects to shrub-steppe habitats above those that currently exist and will be maintained.

New Trails

Blue Canyon to Osceola (East) Ditch –The development would not result in the loss of existing sage steppe habitat since the route follows an old roadbed to the ditch. No effects to shrub steppe habitat would occur.

Strawberry-Sage Loop – The development would result in a net gain in sage steppe habitat since the existing road that is 12 ft in width would be pulled back to a 30 inch trail tread.

Approximately 0.59 acre of habitat will be restored. Effects to shrub steppe habitat would be beneficial, minor, and long-term.

Northern Portion of the Osceola (East) Ditch –The development would result in the loss of a small area of sage steppe habitat that has re-established along the berm of the ditch. Effects to shrub steppe habitat would be negligible and long-term.

Resource Restoration Actions

Road Improvements - The current road is 12 ft. in width with 2 ft shoulders for a total width of 16 ft. The action maintains this width and should not result in the removal on any shrub-steppe habitat. There will be no effects to shrub steppe habitat.

Improve Culvert Crossings – Sage steppe habitat occurs near this development but would not be directly effected. There would be no effects to shrub steppe habitat.

Park Boundary Road - Restoration of the old road and thinning of pinion juniper would result in an increase of 2,800 ft² (0.064 acres) of shrub steppe habitat. Effects of this restoration on shrub steppe would be beneficial, minor and long-term.

Dispersed Campsites – Soils indicate that habitat near these campsites was formerly dominated by shrub steppe now severely encroached by pinion juniper. This encroachment has resulted in the complete loss of shrub and herbaceous vegetation and area no longer functions as a shrub steppe ecosystem. Restoration of these campsites and the associated access roads would result in an increase of shrub steppe habitat. Effects of this restoration on shrub steppe would be beneficial, minor and long-term.

Road-to-Trail – The road to trail conversion of the upper 0.5 mile segment of existing road occurs within the park's most pristine shrub steppe habitat. Currently erosion and vehicle traffic along this road are causing adverse, minor, long-term effects to shrub steppe. In the long-term, reclamation would reduce erosion and disturbance from vehicle traffic and increase the total area of shrub steppe habitat. The total area of road to be reclaimed is 25,496 ft² (0.59 acres). The increase in the area of shrub steppe habitat, decrease in patch fragmentation, and decrease in vehicle disturbance would result in beneficial, moderate and long-term effects. The net result of will be an increase in shrub steppe habitat, plant productivity and resiliency, and will ultimately increase the area and health of shrub steppe habitat appreciably and in a readily apparent fashion at the scale of the project area.

Mitigation – No mitigation measures applied.

Cumulative Effects - Shrub steppe habitats are severely altered across the Great Basin and within GRBA by tree encroachment, grazing, fire suppression, non-native annual grasses, and climate change. Within the project area, these effects have been adverse, major, and long-term. Continued loss of shrub steppe habitat due to developments would be cumulative due to these past effects. However restoration actions will restore a greater area of shrub steppe habitat than would be lost. Future shrub-steppe restoration projects are planned in the Strawberry Creek watershed. Past shrub-steppe restoration projects have been completed. Overall the beneficial effects within the proposed action would additive to these past and future actions.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of resources would occur under this action. Irretrievable commitment of resources would constitute the small area of shrub-steppe ecosystem occupied by the developed sites which would no longer function as shrub-steppe.

Conclusion - Long-term net effects of this alternative on shrub steppe habitat would be beneficial. Habitat losses under this alternative are less than habitat gains. This alternative will result in a net gain of shrub steppe habitat of 0.64 acres from the road to trail conversions and approximately 4 acres from the thinning. These effects are localized and of small. Direct effects would be beneficial, minor and long-term. Irretrievable commitment of resources would constitute the small area of shrub-steppe ecosystem occupied by the developed sites. Cumulative effects are beneficial to the ongoing and future efforts on restoring shrub steppe habitats on a landscape scale within the watershed and areas adjacent to the watershed. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on invasive exotic plants

Recreational Infrastructure Developments

Park Boundary - Direct effects include the increased risk of the establishment and persistence of populations of cheatgrass in the area disturbed by construction. There is also the potential effect of nonnative plants being introduced to the park from seeds transported in with fill materials and increased construction traffic. These population increases are expected to be short-term in duration and minor in intensity due to the size of the disturbed area and the high likelihood of long-term native species re-vegetation. The restoration actions of seeding and mulching the disturbed sites should assist in minimizing the potential effects. The rolling and compacting of the fill material will render seed germination minimal. The long-term effects will be minor with the continued presence of cheatgrass in the area and the high likelihood of new species importation into the site. Indirect effects will be minor with the continued presence of invasive species in the area and a high likelihood of new species importation into the site from vehicles stopping at the entrance pull off.

Strawberry Campsites and Equestrian Facility - Direct effects include an increased risk of the establishment and persistence of populations of cheatgrass in the area disturbed by construction. There is also the potential effect of nonnative plants being introduced to the park from seeds

transported in with fill materials and increased construction traffic. The restoration actions of seeding and mulching the disturbed sites should assist in minimizing the potential effects. The rolling and compacting of the fill material will render seed germination minimal. These population increases are expected to be short-term in duration and minor in intensity due to the size of the disturbed area and the high likelihood of long-term native species re-vegetation. Indirect effects will be moderate with the continued presence of invasive species in the area and a high likelihood of new species importation into the site because the presence of a dedicated equestrian facility. These effects would be moderate due to the lack of weed-free-feed policy enforcement and seed dispersal from manure.

Blue Canyon Trailhead - Direct effects include an increased risk of the establishment and persistence of populations of cheatgrass in the area disturbed by construction. The restoration actions of seeding and mulching the disturbed sites should assist in minimizing the potential effects. The rolling and compacting of the fill material will render seed germination minimal. These population increases are expected to be short-term in duration and minor in intensity due to the size of the disturbed area and the high likelihood of long-term native species re-vegetation. The long-term effects will be minor with the continued presence of invasive species in the area and a low likelihood of new species importation into the drainage.

