

grows at calcareous springs and seeps on canyon walls and stream banks, plus boulder-lined stream courses and at waterfalls with waters rich in calcium bicarbonate. Habitat sites in Bighorn Canyon include seeps near the Upper Layout Creek trail, Hillsboro ranch, Trail Creek and the Om-Ne-Ah trail. Wyoming *Sullivantia* is often in remote settings that have few direct threats. The primary threat to this species is change in water quality and flow. It has a narrow ecological amplitude and occupies a fragile habitat that is directly affected by any changes in the groundwater discharge and stream flow conditions, with unconsolidated substrate that is vulnerable to the slightest amount of trampling. Under Alternative B, some areas of sensitivity would receive trail improvement and educational signs to protect its habitat, particularly Upper Layout Creek. Impacts would be beneficial, site-specific, short and long-term and minor to moderate.

**Persistent sepal yellowcress** (*Rorippa calycina*)- Impacts would be the same as in Alternative A; adverse, site-specific, short and long-term and minor.

**Bighorn fleabane** (*Erigeron allocotus*)- Impacts would be the same as in the No Action Alternative; no discernable effect anticipated.

**Hairy prince's plume** (*Stanleya tomentosa*)- Impacts would be the same as in the No Action Alternative; no discernable effect anticipated.

**Wind River milkvetch** (*Astragalus oreganus*)- Impacts would be the same as in the No Action Alternative; no discernable effect anticipated.

**Rabbit buckwheat** (*Eriogonum brevicaulis* var. *canum*)- Impacts would be the same as in the No Action Alternative; adverse, site-specific, short and long-term and negligible.

#### **Wildlife:**

**American peregrine falcon**- Impacts would be the same as those in the No Action Alternative; adverse, site-specific, short-term and minor.

**Yellow-billed cuckoo**- Impacts would be the same as in Alternative A; beneficial, site-specific to local, short and long-term and minor to moderate.

**Pallid bat**- The pallid bat emerges about 1 hour after sunset to forage. It primarily gleans large insect prey from the ground and vegetation, but also forages in flight within about 10 ft of the ground. Due to its roost preferences, very few areas in Wyoming are suitable for the pallid bat. Bighorn Canyon is one of the best such sites due to its warm, arid climate and abundant cliff roosting habitat. Because of its nocturnal behavior, direct impact while foraging is not a major concern. Negative impacts would be felt mainly in roosting sites, which tend to be on or near cliffs and occasionally in buildings. The path upgrade at the Devil Canyon Overlook and the improvements on the Upper Layout Creek trail would have the most potential to temporarily impact the soundscape near day roosts. Impacts would be adverse, site-specific, short-term and negligible.

**Spotted bat**- Roosting habitat is almost exclusively rocky cliffs on or near substantial cliff features. Suitable habitat in Wyoming is associated with rocky cliffs near permanent water, a situation especially prevalent in Bighorn Canyon. In fact, BICA is one of the few places in Wyoming where the spotted bat regularly occurs. This species emerges to forage long after sunset and specializes in high flying moths, which they catch in flight. Because of its nocturnal behavior, direct impact while foraging is not a major concern. The path upgrade at the Devil Canyon Overlook and the improvements on the Upper Layout Creek trail would have the most potential to temporarily impact the soundscape near day roosts. Impacts would be adverse, site-specific, short-term and negligible.

**Fringed myotis**- Impacts would be the same as those under Alternative A; adverse, site-specific, short-term and minor.

**Townsend's big-eared bat-** Impacts would be the same as those under Alternative A; adverse, site-specific, short-term and negligible.

**Northern leopard frog-** Impacts would be the same as under Alternative A; beneficial, site-specific, short and long-term and minor.

**Plains spadefoot toad-** Habitat is poorly documented, however this species is usually found in areas with soft sandy/gravelly soils near permanent or temporary bodies of water, which they enter to breed. As desert amphibians they are active primarily during rainy periods and remain in estivation, deep in underground burrows for the remainder of the year. Trail work is not expected to impact this species, however if probable habitat is discovered during new trail construction, mitigation measures would be used. Construction would not occur during the rainy season. Alternative B is not expected to have any discernable impact on this species.

#### Cumulative effects

Future projects with impacts to vegetation include prescribed fires, invasive plant treatments, and re-vegetation projects. All of these projects are intended to improve vegetation/habitat in the park, causing short-term, adverse impacts followed by beneficial, long-term results. The WAPA proposed transmission line rebuild will also impact sensitive vegetation in the park. Past grazing and ATV use as well as inundation of habitat by the Yellowtail Reservoir may have past impact on specific plant species, however documentation is not available.

Grazing, ATVs, and the dam may also have had long-term cumulative impacts on wildlife habitat through inundation, habitat fragmentation and changes in plant ecology. Prescribed fires, invasive plant treatments and re-vegetation projects would have temporary adverse impacts on habitat but they are outweighed by long-term habitat improvement once finished.

#### Conclusion

Alternative B improves upon existing trail maintenance without adding new construction. Impact from this action would not have substantial effects compared to current conditions. However, in some cases, as in the improvements at Upper Layout Creek, habitat could be improved through trail re-routing and educational signs, which would benefit sensitive plants and amphibians. The lack of trails at the Devil Canyon Overlook would mean continued off-trail use, with the potential to negatively impact nesting and roosting, nesting, plant and undocumented toad habitat. In many other cases, improvement of existing trails would have little to no effect on these species. In the cases where adverse impacts are expected, most impacts are site-specific and negligible to minor, meaning that the overall viability of the species would not be affected, and if left alone, the species would recover. This combined with surveys and mitigation measures would ensure that no state species of special status would be significantly affected.

Overall impacts to special status species are expected to have no discernable effect to adverse impacts that are site-specific, short and long-term and negligible to minor. No effects are expected for federally listed species in the park.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Geology and Soils

### Methodology

Bighorn Canyon's geology forms the framework for the dam, reservoir and park. According to 2006 Management Policies, "The Service will protect geologic features from the unacceptable impacts of human activity while allowing natural processes to continue." 2006 Management policy also protects the parks soils, directing parks to "prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil". Park soils are for the most part poorly developed desert typical soils. On some park soils, soil crust organisms (Cryptobiotic soils) are well developed. Careful trail development would be required to minimize effects on park soils. Impact analysis was based on the knowledge and best professional judgment of park staff and resources.

### Intensity Thresholds

Within this analysis, impacts on soil in the park were assessed based on the type of proposed action, and impacts were compared to the available scientific literature and general ecology. Proposed actions were rated using two sets of criteria: type and intensity.

*Type* determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect),
- Context (site-specific, local, or regional),
- Duration (short-term, lasting less than one year; or long-term, lasting more than one year).

*Intensity* thresholds of soil impacts are defined as follows:

- **Negligible:** The action would result in a change in soils or a geologic feature, but the change would be at the lowest level of detection or not measurable.
- **Minor:** The action would result in a detectable change, but the change would be slight and local. Soils or geologic resources might be slightly altered in a way that would be noticeable. There could be changes in a soil's profile in a relatively small area, but the change would not appreciably increase the potential for erosion.
- **Moderate:** The action would result in a clearly detectable change in soils or geologic resources. Soils would be obviously altered, or a few features would show changes. There could be a loss or alteration of the topsoil in a small area, or the potential for erosion to remove small quantities of additional soil would increase.
- **Major:** The action would result in the permanent loss of an important soil or geologic resource, or there would be highly noticeable, widespread changes in many soils or features. There would be a permanent loss or alteration of soils or geologic resources in a relatively large area, or there would be a strong likelihood for erosion to remove large quantities of additional soil as a result of the action.

