

D. Biological Resources Impacts

1. Vegetation Impacts

Alternative 1 Impacts

There would be a wide variety of adverse and beneficial effects on vegetation from accessing treatment sites and from nonnative plant treatment techniques. Access could result in short-term minor adverse and direct impacts from trampling by foot or compaction from OHVs used to get to nonnative plant populations. Trampling could result in no effect, reduced vigor or death, depending on the stature and structure of the plant and the amount and duration or number of times the impact occurred. Moderate long-term impacts are possible if crews do not thoroughly clean vehicles or clothing adequately prior to accessing the site, thereby introducing new weed propagules to the area (seeds, rhizomes etc.). The chances of these propagules establishing would be greater with repeated and/or heavy disturbances (including when crews are large, or when sites are accessed when soils are saturated). Such activities would reduce or damage plant cover, opening up plant canopies and creating ideal conditions for new propagules to establish. When crews carefully clean vehicles, machinery and clothing, and minimize disturbance, individual plants would be affected, but there would be no lasting effects on non-target plant populations, communities or ecological processes.

Manual /mechanical techniques would result in the removal of all or part of a plant and could affect non-target as well as target plants if they were growing close together or were intertwined. In addition, ground disturbance around non-target plants could affect the growth and/or vigor of non-target plants but would generally have negligible adverse effects. If large areas of nonnative invasive plants were treated, however, there would be an increased level of ground disturbance that could result in additional or new nonnative invasive plants in an area if left unchecked, a short- to long-term minor to moderate adverse effect. Although some parks have been systematically implementing restoration along with nonnative invasive plant removal, most parks have generally focused more on treatment than restoration. (Note: Small spot treatments do not generally require any additional restoration activity since there is little change in percent cover of vegetation.) To the extent that restoration occurred following treatment or removal, there would be long-term beneficial effects.

Impacts of chemical treatments on vegetation communities may have a wide range of possible outcomes, including short-term minor to moderate adverse effects; long-term beneficial effects; and long-term minor to moderate adverse effects. Overall, effects are more likely to be minor and short-term when herbicides are spot-sprayed to target specific weeds, compared to broadcast sprayed. Spot spraying minimizes non-target effects, resulting in negligible to moderate short-term adverse effects on native vegetation (depending on the herbicide, and the native plants' proximity to the target weed), ideally followed by long-term beneficial effects on native vegetation as it presumably increases in density and/or vigor following release from competition by the targeted weed.

Chemical treatments are used with the assumption that without their use, there would be an expansion of the targeted nonnative invasive plant population, often accompanied by reductions in the native plant populations. Without this treatment, future control efforts would likely increase in cost and difficulty, and the chances of restoring native plant populations would decrease. Spot-spraying small, recently formed patches known to be highly invasive that do not respond well to mechanical treatment (for example rhizomatous species) before these patches firmly establish, develop a seed bank, and expand is considered one the more cost effective and environmentally sound uses of herbicides. When populations are detected and sprayed early, for example through EDRR, there would be minor short term adverse effects and long-term beneficial effects (small amounts of herbicides would be used to spot spray small patches, while to large amounts of herbicides would potentially be needed to broadcast spray larger areas).

Effective use of chemicals becomes much more difficult and the results far less easy to predict when spot-spraying is not possible based on the proximity of non-target plants (making some drift inevitable), or when broadcast applications are required based on the size of the weed patch. The success or efficacy of broadcast herbicide applications for large patches of weeds should be measured based both on whether the target weed is reduced or eliminated, and whether the surrounding plant community begins to show signs that it can return in composition and function to its character prior to the weed invasion (although for some areas like at Craters of the Moon, efficacy may be based more on reductions in the target weed because native plants are naturally sporadic with large interstitial spaces of bare ground). Efficacy of herbicides, and thereby potential effects depend on the weed and its susceptibility to the selected herbicide; the size and longevity (years to establish seed and/or rhizomes) of the weed population; the timing of the herbicide application in relation to the growth of the weed; annual weather patterns and many other factors. Long-term control typically depends on the surrounding plant community, including its vigor, composition (primarily grasses, or a more diverse mixture of grasses, forbs, and shrubs) and response to selected herbicide; and its ability to fill in the treated area following the reduction in the target weed.

As described in manual / mechanical techniques above, for large areas dominated by nonnative invasive plants, there would be an increased level of ground disturbance following broadcast herbicide applications to large areas. After the targeted weeds die back, the disturbance could result in additional or new nonnative invasive plants establishing in the area if there were no remnant native plants to fill in. For parks that have not been using restoration following herbicide application to large areas, the repeated need for additional herbicide, and the probability of new weeds establishing following herbicide applications, would result in a moderate, long-term adverse effects. For parks that have been systematically implementing restoration, however, along with nonnative invasive plant removal there would be long-term beneficial effects.

Effects of broadcast applications in areas not dominated by the target weed, but with mixed, albeit low populations of native grasses, shrubs and forbs would vary widely. Where the target weed responds poorly to herbicides (for example leafy spurge may be only temporarily suppressed following herbicide applications), herbicide applications can weaken the surrounding native plant community, reducing the diversity of native plants, and potentially increasing the weed population by releasing them from competition (Rinella *et al.* 2009). This would result in a long-term moderate adverse effect.

The use of insect biological control agents would have primarily long-term beneficial effects. As noted earlier, biological control agents released in parks would be approved by APHIS and NPS regional and/or national IPM coordinators and would have no demonstrated affinity for native plant species. Because biological control agents are specific to a nonnative plant species, there would be negligible adverse impacts to non-target plant species. As noted in Soils Impacts, however, minor short-term to long-term indirect adverse effects are possible due to the potential increase in the release of allelochemicals by some plants, such as spotted knapweed (*Centaurea stoebe*) when attacked by some biological control agents (Callaway *et al.* 1999). Increased levels of allelochemicals in soils may reduce the growth of desirable species that are susceptible to them. If a biological control agent was found later to be impacting native species, a negligible to moderate adverse effect, depending on the species impacted, it would no longer be approved for release. Although this is a rare occurrence, it has happened with agents intended to control Canada thistle feeding on native thistles (elsewhere in the U.S.). Unless this occurred, no specific measures would be implemented to contain biological control agents. APHIS and NPS approved insect biological control agents are host-specific to the identified target nonnative plant(s). As a result, impacts to target plants would be direct and beneficial and would improve ecosystem integrity.

The use of herbivore (livestock) biological control agents at Grant-Kohrs would continue to have long-term beneficial effects on the reduction of nonnative invasive weeds at that park, depending on the extent to which the cows favored eating of weeds over other non-target native species. At the same time, cows, which are an integral to the cultural landscape, mission and purpose of the park would likely continue to have negligible to minor or moderate adverse impacts on native plants from trampling and other effects.

To the extent possible, these would continue to be minimized by appropriate grazing best management practices.

Effects of prescribed fire would affect both nonnative invasive and native plant populations, unless the fire boundary is particularly small or the nonnative invasive species plant population particularly large. Ecologically, because park ecosystems have evolved in response to periodic fire and other disturbance events, long-term effects would be minor. Plant communities that persist as part of these ecosystems often benefit from fire, are tolerant of it over the long-term, or are temporarily changed from its effects. Short-term effects include loss of some individuals and habitat. In Northern Rocky Mountains parks, frequent fire has also been shown to increase dominance of some nonnative species, such as cheatgrass. Fire is among an array of disturbances that may result in major short- or long-term changes to vegetation cover and elapsed time since the last major disturbance, such as fire, is one of the factors which determine the stage of vegetation succession. Besides fire, other major disturbances to vegetation include snow and rock avalanches, mud or debris flows, hail, floods and wind.

Other ecosystem effects from fires include plant community succession, maintenance of landscape mosaics, structural and species diversity. Fires often cause major changes in vegetation, including plant community composition (species diversity and arrangement). Dependent on fire tolerance within a plant community, fires can result in reoccurrence of the same species or a complete change in species dominance. Fires can also result in a variety of vegetation impacts, including, as mentioned, short or long-term localized or profound changes to vegetative cover. Depending on their timing, location, severity and extent, fires can result in complete removal of vegetative cover, in forest stand replacement, or simply in removal of fine fuels, such as forbs, and forest duff. Fires may increase plant vigor or damage or kill plants. Fires can change the localized or long-term dominance of early and late seral species.

Effects of fire on soil can also indirectly affect plants. High fire severity can remove soil organic matter, lower the soil pH and nitrogen content, kill rhizomes and mycorrhizae, cause soil to repel water, and result in short and long-term changes to vegetation communities that may or may not be adapted to these conditions. Fires may also result in increased or decreased soil fertility and water holding capacity and affect plant vigor. Where fires have resulted in water repellant soils that have lost structure, vegetation establishment after fires in communities intolerant of fire, including nonnative invasive plants may be poor. Where fire severity is high, a modified environment for plant germination and growth would result. For instance, although burning can decrease total nitrogen, or it can temporarily increase plant available nitrogen. Severe impacts, however, are often limited in distribution within the perimeter of a fire because fires do not burn with the same intensity within their boundary. Even high intensity fires may result in beneficial impacts to vegetation. Where plant communities or seed banks are tolerant, they often remain viable and resultant new growth may occur as a result of the increased flush of nutrients, light and water. Fires can also result in beneficial impacts related to park management, including improving scenic vistas or reducing vegetation management needs.

The effect of fire on plants is often species-specific. Fire may either increase or reduce germination and vigor of plants. Although prescribed fire may have minor adverse impacts on some individual non-target plants, it would affect a relatively small portion of the overall population. Overall, prescribed fire would likely result in beneficial effects on grassland ecosystems, while sagebrush steppe ecosystems could experience harmful effects from potential invasion of new invasive species, such as cheatgrass, following fire. In general, assuming an absence of nonnative invasive plants propagules, fires would increase species diversity and reduce woody species relative to grasses and forbs. Beneficial effects from increased soil productivity would also occur and would be evident over several growing seasons. Overall effects from prescribed fire currently used in just a few of the Northern Rocky Mountains parks would likely continue to be minor to moderate and both adverse and beneficial.