New Trails - Direct effects from the new Blue Canyon trail will result in an increased risk of the establishment and persistence of a population of spotted knapweed due to soil disturbance that may allow the germination of seeds in the seed bank. This population increase is expected to be short-term in duration because of the active management program that has eradicated these populations once before but moderate in intensity because of the highly invasive nature of this species. The Strawberry-Sage Loop and Osceola Ditch Trail will have minor effects in the short and long-term due to the small footprint of the area, the low densities of cheatgrass and mullein and the high likelihood of native species re-vegetation.

Resource Restoration Actions

Road Improvements - Direct effects include an increased risk of the establishment and persistence of populations of cheatgrass and common mullein in disturbed areas. There is the potential for establishment of new exotic species to the drainage from imported soils and from increased construction traffic. The effect of cheatgrass and mullein is expected to be moderate in intensity due to the existing populations, low likelihood of native species re-vegetation within the road prism and frequent disturbance from road maintenance activities. The rolling and compacting of the fill material will render seed germination minimal on the roadbed but allowed on the shoulder areas. The restoration action of seeding and mulching the disturbed site should assist in minimizing the potential effects. The effect from imported soils is expected to be moderate in intensity and long-term in duration due to the area of disturbance, the increased potential of new species importation and the potential long-term seedbed from the as yet defined fill source. The effect from increased construction traffic is expected to be minor in intensity and short-term in duration.

Direct effects from the restoration of last ½ mile of the Strawberry Road will result in an increased risk of the establishment and persistence of a population of bull thistle due to soil disturbance that allows germination of seeds in the soils seed bank or from nearby plant

populations in the meadow. This population increase is expected to be long-term in duration and minor to moderate in intensity because of the small amount of acreage and the high likelihood of native species re-vegetation. The intensity is variable, while the park has an active management program that treats bull thistle, population size varies considerably from year to year regardless of control and no population has yet been eradicated.

Indirect effects include the potential establishment of new exotic species to the drainage from increased visitor traffic and increased horse use. The effect from vehicle traffic is expected to be moderate in intensity due to the high potential of new species introductions and long-term in duration. Increased horse use in the drainage is expected to result in minor long-term effects as well. The park currently has a weed-free hay policy that should reduce the intensity of the potential effects of new species introduction from moderate to minor but not completely eliminate the effect because of difficulties enforcing this policy.

Mitigation Measures

1) The use of weed free fill and road base materials will reduce the risk of new exotic plant infestations. Borrow pits identified for use will be inventoried for exotic plant species prior to use. Topsoil or the top 6 inches of any material that has existing populations of exotic plant species will not be brought into the park.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources are associated with this alternative. No irretrievable commitment of resources is anticipated.

Conclusion - This alternative would result in direct and indirect effects to invasive exotic weeds that are generally minor in the short-term and minor to moderate in the long-term. The implementation of mitigation measures will likely reduce the short-term effects of new infestations and should reduce the long-term establishment of new populations. The restoration of areas will have a short-term increase in weed species due to disturbance followed by a long-term decline as control measures are implemented and native vegetation takes over. Seeding and mulching the disturbed site should assist in minimizing the potential effects. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

4.4 ALTERNATIVE 3

Issue: Effects on Cultural Resources

Recreational Infrastructure Developments

The effects from the Park Boundary, Strawberry Creek Campsites, Blue Canyon trailhead and new trails effects are the same as Alternative 2.

Sage-Steppe Group Campsite – no cultural resources were observed during the cultural Section 106 survey in the proposed campsite area. The development of the road-to-trail will include site

26WP2020, Robison Corral area. By turning this into a trail, the possibilities of vandalism to the corral and/or dendroglyphs are reduced.

Resource Restoration Actions

The effects of the road and culvert crossings improvements are the same as those disclosed under Alternative 1. The effects of the park boundary, dispersed campsites reclamation and road-to-trail restoration actions are the same as those disclosed under Alternative 2.

Mitigation – Mitigation measures are the same as those prescribed under Alternative 2.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources as associated with this alternative. Irretrievable commitment of resources is the small area, 2000 sq. ft., of elk habitat occupied by the Blue Canyon trailhead development. This effect would be negligible and long-term.

Conclusion - Overall there will be short-term, negligible adverse effects to cultural resources under Alternative 3 which will be further minimized to no effect through implementation of the prescribed mitigation measure. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Wildlife Species of Management Concern Recreational Infrastructure Developments

The effect from the Park Boundary, Strawberry Creek Campsites, Blue Canyon trailhead and new trails effects are the same as those disclosed under Alternative 2.

Sage-Steppe Group Campsite – Habitat is suitable for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. The area of this development is 1,600 ft² (0.04 acres) much of which is vegetated shrub steppe habitat. This would result in effects to a small area of foraging and breeding habitat. This represents <0.04 acre out of the 858 acres of existing shrub-steppe within the watershed. The development would result in the no significant loss of foraging and breeding habitat. No effects to these species will occur based upon a habitat standpoint. There is the potential for minor displacement of a few individuals during construction due to a short period of human caused disturbance. Effects to these species would be adverse, negligible, and short-term.

Resource Restoration Actions

The effects of the road improvements and restoration actions are identical to those identified under Alternative 1, except for the addition of the restoration of the Robinson Corral dispersed campsite and road. Habitat is suitable for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur within the area of this campsite. In the long-term, reclamation would reduce disturbance from vehicle traffic and improve habitat suitability for

these species by increasing the available area of foraging and breeding habitat. These effects would be beneficial, minor, and long-term.

Mitigation – No mitigation measures are prescribed.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of resources would occur under this action. Irretrievable commitment of resources would constitute the small area of habitat occupied by the developed sites which would no longer serve as habitat for Species of Management Concern.