## ***No Action Alternative***

The No Action Alternative represents current conditions and is a baseline for evaluating change. Under the No Action Alternative, existing trails would continue to receive brush removal and weed management to keep existing paths reasonably clear.

## **North District**

Under the No Action Alternative, the current trail conditions would remain the same.

### **Reservoir Planning Area**

There would be no maintenance of the Om-Ne-A trail and it would remain closed to visitors. Reclamation would be allowed to occur naturally, and some erosion would continue on the trail scar. Compared to current conditions, the change would be negligible. The effects on soils would be adverse, local, short- and long-term and negligible.

### **Headquarters Planning Area**

The No Action Alternative would not cause any discernable change in this area.

### **3-mile Planning Area**

The 3-mile fishing access would continue to develop spur paths to the river. Spurs leading off trail to the river would continue to damage streamside vegetation, leading to increased erosion into the stream. The impacts would be adverse, site-specific, short- and long-term and minor.

## **South District**

All existing trails would continue to have brush cleared from the trail and minimal maintenance.

### **Horseshoe Bend Planning Area**

Trails would not see any change from current conditions however this area has cryptobiotic soils that would be particularly vulnerable to off-trail travel. Without clearly defined trails and visitor education, impact would be adverse, local, short and long-term and moderate.

### **Canyon Rim Planning Area**

Impacts under the No Action Alternative would remain the same as current conditions. Impacts would be adverse, local, short- and long-term and negligible.

### **Proposed Wilderness Planning Area**

Western Area Power's line rebuild project would still result in impact to the roads here. Impacts would be somewhat mitigated by restoration. No sanctioned mountain biking would occur. Effects would be negligible.

### **Ranch/Landing Planning Area**

Improper trail construction at Upper Layout Creek would leave problems with erosion unchecked, damaging vegetation and water quality. Sensitive areas like the spring would continue to receive unrestricted foot traffic, increasing erosion concerns that would impact not only the spring but the entire stream. Trail re-routing may become even more necessary, requiring greater mitigation measures in the long run.



The Barry's Island trail would not receive the maintenance it needs on the south side wash, which would lead to further erosion, reducing soils available to native plants. All other trails would continue to receive brush removal and weeds management, but no measures to control erosion. Overall impact would be adverse, site-specific, short- and long-term and minor.

## **Yellowtail Wildlife Habitat Management Area**

Under the No Action Alternative, roads would be left as is, without designated use.

### **Habitat Planning Area**

Roads would not be designated for use and damage by motorized vehicles would continue unabated. Trucks avoiding muddy areas would continue to drive over roadside vegetation, increasing erosion and widening mud holes. There would be no action to re-establish native plants to hold soil in place. Effects would be adverse, local, short- and long-term and moderate.

### **South and Southeast Lake Planning Area**

Roads would continue to multiply as visitors forge new "social roads". The impact on plants would increase soil erosion and could impact geologic features. Effects would be adverse, local, short- and long-term and moderate.

### ***Cumulative Impacts***

The past, present, and reasonably foreseeable future impacts are primarily related to cattle grazing and dirt roads. The presence of these factors has led to the permanent loss of surface soils in some areas creating gullies caused by water channeling into tire and livestock trails. The loss of soils and continued erosion have opened up avenues for invasive weed colonization and made the natural re-establishment of native plants extremely difficult. Left unchecked, these impacts could worsen and expand. Other cumulative impacts such as fire management, invasive weeds management and re-vegetation projects are intended to improve vegetation in the park which may offset the effects of neglect in localized areas.

### ***Conclusion***

No Action would continue to result in unchecked erosion on several trails. Although impacts have already occurred to vegetation, continued neglect could lead to larger impacts in areas of the Yellowtail Habitat, Horseshoe Bend, Upper Layout Creek and in the Proposed Wilderness. In certain areas such as the Reservoir planning area, re-vegetation would eventually occur, helping to repair areas of erosion and soil loss, but recovery without assistance would be slow. Past soil compaction, erosion and disturbance have left the trail vulnerable to further soil loss in the meantime. The improvements scheduled for WAPA maintenance roads would increase erosion in the short-term, but would also leave lasting impacts to soil, increasing loss over the long-term. Areas such as Upper Layout Creek and Barry's Island would continue to see erosion in sections where the trails were not sustainably designed. This could mean larger repairs later, if the trails continue to degrade.

However, because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## ***Alternative A***

Alternative A would establish new trails in the park and improve existing trails. Mountain bike trails would be introduced and trails would be designated for user groups. Roads would be closed to public use in some areas.

### **North District**

Under Alternative A, a closed trail would be re-opened, one new trail would be developed and two existing trails would receive improved maintenance.

#### **Reservoir Planning Area**

The Om-Ne-A trail would be re-opened and brush overgrowth would be cleared. Clearing would take place only in previously impacted areas. Trail maintenance would prevent further erosion, benefiting site-specific locations. Increased foot traffic would cause further compaction and may cause a negligible increase in erosion. Impact would be adverse, local, short- and long-term and negligible. If trail re-routing were to become necessary, trail building would impact formerly unaffected areas, having an adverse, local, long-term and moderate impact on the soil in that area.

#### **Headquarters Planning Area**

The Beaver Pond trail to meet the Bighorn Headgate Trail would be improved, providing better erosion control. The impact would be beneficial, site-specific, short-term and negligible.

A new trail would be established as the Fort Smith Loop Trail using an existing social/game trail. Vegetation would be impacted and removed as the trail were widened and developed resulting in some short-term soil loss. The resulting trail would reduce the social spur trails leading down from the ridge, would allow plants to re-grow and protect soils on the slope. Although trail work would initially have an adverse effect on soil erosion, with proper mitigation measures and a reduction in spur trails, long-term impacts would be beneficial. Overall impacts for the new trail would be beneficial and adverse, site-specific, short- and long-term and minor.

#### **3-mile Planning Area**

The foot path used for fishing access would be more thoroughly cleared and better maintained, redundant spur trails would be eliminated to better protect the stream bank vegetation, reducing erosion. A negligible amount of erosion would occur during improvement. Impacts would be beneficial and adverse, local, short- and long-term and minor.

### **South District**

New trails would be developed throughout the South District under Alternative A, introducing mountain bike trails for the first time in Bighorn Canyon.

### **Horseshoe Bend Planning Area**

Two of the trails proposed in this area, the Sykes Mountain Trail and the Mouth of the Canyon trail would see improved brushing but would not cause further impact to the geology or soils. On these two trails there would be no discernable effect. Three new trails would be developed, the Sykes notch and Rim trails and the Crooked Creek Fishing Access. The latter would make a small fishing access path down to the lake from an established parking area. Several social trails wander through this area and a path would be established, utilizing already impacted areas. A graveled path to the shore would reduce the need for various social paths, and reduce erosion. Fewer social paths would benefit soils at crooked creek, allowing plants to re-establish on the unused paths. Impacts would be beneficial, site-specific, short- and long-term and minor. The other 2 new trails would require some vegetation removal and introduction of human disturbance, increasing soil erosion and compaction in formerly untraveled areas. Focus would be given to sustainable trail design and mitigation measures to protect the soils and geology of the proposed paths. The old Crooked Creek Nature Trail would also be improved, and re-opened. However, impact would be adverse, local, long-term and moderate.