Restoration, including reseeding and/or planting would have short-term negligible to minor adverse effects from disturbance and long-term localized beneficial effects, depending on the amount of area

restored and the success of the restoration program. For several years, Grant-Kohrs Ranch and the NRM-EPMT have been working on restoration of a riparian area at the park. Early results have shown reinvasion by native riparian species and a sustained decrease in nonnative species. Removal of nonnative plants from particularly sensitive habitats, such as riparian areas and wetlands would continue to have long-term moderate beneficial effects from increasing native plant cover and from improving ecological integrity by creating additional habitat for culturally important nonnative and native plants.

Alternative 2 Impacts

Impacts would be similar to Alternative 1. In addition, there would be an improved ability to detect new nonnative invasive plants through better early detection and rapid response protocol and tools provided by this plan (see Appendix J: *List of Potential New Invaders*). This would be combined with systematic monitoring of developed areas or hot spots to detect nonnative invasive species. Together these would contribute long-term beneficial impacts from identifying new invaders before they become a problem.

By employing a more effective process (the 7-Step Decision-making Tool), parks would systematically identify nonnative invasive plants and their characteristics to determine which plants are the highest priorities for treatment. Although this list could vary from year to year based on several variables, the ability to use the APRS and a collaborative set of resource-based criteria to identify the park's highest priorities would ensure that those species that pose the greatest threats would be identified and potentially targeted for treatment. Whether or not these species were actually treated would depend on the availability of successful treatment methods, funding, staffing and other operational factors. Combined, the ability to identify the highest priority plants and additional knowledge provided by the plan associated with treatment methods would have a long-term beneficial effect on reducing the incidence and spread of nonnative invasive plants.

Alternative 2 also sets up a means to determine if new nonnative species are invasive and allows resource managers to monitor their effects prior to taking action, a long-term beneficial effect.

Whereas treatment methods in Alternative 1 would be based on NRM-EPMT recommendations or the history of treatment of the nonnative invasive species in the park unit, in Alternative 2 treatment methods would be systematically analyzed over time to determine the most cost effective, and environmentally sound means of controlling, or eradicating where possible, the target species. In addition, treatment method(s) would also be selected to meet the management strategy (goal). Combined, these would be long-term beneficial effects that would contribute to more effective treatment and use of resources compared to Alternative 1. The judicious use of herbicides would continue to effectively reduce weed populations, reducing the amount of ground disturbance and the use of herbicides in subsequent years.

Alternative 2 would also allow for adaptive management. Herbicides with similar or less toxicity and fewer environmental effects would be used to treat nonnative invasive plants as these were developed and approved as non-restricted use herbicides and subsequently approved through the PUPs system by NPS regional or national IPM Coordinators. The ability to use a wider range of herbicides as these were developed and tested and proven successful would have a long-term beneficial effect on decreasing weed abundance and fewer effects from treatment with less weed resistance would occur from herbicide use. As noted by the BLM, weed resistance to herbicides can be minimized by using multiple herbicides with different sites of action in the same application, alternating herbicides with different sites of action each year, or alternating herbicide use with other effective forms of treatment (BLM 2007a in BLM 2009).

Although biological controls have been released on only a limited basis by one of the parks, Alternative 2 would allow for the use of additional insect biological control by all of the parks and ongoing livestock biological control by Grant-Kohrs Ranch. If approved through regional or national IPM coordinators, insect biological control releases could occur in the parks. Although only two of the parks have intentionally released insect biological controls (for example, to treat spotted knapweed at Grant-Kohrs), several of the parks have observed the effects of insect biological control releases by surrounding areas, including on county, BLM or USFS lands. These insects have been found on leafy spurge and Dalmatian

toadflax. Because the release of insect biological control agents is approved nationally via APHIS and insect biological controls approved for release are host specific (on target nonnative invasive plants), there would be few (negligible to minor) adverse effects and long-term beneficial effects on parks from these additional releases. While rare, adverse effects could include possible use of native species by these nonnative insects. Beneficial effects would include potential containment of nonnative invasive plants and the ability to use biological control combined with other treatment methods to reduce the incidence and spread of nonnative invasive plants, ideally increasing native species dominance in the parks. Even without introduction by the parks, it is likely that releases occurring on adjacent lands would eventually occur in the parks, a long-term indirect adverse and beneficial effect.

Alternative 2 would also allow for the use of fire by several parks not currently using it as an invasive plant management tool. These parks, however, would be required to have separate fire management plans and later prescribed fire plans that specifically evaluated impacts associated with the use of prescribed fire on nonnative invasive plants and park ecosystems. In the interim, therefore, only parks with currently approved FMPs that specifically identify the use of prescribed fire as an invasive plant management tool could continue to use fire. These include Fossil Butte (although there is no current intention to use fire to treat invasive plants), Golden Spike, and Grant-Kohrs. Upon approval of a revised FMP, Little Bighorn could also use prescribed fire. To the extent that prescribed fire is an effective treatment for nonnative invasive plants and where restoration is used in combination with this treatment, there would be both short-term minor to moderate adverse and long-term beneficial effects from its use by these parks.

In Alternative 2, increased monitoring (in parks where only NRM-EPMT monitoring is occurring) and improved monitoring (in parks where some additional monitoring is now occurring) would improve the effectiveness of the invasive plant management program by helping to direct efforts where they are most effective, a long-term beneficial effect.

In Alternative 2, there would also be greater emphasis on combining treatments with rehabilitation or restoration where possible. This would minimize the opportunities for additional invasion or spread of nonnative invasive plants in treated areas, a long-term beneficial effect.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives* and measures noted under soils/geology the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to vegetation:

- In plant communities composed of target and desirable species, prescribed grazing would only be used where a difference in phenology or palatability is sufficient to protect desirable species from damage or when litter removal is the management goal.
- Where possible, weed free supplemental forage would be encouraged or required.
- Mulches or other rehabilitation treatments, including straw bales would come only from approved sources.
- To limit the potential for equipment to spread nonnative plant seeds, treatments would generally be completed before seed becomes viable.
- Herbicide application would be designed to minimize potential impacts to non-target plants (and animals), while remaining consistent with management goals.
- Selection of restoration species would be limited to native species that exist naturally in the region or culturally important species to prevent the accidental introduction of new invasive species. To minimize genetic contamination, propagules would be collected or propagated from the closest sites possible, as long as the collection site remains healthy and resilient to future disturbance. The benefits of local propagule collection would be weighed against the need for prompt revegetation. In many cases it may be more important to prevent establishment of non-desirable species and stabilize soils than to wait for sufficient seed to be collected locally. (For example, a sterile wheat cover crop was used prior to restoration of a treated area at Little Bighorn in 2006.) Planning would be utilized to ensure that appropriate seed is available at the necessary time, and

local collections would be prioritized based on available information concerning each species' genetic site-specificity.

- Impacts to water quality from livestock would be minimized by preventing access by livestock to open water or saturated soils.

Cumulative Impacts: A wide variety of habitat modification in the parks has occurred over time from a range of activities, including from the construction of park facilities and from effects related to events that contributed to the parks' establishment. There have also been a wide array of impacts related to the suppression or use of fire and from whether grazing has occurred or is currently occurring. Therefore, the parks vary dramatically with respect to what degree invasive plants have invaded native plant communities. Some parks are almost wholly covered by nonnative species (such as Minidoka), while others are essentially intact (such as Bear Paw). Most parks fit somewhere in the middle, with some areas dominated by nonnative species, while other areas are impressive examples of intact native landscapes. The degree to which invasive species dominate is primarily based on previous disturbance that has occurred at the parks (from recreation, livestock grazing, farming, ranching, water diversion and irrigation, road building and development); however, nonnative invasive species are also transported into remote areas by wind, water or wildlife. For instance, remote wilderness in Craters of the Moon has been invaded by the windblown seeds of rush skeletonweed.

Invasive plant management within the parks, combined with invasive plant management by park neighbors would continue to have minor cumulative adverse effects combined with long-term cumulative beneficial effects from reducing the incidence and spread of nonnative invasive plants. Compared to Alternative 1, Alternative 2 would have greater cumulative beneficial effects from implementation of a more systematic and comprehensive program of nonnative invasive plant treatment. When these impacts are added to the effects from past, present and future projects in the 10 parks, such as fire recovery at Hagerman Fossil Beds, Fossil Butte and improving understanding of fire effects at Little Bighorn, as well as from construction or rehabilitation projects that directly impact vegetation, including visitor facilities construction at City of Rocks, Craters of the Moon, Minidoka and Little Bighorn, there would be cumulative minor to moderate localized impacts on vegetation.

Conclusion: Alternatives 1 and 2 would have both short- and long-term negligible to moderate adverse and long-term beneficial effects on vegetation. Effects of nonnative plant treatments would adversely affect individual plants and populations of invasive species, but would have beneficial effects on native plant populations, plant communities, and ecological processes, while adversely affecting a few individual native species in close proximity to invasive species. Compared to Alternative 1, Alternative 2 would have more long-term beneficial effects and would likely achieve nonnative plant management goals more quickly.

2. Wildlife Impacts

Alternative 1 Impacts

There would be short-term negligible to minor noise and disturbance to wildlife associated with people and equipment used to conduct nonnative invasive plant treatment. Short-term minor adverse effects could also occur from wildlife using habitats occupied by nonnative invasive species; however restoration of these habitats would result in long-term beneficial effects on wildlife. Depending on the extent of the habitat degradation by nonnative invasive species, long-term beneficial effects from nonnative invasive species removal could occur that would provide key habitat components for some wildlife and wildlife communities.

Noise impacts would range from short-term human disturbance to longer-term effects from the use of chainsaws and other equipment to remove part or all of plants, including large shrubs and trees. Depending on the extent and type (such as trees) of invasive vegetation, impacts could occur over a few minutes to a few days or weeks. Impacts from noise and disturbance, however would be spread over

affected park areas, and would generally only be concentrated to the extent that it took to remove or treat target plants. To the extent that wildlife were adversely affected by noise and disturbance, some species would leave during the day and could return at night or during other times when treatment was not conducted, or was being conducted elsewhere. Overall effects would be slight and would result in impacts to individuals, but not wildlife populations.