Conclusion - Effects to wildlife Species of Management Concern would be similar to Alternative 1. The primary difference in this alternative is the reclamation of the Robison Corral and road. The reclamation of the dispersed campsites would have additional long-term, minor, beneficial effects on Species of Management Concern. The overall conclusion is that this alternative would result in net beneficial gains in habitats, while be it small, used by Species of Management Concern potentially assisting with the reversal of downward trending population status. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Elk

Recreational Infrastructure Developments

The effects from the development of the park boundary, Strawberry Creek campsites Strawberry Creek-Blue Canyon trailhead and new trails are the same as Alternative 1.

Sage-Steppe Group Campsite – Habitat is suitable for elk which occur near this development. The area of this development is 1,600 ft² (0.04 acres) much of which is vegetated shrub steppe habitat. The development would result in the loss of a small area of foraging and breeding habitat which would be an adverse minor effect and long-term in duration since it is localized but measurable. The effects to the elk population as a whole from this habitat loss would be negligible. Indirect effects would potentially result from an increase in visitor use during the summer season from recreational infrastructure development. These effects would be adverse, negligible, and short-term. Animals could be pushed to remote areas in the watershed to avoid disturbance at first but would eventually habituate.

Resource Restoration Actions

Effects from the road improvements and restoration actions are the same as those identified under Alternative 1, except for the reclamation of the Robinson Corral dispersed campsite. Habitat is suitable for elk which occur near this reclamation area. This reclamation would temporarily displace individuals. Effects to elk would be adverse, minor, and short-term. In the long-term, reclamation would reduce disturbance from vehicle traffic and increase foraging habitat for elk by increasing the available area of foraging and breeding habitat. These effects would be beneficial, minor, and long-term.

Mitigation - Mitigation measures will be identical to that identified under Alternative 1.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of resources would occur. Irretrievable commitment of resources would be the loss of elk habitat at both the Blue Canyon Trailhead and the Shrub-steppe group campsites as long as they occupy the sites.

Conclusion - Effects to elk are similar to those described under Alternative 2. The primary difference between this and Alternative 1 are the reclamation of the Robison Corral dispersed campsites and the construction of the shrub-steppe group campsites. These would be considered adverse, minor and long-term in their effects to elk. Over all, Alternative 3 would have long-term, minor beneficial effects on elk due to an increase in habitat suitability through restoration actions located in key elk habitats and a reduction in vehicle traffic and use adjacent to wallows and calving areas. Short-term minor adverse effects exist from elk displacement due to disturbance from construction activities. With the incorporation of the mitigation measure described under Alternative 1, these effects are eliminated. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Fish Species of Management Concern Recreational Infrastructure Developments

The effects of the park boundary, Blue Canyon Trailhead and new trails are the same as those disclosed under Alternative 2.

Strawberry Creek Campsites - The additional campsites, vault toilet, and restoration actions are located far enough from Strawberry Creek so as not to present any additional effects to native fish. No equestrian facilities will deemphasize equestrian use and will lessen the potential effects from increased traffic to negligible and long-term.

Indirect effects would potentially result from an increase in visitor use during the summer season from recreational infrastructure development. These effects would be adverse, negligible and long-term. These indirect effects would mainly result from the creation of social trails to access the stream and fishing pressure.

Sage-Steppe Group Campsites - The construction of a parking area and ADA accessible group campsites and vault toilet will be over 350 feet from Strawberry Creek and will have no effect to native fish in the creek.

Resource Restoration Actions

The effects of the restoration actions are the same as those disclosed under Alternative 2.

Mitigation – Same as those prescribed under Alternative 2

Cumulative Effects – There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. Wildfires may contribute additional sediment to the stream.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of native fish would occur under this action. No irretrievable commitment of native fish would occur under this action.

Conclusion – This alternative will ultimately provide beneficial, moderate, long-term effects for native fish in Strawberry Creek by reducing sedimentation into the stream, restoring small areas of habitat and removing the fish barrier. The process of improving these conditions may cause short-term effects such as additional sediment in the stream during culvert improvements. By implementing the prescribed mitigation measures, these short-term effects to native fish will be minimized. The restoration actions in combination with the road improvement will assist with the implementation of the Bonneville cutthroat trout CA by improving habitat conditions. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Riparian Habitats

Recreational Infrastructure Developments

Effects of the park boundary will have the same effects on riparian habitat as Alternative 2.

Strawberry Creek Campsites - Alternative 3 will have the same direct effects on riparian habitat as the Alternative 2. The indirect effects to the riparian zone from the removal of the proposed horse facilities will be minimized or eliminated due to no potential for visitors attempting to water horses at the stream and lessens the threat of nonnative species introduction from feed. There will still be adverse, negligible and long-term effects on riparian habitat from visitors accessing the creek for water and recreation.

Sage-Steppe Group Campsite - The campsites, parking and toilet would be greater than 350 feet from the creek, but will be adjacent to riparian habitat including a spring complex, wet meadow, aspen grove, and stands of willow. The proposed developments would be in an already disturbed site and affect mainly sagebrush habitat. Creation of the two group campsites and closure of the existing dispersed campsite will mitigate effects from camping in the aspen grove. No direct effects to riparian habitats will occur. Indirect effects could occur due to the potential for increased visitation leading to the introduction of non-native species and the subsequent loss of native riparian species.

New Trails - Effects will be the same as those discussed under Alternative 1 with the addition of the Robison Coral Interpretive Trail. The planned interpretive trail to Robison coral would be converted from an old road and travel through a wetland area over spring channels culminating in an aspen grove. Converting the road to trail will help mitigate effects from camping in the aspen grove, but not eliminate effects entirely. Continued use of this area will have adverse effects on the riparian habitat that are negligible and long-term.

Resource Restoration Actions

The effects from the road improvements and restoration actions are the same as those discussed under Alternative 2 except for the restoration of the Robison Corral dispersed campsite. Restoring the existing dispersed campsite that is located within an aspen grove will be beneficial, negligible and long-term.