### **Canyon Rim Planning Area**

Two new trails would be developed in this area. Building the Balcony trail would require vegetation removal and introduce visitor impacts of soil compaction, erosion and surface run-off. However, a trail would also direct visitors to a specific trail rather than allowing numerous social trails to develop from visitors who want to walk the canyon rim past the Devil Canyon Overlook. The impact of this new trail would therefore be adverse and beneficial, local, short- and long-term and minor to moderate. ADA improvements at the Overlook would follow an established path, and therefore not create new impacts. Defined paths could also direct visitors to viewpoints, allowing plants to re-grow in the wide swath where they have been trampled for years. As such the ADA improvement would be beneficial, site-specific, long-term and minor. The Two Eagle Trail would have direct adverse minor impact on soils, but would primarily follow an existing service road scar, minimizing impacts. All other proposed action in this area would similarly define trails for visitors, reducing impacts from visitors wandering off trail, reducing vegetation and therefore soil loss. Additional brushing would have site-specific impacts on soils which would be negligible. Overall impacts to geology and soils would be beneficial, local, short- and long-term and minor.

### **Proposed Wilderness Planning Area**

Under Alternative A, existing maintenance roads would be used to establish a trail. These roads, which will be cleared and re-grated for the proposed WAPA utility line upgrade, would cause a large amount of impact to soils. Compaction by vehicles will cause reduced water infiltration, surface run-off and exposure to both wind and water erosion. The proposed trail would take advantage of this already impacted area. Although the area is already highly impacted, trail use may increase erosion, creating gullies and tracks that could magnify surface run-off. Gully erosion is a problem in recreation management because water is concentrated into channels, thus increasing its erosive power (Hammitt and Cole 1998). Part of the trail would include steep inclines which would be particularly vulnerable to those impacts. Opening paths where none had formerly existed would also increase opportunities for off-trail use, impacting vegetation and soils near the trail. Utilization by trail users however would have much less impact than the motorized vehicles that will occasionally use the road to maintain power lines. A trail would also mean regular maintenance and increased monitoring for damage, which would result in quicker responses with mitigation measures, where none would exist otherwise. The monitoring and maintenance of the trail would be more soil protection than would occur were no action taken and the road was left to degrade.

naturally. With this in mind, the impacts of using this established road as a trail would be adverse, local, short- and long-term and minor.

Impacts of closing and reclaiming other roads in the proposed wilderness would be beneficial, local, long-term and minor.

### **Ranch/Landing Planning Area**

Improving trail construction at Upper Layout Creek would address problems with erosion and vegetation damage currently taking place. Sensitive areas like the spring, where unrestricted foot traffic is damaging the localized ecosystem, would have educational signs posted to help visitors understand resource impacts. Re-designing the trail could reduce erosion effects and trampling at the spring. It would also help reduce erosion along the trail, benefiting both the soils and water quality of the stream. Effects on soils would be beneficial, local, short- and long-term and minor.

Proposed action for the Lower Layout Creek trail and both historic ranches would have no discernable effect on soils or geology from the current impacts. Action on the Barry's Island trail would also have little impact. However, trail improvement could decrease erosion impacts along the south side of the island, protecting the trail and soils in the long run. Introducing mountain bikes to Barry's Island could increase erosion impact due to the creation of gullies, which increase the rate of erosion. Effects on Barry's Island would be beneficial and adverse, site-specific and local, short- and long-term and minor.

The development of the South Pasture trail would reduce a 2-track road to a single track for a majority of the trail's length. Rehabilitating half of the road scar would be beneficial for soil retention, but use by bicycles could increase erosion, compaction and the creation of gullies in the remaining track. Mountain bikes use may also result in a wider trail in sections where pools collect and bikers avoid water by riding on vegetation. Once dry, this could lead to increased surface erosion. Since road scars already exist, part of which would benefit from trail establishment, the impacts would be adverse and beneficial, local, short- and long-term and minor.

### **Yellowtail Wildlife Habitat Management Area**

Alternative A would take an active approach to closing and rehabilitating unnecessary roads.

#### **Habitat Planning Area**

Roads could be closed and actively rehabilitated, increasing native plant populations and reducing soil loss and degradation. Seasonal closures could mitigate vegetation damage during wet periods when vehicles drive on plants to avoid muddy roads, which would benefit soils over time. Impacts would be beneficial, local, long-term and moderate.

#### **South and Southeast Lake Planning Area**

Roads could be closed and actively rehabilitated, increasing native plant populations, reducing compaction and limiting erosion. Impacts would be beneficial, local, long-term and minor.

### ***Cumulative Impacts***

The past impacts related to cattle grazing, uranium prospecting, and dirt roads allow some new trails to be developed without causing noticeable new impact. Trailing of livestock through the park, and the continued grazing of wild horses on the Pryor Mountain Wild Horse Range, currently have the biggest cumulative effects on soils and geology in the park (aside from natural erosion processes). A history of uranium prospecting and associated roads have also had significant effect on geology and

soils. The presence of these factors have led to the permanent loss of surface soils in some areas creating gullies caused by water channeling into tire and livestock trails. The introduction of mountain bikes and foot traffic on new trails would add to the loss of surface soils in some areas. Increased trail maintenance and monitoring done under Alternative A would help mitigate these impacts and reduce further damage to geology and soils.

Other cumulative impacts such as fire management, invasive weeds management and re-vegetation projects are intended to improve vegetation in the park which would help to mitigate impact to soils caused by trail improvement and development.

### ***Conclusion***

As new trail sections are opened and used, potential for the loss of surface organic material, leading to possible erosion, soil compaction, reduced water infiltration and surface run-off increases. The proposed mitigation measures, intelligent trail design and increased attention paid to trails in Alternative A would help in monitoring efforts to control the negative impacts to geology and soils. Some areas, such as the Canyon Rim, Horseshoe Bend, and Headquarters Planning Areas and Upper Layout Creek trail would benefit from well defined trails that would keep visitors contained within impacted areas, rather than wandering across vegetated areas or areas with delicate soils. Trail re-routing would address negative impacts already occurring on those trails that were not sustainably designed in the beginning. Trail alignment would be planned to minimize long-term impacts to soils, and as most trails follow existing 2 track roads, new impacts would be limited. Soils would be beneficially impacted by the restoration of old 2 track roads not identified as travel routes in this plan. Overall impacts under Alternative A would be adverse and beneficial, local, short- and long-term, and minor to moderate.

There would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents. Therefore, there would be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative B***

Alternative B would improve existing trails without building any new trails. Redundant or unnecessary roads would be reclaimed and some trails would be re-routed to address resource damage. Mountain bikes would not be allowed on trails.

### **North District**

Under Alternative B, a closed trail would be re-opened and two existing trails would receive improved maintenance.

#### **Reservoir Planning Area**

Impacts would be the same as in Alternative A.

#### **Headquarters Planning Area**

Impacts would be the same as in the No Action Alternative.



### **3-mile Planning Area**

The foot path used for fishing access would be more thoroughly cleared and better maintained, redundant spur trails would be eliminated to better protect the stream bank vegetation, reducing erosion. Impacts would be beneficial, local, short- and long-term and minor.

### **South District**

Under Alternative B, most trails would have improved maintenance and one trail would be re-routed to better protect resources. Unnecessary roads would be reclaimed.

### **Horseshoe Bend Planning Area**

Three of the trails proposed in this area, the Sykes Mountain Trail, the Crooked Creek Nature Trail and the Mouth of the Canyon trail would see improved brushing and would have no discernable impact on soils and geology. Crooked Creek Fishing Access would utilize existing social trails, graveling one main trail, with negligible impact. The establishment on a defined gravel path would reduce the use of several social trails, allowing plants to grow over them, and reducing erosion. Impacts would be beneficial, site-specific, short- and long-term and minor.

### **Canyon Rim Planning Area**

ADA access would be improved at the Devil Canyon Overlook using an area that is already heavily impacted. A defined path would guide people to points of interest, lessening the broader soil compaction and vegetation destruction happening near the Overlook parking area. The impact on soils would be beneficial, site-specific, long-term and minor. Improved brushing on the Stateline and Sullivan's Knob trails would similarly define trails for visitors, reducing impacts from visitors wandering off trail, and trampling soils and vegetation. Continued minimal brushing on the Ranger's Delight trail and the connector to Stateline would have no discernable effect. Overall impacts to soils would be beneficial, local, short- and long-term and minor.