Where manual/mechanical treatments are widespread or are ongoing, these treatments could have localized adverse impacts on ground-nesting birds from disturbance within their habitat and on ground-dwelling mammals and insects, including on their food sources. While these effects could have negligible to minor or moderate adverse impacts on individuals, they would have no or negligible effects on populations or communities. Short term adverse impacts associated with habitat alteration, including soil disturbance, would be outweighed by the long-term improvement of habitat associated with the removal of nonnative invasive plants and the reestablishment of native vegetation.

Chemical applications may harm wildlife directly through contamination of food, water sources, habitat alteration, or direct contact. It is also possible that some wildlife would avoid treated areas for some time after treatment due to odors or other indirect effects from treatment. Some wildlife would leave the area, while others would escape to a belowground burrow/den during treatment, causing short-term minor to moderate effects associated with disturbance. While herbicide treatments, such as spraying or stump painting, would be unlikely to directly affect most wildlife, except for insects and potentially small mammals, indirect exposure from use of treated areas following application of herbicides or from movement of herbicides through soil and groundwater could affect wildlife, including through ingestion or contact with treated plants. With use of herbicides according to label specifications, it is unlikely that wildlife would be overexposed.

The extent of direct and indirect impacts to wildlife would vary based on the effectiveness of herbicide treatments in controlling target plants and promoting the growth of native vegetation. Impacts would also vary associated with the extent and method of treatment (e.g., aerial vs. ground) and chemical used (e.g., toxic vs. non-toxic; selective vs. non-selective), the physical features of the terrain (e.g., soil type, slope), and weather conditions (e.g., wind speed) at the time of application (BLM 2009). Other factors would include the sensitivity of each species to the particular herbicide used and what kind of exposure occurred. Widespread spraying, including aerial applications would have the greatest potential to affect wildlife because they would likely cover the largest treatment areas. Other impacts could result in future effects to wildlife health from exposure to herbicides (BLM 2009). Herbicides may also affect honey bees and other beneficial insects. As indicated by label warnings, use of some herbicides would be avoided at certain times or not used to avoid accidental bee deaths.

Some uses of biocontrol organisms would directly affect the ability of some wildlife, such as birds, to find food, with localized increases in insect abundance. An additional population of insects may benefit mammal and bird species that prey on insects. Impacts would be short- to long-term, depending on population establishment and negligible to moderate, depending on the abundance of the nonnative target plant population and on the natural cyclic rise and fall of insect populations over the seasons and associated with target plant abundance. Most impacts from insect biocontrols would likely be beneficial and short- and long-term. Although it is unlikely that the introduction of other insects would result in competition between native insect populations, it is possible if inadequate testing resulted in the introduction of insects that fed on the same plant species. If this occurred, such introductions would likely have long-term minor adverse effects.

Use of herbivores, such as cows to eat weeds at Grant-Kohrs, could continue to have long-term negligible to minor beneficial effects on wildlife from an increase in soil fertility related to waste recycling combined with long-term negligible to minor disturbance of wildlife from the ongoing presence of the cows. At Grant-Kohrs, where cows are a part of the cultural landscape, whether they eat weeds or not, impacts would continue to be negligible to minor. When used at appropriate levels, and when the plant community is not stressed, grazing can stimulate grass growth, increasing the health and availability of

forage. Not using cows for nonnative invasive weed treatment would not eliminate them from this cultural landscape. As a result, negligible to minor effects from their ongoing disturbance of wildlife would continue to be an acceptable consequence of the park's purpose.

Use of prescribed fire for nonnative invasive plant treatment would have a variety of effects on wildlife, depending on the type of area treated, its size and what kind of vegetation community it was located in or adjacent to. Fire can have direct mortality on non-mobile species, including small mammals, some invertebrates, reptiles, and amphibians. Effects to some wildlife may be detectable, but would be small and would be unlikely to have population-level effects. Unless the fire is very fast-moving or occurs over an extremely large area, direct mortality from fire is unusual among most medium to large mammals or bird species because they are able to move to other areas. These species may be indirectly impacted by fire, however, through reduction of potential nesting, resting, and foraging habitat and by increased predation. Fire may also cause mobile animals, such as ungulates, to concentrate in specific areas immediately after the burn to search for food or cover. These minor to moderate adverse impacts would be localized, short- and long-term.

Fires that create a mosaic of burned and unburned areas may directly benefit ground-nesting birds, small mammals, and ungulate populations by opening up areas of dense and/or senescent vegetation. Fire may also indirectly benefit large mammals that feed on small mammals or ungulates from changes in habitats.

Restoration, including reseeding or planting, including potential use of irrigation to reestablish plants, would have negligible to minor adverse and long-term minor to moderate beneficial effects on wildlife habitat. Adverse effects could occur from the provision of water through irrigation in some dry environments and from digging for planting. Although many nonnative thistles have become popular food sources for bees and other insects, the long-term impacts of invasive plant management would provide other native sources of food to those insects. Other effects, such as restoring native vegetation, including cover and food sources for wildlife would be wholly beneficial.

Birds

There could be a variety of impacts on birds, including migratory birds. Although some weedy species may provide seasonal forage or cover, a return to native species would likely increase the provision of habitat needs. Because most treatment methods (such as manual and biological control treatments) would not result in the removal of vegetation over a large area, effects would generally be negligible to minor. Cultural methods, prescribed fire and herbicide application over a large area, however, could cause localized minor to moderate adverse effects. Where nonnative and invasive trees within special habitat areas, such as riparian areas or other wetlands, were cut down, there would be short-term loss of habitat for some species. To minimize some effects, treatments would occur outside of the nesting season. Unless nesting, birds, like large and mid-size mammals would be able to leave treatment areas when disturbed by noise and activity.

Loss of trees and woody plants would increase recovery time for some habitats (from a few weeks to decades) but would not affect habitat for most species at the population level. Where sensitive species were present, smaller areas could be treated over time (see Special Status Species section below). Wildlife, including birds could also suffer health effects from exposure to herbicides. Most bird species use nonnative Russian olive and tamarisk at much lower levels compared most native tree species (IDPIF 1998). As a result removal of these species is a stated goal of the Idaho Partners in Flight Bird Conservation Plan (Ritter 2000). Therefore, it is expected that a return to native species diversity through nonnative invasive plant removal and restoration would result in long-term beneficial impacts to birds and other wildlife from improvements in habitat for nesting and resting.

Aquatic Wildlife and Fisheries

While use of water for irrigation and for other uses in controlling nonnative invasive plants would occur in some parks and could occur in others, use of water would not deplete or have a measureable effect on

wildlife water sources. Nonetheless, use of water could cause some negligible to minor adverse effects from its increased availability in arid areas or from its use.

As noted in the soils and water quality impacts sections, there could be potential negligible to localized moderate adverse effects from erosion of soils contributing to sedimentation from nonnative invasive plant treatment practices, including pulling, tilling or other ground disturbance that would affect water quality and therefore aquatic organisms.

As with most terrestrial wildlife, except insects, it is unlikely that aquatic wildlife would be directly exposed to herbicides during application. Use of herbicides registered for use in or near water (such as water-suitable formulations of glyphosate) would not pose a risk to aquatic communities or other standing water environments and would not be detectable (Table 37: *Environmental Effects of Current and Proposed Herbicides*). Herbicides used to treat nonnative invasive aquatic species would be those approved for in water application. Impacts resulting from the use of herbicides could have short- and long-term negligible to moderate adverse impacts on native aquatic wildlife species, their habitats, or natural processes sustaining them.

Risks from accidental direct spray or a chemical spill into a water body of a non-aquatic approved herbicide could be moderate and could cause direct mortality of invertebrates or fish, but the probability of either event occurring is low. Because procedures that would prevent spills and direct spraying of non-aquatic approved herbicides into fish bearing waters, there would be negligible to minor effects on fish species. If non-target plants that bind sediment, protect banks and shade water were affected by spraying weeds, fish habitat quality could potentially be reduced from a reduction or loss of streamside shading or stabilizing streambank vegetation.

Impacts associated with the use of insect biological controls would be the same as for terrestrial wildlife, generally minor to moderate and beneficial.

Direct mortality from fire is unlikely for aquatic organisms. Indirect effects from temporary loss of vegetation, however, could affect aquatic organisms by causing minor increases in erosion and sedimentation or water temperature or other physical and chemical components. Because prescribed fires used to treat infestations of nonnative invasive species would be small, however, extensive impacts would not be expected to occur and although some impacts would be detectable, they would remain generally localized, minor and short-term.

Restoration of aquatic habitats by removing nonnative invasive species would have long-term beneficial effects on aquatic wildlife. Removal would increase native habitat components and decrease nonnative habitat components which may not fulfill habitat requirements for food or nesting for native species.

Alternative 2 Impacts

Impacts associated with Alternative 2 would be similar to Alternative 1. In addition there would be additional long-term minor beneficial impacts on wildlife habitat from more effective use of an EDRR program. New invaders would ideally be identified early, before they had the opportunity to become widespread and to affect native wildlife species or habitats.

Long-term beneficial effects would likely also occur from the use of a directed decision-making process to identify which species are the highest priorities for treatment and from the use of monitoring to ensure progress is made in treatment. Beneficial effects would also result from selection of the most effective environmentally benign type of treatment and from the ability to use adaptive management to select from newly developed herbicides or treatment methods if these had similar or fewer effects than currently used herbicides or treatments.

Finally, there would also be long-term beneficial effects on wildlife and wildlife habitat from the more effective use of mitigation measures that would help to avoid or minimize impacts of proposed treatments on wildlife and non-target plants.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in the Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to wildlife:

- Where applicable, a biologist would provide information about the potential presence of sensitive fish or wildlife in the vicinity of project work.
- Work would be conducted during daylight hours.
- No repositioning, removal or disturbance of existing large woody debris embedded in the stream bank or bed would occur. Non-embedded woody debris may be repositioned.
- There would be no use of heavy equipment in water.
- Herbicides used in or near water would only be those specifically formulated and approved for such use.
- Physical disturbance would avoid areas associated with ground-nesting birds and burrows of ground-dwelling mammals, amphibians, reptiles or invertebrates.
- Mitigation could include removal of nesting habitat from areas of project disturbance prior to the nesting seasons (i.e. mowing, clearing). If nests were found during surveys, protection such as moving or delaying project work would occur to allow fledging of birds from nests.
- Herbicide application would be designed to minimize potential impacts to non-target plants and animals, while remaining consistent with management goals.
- Domestic livestock used for prescriptive management of invasive species would be excluded from sites (including access routes) where listed plants are known to occur or during seasons when listed plants are vulnerable to damage, when there is a risk of transmitting diseases to wildlife, and/or during critical times of the year.
- Use of mechanized equipment would be limited to the fewest number of hours needed and to the degree practicable would occur during low wildlife use times (such as mid-day).