Mitigation Measures: The same mitigation measures as described under Alternative 2 apply.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – There are no irreversible or irretrievable commitments or resources as associated with this alternative.

Conclusion - The actions and changes proposed under Alternative 3 would eliminate the current effects to riparian habitat along Strawberry Creek from dispersed camping activities. There are negative indirect effects to the riparian zone adjacent to the Strawberry Creek campsites, the Sage-Steppe group campsite and at the proposed trailhead facilities from visitor use. Restoration actions would have negligible to minor beneficial effects on riparian areas by providing for a more stable and productive habitats. With the implementation of the mitigation measures, the overall environmental consequences to riparian ecosystems from this alternative would be beneficial, minor and long-term. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on shrub-Steppe**Recreational Infrastructure Developments**

The effects from the park boundary, Strawberry Creek campsites, Strawberry Creek-Blue Canyon trailhead and new trails are the same as those under Alternative 2.

Sage-Steppe Group Campsite – The area of this development is 1,600 ft² (0.04 acres) much of which is vegetated shrub steppe habitat. This development would result in the loss of this small area of sage steppe habitat. Effects would be adverse, negligible, and long-term.

Resource Restoration Actions

Road improvements and restoration action effects are the same as those disclosed under alternative 2, with the addition of the restoration of the Robinson Corral dispersed campsite and road. A healthy intact shrub-steppe ecosystem occurs at this site. In the long-term, reclamation would reduce erosion and disturbance from vehicle traffic and increase the total area of shrub steppe. The increase in the area of shrub steppe habitat, decrease in patch fragmentation, and decrease in vehicle disturbance would result in beneficial, minor, and long-term effects.

Mitigation – No mitigation measures are prescribed.

Cumulative Effects – Future shrub-steppe restoration projects and planned in the Strawberry Creek watershed. Past shrub-steppe restoration projects have been completed. Overall the effects of the proposed action would add to the beneficial, minor and long -term effects of these actions combined.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of shrub steppe habitat would occur under this action. Irretrievable commitment of resources would constitute the small area of shrub-steppe occupied by the developed sites which would no longer function as serve as shrub-steppe.

Conclusion - The primary difference between Alternative 2 and 3 is that the reclamation of the Robison Corral Dispersed campsites would have additional long-term, minor, beneficial effects on shrub steppe. The net gain in shrub-steppe ecosystems from the restoration actions are far greater than the small areas with adverse negligible effects. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on invasive exotic plants

Recreational Infrastructure Developments

Effects of the park boundary, Blue Canyon trailhead and new trails are the same as disclosed under Alternative 2.

Strawberry Campsites - The short-term effects are expected to be greater than Alternative 2 due to the larger amount of area disturbed from additional campsite development but will still be minor in nature. Indirect effects would be reduced to minor because of the absence of the dedicated equestrian facility. The lack of a dedicated equestrian facility is offset by the greater number of campsites so while horse usage may decrease, overnight camping and associated traffic is expected to increase. The effect from vehicle traffic is expected to be minor in intensity due to the high potential of new species introductions and long-term in duration.

Sage Steppe Campsites - Direct effects include an increased risk of the establishment and persistence of populations of cheatgrass in the area disturbed by construction. These population increases are expected to be short-term in duration and minor in intensity due to the size of the disturbed area and the high likelihood of long-term native species re-vegetation. Indirect effects would be negligible with the minor of the equestrian facility but the continued transport of invasive species into the area from vehicles would still exist and would be long-term.

Resource Restoration Actions - Road Improvements and restoration actions are the same as those disclosed under Alternative 2.

Mitigation Measures - Mitigation measures are the same as applied to alternative 2.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources are associated with this alternative. No irretrievable commitment of resources is anticipated.

Conclusion - Alternative 3 would result in direct and indirect effects to invasive exotic weeds ranging from moderate in the short-term and minor in the long-term. The implementation of mitigation measures will likely reduce the short-term effects of new infestations and should reduce the long-term establishment of new populations. The restoration of areas will likely have a short-term increase in weed species due to disturbance followed by a long-term decline as control measures are implemented and native vegetation takes over. Because of the larger overall amount of disturbance and the greatest potential for visitation, this alternative would have greater overall effects than Alternative 1. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

4.5 ALTERNATIVE 4

Issue: Effects on Cultural Resources Recreational Infrastructure Developments

The effects from the Park Boundary, Strawberry Creek campsites, Blue Canyon trailhead and new trails effects are the same as Alternative 2 and 3.

Sage-Steppe Trailhead – no cultural resources were observed during the cultural Section 106 survey in the proposed campsite area. The closing of the road to site 26WP2020, Robison Corral, area will have negligible beneficial effects since access will be limited to foot but the corral is still visible from the trailhead.

Resource Restoration Actions - The effects are the same as those disclosed under Alternative 2.

Mitigation – Mitigation measures are the same as those prescribed under Alternative 2.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent areas in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources as associated with this alternative. Irretrievable commitment of resources is the small area, 2000 sq. ft., of elk habitat occupied by the Blue Canyon trailhead development. This effect; however, would be negligible and long-term.

Conclusion - Overall there will be short-term, negligible adverse effects to cultural resources under Alternative 4, which will be further minimized to no effect through implementation of the prescribed mitigation measure. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

**Issue: Effects on Wildlife Species of Management Concern
Recreational Infrastructure Developments**

The effects of the park boundary, Strawberry Creek campsites and new trail are the same as disclosed under Alternative 2.

Sage-Steppe Trailhead – Habitat is suitable for sagebrush voles, beaver, striped skunk, ringtails, porcupine, and sage grouse which occur near this development. The area of this development is 1,600 ft² (0.04 acres). This development is primarily located in a disturbed site, currently used as a road and vegetation loss due to this development would be minimal. For these reasons the development would result in minimal habitat loss (approximately 400 ft²). This represents a loss of 0.01 acre out of the 858 acres of shrub-steppe habitat within the watershed. There would be no effects to these species.