### **Proposed Wilderness Planning Area**

Impacts would be the same as those listed in the No Action Alternative.

### **Ranch/Landing Planning Area**

Improving trail construction at Upper Layout Creek would address problems with erosion and vegetation damage currently taking place. Sensitive areas like the spring, where unrestricted foot traffic is damaging the localized ecosystem, would have educational signs posted to help visitors understand resource impacts. Re-designing the trail could reduce erosion effects and trampling at the spring. It would also help reduce erosion along the trail, benefiting both the soils and water quality of the stream. Effects on soils would be beneficial, local, short- and long-term and minor.

Proposed action for the Lower Layout Creek trail and both historic ranches would have no discernable effect on soils or geology from the current impacts. Brushing and maintenance on the Barry's Island trail would also have little impact. However, trail improvement could decrease erosion impacts along the south side of the island, protecting the trail and soils in the long run. Reclaimed roads would have beneficial impacts on vegetation, which would protect soils from further erosion. Overall impacts would have no discernable effect or be beneficial, local, short- and long-term and minor.

## **Yellowtail Wildlife Habitat Management Area**

Unnecessary and redundant roads would be closed and left for natural reclamation unless active rehabilitation is necessary.

### **Habitat Planning Area**

Impacts would be the similar to those in Alternative A

### **South and Southeast Lake Planning Area**

Impacts would be the similar to those in Alternative A

## ***Cumulative Impacts***

The past, present, and reasonably foreseeable future impacts are primarily related to cattle grazing and dirt roads from uranium prospecting and ranching. Trailing of livestock through the park, and the continued grazing of wild horses on the Pryor Mountain Wild Horse Range, and the presence of uranium scars and prospect pits currently have the biggest cumulative effects on soils and geology in the park (aside from natural erosion processes). The presence of these factors have led to the permanent loss of surface soils in some areas creating gullies caused by water channeling into tire and livestock trails. Increased trail maintenance and monitoring done under Alternative B would help mitigate these impacts and reduce further damage to geology and soils on existing trails.

Other cumulative impacts such as fire management, invasive weeds management and re-vegetation projects are intended to improve vegetation in the park which would help to mitigate impact to soils caused by trail improvement and development.

## ***Conclusion***

The increased attention given to trails in Alternative B would help in monitoring efforts to identify and repair areas of unacceptable soil impacts. Certain areas, such as the Devil's Canyon Overlook would benefit from well defined trails that would keep visitors contained within impacted areas, rather than wandering across vegetated areas where compaction and vegetation destruction are causing soil loss and damage. Trail re-routing such as that proposed at Upper Layout Creek would address negative impacts already occurring on those trails that were not sustainably designed in the beginning. Trail alignment would be planned to minimize long-term impacts to geology and soils. The reclamation of old 2 track roads would help eliminate further soil loss and compaction. Overall impacts to geology and soils under Alternative B would be adverse and beneficial, local, short- and long-term, and negligible to minor.

There would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents. Therefore, there would be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## ***Cultural Resources***

These include archeological sites, historic structures, cultural landscapes and ethnographic resources.

## Archeological Resources

### Methodology

Information about historic structures and archeological cultural resources was compiled and compared with the locations of proposed developments and other actions. The impact analysis was based on the knowledge and best professional judgment of cultural resource specialists, data from park records and studies of similar actions and effects, when applicable.

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Cultural resources have the potential to answer, in whole or in part, such research questions.

Prior to implementation of the trails and access plan, potential impacts on historic properties (any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the secretary of the interior) would be identified and evaluated in accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing Section 106 of the *National Historic Preservation Act* (NHPA) (16 U.S.C. 470) and implementing regulations 36 CFR 800 (Protection of Historic Properties). This process involves the following steps:

- Determine the area of potential effects (APE) (36 CFR 800.4(a)).
- Identify historic properties in the APE (36 CFR 800.4(b)).
- Evaluate historic significance (36 CFR 800.4(c)).
- Apply the criteria of adverse effect to affected properties (36 CFR 800.5).
- Resolve adverse effects (36 CFR 800.6).

### Intensity thresholds

For purposes of analyzing impacts on historic structures and archeological resources, thresholds of change for the intensity of an impact are based upon the potential of the site(s) to yield information important in prehistory or history as well as the probable historic context of the affected site(s). Within this analysis, impacts on historic structures and sites in the park were assessed and proposed actions were rated using type and intensity criteria.

**Type** determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect),
  - Context (site-specific, local, or regional),
  - Duration (short-term, lasting less than one year; or long-term, lasting more than one year).
- \*All impacts on historic structures and archeological resources are assumed to be long-term.

**Intensity** thresholds of impacts are defined as follows:

- **Negligible:** The effect on historic structures and/or archeological resources would be at the lowest levels of detection, barely perceptible, and not measurable.
- **Minor:** The effect on historic structures and/or archeological resources would be measurable or perceptible, but slight. A limited area of a site or group of sites would be affected. The impact would not affect the character defining features of NRHP eligible or listed properties and would not have a permanent effect on the integrity of any historic structures and/or archeological resources.
- **Moderate:** The effect would be measurable and perceptible. The impact would change one or more character defining feature(s) of historic structures and archeological resources but

would not diminish the integrity of the resource(s) to the extent that NRHP eligibility would be jeopardized.

- **Major:** The effect on historic structures and archeological resources would be substantial, noticeable, and permanent. The impact would be severe or of exceptional benefit. For National Register eligible or listed historic structures and/or archeological resources, the impact would change one or more character defining features(s) of the resource, diminishing the integrity of the resource to the extent that it would be no longer eligible for listing in the NRHP.

### ***No Action Alternative***

The No Action Alternative represents current conditions and is a baseline for evaluating change. Under the No Action Alternative, existing trails would continue to receive brush removal and weed management to keep existing paths reasonably clear.

Existing trails were built without any archeological compliance, and impacts on archeological sites are not well known. Some of the trails have now been informally surveyed by the park archeologist as trail markers have been replaced. Under the No Action Alternative, there is potential for impacts to archeological sites to continue as hikers travel trails. More complete inventories of these sites would be necessary to fully understand the extent of impacts.

### ***Cumulative impacts***

The biggest upcoming impact to archeological resources in the park will be the Western Area Power Administration's plan to rebuild/upgrade 13 miles of power lines in the park starting in 2012. During the Class III inventory for this project, 60 NRHP eligible archeological sites were recorded on or near access roads and the Right of Way for the proposed project, 15 of which will require mitigation. Prescribed burns conducted in the park for habitat improvement also have the potential to impact archeological sites, but complete Class III surveys are conducted prior to each burn project, and are planned to minimize impacts to cultural resources. Cumulative impacts are adverse, site-specific, long-term and minor.

### ***Conclusion***

Under current conditions BICA's historic ranches have limited visitation and although the sites would always have some sort of impact, the impacts thus far have been negligible to minor. Without surveys and mitigation measures, it is uncertain how sites would be impacted. Under the current management of trails, surveys are likely to be sporadic and not directly related to trail areas. Trails with unclear paths also carry an extra risk of off-trail hiking, which could further impact unknown sites. Continued maintenance of a trail system that has not been surveyed or established to protect archeological resources is likely to have continued, adverse, site-specific, long-term and minor effects on unrecorded archeological sites as visitors continue to use trails.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## ***Alternative A***

Some new trails would be developed and existing trails would receive improved maintenance and monitoring. Some trails would be designated as multi-user trails, allowing mountain bikes for the first time. Some roads would be closed and actively reclaimed.