Cumulative Impacts: Similar to other protected areas, the combined effects of development in areas near the parks over time, coupled with the purposeful eradication of predators through the mid-1900s have contributed to low-level or extirpated wildlife populations of some key species. Past and reasonably foreseeable development projects, including construction of administrative facilities, maintenance of existing facilities and other management activities combined with visitor use would continue to contribute minor cumulative adverse effects on wildlife in the parks. Because many of the parks are surrounded by other federal lands or open private lands and are located in rural landscapes, however, there may have been fewer effects on wildlife than in some other parts of the country.

Nonnative invasive plant management would also continue to contribute negligible to minor cumulative adverse and beneficial effects. Nonnative invasive plants have affected park ecosystems to a varied extent. In some cases these plants have taken over and occupy a continuous swath of formerly native landscape, contributing to diminished native wildlife values and presence. In other areas, nonnative invasive species occur sporadically amidst a landscape of primarily native plants. Over time, nonnative invasive plants have become an increasingly serious threat to the integrity and persistence of native plant and wildlife communities. In addition, a variety of ongoing park operations activities affect wildlife, including construction, routine maintenance of facilities/historic structures (roadside mowing, trail maintenance, cemetery maintenance, etc.), utility work, and research and monitoring activities. Ongoing visitor use also affects wildlife presence. Removal of nonnative invasive plants under Alternative 1 or 2 would contribute short- and long-term, mostly localized beneficial effects on wildlife habitat and species. At the same time, effects of some treatments could contribute minor localized cumulative adverse effects on some individuals but would not be expected to have long-term adverse cumulative effects on wildlife.

populations or communities. When these impacts are added to the impacts from past, present and future actions in the 10 parks, such as the Grazing Management Plan at City of Rocks, the potential for new visitor facilities in the proposed City of Rocks and Golden Spike GMPs, and the impacts from the Superfund site near Grant-Kohrs as well as ongoing impacts from roads in the parks, cumulative adverse effects would be minor to moderate and localized.

Conclusion: Controlling nonnative invasive plants would increase the integrity and persistence of healthy native plant communities which comprise intact wildlife habitat. While success in treating nonnative invasive plants affecting wildlife would vary among the parks, Alternative 1 would have localized short-term minor to moderate adverse effects on individuals and negligible to minor adverse effects on populations coupled with long-term beneficial effects. There would be more beneficial effects in Alternative 2, compared to Alternative 1. There would be no impairment of wildlife or wildlife values from the implementation of Alternatives 1 or 2.

3. Special Status Species Impacts

Alternatives 1 and 2 Impacts

Generalized Effects for Special Status Species Not Listed Below: Overall impacts would be similar to those described separately for vegetation and wildlife. Specific impacts on threatened and endangered species, however, would be limited because other than spot treatment of individual nonnative invasive plants by the most effective, method with the fewest non-target direct and indirect effects, treatment of or within known endangered species habitat would be avoided unless additional consultation with the USFWS occurred. For those species which range widely, such as gray wolves, treatment in suitable habitat would likely occur as part of the overall park program. That treatment, however, would not affect known sensitive habitat, such as nesting or denning areas or areas surrounding concentrations of sensitive plants.

As a result, it is unlikely that rare, threatened or endangered species would be affected by treatments. Manual, mechanical or herbicide treatments conducted nearby would be outside of known habitats and sensitive areas. No herbicides would be applied during sensitive periods in the vicinity of known habitat or sensitive areas. Where biological controls were approved in a park, these would have been tested by APHIS and would not have an affinity for native species, especially known sensitive species. As a result, there would be no effects from their use. As with non-special status wildlife species, there could be some limited beneficial effects from additional populations of prey from the release of biological control insects.

There would be limited impacts from fire because it would not be used in areas that could affect listed species during sensitive periods and would not be used at all within or near known sensitive species habitats unless additional consultation with the USFWS occurred and likely effects were negligible and/or beneficial.

Long-term beneficial impacts could occur from treatment of nonnative invasive plants near rare, threatened or endangered species habitats. Native plants and wildlife, in general, would benefit from the treatment of nonnative invasive plants. Restoration, such as reseeding or planting would promote the reestablishment of native vegetation, a long-term beneficial effect.

City of Rocks: Because there are no federally-listed species known to occur in the reserve, there would be no effect on threatened or endangered species in Alternatives 1 or 2. Three sensitive plants that occur in the reserve would be avoided by establishment of buffer zones for treatment in their habitats. These include Simpson's hedgehog cactus, narrow-leaved Indian paintbrush, and Kruckeberg's swordfern.

Craters of the Moon:

Gray Wolf: Ongoing actions under Alternatives 1 and 2 would have no effect on gray wolves, which are the only currently listed species that occurs in the monument and preserve. No gray wolf habitat would

be lost and gray wolves would not be disturbed as a result of this plan. If dens, foraging areas or rendezvous sites were later identified, no nonnative plant management activities would be conducted in or near these areas without USFWS consultation. Although gray wolves are occasionally seen near the northern part of the monument, no actions proposed herein would affect them.

Greater Sage-grouse: The USFWS found that listing of the sage-grouse is warranted but currently precluded by higher listing priorities. To avoid impacts to sage-grouse, no chemical treatments would occur in the vicinity of known lek sites during the lekking season. Use of manual / mechanical or cultural treatments would only occur when the sites were unoccupied or beyond an established buffer area around the site. If nests are located no treatments within the recommended buffer would be performed until hatching and abandonment of nest structure. Actions under Alternatives 1 and 2 would be not likely to adversely affect sage-grouse.

Pygmy Rabbit: No pygmy rabbits have been found in Craters of the Moon. If pygmy rabbits were later found, to avoid impacts to this sensitive species, buffer areas would be used in the vicinity of known concentrations of pygmy rabbits during sensitive periods and no herbicide use would occur. No native pygmy rabbit habitat would be lost and no pygmy rabbits would be disturbed as a result of this plan. Actions under Alternatives 1 and 2 would have no effect on pygmy rabbits.

Pika: The proposed listing process for pika by the USFWS determined that listing was not currently warranted. To avoid impacts to this species, only targeted treatments, such as hand-pulling, would occur in the vicinity of pika occupied habitat (open rocky areas) and these treatments would not affect grasses or rocky areas of known habitat. Actions under Alternatives 1 and 2 would be not likely to adversely affect pika.

Bald Eagle: The bald eagle remains a protected species under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles would not be affected because no known sensitive habitats, such as nesting or winter roost sites, are known from the monument and preserve. If nesting habitat (mature stands of conifers in association with surface water resources) was found, it would be avoided. There would continue to be no effect on bald eagles from actions implemented as part of Alternatives 1 or 2.

Peregrine Falcon: Although no longer listed as federally threatened, this species is protected by the Migratory Bird Treaty Act and the State of Idaho. If a nest site is found, a no-entry buffer as recommended by the USFWS would be implemented to avoid impacts. Actions under Alternatives 1 and 2 would have no effect on peregrine falcons.

Fossil Butte:

Gray Wolf: Actions to avoid impacts to this sensitive species would be the same as described above for Craters of the Moon. There would continue to be no effect on gray wolves from actions implemented as part of Alternatives 1 or 2.

Grizzly Bear: Although grizzly bears could occur within Fossil Butte, none have been observed. No grizzly bear habitat would be lost and grizzly bears would not be disturbed as a result of this plan. There would continue to be no effect on grizzly bears from actions implemented as part of Alternative 1.

Black-footed Ferret: Although suitable habitat for ferrets exists in the monument, their key prey species – prairie dogs – do not occur in numbers large enough to support them in the monument. No ferret habitat would be lost and no ferrets would be disturbed as a result of this plan. There would continue to be no effect on black-footed ferrets from actions implemented as part of Alternative 1.

If black-footed ferrets were later found, the following conservation measures would be implemented:

- Physical disturbance to prairie dog colonies would be avoided.

- No mechanical treatments, such as tilling, would be used in prairie dog colonies.
- The USFWS would be contacted and Section 7 consultation would occur if herbicide use was later proposed near prairie dog colonies.

Pygmy Rabbit: Actions to avoid impacts to this sensitive species would be the same as described above for Craters of the Moon. Actions under Alternatives 1 and 2 would be not likely to adversely affect pygmy rabbits.

Whooping Crane: If whooping cranes are present, a half-mile buffer area would be established around feeding or roosting areas. No nonnative plant management activities would occur when cranes are present. No native whooping crane habitat would be lost. Actions under Alternatives 1 and 2 would have no effect on whooping cranes.

Bald Eagle: Bald eagles nest 1-2 miles from the monument but have not been found nesting or roosting in the monument. Actions to protect bald eagles would be the same as described above for Craters of the Moon. Actions under Alternatives 1 and 2 would have no effect on bald eagles.

Greater Sage-grouse: Actions to avoid impacts to this sensitive species would be the same as described above for Craters of the Moon. Actions under Alternatives 1 and 2 would be not likely to adversely affect sage-grouse.

Golden Spike:

Gray Wolf / Grizzly Bear: Because these species are extirpated from Golden Spike, there would be no effect from actions under Alternatives 1 or 2.

Bald Eagle: Non-resident bald eagles occur but no nesting or roosting areas are known from the area. Actions to protect bald eagles would be the same as described above for Craters of the Moon. Actions under Alternatives 1 and 2 would have no effect on bald eagles.

Greater Sage-grouse: Because this species is not known to occur at Golden Spike, there would be no effect on it. If sage-grouse were later found, actions noted under Craters of the Moon would be implemented.