Resource Restoration Actions – Road improvements and restoration actions are the same as those disclosed under Alternative 2 except for the Robinson Corral and road which was discussed under Alternative 3.

Mitigation - No mitigation measures are applied.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of resources would occur under this action. Irretrievable commitment of resources would constitute the small area of habitat occupied by the developed sites which would no longer serve as habitat for Species of Management Concern.

Conclusion - This alternative has the least amount of adverse effects and the greatest beneficial effects to Species of Management Concern. The combination of reclamation with infrastructure placement result in more acres of habitat restored than adversely effect while still allowing the recreational development. The primary difference between this alternative and Alternatives 2 and 3 is the restoration of the existing road from the sage trailhead resulting in a greater increase in foraging and breeding habitat for Species of Management Concern. This increase will have a long-term, beneficial, minor effect. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

**Issue: Effects on Elk
Recreational Infrastructure Developments**

The effects of the park boundary and Strawberry Creek campsites are the same as those disclosed under Alternative 2.

Sage-Steppe Trailhead – Habitat is suitable for elk which occur near this development. The area is 1,600 ft² (0.04 acres). This development is primarily located in a disturbed site, currently used as a road and vegetation loss due to this development would be minimal. For these reasons the development would result in minimal habitat loss (approximately 400 ft²). The development

would result in the loss of a small area of foraging and breeding habitat which would be an adverse minor effect and long-term in duration since it is localized but measurable. The effects to the elk population as a whole from this habitat loss would be negligible. Displacement could occur during the breeding or calving season but would be considered adverse, negligible, and short-term. Indirect effects would potentially result from an increase in visitor use during the summer season from recreational infrastructure development. These effects would be adverse, negligible, and short-term. Animals could be pushed to remote areas in the watershed to avoid disturbance at first but would eventually habituate.

New Trails - Effects will be identical to those identified under Alternative 1 except the additional 0.25 miles of road to trail conversion would have beneficial effects to elk habitats and further minimize effects from vehicle traffic on wet meadow calving areas and wallows. Effects would be beneficial, minor and long-term.

Resource Restoration Actions

Road Improvements - Effects will be identical to those identified under Alternative 2 except that the closure of the road at this location would eliminate disturbance associated with the action to the areas as a key calving habitat. Potential displacement concerns still exist during the breeding season and would be considered adverse, minor and short-term. Restoration Actions - Effects will be identical to those identified under Alternative 1 except that an additional 0.25 mile of main Strawberry Creek road would be converted into a trail. The road to Robison Corral would be reclaimed restoring elk habitat that would be classified as suitable for calving due to their mix of wet meadows, shrub-steppe and aspens. These effects would be beneficial, moderate and long-term.

Mitigation - To avoid disturbance to elk populations during the breeding periods no work will occur on the new trails, or road to trail conversions from August 25th-October 15th.

Cumulative Effects – There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of resources are associated with this alternative. Irretrievable commitments of resources are those associated with elk habitat loss associated with the Shrub-steppe trailhead. These effects have been considered adverse, negligible, and long-term.

Conclusion - Of all the alternatives, this one has the least effects to the elk population in Strawberry Creek. Overall, this alternative would have moderate beneficial effects. The primary difference between this and the other alternatives is that the restoration of an additional 0.25 mile of the main road from the sage trailhead to Blue Canyon and the restoration of the road to Robison Corral will result in a greater increase in foraging and breeding habitat. There is a greater reduction in road density through key elk habitats, a greater reduction in vehicle disturbance, and a reduction in the probability of illegal take of elk by poachers. With the incorporation of the mitigation measure, the effects of displacement are eliminated. Based upon

the analysis of environmental consequences and the effectiveness of mitigation measure, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Fish Species of Management Concern

Recreational Infrastructure Developments

The effects of the park boundary, Blue Canyon Trailhead and new trails are the same as those disclosed under Alternative 2 except that an additional 0.25 mile of trail would be made from the current road in this alternative. It is not located near the creek thus it would have no effects on native fish. The effects of the Strawberry Creek campsites are the same as those disclosed under Alternative 3.

Sage-Steppe Trailhead - The construction of a parking area, trailhead, and ADA accessible vault toilet will be over 350 feet from Strawberry Creek and thus will have no effect to native fish in the creek. Hikers may desire to seek shade before or after their hikes and cross springs to access the aspen grove and wetland area by the Robison Corral. Indirect effects are adverse, minor, and long-term due to trampling increasing sedimentation, possible contamination with improper trash disposal, and non-natives or invasives.

Resource Restoration Actions - The effects of the park boundary, new trails, reclamation of dispersed campsites and road and culvert improvements are the same as those disclosed under Alternative 2.

Mitigation – Same as those prescribed under Alternative 2.

Cumulative Effects – There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. Wildfires may contribute additional sediment to the stream.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of native fish would occur under this action.

Conclusion – Alternative 4 will ultimately provide beneficial, moderate, long-term effects for native fish in Strawberry Creek by reducing sedimentation into the stream, restoring small areas of habitat and removing the fish barrier. The process of improving these conditions may cause short-term effects such as additional sediment in the stream during culvert improvements. By implementing the prescribed mitigation measures, these short-term effects to native fish will be minimized. The restoration actions in combination with the road improvement will assist with the implementation of the Bonneville cutthroat trout CA by improving habitat conditions. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on Riparian Habitats

Recreational Infrastructure Developments

The effects to riparian ecosystems from the park boundary and new trail developments will be the same as those discussed under Alternative 2.

Strawberry Creek Campsites - The effects to riparian ecosystems from the park boundary and new trail developments will be the same as those discussed under Alternative 3.