Class III surveys would be conducted on existing and proposed trail segments. If trails are found to be impacting eligible archeological sites the trails could be re routed to avoid further damage. New proposed trails and trail sections would also be surveyed. As trails are planned and constructed, new sites that could be eligible NRHP sites would be avoided. Increasing traffic into the backcountry may increase the risk of vandalism to some sites, but having completed surveys would allow the park to align trails to minimize impact risk.

Clearly delineated trails would help reduce off-trail traffic, lessening risks to nearby archeological sites. The addition of educational materials would also help to improve visitor awareness of such sensitivity.

The trail in the Proposed Wilderness Planning Area is the most likely to impact archeological sites, as it utilizes WAPA maintenance roads which have recently been surveyed to reveal archeological sites. Complete surveys and mitigation measures would have to be in place for this to become a viable trail. Class III surveys of these and other proposed trails would assure that no unknown sections of cultural resources are impacted, particularly the proposed trail on WAPA service roads in the proposed wilderness.

Trail improvements at historic ranches are planned for roads into the ranches only and are not expected to add new impacts. Ranches would continue to see low visitation, as has been the case since the park's creation. Mitigation measures would ensure trail work is of minimal impact in these areas. The historic Headgate in the North District has an existing trail which could be joined with the Beaver Pond trail. The existing trail has caused negligible impact and the joining of the two trails is expected to remain negligible in impact. Overall, the impacts would be beneficial, site-specific, long-term and minor.

## ***Cumulative impacts***

The biggest upcoming impact to cultural resource in the park will be the Western Area Power Administration's plan to rebuild/upgrade 13 miles of power lines in the park starting in 2012. During the Class III inventory for this project, 60 NRHP eligible archeological sites were recorded on or near access roads and the Right of Way for the proposed project, 15 of which will require mitigation.

Prescribed burns conducted in the park for habitat improvement also have the potential to impact archeological sites, but complete Class III surveys are conducted prior to each burn project, and are planned to minimized impacts to cultural resources.

## ***Conclusion:***

Alternative A would eventually result in Class III surveys of all existing and proposed trails, allowing for much more informed management of archeological resources. New trail sections would be designed to avoid or minimize impacts to archeological resources, resulting in negligible impacts to archeological sites in the park. Trail improvement and re-routing would benefit trails that were not sustainably designed and are causing resource damage in their current states. Closed roads would likely have no discernable effect on cultural resources. Overall impacts of surveys for archeological



sites, trail improvement and re-routing and new trail development would be beneficial, site-specific, long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative B***

Existing trails would receive improved maintenance and monitoring. Some trails would be re-routed to protect resources. Unnecessary roads would be closed and left to naturally reclaim. Any trail sections which are redesigned or rebuilt would have a Class III survey completed on the trail section. Trails would be designed to minimize impacts on archeological sites and to avoid eligible sites. Increased traffic has the potential to increase impacts to nearby archeological resources, but would be mitigated by trail planning and education.

Clearly delineated trails would help reduce off-trail traffic, lessening risks to nearby archeological sites. The addition of educational materials would also help to improve visitor awareness of such sensitivity.

Trail improvements at historic ranches are planned for roads into the ranches only and are not expected to add new impacts. Ranches would continue to see low visitation, as has been the case since the park's creation. Mitigation measures would ensure trail work is of minimal impact in these areas. Overall impacts of surveys for archeological sites, trail improvement and re-routing would be beneficial, site-specific, long-term and minor.

### ***Cumulative impacts***

The biggest upcoming impact to cultural resource in the park will be the Western Area Power Administration's plan to rebuild/upgrade 13 miles of power lines in the park starting in 2010. During the Class III inventory for this project, 60 NRHP eligible archeological sites were recorded on or near access roads and the Right of Way for the proposed project, 15 of which will require mitigation.

Prescribed burns conducted in the park for habitat improvement also have the potential to impact archeological sites, but complete Class III surveys are conducted prior to each burn project, and are planned to minimized impacts to cultural resources.

### ***Conclusions***

Alternative B action would eventually result in Class III surveys of all existing and proposed trails, allowing for much more informed management of archeological resources. Trail improvement and re-routing would benefit trails that were not sustainably designed and are causing resource damage in their current states. Clearly delineated trails would help funnel visitors to sites of interest while limiting off-trail travel, protecting undocumented and documented sites nearby. Closed roads would likely have no discernable effect on cultural resources. Overall impacts of surveys for archeological

sites, trail improvement and re-routing would be beneficial, site-specific, long-term and minor to moderate (depending on survey results).

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## **Cultural Landscapes**

Bighorn Canyon has four historic ranches, but only the Caroline Lockhart Ranch has a completed Cultural Landscape Inventory. However, the other ranches within the boundaries of Bighorn Canyon NRA are also listed as NRHP properties, including the Mason Lovell Ranch, at the south end of the park, The Ewing Snell Ranch near Layout Creek, and the Hillsboro/Cedarvale Ranch near Barry's Landing. All of the historic ranches have a long history of occupation and consist of significant intact structures making them eligible for the national register.

Also listed on the NRHP is the cultural landscape of the Bad Pass Trail. This trail was used for thousands of years by Native American People as a travel corridor between the Northern Plains, and the interior Basins, Foothills, and Mountains. Later the trail system was used by fur trappers, military expeditions, and early settlers to the area. The trail is marked by approximately 700 stone cairns, and is considered a Traditional Cultural Property (TCP) by the Crow Tribe. Unfortunately segments were destroyed as a result of construction of the main park road as the project followed the "best route" along the west rim of Bighorn Canyon. Today the Bad Pass Trail is no longer used as a trail in the park.

Near the Ewing-Snell Ranch is another cultural landscape of the NRHP known as the Pretty Creek site. It is a series of different activity areas which were occupied for different lengths of time, by various groups of people throughout its estimated 8,000 year history.

## ***No Action Alternative***

Under this alternative minimal brush clearing and trail maintenance would continue. Visitors would continue to use existing trails which begin in, or travel through historic ranches. No new trails or trail sections would be constructed. Presently, one trail crosses the Bad Pass Trail and all of the historic ranches listed are accessible to the public. There is no visitor information or trail access to the Pretty Creek site but hiking is allowed off trail in the park and the site could be accessed legally. At current and reasonably foreseeable levels of trail use, current routes are not likely to have further impact to cultural landscapes.

## ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the view shed of cultural landscapes, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail, Ewing-Snell, and Caroline Lockhart Historic Ranches.

Prescribed burns conducted in the park for habitat improvement also have the potential to impact areas near the Bad Pass Trail and Hillsboro site, but complete Class III surveys are conducted prior to each burn project, and are planned to minimize impacts to cultural resources.

### ***Conclusions***

At present visitors may access cultural landscapes in the park freely. Impact thus far has been negligible to minimal, however sites would benefit greatly from increased education on the delicate nature of historical sites. Although continued use is not expected to change impacts significantly, impact of continued trail use is expected to be adverse, long-term, site-specific, and negligible to minor compared to current conditions.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative A***

Some new trails would be developed and existing trails would receive improved maintenance and monitoring. Some trails would be designated as multi-user trails, allowing mountain bikes for the first time. Some roads would be closed and actively reclaimed.

The proposed trail project with the biggest potential impact to a cultural landscape is the Hillsboro trail. The Hillsboro/Cedervale Ranch was historically accessed from what is now the main park road. This access has long been disused. Its position on a steep slope means it has deteriorated, though some stabilization work has been done. The Hillsboro trail would follow this historic road alignment from the park road into the bottom of the canyon where the ranch buildings are located. Because the trail follows existing alignments, impact is expected to be beneficial to correcting the road and maintaining the integrity of the landscape.