Passey Onion: Golden Spike provides habitat for the federally proposed endemic Passey onion, a species known from its type location in Box Elder County and from two locations in Golden Spike. Nonnative species growing in its habitat would be hand-pulled, pending consultation with Utah Fish and Game Department and/or the USFWS. Actions under Alternatives 1 and 2 would be not likely to adversely affect Passey onion.

Grant-Kohrs:

Gray Wolf: Although gray wolves have been detected near the park, they have not been seen within the park. Alternatives 1 and 2 would employ the same measures listed above under Craters of the Moon. Therefore, there would be no effect on gray wolves.

Grizzly Bear: No grizzly bears have been detected in or near the park. Actions under Alternatives 1 and 2 would have no effect on this species.

Bald Eagle: No bald eagle nests occur in the park. Although nests are found nearby, they are away from the buffer zone that would be applied for activities occurring in the park. Alternatives 1 and 2 would have no effect on bald eagles.

Bull Trout: Despite numerous surveys, no bull trout have been found in the Clark Fork River within the park. The Clark Fork River, however, including the area within the park has recently been designated as critical habitat for bull trout (Federal Register Vol. 75, No. 200, Monday, October 18, 2010, pp. 63909).

Although no bull trout have been found within the park, populations have been detected in the Clark Fork River at Jens (approximately 30 stream miles downstream) and in an upstream tributary (Warm Springs Creek approximately 41 stream miles from the park). Based on the incorporation of mitigation measures related to herbicide treatment of nonnative invasive plants near the Clark Fork River, actions under Alternatives 1 and 2 would be not likely to adversely affect bull trout.

Hagerman Fossil Beds:

Bald Eagle: No known bald eagle nests occur within or adjacent to the monument. There would be no effect on this species.

Peregrine Falcon: Actions and impacts associated with the peregrine falcon would be the same as for Craters of the Moon. Alternatives 1 and 2 would have no effect on peregrine falcons.

White Sturgeon: There would be no effect on White Sturgeon.

Freshwater Snails: There would be no effect on freshwater snails.

Little Bighorn:

Black-footed Ferret: Although suitable habitat for ferrets exists in the monument, their key prey species – prairie dogs – do not occur in numbers large enough to support them in the monument. No ferret habitat would be lost and no ferrets would be disturbed as a result of this plan. There would continue to be no effect on black-footed ferrets from actions implemented as part of Alternative 1 or 2.

If black-footed ferrets were later found, the following conservation measures would be implemented:

- Physical disturbance to prairie dog colonies would be avoided.
- No mechanical treatments, such as tilling, would be used in prairie dog colonies.
- The USFWS would be contacted and Section 7 consultation would occur if herbicide use was later proposed near prairie dog colonies.

Bald Eagle: No known bald eagle nests occur within or adjacent to the monument. There would be no effect on this species.

Whooping Crane: If whooping cranes are present, a half-mile buffer area would be established around feeding or roosting areas. No nonnative plant management activities would occur when cranes are present. No native whooping crane habitat would be lost. Actions under Alternative 1 or 2 would have no effect on whooping cranes.

Black-tailed prairie dog: (Note: The black-tailed prairie dog was removed from federal candidate status on 8-12-04.) A small prairie dog colony occurs adjacent to Little Bighorn within the project area. No prairie dog habitat would be lost and no prairie dogs would be disturbed as a result of this plan. There would be no effect on black-tailed prairie dogs from actions implemented as part of Alternatives 1 or 2.

If black-tailed prairie dogs were later listed federally, the following conservation measures would be implemented:

- Physical disturbance to prairie dog colonies would be avoided.
- No mechanical treatments, such as tilling, would be used in prairie dog colonies.
- The USFWS would be contacted and Section 7 consultation would occur if herbicide use was later proposed near prairie dog colonies.

Minidoka: No known federally-listed species occur at or within the vicinity of Minidoka. Although the area is within the former range of the greater sage-grouse and pygmy rabbits, it does not contain suitable habitat for either of these species, which need large, old and intact areas of sagebrush habitat. No other

known special status species occur at Minidoka. There would be no effect on threatened or endangered species from actions proposed in Alternatives 1 or 2.

Nez Perce: Bear Paw: No known federally-listed species occur at or within the vicinity of Bear Paw. In addition, no other special status species are known from the site. There would be no effect on threatened or endangered species from actions proposed in Alternatives 1 or 2.

Nez Perce: Big Hole:

Gray Wolf: The gray wolf has not been detected in or near the park. Actions under Alternatives 1 and 2 would have no effect on this species.

Grizzly Bear: No grizzly bears have been detected in or near the park. Actions under Alternatives 1 and 2 would have no effect on this species.

Montana Arctic Grayling: The arctic grayling occurs in the Big Hole River. Actions under Alternatives 1 and 2 would be not likely to adversely affect this species.

Ute Ladies Tresses: Because this species has not been found in the park, there would be no effect on it from the implementation of Alternatives 1 and 2.

Lemhi Penstemon: Herbicides would not be used in close proximity to known populations of Lemhi penstemon (*Penstemon lemhiensis*). Although there are more than 190 populations, more than 50 percent of these contain 30 or fewer plants. The population at Big Hole is one of the three largest and contains more than 300 plants. Like other known penstemon populations, spotted knapweed has affected the Big Hole site but it is relatively limited. If potential effects were to occur from this or another invasive plant, it is likely that manual hand-pulling or limited spot spraying would be used. Actions under Alternatives 1 and 2 would be not likely to adversely affect Lemhi penstemon.

Alternative 2 Additional Impacts

Alternative 2 would have some additional long-term beneficial effects associated with the establishment of special protection zones in some parks to avoid rare or sensitive species and their habitats.

Where treatments occurred outside of buffer areas, or inside through later consultation with the USFWS, these would potentially reduce competition from nonnative invasive species and benefit sensitive species. Adverse effects could be reduced or eliminated by the establishment of these buffer zones, careful selection of herbicides (if approved for use), altering the timing of treatments, and avoiding other than insect biological control methods.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to federally-listed and other special status species:

- Herbicide applicators and others involved in nonnative plant treatment would receive training on the identification of rare plants, if present, in parks. If these plants were later found in the field, treatments would be halted until buffer areas could be established or additional consultation with the area authority (park plant ecologist or USFWS) occurred regarding approval for appropriate treatment in the area.
- Buffer zones would be established to protect the habitat of native sensitive plants, if present. Generally, a no-spray zone would be established.
- If special status species were present in a large area to be treated, smaller areas would be treated over time to minimize effects (in consultation with the USFWS or state fish and wildlife agencies).
- Tilling would not occur where known sensitive plants occur or have the potential to occur.

- The most effective treatment, with the least possible effects would be used to treat nonnative invasive plants in endangered species habitat and would require additional environmental analysis and consultation with the USFWS prior to use if candidate or proposed species became listed.
- Generally, hand-pulling or cutting using non-mechanical tools would be used in the vicinity of sensitive plants, unless this method would adversely affect the sensitive species.
- Fires in special status plant habitat would be avoided unless studies show that the species would benefit from fire.
- No biocontrol agents would be intentionally released for use on an invasive plant species of the same family as a threatened, endangered, or rare plant that occurs inside or adjacent to the parks.
- Golden Spike would review Passey onion patches with a botanist, and consider whether treatments of cheatgrass and perennial pepperweed can improve the habitat, and not harm existing Passey onion plants.
- During the planning phase of invasive plant control activities, the NPS would determine whether special-status plant species are present in the area. If special-status species occur in the proximity of invasive plant control activities, botanists would develop site-specific mitigations to ensure no adverse effects on special-status plant species.
- If other federally-listed plants are later discovered in proposed work areas, additional consultation with the USFWS would take place and no control activities would take place until consultation is complete.

Cumulative Impacts: Over time, there have been a variety of direct and indirect adverse impacts to species now classified as rare, threatened or endangered from the effects of human disturbance and from development that has resulted in habitat alteration or loss. Adverse impacts have been associated with development, predator control, unnaturally frequent wildland fire, and habitat fragmentation, primarily from transportation corridors. Ongoing impacts to special status species would continue to occur from activities on adjacent public and private lands and with negligible effects contributed from park operations and maintenance. Alternatives 1 and 2 would potentially contribute negligible to minor cumulative adverse effects from the removal of nonnative invasive species in and near sensitive species and their habitats, where approved in consultation with state and federal agencies. For plants, these potential adverse effects would be combined with long-term beneficial effects from restoration of habitats by the removal of competitive nonnative invasive species. For wildlife, improvements in native plant populations and cover would contribute to negligible cumulative beneficial effects for wildlife habitat. When these effects are combined with the impacts from past, present and future actions likely to occur in the 10 parks, including ongoing park management maintenance and visitor services activities and proposed construction and rehabilitation of buildings and structures, the contribution to cumulative impacts would be negligible to minor.

Conclusion: The following determinations of effect apply: *City of Rocks*: No effect on sensitive species. *Craters of the Moon*: No effect on gray wolf, bald eagle, peregrine falcon or pygmy rabbit. May affect, not likely to adversely affect greater sage-grouse and pika. *Fossil Butte*: No effect on gray wolf, grizzly bear, bald eagle, whooping crane or black-footed ferret. May affect, not likely to adversely affect pygmy rabbits and greater sage-grouse. *Golden Spike*: No effect on gray wolf, grizzly bear or greater sage-grouse. May affect, not likely to adversely affect Passey onion. *Grant-Kohrs*: No effect gray wolf, grizzly bear or bald eagle. May affect, not likely to adversely affect bull trout. *Hagerman Fossil Beds*: No effect bald eagle, peregrine falcon, white sturgeon or freshwater snails. *Little Bighorn*: No effect black-footed ferret, bald eagle or whooping crane. *Minidoka*: No federally-listed special status species (no effect). *Nez Perce (Bear Paw)*: No federally-listed special status species (no effect). *Nez Perce (Big Hole)*: No effect gray wolf, grizzly bear, Canada lynx or Ute ladies tresses. May affect, not likely to adversely affect Montana arctic grayling and Lemhi penstemon. There would also be no effect on other sensitive species.