Sage-Steppe Trailhead - Under this alternative, Strawberry Creek road will be closed and converted into a trail just below Robison Corral having a long-term, beneficial effect on riparian habitat by mitigating effects on riparian and wetland habitats further upstream. The Sage trailhead will be constructed in an upland environment already disturbed by the road. The trailhead would be located a sufficient distance from the riparian zone and the campsite and road leading to the corral would be reclaimed mitigating adverse effects to riparian habitat. Under this alternative the direct effects to riparian ecosystems would be beneficial, minor and long-term.

Resource Restoration Actions

The effects from the road improvements and restoration actions would be the same as those discussed under Alternative 2 except for: 1) the addition of the restoration of the Robison Corral road and dispersed campsite. By restoring the existing road and dispersed campsite located within an aspen grove and adjacent to a spring complex and wetland, effects to riparian habitat will be eliminated. Effects from restoring this camping area will be beneficial, minor and long-term and 2) Road-to-trail conversion from the Sage Trailhead. The conversion of the road from the Sage trailhead to upper Strawberry Creek will have a beneficial, minor and long-term effect on riparian habitat by lessening vehicle traffic and visitor use and limiting effects from these sources. Reclamation would increase the available area for riparian habitat to recover increasing productivity and available habitat. Indirect effects could occur due to ground disturbance from rehabilitation or construction activities leading to the introduction of non-native species and the subsequent loss of native riparian species.

Mitigation Measures - The same mitigation measures as described under Alternative 2 apply.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources are associated with this alternative. No irretrievable commitment of resources is anticipated.

Conclusion - Of all the action alternatives, Alternative 4 has the greatest long-term beneficial environmental consequences and the least short-term adverse environmental consequences. Under this alternative, all of the dispersed campsites will be reclaimed allowing for the disturbed riparian habitat at these sites to recover. More road area will be reclaimed and converted into trails which will lessen the intensity of effects to riparian habitat. Placement of the trailhead lower in elevation and away from the riparian areas at Blue Canyon will lessen effects at that location. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on shrub-Steppe

Recreational Infrastructure Developments

The effects of the park boundary, Strawberry Creek campsites and new trails are identical to those disclosed under Alternative 2.

Sage-Steppe Trailhead – Sage steppe habitat occurs at this development. The area of this development is 1,600 ft² (0.04 acres). This development is primarily located in a disturbed site, currently used as a road and vegetation loss due to this development would be minimal. For these reasons the development would result in minimal loss of shrub steppe habitat (approximately 400 ft²). This is a loss of 0.001% of the sage steppe habitat from the watershed. This loss is negligible and long-term.

Resource Restoration Actions - The effects of the road improvements are identical to those identified under Alternative 2. Restoration action effects will be identical to those identified under Alternative 2 and 3 but with the addition of the road to trail conversion of this 0.25 mile segment of existing road occurs within shrub steppe habitat. Currently erosion and vehicle traffic along this road are causing adverse, measurable and minor, long-term effects to shrub steppe.

In the long-term, reclamation would reduce erosion and disturbance from vehicle traffic and increase the total area of shrub steppe. The total area of road to be reclaimed is 8,448 feet² (0.19 acres). The increase in the area of shrub steppe habitat, decrease in patch fragmentation, and decrease in vehicle disturbance would result in beneficial, moderate, and long-term effects. The net result of this conversion will be an increase in shrub steppe habitat, plant productivity and resiliency, and will ultimately increase the area and health of shrub steppe habitat appreciably and in a readily apparent fashion at the scale of the project area.

Mitigation – No mitigation measure are prescribed.

Cumulative Effects - Future shrub-steppe restoration projects and planned in the Strawberry Creek watershed. Past shrub-steppe restoration projects have been completed. Overall the effects of the proposed action would add to the beneficial, minor and long -term effects of these actions combined.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitment of sensitive wildlife would occur under this action. Irretrievable commitment of resources would constitute the small area of shrub-steppe ecosystem occupied by the developed sites which would no longer function as serve as shrub-steppe.

Conclusion - This alternative has the least amount of adverse effects and the greatest beneficial effects to Shrub-steppe ecosystems. The combination of reclamation with infrastructure placement result in more acres restored than adversely effect while still allowing the recreational development. Conclusions are similar to those of Alternative 2 and 3. The primary difference between Alternative 3 and this alternative is the restoration of the road from the Sage trailhead will result in an increase in area of shrub steppe habitat of 0.19 acres. This increase will have additional long-term, beneficial, measurable and minor effects on shrub steppe habitat. Based upon the analysis of environmental consequences, no resource impairment was identified. No resource impairment will occur.

Issue: Effects on invasive exotic plants
Recreational Infrastructure Developments

Park Boundary: Effects are the same as disclosed under Alternative 2.

Strawberry Campsites - The short-term and long-term effects are expected to be less than Alternatives 1 and 3 but will still be minor in nature due to the amount of area disturbed and the likelihood of new species importations.

Sage Steppe Trailhead - Direct effects include an increased risk of the establishment and persistence of populations of cheatgrass in the area disturbed by construction. These population increases are expected to be short-term in duration and minor in intensity due to the size of the disturbed area and the high likelihood of long-term native species revegetation. The restoration action of seeding and mulching the disturbed site should assist in minimizing the potential effects. The rolling and compacting of the fill material will render seed germination minimal. The long-term effects will be minor with the continued presence of invasive species in the area and a low likelihood of new species importation into the site.

New Trails - Similar level of effect as Alternative 2. The slightly greater length of trail will still result in negligible effects in the short or long-term due to the small footprint of the area and low densities of cheatgrass and mullein in the area.

Resource Restoration Actions - Effects from the road improvements are similar to the effects disclosed under Alternative 2 although reduced in scale due to the shorter road length. Direct effects from construction traffic are expected to be minor in intensity and short-term in duration. The effect of imported soils is expected to be moderate in intensity and long-term in duration due to the wide potential of new species and the potential long-term seedbed. The rolling and compacting of the fill material will render seed germination minimal on the roadbed but highly likely on the shoulder areas.

Mitigation Measures - Mitigation measures are the same as applied to alternative 1.