Upper Layout Creek Trail is in need of re-routing to protect resources. This trail begins on a road northwest of the Ewing-Snell ranch, and continues to the spring near the head of Layout Canyon. Re-design work on this trail would focus on the steep slopes in the canyon, 2 miles west of the main ranch and would not impact the ranch site. No work is expected to affect the Pretty Creek site.

At present one trail, the Sullivan's Knob trail, crosses the Bad Pass Trail. Improved maintenance is not expected to have additional impact on that area. Improved brushing on the road into the Lockhart ranch would not have any discernable impact on the cultural landscape there.

Under Alternative A a trail would be established would be allowed along WAPA maintenance roads which could impact sections of the Bad Pass Trail. Careful surveys and mitigation measures would have to be established prior to use in these areas.

Impacts to cultural landscapes under Alternative A would be beneficial and adverse, site-specific, long-term and minor.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the view shed of cultural landscapes, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail, Ewing-Snell, and Caroline Lockhart Historic Ranches.

Prescribed burns conducted in the park for habitat improvement also have the potential to impact areas near the Bad Pass Trail and Hillsboro site, but complete Class III surveys are conducted prior to each burn project, and are planned to minimize impacts to cultural resources.

***Conclusion:***

Alternative A action would eventually result in Class III surveys of all existing and proposed trails, allowing for much more informed management of archeological resources. Trail improvement and re-routing would benefit trails that were not sustainably designed and are causing resource damage in their current states. Mountain bike use could potentially impact sections of the Bad Pass Trail that are normally inaccessible to visitors. Improvement of trails near the Bad Pass Trail and into historic ranches would make trails more sustainable and more easily distinguished, limiting off-trail travel and protecting landscapes. Road closures would have no discernable effect on cultural resources. Overall impacts of additional trails, re-routing and improvement would be beneficial and adverse, site-specific, long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

***Alternative B***

Existing trails would receive improved maintenance and monitoring. Some trails would be re-routed to protect resources. Unnecessary roads would be closed and left to naturally reclaim.

Under this alternative the trail section with the most need for re-alignment/maintenance is the Upper Layout Creek Trail. This trail begins at the Ewing-Snell ranch, and continues to the spring near the head of Layout Canyon. Re-design work on this trail would focus on the steep slopes in the canyon, 2 miles west of the main ranch. Under this alternative minimal brush clearing and trail maintenance would continue. Visitors would continue to use existing trails which begin in, or travel through historic ranch property, or near prehistoric sites. At current and reasonably foreseeable levels of trail use, the current routes are not likely to impact cultural landscapes. No work is expected to affect the Pretty Creek site.

At present one trail, the Sullivan's Knob trail, crosses the Bad Pass Trail. Improved maintenance may help to define the trail, limiting off-trail travel which might affect the Bad Pass. Trails into the historic ranches would have improvements done on road segments only, which would not have any discernable impact on the cultural landscapes there. Impacts overall would have no discernable effect or be beneficial, site-specific, long-term and negligible to minor.

***Cumulative impacts***

Projects such as the Western Area Power Administration's upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the view shed of cultural landscapes, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail, Ewing-Snell, and Caroline Lockhart Historic Ranches.

Prescribed burns conducted in the park for habitat improvement also have the potential to impact areas near the Bad Pass Trail and Hillsboro site, but complete Class III surveys are conducted prior to each burn project, and are planned to minimize impacts to cultural resources.

### ***Conclusion***

Alternative B would eventually result in Class III surveys of all existing trails, allowing for much more informed management of archeological resources. Trail improvement and re-routing would benefit trails that were not sustainably designed and are causing resource damage in their current states. Improvement of trails near the Bad Pass Trail and into historic ranches would make trails more sustainable and more easily distinguished, limiting off-trail travel and protecting landscapes. Closed roads would have no discernable effect on cultural resources. Impacts are expected to be beneficial, site-specific, long-term, and negligible to minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### **Ethnographic Resources**

Bighorn Canyon has a long history of human occupation, and plans are underway to implement a complete Traditional Cultural Properties (TCP) Inventory including; collaborative identification and evaluation of culturally significant/sensitive landmarks, landforms, or landscapes, and involvement of descendent communities (Crow, Shoshone, Northern Cheyenne, Northern Arapaho, Euro-American ranch/farm communities.) The only TCP currently identified in the park is the Bad Pass Trail which has been a travel corridor through the park for thousands of years. If other TCPs are identified in the park, the impact of trails on them would be analyzed and mitigated.

### ***No Action Alternative***

Under this alternative minimal brush clearing and trail maintenance would continue. At least one trail (Sullivan's Knob) crosses the Bad Pass Trail.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the Bad Pass Trail, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail.



### ***Conclusion***

The Sullivan's Knob Trail was established without cultural resource protection in mind. Use has thus far had no discernable impact on the Bad Pass Trail. Although the trail crosses the Bad Pass Trail, there is no indication of what it is, which may contribute to the lack of disturbance seen there. Continued use and maintenance is expected to have adverse, long-term, site-specific and negligible to minor impact.

### ***Alternative A***

At least one trail (Sullivan's Knob) crosses the Bad Pass Trail. Under Alternative A, use would be allowed along WAPA maintenance roads which could impact sections of the Bad Pass Trail. Class III surveys would insure that no currently unknown sections of the Bad Pass Trail are impacted, and new trail sections would be designed to avoid trail impacts.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the Bad Pass Trail, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail.

### ***Conclusion***

The Sullivan's Knob Trail was established without cultural resource protection in mind. Use has thus far had no discernable impact on the Bad Pass Trail. Improved brushing and maintenance is expected to have a negligible additional impact. The addition of a mountain bike trail near this area could have adverse impacts. No new trails would be established without Class III surveys and careful planning. These surveys could help protect the Bad Pass from future negative impacts. Overall, impacts would be adverse, long-term, site-specific and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative B***

Existing trails would receive improved maintenance and monitoring. At least one trail (Sullivan's Knob) crosses the Bad Pass Trail. Class III surveys would insure that no currently unknown sections of the Bad Pass Trail are impacted.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an effect on the Bad Pass Trail, and significant mitigation of the project will be required to minimize impacts to the Bad Pass Trail.

### ***Conclusion***

The Sullivan's Knob Trail was established without cultural resource protection in mind. Use has thus far had no discernable impact on the Bad Pass Trail. Improved brushing and maintenance is expected to have a negligible additional impact. Class III surveys could help protect the Bad Pass from future negative impacts. Overall, impacts would be adverse, long-term, site-specific and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## ***Human Environmental Components***

### **Wilderness Values**

#### **Methodology**

Information about wilderness values was compiled and compared with the proposed development and other actions. The impact analysis was based on the knowledge and best professional judgment of planners and biologists, data from park records, and studies of similar actions and effects, when applicable. Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than one year; or long-term, lasting more than one year). Additionally, the planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics.

#### **Intensity Thresholds**

Wilderness values were evaluated in the only area of proposed wilderness in the park; the Proposed Wilderness Planning Area in the South District of the park. The low intensity use of trails in the park provides many opportunities to enjoy wilderness values such as solitude, naturalness, and the appearance that the area has been affected primarily by the forces of nature. However, the Proposed Wilderness Planning area is the only area in the park where wilderness values are a priority of management. Only one trail is proposed in the wilderness, and only under Alternative A.