E. Cultural Resources Impacts

1. Prehistoric and Historic Archeology Impacts

Alternative 1 Impacts

Depending on the treatment method, there would continue to be no effect, or negligible to minor effects (no adverse effect) on archeological resources from treatments associated with nonnative invasive plant removal.

Manual / mechanical and other cultural treatment methods (such as tilling) of more than a few plants in an area that could involve ground disturbance would be employed only where major archeological resources are not present. Where plants were removed from archeological sites, methods would continue to be used that would have negligible effects on potentially unidentified resources.

Although use of herbicides would not create ground disturbance, some chemicals could react with surface or near surface artifacts and skeletal remains (in battlefield areas) as a result of their chemical composition. As a result, use of herbicides within known archeological sites would be approved in advance based on knowledge of the site and the resources it contains and knowledge of the proposed chemical and its potential effects.

The use of insect biological control agents would continue to have no effect on archeological resources. Use of cows to eat weeds at Grant-Kohrs would also have no known effect on archeological resources. Areas where cows are present in pastures have been surveyed for archeological resources and either no sensitive sites are located where cows graze or known sites would not be affected.

The effects of prescribed fire on archeological resources would be variable. In general, sites with buried deposits or features tend not to be impacted by most low intensity fires due to the ability of soil to insulate these against the extreme heat of fires. In heavy continuous fuels, temperatures at the soil surface may be sufficient to damage stone or ceramic resources by scorching, fracturing, charring, and spalling. Temperatures of 500-600° C would begin to affect stone materials. Temperatures diminish rapidly with soil depth; when surface temperatures are 500° C, the temperatures at a depth of five cm would be only about 200°C. With light to moderate severity fires residence time is usually short and the downward heat pulse is low (Petersburg 2004 in NPS DINO 2005). Most fires, however, cause only shallow soil heating even when surface fires are intense and that fires of moderate severity may consume surface fuel layers and cause charring of the top centimeter of the mineral soil (Ryan 2002 in NPS DINO 2005).

A study conducted in Badlands National Park in 2001-2002 found that temperatures and residence times of most prescribed burns are not sufficient enough to cause catastrophic damage to prehistoric resources (Buenger 2003 in NPS DINO 2005). Impacts of the fire – mostly black or light brown carbonaceous residues – would not impact the scientific value of the objects. Subsurface temperatures were also found to have negligible impacts to buried objects. Unpublished monitoring data collected at Dinosaur National Monument indicates that soil heating in sagebrush fires seldom recorded temperatures on bare soil surfaces in excess of 50-55° C (Petersburg 2004 in NPS DINO 2005).

Fires, including prescribed fire, also often represent an extraordinary opportunity to document archeological sites. Dense vegetation that obscures the ground surface is often consumed and its removal results in the ability to document heretofore-unidentified sites. Fires may also present the challenge of protecting archeological sites from the damaging effects of natural erosion, site vandalism (pot hunting) and inadvertent damage as a result of fire suppression activities or post-fire rehabilitation efforts.

Actual effects of fires on prehistoric or historic archeological resources would depend on the location, severity, extent and timing of the fire. There are variable effects based on the fire intensity, duration of heat, heat penetration of the soil, the use of suppression equipment and other factors. Fires may result in:

- loss or damage of physical artifacts (dependent on construction material – e.g. wood, shell, masonry, clay, stone, bone, plant or other organic material, etc. – and context – soil, rock shelter, surface deposit, buried deposit, etc.);
- loss or damage to contextual information, including compaction, erosion and partial or complete consumption of organic matter;
- inability to relocate previously identified archeological sites without vegetation context;
- the ability to locate previously undetected cultural resources obscured by vegetation;
- an increased potential for vandalism to archeological sites;
- an increased knowledge of the areal extent of archeological context for previously recorded sites due to exposure of other site features;
- a change in the potential of for long-term preservation of artifacts (i.e. artifacts may become more brittle);
- consumption of or decreased potential to detect some archeological resources for instance charred surficial deposits of bone, including skeletal remains, etc.;
- the use of low intensity prescribed fire or hazard fuel reduction could increase protection for or avoid impacts to known archeological sites.

These variable effects of fire would continue to be minimized in the parks that used fire by survey of areas proposed for prescribed fire treatment and avoidance of sites with sensitive archeological resources and/or use of low intensity burns in areas containing subsurface resources. Additional environmental analysis would occur through approval of FMPs and subsequent prescribed fire plans.

Restoration of treated sites could also result in ground disturbance from scarifying, seeding and/or planting. As a result, specific actions in proposed areas would be subject to additional environmental analysis, including survey if necessary to ensure that there would be no or negligible effects.

Alternative 2 Impacts

Impacts would be the same as in Alternative 1. Ground disturbance would continue to be required for several types of invasive plant management treatments and avoidance of known archeological sites would continue, as would mitigation measures prior to ground disturbance that would help to avoid impacts. The opportunity to continue to select from a variety of treatment methods, that would have the least possible effect, would allow for fewer impacts on resources. There would continue to be negligible to minor impacts (no adverse effect) on archeological resources.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts on archeological resources:

- During archeological survey, surface or subsurface surveys would be used as necessary to determine the presence or significance of archeological resources.
- If archeological resources were encountered during treatment, if necessary or possible, relocation of the work to a non-sensitive area would occur to enable site testing and documentation. Long-term actions could include reinitiating the project in the same area (upon effective data collection) or changing the method of treatment (if possible). There would be an emphasis on taking actions that would avoid further disturbance to the site.
- Should unknown archeological resources be uncovered during project implementation, work would be halted in the discovery area, the park Cultural Resources Program Manager contacted, the site secured, and the park would consult according to 36 CFR 800.11 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990. In compliance with this act, the NPS would also notify and consult concerned tribal representatives

for the proper treatment of human remains, funerary, and sacred objects should these be discovered during the course of the project.

- Where possible, the archeological site would be documented, avoided, and the documentation prepared for a determination of eligibility to the National Register of Historic Places.
- Newly infested sites would be surveyed for the presence of archeological resources and/or confirmation would occur that the site had previously been surveyed prior to treatment. Over time, access routes to treatment areas would also be surveyed.
- The parks would continue to build on their inventory and monitoring program for archeological resources, including conducting surface and subsurface testing as necessary to document the potential for archeological resources or to understand the extent of archeological resources found.
- Prior to the development of Prescribed Fire plans (and subsequent environmental analysis), areas proposed for fires would be surveyed for the presence of archeological resources. Post-burn surveys would also be conducted.
- Ground disturbing activities would not be used in known sensitive archeological resources sites.
- The location and extent of known sensitive archeological resources would be considered in the decision to use wildland or prescribed fire.
- Inclusion of park archeologist, historians and other resource specialists (as applicable) would occur in the multidisciplinary planning and suppression process. The archeologist would also accompany crews to assist in identification of a fire line route that would avoid damage to known resources in sensitive areas.
- Reconnaissance surveys would be conducted after prescribed fires to locate potential artifacts or archeological resources and landscape features like historic rifle pits (Bear Paw, Little Bighorn, and Big Hole).
- There would be no fire line construction in the vicinity of known archeological resources.
- There would be increased law enforcement patrols in known archeological sites following fires that removed surface vegetation formerly obscuring sites.

Cumulative Impacts: Archeological resources in the parks and surrounding areas have likely been adversely impacted to varying degrees from past construction-related disturbance (prior to the advent of archeological resources protection laws), from visitor use, vandalism, erosion and other natural processes. It is likely that other park management actions, including the development of some facilities and use of the parks before NPS management resulted in disturbance to or inadvertent damage to archeological resources. Because mitigation measures would be employed to minimize impacts to potentially unidentified cultural resources in other proposed and future projects in the parks, it is likely that archeological resources would be protected from future adverse impacts.

Because most nonnative invasive plant treatment began after the laws protecting archeological resources were enacted, it is likely that most treatment has complied with these laws and that few overall impacts to park archeological resources have occurred as a result of nonnative invasive plant management. Alternatives 1 and 2 would contribute negligible to minor adverse cumulative effects on archeological resources. When the impacts of Alternatives 1 or 2 are added to impacts from past, present or future actions that would likely occur in the 10 parks, including from proposed ground disturbance associated with planned rehabilitation or construction projects in the parks, cumulative impacts to archeological resources would be minor.

Conclusion: Alternatives 1 and 2 would have negligible to minor impacts (no adverse effect) on archeological resources. There would be no impairment of archeological resources or values.

2. Historic Structures / Cultural Landscapes Impacts

Impacts Common to Alternatives 1 and 2

Historic Structures Impacts: Fossil Butte has one building potentially eligible for the National Register, the Haddenham cabin, a historic cabin used by early fossil collectors at the site that would continue to not be affected by proposed actions in Alternative 1 or 2. Craters of the Moon has a historic road on the National Register and several historic buildings in the campground, as well as an historic visitor center, residential area and maintenance facility eligible for the National Register that would not be affected by proposed actions in Alternatives 1 or 2. Historic buildings at Grant-Kohrs Ranch would also not be affected.

Alternative 1 Impacts

Collectively, six of the 10 parks comprise a diverse cultural landscape. Most of these parks do not merely contain cultural landscapes, they are cultural landscapes. They include Golden Spike, Grant-Kohrs Ranch, Little Bighorn Battlefield, Minidoka, Bear Paw Battlefield, and Big Hole Battlefield. The four exceptions are Craters of the Moon, which contains part of Goodale's Cutoff (an alternative route of the Oregon Trail); City of Rocks, which contains part of the historic California Trail and Salt Lake Alternate as well as evidence of early stage travel and agricultural use; Fossil Butte, where historic quarry sites are considered potentially eligible for the National Register; and Hagerman Fossil Beds, which contains part of the Oregon Trail as well as areas that are important to the history and science of paleontology.

Big Hole also contains two additional potential cultural landscapes, one associated with mining (Ruby Creek Ditch) that has been determined eligible for the National Register, and one associated with irrigation (Canals 2, 3 and 4) that are considered eligible but whose eligibility has not been formally determined.