Cumulative Effects - There are no other recreational infrastructure developments or road improvement projects scheduled in the Strawberry Creek watershed or in adjacent area in the foreseeable future. There are no cumulative effects associated with this alternative.

Irreversible and Irretrievable Commitment of Resources – No irreversible commitments or resources are associated with this alternative. No irretrievable commitment of resources is anticipated.

Conclusion - Alternative 4 would result in direct and indirect effects to invasive exotic weeds that are generally moderate in the short-term and negligible in the long-term. The implementation of mitigation measures will likely reduce the short-term effects of new infestations and should reduce the long-term establishment of new populations. The restoration of additional areas (greater than Alternatives 1 and 3) will likely result in short-term increases in

weed species due to disturbance followed by a long-term decline as control measures are implemented and native vegetation takes over. Because of the smaller overall amount of disturbance and infrastructure, and the greater area restored, this alternative would have less overall effects than Alternative 2 or 3. Based upon the analysis of environmental consequences and the effectiveness of mitigation measures, no resource impairment was identified. No resource impairment will occur.

Table 4.1 Mitigation Measures

Issue	Alternative 2	Alternative 3	Alternative 4
Issue #1. Cultural Resources	During work in the vicinity of know sites an archeologist will be present to monitor.	During work in the vicinity of know sites an archeologist will be present to monitor.	. During work in the vicinity of know sites an archeologist will be present to monitor.
Issue #2 Wildlife SOMC	None	None	None
Issue #3 Elk	To avoid disturbance to elk breeding periods no work on the Blue Canyon Trailhead, new trails, or road to trail conversions from Aug. 25 th -Oct.15 th .	To avoid disturbance to elk breeding periods no work on the Blue Canyon Trailhead, new trails, or road to trail conversions from Aug. 25 th -Oct.15 th .	To avoid disturbance to elk breeding periods no work on new trails, or road to trail conversions from Aug. 25 th -Oct.15 th .
Issue #4 Effects on Fish Species of Management Concern	1) Road work within 50 ft of the stream, will be completed Sept.15-Mar.15. 2) Weed seed free straw bales will be used as sediment traps in the Narrows. 3) Follow best management practices for roads maintenance and improvements.	1) Road work within 50 ft of the stream, will be completed Sept.15-Mar.15. 2) Weed seed free straw bales will be used as sediment traps in the Narrows. 3) Follow best management practices for roads maintenance and improvements.	1) Road work within 50 ft of the stream, will be completed Sept.15-Mar.15. 2) Weed seed free straw bales will be used as sediment traps in the Narrows. 3) Follow best management practices for roads maintenance and improvements.
Issue #5 Effects on Riparian Ecosystems	No uprooting of riparian species that are providing stream stabilization.	No uprooting of riparian species that are providing stream stabilization.	No uprooting of riparian species that are providing stream stabilization.
Issue #6 Effects on Shrub-Steppe Habitat.	None	None	None
Issue #7 Effects on Invasive Exotic Plant Species	The use of weed free fill and road base materials to reduce the risk of new exotic plant infestations.	The use of weed free fill and road base materials to reduce the risk of new exotic plant infestations	The use of weed free fill and road base materials to reduce the risk of new exotic plant infestations

CHAPTER 5

COMPLIANCE/PARTICIPANTS/REVIEW

5.0 Compliance

The following laws and associated regulations provided direction for the design of project alternatives, the analysis of potential effects and the formulation of mitigation measures:

National Environmental Policy Act of 1969 (Title 42 U.S. Code Sections 4321 to 4370 [42USC 4321-4370]). The purpose of NEPA include encouraging “harmony between [humans] and their environment and promote efforts which would prevent or eliminate damage to the environment...and stimulate the health and welfare of [humanity]”. The purposes of NEPA are accomplished by evaluating the effects of federal actions. The results of these evaluations are used to inform the public, federal agencies and public officials in documented format for consideration prior to taking action or making decisions. Implementing regulations for the NEPA are contained in Part 1500 to 1515 of Title 40 of the U.S. Code of Federal Regulations (40CFR 1500-1515).

Endangered Species Act of 1973, as amended (ESA) (16USC 1531-1544). The purposes of the ESA include providing “a means whereby the ecosystems upon which an endangered species and threatened species depend may be conserved”. The ESA requires that “all Federal departments and agencies shall seek to conserve endangered species and threatened species” and “each Federal agency shall...insure that any action authorized, funded or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species”. Section 7 of the ESA requires that through consultation with the U.S. Fish and Wildlife Service or National Marine Fisheries Service the effects of any agency action that may affect endangered, threatened, proposed species or designated critical habitat must be evaluated. Implementing regulations that describe procedures for interagency consultation to determine the effects of actions on endangered, threatened, proposed species or designated critical habitat are contained in 50 CFR 402.

National Historic Preservation Act of 1966, as amended (NHPA) (16 USC 470 *et sequential*). Congressional policy set forth by the NHPA includes preserving “the historical and cultural foundations of the Nation” and preserving irreplaceable examples important to our national heritage to maintain “cultural, educational, aesthetic, inspirational, economic and energy benefits”. Section 106 of the NHPA requires that federal agencies take into account the effects of their actions and consult as appropriate in fulfilling Section 106 requirements. Section 106 further requires federal agencies to propose and evaluate alternatives to undertakings that would adversely affect historic properties or to adequately mitigate adverse effects if avoidance cannot be reasonably achieved.

Clean Air Act of 1977, as amended (PL 101-549). The Clean Air Act, as amended in 1977, was enacted by Congress after determination that the nation's air quality was rapidly deteriorating, and that Federal leadership and financial assistance were needed to cope with the problem. The stated purpose of the Act is to protect and enhance the nation's air quality. The primary Federal responsibility is to provide technical and financial assistance to state and local

governments, who have the responsibility to develop and execute air pollution prevention and control programs. This includes the State of Nevada's Smoke Management Plan.