The intensity thresholds of an impact on wilderness values are defined as follows:

- **Negligible:** A change in the wilderness character would not occur, or if it occurred, would be so small that it would not be of any measurable or perceptible consequence. Natural conditions would prevail and the forces of nature would primarily affect the wilderness area.
- **Minor:** A change in the wilderness character and associated values would occur, but it would be small, and if measurable, would be highly localized. Natural conditions would predominate. The wilderness area would generally appear to have been affected primarily by the forces of nature.
- **Moderate:** A change in the wilderness character and associated values would occur. It would be measurable and localized or regional. It would be apparent that humans have altered

(improved or reduced) natural conditions within such areas. The wilderness area would appear to have been affected primarily by the forces of nature; however, it would be evident that people have affected the area.

- **Major:** A noticeable change in the wilderness character and associated values would occur. It would be measurable and would have substantial consequences. Natural conditions would have been substantially altered (improved or reduced) by humans. Changes made by humans would become part of the landscape.

### ***No Action Alternative***

Under the No Action Alternative there would be no action in the proposed wilderness which would have no discernable effect on wilderness values.

### ***Alternative A***

Alternative A proposes using an existing dirt road as a trail. This trail would be the first official trail in the proposed wilderness, and would use 1.5 miles of existing road. The trail would provide opportunities for solitude and could provide backcountry camping access into the wilderness. If current trends persist the trail would have low intensity of use. Wilderness values in the remainder of the area would continue to stay intact due the lack of other trails leading into the wilderness area. However, new access could also create social trails in a formerly unused section of the park, impacting natural conditions away from the main trail. Spur trails and backcountry use could adversely impact wilderness values by altering natural conditions. Impacts to wilderness values would be beneficial and could be adverse, short- and long-term, site-specific and minor.

### ***Cumulative Impacts***

Past cattle grazing and 4WD roads have left their mark on the wilderness area as well as the electrical transmission lines that were already in place when the wilderness was proposed. The main park road and powerlines are visible from most parts of the wilderness as well, impacting the sense of solitude and naturalness.

Future projects such as the Western Area Power Administration's upcoming plans to rebuild/upgrade 13 miles of transmission line would have the most impact on wilderness values in the proposed wilderness. Construction, road maintenance and use will affect the soundscape and sense of peace, create dust and erosion, and will create a visible scar on the area.

### ***Conclusion***

The cumulative impacts listed above have a substantial effect on wilderness values in the Proposed Wilderness Planning area and cannot be reduced. The use of an already severely impacted area for a trail would not add significant change to the wilderness values already affected. At present, little opportunity exists for visitors to access the wilderness area. A trail would provide more visitors the option of traveling into the wilderness to enjoy the wilderness values it offers. The proposed trail would benefit wilderness values for the visitor in the local area of the Proposed Wilderness Planning Area. Impacts would be beneficial and adverse, short- and long-term, local, and minor.

## ***Alternative B***

Under Alternative B there would be no action in the proposed wilderness, which would have no discernable effect on wilderness values.

## **Visitor Use and Experience**

### **Methodology**

The impact analysis was based on the knowledge and best professional judgment of planners and biologists, data from park records, and studies of similar actions and effects, when applicable. Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than one year or long-term, lasting more than one year).

### **Intensity Thresholds**

Park visitation peaked in the early 1990's but has seen a decline and stabilization since. Current visitation is similar to numbers reported at the time of the park's creation (see Graph 3.1). Visitation tends to fluctuate around lake levels, as a majority of visitors use the park for water-based recreation. Other visitor activities include, auto-touring, hiking, wildlife viewing, horseback riding, camping and bird watching. The impacts are based on the ability of the visitor to experience a full range of activities.

The intensity thresholds of an impact on visitor use and experience are defined as follows:

- **Negligible:** Impacts on visitor use, or conflicts between different user groups would be barely detectable and/or would affect few visitors. Visitors would not likely be aware of the effects associated with management actions.
- **Minor:** Impacts on visitor use, conflicts between different user groups, and/or visitor experience would be detectable although the changes would be slight. Few visitors would be affected.
- **Moderate:** Impacts on visitor use, conflicts between different user groups, and/or visitor experience would be readily apparent. Many visitors would be affected and would likely express an opinion about the effects.
- **Major:** Impacts on visitor use, conflicts between different user groups, and/or visitor experience would be readily apparent and have important consequences. Most visitors would be affected and would likely express a strong opinion about the effects.

## ***No Action Alternative***

Under the No Action Alternative, existing trails would continue to receive brush removal and weed management to keep paths reasonably clear.

## **North District**

Under the No Action Alternative, the current trail conditions would remain the same, allowing visitors to continue using existing trails without any discernable effect.

## **South District**

Under the No Action Alternative, the current trail conditions would remain the same, allowing visitors to continue using existing trails without any discernable effect. Safety may become an increasing concern as trails deteriorate.

## **Yellowtail Wildlife Habitat Management Area**

Under the No Action Alternative, roads would remain open and undesignated and no discernable change would be detected by visitors.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an impact on visitor use and experience during the course of the project. Controlled burns and weed/vegetation projects may also have short-term, site-specific adverse impacts on visitor experience.

### ***Conclusion***

Taking no action with trails and roads would allow visitors to enjoy the existing travel system in the park without impact. Some user groups would remain excluded from trails and certain areas where degradation of resources are occurring, may impact visitor enjoyment in the future. For the most part however, continued brushing and maintenance of trails would leave visitor use and experience unaffected.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.



## ***Alternative A***

Alternative A would establish new trails in the park and improve existing trails. Mountain bike trails would be introduced and trails would be designated for user groups. Some roads would be closed and restored to more natural conditions.

### **North District**

Under the Alternative A, the current trails would remain open and would receive improved maintenance. Two new trails would be opened to visitors, offering more challenging and longer trails. One trail would be extending and has the potential to loop together with new trails creating an expanded trail system. Improved brushing near the river and the reduction of spur trail impact would improve visitor access and experience with the potential to improve habitat for birds, animals and fish. Impacts to visitor use and experience would be beneficial, local, long-term and moderate.

### **South District**

Some of the existing trails would receive improved maintenance, making them easier to follow and in some cases creating loops for a longer hiking option. Re-routing and improvement would increase visitor safety and protect resources that visitors place value on. Handicap accessible paths would be created or improved and trails would be open to a wider variety of trail users. Conflicts may occur between user groups but would be mitigated for, should the conflicts arise. Several new trails would be constructed, creating a variety of options for various skill levels and user groups, including mountain bikes. Trail improvements would be short-term projects and in some places, may limit trail use during the construction period, but impact to visitor experience would be negligible. Overall impacts would be beneficial to visitors, local, long-term and minor.

### **Yellowtail Wildlife Habitat Management Area**

Redundant and unnecessary roads would be closed and officially designated to reduce resource damage. This would impact some motorized visitors if habitual access routes are no longer available. Visitors would still have access to popular areas and restored vegetation would improve wildlife habitat, an important value for visitors who enjoy wildlife and bird watching in this area. Impacts would be beneficial, local, long-term and minor.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an impact on visitor use and experience during the course of the project. Controlled burns and weed/vegetation projects may also have short-term, site-specific adverse impacts on visitor experience.

### ***Conclusion***

Improved trail maintenance would allow visitors to enjoy the existing trails system in the park more safely and with more well defined trails. A larger variety of user groups and skill levels would be served and mountain bikers would have trail riding options for the first time in the park. A total of nine new trails would increase land-based recreation opportunities and provide more opportunities for solitude and wildlife viewing. Re-designing certain trails and closing some roads would improve

visitor experience as it improves plant and animal habitat. Construction would be done one at a time, over several years, making impacts to trail users negligible. Overall impacts would be beneficial, local, long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative B***

Alternative B would improve existing trails without building any new trails. Redundant or unnecessary roads would be reclaimed and some trails would be re-routed to address resource damage. Mountain bikes would not be allowed on trails.