Although cultural landscapes comprise a major portion of the 10 parks, most of the characteristics of cultural landscapes would not be affected by ongoing implementation of an invasive plant management program in Alternative 1. The characteristics of cultural landscapes that convey the characteristics of location, feeling, setting and association include:

- Spatial organization – the composition and sequence of outdoor spaces within the district;
- Circulation – the means and patterns of movement through the district;
- Topography – the ways in which the landscape planning responds to the topographic features of the site and the modifications of that topography;
- Views and Vistas – constructed or natural openings that direct how the landscape is seen;
- Vegetation – the response of existing vegetation as well as the management of vegetation through pruning, removal or addition of trees and shrubs;
- Natural Systems and Features – the way existing landscape features are used in the cultural landscape, such as rock outcrops or water bodies;
- Structures – all contributing structures, including roads, trails and other small scale features such as rock walls and culverts;
- Buildings – structures intended to shelter a human activity; and
- Archeological Sites – areas showing evidence of the remains of human activity.

Together, where applicable, these are used to identify contributing resources in cultural landscapes.

Among those characteristics of cultural landscapes that would not be affected by ongoing implementation of Alternative 1 would include spatial organization within the cultural landscape, circulation patterns, topography, views and vistas, and buildings. Some potential adverse and beneficial effects could occur to structures (roads, trails, small scale features such as rock walls and culverts) and archeological sites, while those characteristics that would be affected would likely include vegetation, and natural systems and features.

Spatial Organization: There would be no effect on spatial organization, because there would be no physical modification of areas associated with cultural landscapes in the parks.

Circulation Patterns / Topography: With no physical modification of the landscape or changes to it, there would be no effect on circulation patterns or topography, where these contribute to the cultural landscapes in the parks.

Views and Vistas: Although views and vistas are key cultural landscape features, such as at Bear Paw Battlefield, where an understanding of the journey that led the Nez Perce and the U.S. Cavalry there requires a view toward the Bear Paw Mountains and north toward Canada, and at Little Bighorn, where a rolling prairie landscape gives a better understanding of how the Sioux, Cheyenne, and Arapaho Indians and the 7th cavalry took cover, these landscapes have generally remained unmodified and would not be adversely affected by nonnative invasive plant removal. Long-term beneficial effects, however, are possible where nonnative invasive plant removal helps to restore the historic scene.

Buildings: There would be no removal to or physical modification of buildings as a result of the implementation of Alternative 1; therefore, there would be no effect on buildings, where these contribute to cultural landscapes within the parks, such as at Grant-Kohrs. Where appropriate, the removal of nonnative invasive vegetation near historic buildings would have a long-term beneficial effect.

Structures: Where nonnative invasive vegetation would be removed from overgrown small scale features, such as along rock walls, within pastures, or near battlefield monuments and markers, there would be long-term beneficial effects on the preservation of these features and their presence in the landscape from a return to the native landscape that once existed in these areas. Other structures, such as historic trails, an important component of the parks that preserve parts of the Oregon or California trails (including City of Rocks, Hagerman Fossil Beds and Craters of the Moon), would be enhanced by nonnative invasive vegetation removal where these trails remain visible, thereby giving visitors to these areas a better sense of what the early emigrants found on their journeys.

Archeological Sites: Potential effects to archeological sites could occur from the use of manual or mechanical techniques or other ground disturbance to remove invasive plants in an unknown site as well as from other treatment methods. To the extent that mitigation measures (identified in the Archeological Resources impacts section above) were employed, these effects would likely be negligible to minor.

Vegetation: Vegetation that is nonnative but noninvasive that is present in the parks to support the cultural landscape would not be affected by the implementation of Alternatives 1 or 2. Vegetation impacts would be the same as those described in that section. Elsewhere nonnative invasive vegetation would be removed from cultural landscapes or potential cultural landscapes in the parks, with removal having a long-term beneficial impact on maintaining the cultural landscape. For example, nonnative invasive weeds in pastures at Grant-Kohrs, along the Oregon Trail in Craters of the Moon and Hagerman Fossil Beds, and in the Big Fill area of Golden Spike would be removed. Beneficial impacts would vary depending on the extent to which invasive plants were removed or the site restored to improve the cultural landscape. Topography and vegetation played an important role in Little Bighorn battle movements. Restoring big sagebrush that has not returned since the 1983 and 1991 fires would be a major beneficial impact. Also, removing nonnative grasses (like cheatgrass and bulbous bluegrass) and restoring native grasses would help to return Little Bighorn to June 1876 conditions when the rolling-hills landscape was much greener. The wooded grounds that make up the siege area and the riparian area dominated by willows where the Nez Perce camped on the night before the battle at Big Hole are important landscapes that help tell the story of the site. There would be long-term beneficial impacts on these uniquely vegetated areas.

Natural Systems and Features: Natural systems and features, such as the coulees along Snake Creek at Bear Paw Battlefield and the natural depression that was deepened to become a swimming area for the

internees at Minidoka are important components of some cultural landscapes in the parks. As with most other aspects of the cultural landscapes, the overall character of these would be improved by the removal of nonnative invasive vegetation, a long-term beneficial effect.

Alternative 2 Impacts

Impacts would be the same as Alternative 1. In addition, the use of mitigation measures and a systematic program of implementation for nonnative invasive plant management would enhance beneficial effects.

Impact Avoidance, Minimization or Mitigation Measures

Measures would be the same as those noted in Chapter III: *Alternatives* and in the individual sections for vegetation and archeological resources (above).

Cumulative Impacts: In several parks, prior to the protection of the sites as historic structures or cultural landscapes, alterations occurred that affected overall preservation of their features. Past projects in parks that have occurred from past actions, such as the construction of visitor facilities or maintenance of these areas have had both beneficial and adverse impacts on these areas. Since then, NPS actions to identify, designate and manage these areas have contributed to their preservation through the analysis and use of cultural landscape inventories and reports. Alternatives 1 and 2 would contribute negligible adverse effects coupled with long-term minor to moderate cumulative beneficial effects from additional preservation of the vegetation characteristics associated with historic structures and cultural landscapes. When the impacts of Alternatives 1 or 2 are added to impacts from past, present and future projects in the 10 parks, such as modifications to improve accessibility of visitor facilities at Craters of the Moon and potential future projects improving visitor facilities from the GMP processes at City of Rocks and Golden Spike, there would be a potential for negligible to minor cumulative adverse impacts on historic structures and negligible cumulative adverse impacts combined with beneficial cumulative impacts on cultural landscapes.

Conclusion: Although alteration of vegetation patterns or features within cultural landscapes could occur, the overall integrity of the landscape would not be diminished, and in fact, would improve with removal of nonnative invasive vegetation. Most vegetation considered integral to cultural landscapes would not be affected; however some legumes in Grant-Kohrs pasture would have minor short-term adverse effects but long-term beneficial effects. There would be long-term beneficial effects from removal of nonnative invasive plant species. Removal would protect and enhance the values for which many areas were designated and/or would restore the historic scene at parks. Nonnative invasive plant removal would have no adverse effect on historic structures and cultural landscapes at the parks. There would be no impairment of cultural landscapes or the values associated with them from the implementation of Alternatives 1 or 2.

F. Recreational / Social Resources Impacts

1. Visitor Experience Impacts

Alternative 1 Impacts

Visitor Access: There would be negligible adverse impacts on transportation associated with visitor experience. Slow moving vehicles treating roadside weeds could be encountered by some visitors or intermittent delays in accessing tour road pullouts (such as at Little Bighorn) could occur. Visitor access could be temporarily restricted or delayed while prescribed fire or chemical treatments are conducted in an area and for some time after the treatment is conducted, depending on park policy and the application guide from the label. (Some pesticides have a wait period, restricted entry interval (REI), for reentry into an area after use. Other sensitive areas, such as trails, campgrounds and picnic areas would also likely be posted and/or treated at times that would not impede visitor use.) Although changes in access to an area could adversely affect visitor enjoyment, the beneficial effects on visitor safety that would occur would outweigh these adverse effects (see Human Health and Safety / Hazardous Materials Impacts below).

There could also be some temporary impediments to access based on manual or mechanical or other invasive plant treatments in an area. For the most part, these would be short-term and would be unlikely to affect the experience of most visitors. Some closures, such as those related to grazing by adjacent landowners at Golden Spike could be longer term and minor, but would also be unlikely to affect most visitors. Visitors would continue to be able to access important resources and use areas.

Visitor Enjoyment: Removal of nonnative invasive plants would have short-term negligible to minor adverse impacts on visitor enjoyment coupled with long-term beneficial effects. Among those visitors who were aware of the adverse effects of nonnative plants, fewer visitors would complain or note the presence of nonnative plants to park staff where focused removal is implemented. Overall, visitors would benefit from seeing park landscapes in their natural condition and/or in a condition appropriate to the establishment of the park. Rehabilitation of native plant communities would have localized long-term beneficial impacts. Nonnative plant removal would continue to create new opportunities to demonstrate to or interpret for visitors the importance of this resource management program in the parks. Where specific interpretive programs that focus on or provide information about nonnative plants were presented, visitors would have enhanced opportunities to learn about and to recognize nonnative plants. In some parks, there would continue to be volunteer opportunities to conduct nonnative plant removal, primarily by manual or mechanical means. Where these programs were provided, there would be more opportunities for visitor enjoyment, with short- and long-term beneficial effects.

Nonnative invasive plants also have a variety of adverse impacts on recreational experiences, including on wildlife habitat, affecting wildlife viewing opportunities; on annual wildflower displays; on access to trails and campsites; and from contact (such as the spines of Canada or yellow starthistle or the poisonous sap from leafy spurge). Removal of nonnative invasive plants therefore would also have long-term beneficial impacts on these recreational values.

Soundscape: No inventory of soundscape conditions, sound sources, or noise levels exists for most of the parks. An inventory would help to understand the relationship between the natural soundscape, cultural soundscape, and other appropriate sources of sound and the human component of the existing ambient soundscape. This information would make it possible to better understand resources needing protection and appropriate and inappropriate sound sources. It would also enable the NPS to establish acoustic objectives and associated standards for different management zones. A soundscape inventory would also provide a more comprehensive structure for evaluating existing and proposed activities and their impacts and would identify where management actions would most effectively contribute to protecting park resources and improving the visitor experience consistent with park purposes.