The Clean Water Act of 1972, as amended (PL 95-217). The Clean Water Act is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

National Park Service Management Policies 2006. This volume of Management Policies focuses exclusively on the policies and procedures for the national park system.

5.1 List of Preparers

The core interdisciplinary team consisted of the following GRBA personnel:

Bryan Hamilton, Wildlife Biologist
Gretchen Schenk, Aquatic Ecologist
JoAnn Blalack, Cultural Resource Program Manager
Tod Williams, Resource Management Program Manager
Ben Roberts, Natural Resource Program Manager
Karla Jageman – Archeologist
Margret Horner – Lead Biological Science Technician
Laura Belica – Fisheries Biologist
Mike Allison – Chief of Maintenance
Betsey Duncan-Clark – Chief of Interpretation
Glen Dearden – Maintenance Foreman.

5.2 List of EA Recipients:

Federal Agencies

Humboldt National Forest	Bureau of Land Management
Ely Ranger District	Ely Resource Area

Bureau of Indian Affairs
Western Regional Office

U.S. Fish and Wildlife Service
Ecological Services – Reno Field Office

Local/State Agencies

White Pine County Commission	Nevada Department of Wildlife
Ely, NV	Reno, NV

Nevada Division of Environmental Quality	Nevada Department of Wildlife
--	-------------------------------

Reno, NV

Elko, NV

Native American Tribes

Southern Paiute Tribe of Utah
Cedar City, UT

Indian Peaks Band
Southern Paiute Tribe, Cedar City, UT

Southern Paiute Consortium
Fredonia, AZ

Goshute Business Council
Ibapah, UT

Ely Shoshone Council
Ely, NV

Skull Valley Band of Goshutes
Salt Lake City, UT

5.3 List of Abbreviations and Acronyms

ADA =	Americans with Disabilities Act
BCT =	Bonneville Cutthroat Trout
EA =	Environmental Assessment
ESA =	Endangered Species Act
GMP =	General Management Plan
GRBA =	Great Basin National Park
NDOT =	Nevada Department of Transportation
NEPA =	National Environmental Policy Act
NHPA =	National Historic Preservation Act
NPS =	National Park Service
USFWS =	U.S. Fish & Wildlife Service

5.4 Glossary of Terms

Action - All activities or programs of any kind authorized, funded or carried out, in whole or in part by Federal agencies.

Affected Environment – Is the description of the existing environment potentially affected by the proposed action and alternatives to the proposed action?

Context - The setting in which each impact is analyzed, such as affected region, society as a whole, the affected interests, and/or locality.

Cumulative Effects – Is the impact on the environment, which results from the incremental effects of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or persons undertake such actions.

Duration - Is a measure of the time period over which the effects of an impact persist.

Environmental Consequences – Are the analytic evaluations of the potential effects or effects of the proposed action and alternatives to the proposed action to the effected environment.

Intensity - Is a measure of the scale of the impact, which can be defined as both detrimental as well as beneficial.

Issues – Are concerns and opportunities raised by the internal and external public about the proposed action through the scoping process. Issues drive the NEPA process and determine the range of actions, alternatives and effects to be addressed.

Irretrievable Commitment of Resources - Are uses that may cause resources to be lost because the lands providing these resources are allocated for other uses.

Irreversible Commitment of Resources - Includes consumption or destruction of nonrenewable resources such as minerals and archeological remains.

Mitigation Measure - Are actions designed to minimize or eliminate adverse effects of an action on the environment?

Scoping - Scoping is an early and open process to solicit public and internal concerns relating to a proposed action.

Species of Management Concern – Species whose population status is either unknown or thought to be declining and are an emphasis for management.

Threatened and Endangered Species - Any species of fish, wildlife or plant actually listed under Section 4 of the Endangered Species Act.

References

Allan, David J. 1995. Stream Ecology: Structure and Function of Running Waters. Kluwer Academic Publishers, Norwell, MA.

Bergstresser, Laura Suzanne and JoAnn Blalack. Archeological Survey at Great Basin National Park: 1998 and 1999. In Publications in Anthropology 92. U.S. Department of the Interior, National Park Service – Intermountain Region, Western Archeological and Conservation Center, Tucson.

Burroughs, E.R. and J.G. King. 1985. Surface erosion control on roads in granitic soils. In Proceedings: ASCE Committee on Watershed Management, Denver, CO. pp. 183-190.

Burroughs, E.R. and J.G. King. 1989. Reduction of soil erosion on forest roads. USDA Forest Service General Technical Report INT-264. Ogden, UT. 21 p.

Holmer, Richard N. 1986. Common Projectile Points of the Intermountain West. In Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings. pp. 89-115. Edited by Carol J. Condie and Don D. Fowler. University of Utah Anthropological Papers No. 110. University of Utah Press, Salt Lake City.

Jageman, Karla and JoAnn Blalack. 2008. Strawberry Creek Road Improvement and Campground Development, Great Basin National Park, White Pine County, Nevada. Clearance No.: 001-2008-GRBA.

McLane, Alvin R.

1989 Rock Art in the Snake Range, White Pine County, Nevada. Prepared for the Nevada State Museum, Truman-Orr Foundation, Inc. Grant. On file Great Basin National Park, Resource Management.

NPS. 1998a Management of Ethnographic Resources. In NPS-28: Cultural Resource Management Guideline. pp. 157-176.

1998b Management of Cultural Landscapes, In NPS-28: Cultural Resource Management Guidelines. pp. 87-112.

Unrau, Harlan D. 1989. National Register of Historic Places Registration Form: Osceola (East) Ditch. On file Nevada State Historic Preservation Office, Carson City.

1990 Historic Resources Study: Great Basin National Park - Basin and Range: A History of Great Basin National Park, Nevada. U.S. Department of the Interior, National Park Service.

Wells, Susan J. Archeological Survey and Site Assessment at Great Basin National Park. In Publications in Anthropology 53. U.S. Department of the Interior, Western Archeological and Conservation Center, Tucson.