### **North District**

Impacts would be the same as in the No Action Alternative.

### **South District**

Some of the existing trails would receive improved maintenance, making them easier to follow and in some cases creating loops for a longer hiking option. Re-routing and improvement would increase visitor safety and protect resources that visitors place value on. Handicap accessible paths would be created or improved to accommodate all visitors. Construction would be done one at a time, over several years, making impacts to trail users negligible. Impacts would be beneficial, local, long-term and minor.

### **Yellowtail Wildlife Habitat Management Area**

Impacts would be the same as in Alternative A.

### ***Cumulative impacts***

Projects such as the Western Area Power Administrations upcoming plans to rebuild/upgrade 13 miles of transmission line will have an impact on visitor use and experience during the course of the project. Controlled burns and weed/vegetation projects may also have short-term, site-specific adverse impacts on visitor experience.

## ***Conclusion***

Improved trail maintenance would allow visitors to enjoy the existing trails system in the park more safely and with more well defined trails. Re-designing certain trails and closing some roads would improve visitor experience as it improves plant and animal habitat. Trail work would occur one trail at a time over long time periods resulting in very little restriction on trail offerings. Overall impacts would be beneficial, local, long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## ***Park Management and Operations***

### **Methodology**

Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct park operations.

### **Intensity Thresholds**

The discussion of impacts on park operations focuses on (1) number of staff available to ensure visitor and resident safety, and (2) the ability of park staff to protect and preserve resources given current funding and staffing levels. It was assumed that under all alternatives, the park would apply for and receive funding to implement the alternative. However, this funding is not guaranteed; each alternative discusses the impacts of receiving or not receiving additional funding. Park staff knowledge was used to evaluate the impacts of each alternative, and the evaluation is based on the current description of park operations presented above.

The intensity thresholds of an impact for Park Management and Operations are defined as follows:

- **Negligible:** Park operations would not be affected, or effects would not be measurable or would be outside of normal variability. There would not be a noticeable effect on park operations.
- **Minor:** Effects on park operations and facilities would be slightly detectable but would not be expected to have an overall effect on the ability of the park staff to provide services and facilities to the visiting public.
- **Moderate:** Effects on park operations and facilities would be clearly detectable and could have a noticeable effect on the park's ability to provide adequate services and facilities to visitors and staff. Measures such as increased staffing and funding might be necessary to provide services and facilities to the visiting public.

- **Major:** Effects would have a substantial influence on park operations and facilities and would include impacts that would change the park's ability to provide adequate services and facilities to visitors and staff. Increased staff and funding would be needed, or other park programs would have to be eliminated.

#### No Action Alternative

Under the no action alternative, and there would be no change in trail maintenance. Trail erosion would continue to require ongoing maintenance. Comprehensive guidance for trail design, mitigation, signs, and standards would not be undertaken. Park staff would have insufficient funding to address all trail maintenance and repair issues. As a result, park staff would continue to do the minimum amount of work necessary to maintain trails. Park staff would continually approach problems with short-term, partial remedies to ongoing trail problems not covered by existing plans. Impacts to management and operations would be adverse, site-specific, short- and long-term, and minor.

#### *Cumulative impacts*

Past trail establishment was done without proper design or resource mitigation, creating present problems with erosion and resource impact. Combined with past grazing and intermittent drought, trail erosion has led to the creation of gullies in some areas, accelerating trail damage.

#### *Conclusion*

The no-action alternative would result in primarily minor effects to park operations because the trail and road system would remain the same. The interpretive staff with the help of the YCC have been responsible for trails. The adverse impacts on the trails without mitigation could however lead to other impacts to cultural and natural resources, requiring increased protection and restoration resources from other departments. Overall impacts would therefore be adverse, site-specific, short- and long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

#### Alternative A

Implementation of Alternative A would create mountain biking trails, improve and sustainably redesign existing trails, create additional hiking trails, develop handicap accessible trails, and define legal access on two track roads in the park.

Prior to trail building, proper surveys to protect cultural and natural resources listed in this chapter would be conducted, requiring additional resources and staff. However, trail improvement would improve visitor safety and help protect resources, lessening demands on other departments over the long-term.

New trails would require increased vigilance for the spread of invasive weeds, erosion management and visitor safety in new areas of the park. The addition of mountain bikes would require initial monitoring to determine impacts and mitigation to protect against resource damage or accelerated erosion. The addition of

new trails would also require funding to hire a trails crew or at minimum a trail crew leader to train existing staff in sustainable trail design. Most work would still fall to the interpretive staff and YCC members.

New user designations on some trails would require an increase in law enforcement efforts to ensure proper trail use. Road closures may require staff to enforce closures and restore roads.

### ***Cumulative Effects***

Past trail establishment was done without proper design or resource mitigation, creating present problems with erosion and resource impact. Combined with past grazing and intermittent drought, trail erosion has led to the creation of gullies in some areas, accelerating trail damage.

### ***Conclusion***

Most of the adverse impacts to park operations would be minor and short-term. Adverse impacts would be due mostly to an increased need for staff to survey and monitor existing and proposed trails and to enforce new designations. Beneficial impacts to park operations with regard to safety would also result from Alternative A. Many of the existing thirteen trails were not sustainably designed and are beginning to degrade. Several of them include tripping, falling, and sliding hazards. Improved trails, as well as additional signing, would decrease safety hazards for visitors and mitigate resource impacts, lessening the need for resources to be directed towards protection in the long-term. Sustainably designed trails would also lessen erosion impacts, reducing the need for constant repair or future overhaul. Funding would be needed to hire at least one additional employee for trail design and building, otherwise trail work would continue to be done by the interpretive staff and YCC. Any improvements or new construction projects would be contingent upon available funding which may take many years to secure. Trail work would not however impact general park operation or limit visitor services. A majority of park staff would not be affected by a change in trails management. Overall, impacts would be beneficial and adverse, local, short- and long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### ***Alternative B***

Implementation of Alternative B would improve and sustainably redesign existing trails, close unnecessary roads and define legal access on two track roads in the park.

Proper surveys to protect cultural and natural resources listed in this chapter would be conducted, requiring additional resources and staff. However, trail improvement would improve visitor safety and help protect resources, lessening demands on other departments over the long-term.

Redesigning and sustainably building some trails would also require funding to hire a trails crew or at minimum a trail crew leader to train existing staff in sustainable trail design. Most work would still fall to the interpretive staff and YCC members. Road closures may require increased efforts by law enforcement to enforce closures.



### ***Cumulative Effects***

Past trail establishment was done without proper design or resource mitigation, creating present problems with erosion and resource impact. Combined with past grazing and intermittent drought, trail erosion has led to the creation of gullies in some areas, accelerating trail damage.

### ***Conclusion***

Most of the adverse impacts to park operations would be minor and short-term. Adverse impacts would be due mostly to an increased need for staff to survey cultural sites and to enforce road closures. There would be beneficial impacts to park operations with regard to safety, as many of the existing thirteen trails were not sustainably designed and are beginning to degrade. Several of them include tripping, falling, and sliding hazards. Improved trails, as well as additional signing, would decrease safety hazards for visitors and mitigate resource impacts, lessening the need for resources to be directed towards protection in the long-term. Sustainably designed trails would also lessen erosion impacts, reducing the need for constant repair or future overhaul. Funding would be needed to hire at least one additional employee for trail redesign and building, otherwise trail work would continue to be done by the interpretive staff and YCC. Any improvements or new construction projects would be contingent upon available funding which may take many years to secure. Trail work would not however impact general park operation or limit visitor services. A majority of park staff would not be affected by a change in trails management. Overall, impacts would be beneficial and adverse, local, short- and long-term and minor.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Bighorn Canyon National Recreation Area; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.