While the impacts of some treatments, such as biological control, would have no effect on the natural soundscape, implementation of others, including some manual / mechanical treatments such as mowing and the use of chainsaws, the potential for use of OHVs and the potential for aerial spraying at those parks that have used aerial spraying in the past (Grant-Kohrs), would affect the natural soundscape. Although use of power tools and equipment would create noise, often the impact of these would be offset by the location of the work and the short-term nature of the work. In less isolated sites, work would be scheduled during weekdays and other periods of low visitation. Noise impacts would be similar to those produced by the mechanical equipment used by many homeowners.

Noise impacts to the natural soundscape would be site specific, primarily short-term and negligible to minor, however, impacts from long-lasting activities, such as concentrated nonnative plant removal in a particular area over a period of many days or weeks or mowing which could be occurring throughout an area would be of longer duration. These impacts which could occur during a visitor's entire visit to an area would therefore be moderate. Impacts would also be moderate from the use of aerial spraying, from very loud equipment and vehicles, and from use of these kinds of tools in the vicinity of a key resource, where use would interfere with enjoyment of that resource, such as in a picnic area when visitors were using it or near an interpretive program area.

Because no new facilities are proposed, there would be no long-term impacts to the natural soundscape. When equipment was not being used and in areas other than where equipment was temporarily being used, natural sounds would be readily perceptible. Overall adverse effects would be short-term and would vary between negligible and moderate and these would be accompanied by long-term beneficial effects where quieter methods were employed to protect the natural soundscape.

Scenic Resources: Some negligible to minor, adverse, short-term visual impacts may occur from the use of herbicides. On a small scale, non-target vegetation could show signs of chemical burns from localized herbicide drift, however this would be minimized by application of herbicides according to label specifications in low or no wind conditions. Minor to moderate visual effects would likely occur in areas where large infestations of exotic plants respond to chemical or other treatment methods. These areas may be devoid of vegetation or appear as darkened dead areas until native vegetation becomes reestablished through reseeded, revegetation or other restoration treatments. Minor adverse effects can also occur from OHV use on hillsides. The duration of these visual effects would vary among treated locations and species within a park and from park to park. Other short-term effects could occur from the use of dyes, surfactants or adjuvants in combination with a herbicide – either to mark an area treated or to enhance effectiveness of application techniques. As a result, some areas could be visually colored for a few hours to a few days after herbicide application. Overall adverse effects would generally be short-term and negligible to minor, but could occasionally be moderate.

Beneficial effects from treatment would also occur. In some areas, removal of nonnative invasive plants could open up scenic vistas, particularly in riparian areas where trees such as Russian olive or tamarisk were removed, a long-term beneficial effect.

Alternative 2 Impacts

Visitor Access: Impacts from Alternative 2 would be similar to Alternative 1. Visitor access could occasionally be delayed or reduced due to nonnative invasive plant management activities. In addition, there would be long-term beneficial impacts on visitors from the use of mitigation measures, such as from potentially changing the times during which nonnative invasive plant removal is conducted.

Visitor Enjoyment: In addition to impacts in Alternative 1, there would be additional beneficial effects in Alternative 2 from the use of a variety of new strategies (such as the top 10 weeds for EDRR information sheets created by each park that include pictures and descriptive characteristics) to increase awareness and knowledge of nonnative invasive plants among park staff, visitors, neighbors and partners. This could potentially result in more assistance from staff and partners in removing nonnative invasive plants.

Soundscape: Impacts would be similar to Alternative 1. Existing kinds of noise disturbance would continue from actions to control nonnative invasive plants. Some additional noise could occur in those parks that choose to use aerial spraying but because this activity would be limited and infrequent, impacts from it would also remain minor to moderate.

Scenic Resources: Impacts would be similar to Alternative 1. Ongoing impacts related to treatment of nonnative invasive plants would occur. More use of early detection and rapid response monitoring and information sharing, however, could result in more long-term beneficial effects to park scenic resources from faster detection and therefore treatment of nonnative invasive plants in park landscapes. There would continue to be long-term beneficial effects from the restoration of park resources damaged by nonnative invasive plants.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to visitor experience (including access and transportation, opportunities, safety, and soundscapes):

- Use of mechanized equipment would be limited to the fewest number of hours needed and to the degree practicable would occur during low visitor use times (weekdays) or seasons (late summer through fall) or before or after primary visitor use times to reduce impacts to park visitors.
- Parks would disseminate information about the reasons for control projects and the use of loud equipment such as OHVs, aircraft or chainsaws to the public and staff.
- Dyes would not be used near historic or interpretive structures or grave markers to maximize visitor enjoyment and photo opportunities and out of respect (Bear Paw, Big Hole, and Little Bighorn).

Cumulative Impacts:

Visitor Access: There have been few cumulative adverse impacts on visitor access from past or present actions undertaken by the parks. In some parks, such as Craters of the Moon, visitor access to some areas has been modified over time. In others, visitor access has improved with the development of new facilities (such as trails and visitor centers) and the restoration of existing facilities (such as at Grant-Kohrs). Future projects to improve visitor facilities, including trails at Minidoka would contribute to cumulative beneficial impacts on visitor access. There would be no adverse cumulative impacts on visitor access from the implementation of Alternative 1 or 2. Impacts on access would be short-term.

Visitor Enjoyment: Past, present and future actions have resulted in long-term beneficial and adverse effects on visitor enjoyment associated with programs. There have been ongoing minor changes in the type, number and diversity of interpretive and educational programs over time in the parks. Construction of and modifications to trails and other visitor facilities in the parks has contributed cumulative beneficial effects on visitor enjoyment. Alternative 1 or 2 would contribute cumulative beneficial effects from increasing knowledge and awareness of invasive plants through interpretive, educational and/or volunteer programs.

Soundscapes: Past, present and future actions have and would likely continue to result in both cumulative adverse and beneficial effects on soundscapes. Park facility use and management, including nonnative invasive plant management have contributed minor adverse impacts on soundscapes. These impacts, however, are generally short-term and localized. The alternatives would not contribute adverse cumulative effects on soundscapes because actions in the alternatives would not create long-term sources of noise and use of mechanical equipment in nonnative invasive plant removal would be intermittent and seasonal.

Scenic Resources: In some parks, such as Minidoka and Grant-Kohrs, development and the changes to the landscape through time have resulted in long-term adverse effects on scenic resources from the invasion of nonnative plants. In other parks, such as Bear Paw, Big Hole and most parts of Craters of the Moon, there have been few changes to the landscape and invasive plant management is focused on retaining native landscapes, including their scenic qualities. Actions in Alternative 1 or 2 would contribute cumulative beneficial effects by increasing native plant diversity or culturally important plant health over nonnative plant diversity thereby improving the scenic resources.

When the impacts of past, present and future actions in the 10 parks, such as improvements to visitor facilities at City of Rocks, Craters of the Moon, Fossil Butte, and Little Bighorn are added to the impacts of action proposed in Alternatives 1 or 2, there would be negligible cumulative adverse impacts on visitor experience and cumulative beneficial effects.

Conclusion: There would be short-term negligible to moderate adverse impacts on visitor access, soundscapes, and scenic resources and short-term negligible to minor impacts on visitor enjoyment. These would be coupled with long-term beneficial effects in both alternatives, with more beneficial effects in Alternative 2. There would be no impairment of scenic resources or soundscapes as a result of the implementation of Alternatives 1 or 2.

2. Grazing and Livestock Trailing Impacts

Alternative 1 Impacts

At the parks where grazing and/or livestock trailing currently occurs (City of Rocks, Fossil Butte – trailing, Golden Spike, Grant-Kohrs, and Little Bighorn), there would generally be long-term beneficial effects from the removal of nonnative invasive plants. At Grant-Kohrs, where cows have also been trained and are used to control nonnative invasive plants, there would be additional long-term beneficial effects, with perhaps, more efficient reduction of nonnative invasive species attributed to this program.

Nonnative invasive plant management activities, including manual / mechanical and cultural techniques as well as the use of prescribed fire (if any) and herbicide use would need to continue to be coordinated with grazing permittees (where applicable) and/or with trailing activities to ensure that these could be conducted at times that did not interfere with the grazing / trailing. For instance, permittees would continue to be notified when activities such as herbicide application or weed pulling were to occur in their allotment(s). Notification prior to herbicide application is especially important because some weeds that are toxic to livestock, but not palatable, become more palatable following herbicide applications. At some parks, such as Golden Spike, there would continue to be periodic closure of some areas related to grazing from adjacent landowners. At others, such as grazing over the Tour Road right-of-way easement at Little Bighorn or ongoing livestock grazing and trailing at City of Rocks, grazing would continue to occur simultaneously with public use.

Although some livestock would likely continue to feed on desirable target species at Grant-Kohrs, the extent to which is currently unknown, elsewhere livestock would generally avoid nonnative invasive species. As a result, treatment or removal of nonnative invasive species would have long-term beneficial effects on grazing. In addition, there would continue to be a potential for long-term minor to moderate adverse effects from undesirable plants being introduced through livestock feces, fur or supplemental forage at Grant-Kohrs Ranch. To the extent that mitigation measures were employed, the potential for importation of new weeds through livestock would be reduced. Elsewhere, nearby livestock grazing could continue to adversely affect adjacent parks.

When used at appropriate levels, and when the plant community is not stressed, grazing can also have long-term beneficial effects from stimulating grass growth, increasing the health and availability of forage.

Alternative 2 Impacts

Impacts would be the same as in Alternative 1. In addition, there would be more long-term beneficial effects from employing more systematic mitigation measures to prevent the introduction and spread of nonnative invasive plants through livestock at Grant-Kohrs Ranch.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to grazing:

- Temporary and existing permanent fencing or herding would be used to ensure that grazing does not occur in areas where it is not intended to occur.
- Where livestock are used by visitors in the park, to prevent the unintentional introduction of weed species through feces, livestock would be quarantined and/or fed a weed-free diet before entering uncontaminated areas or would stay in designated corrals. Required quarantine periods could be longer depending on prior location of the animals, invasive species present in that area, biology of weed seeds and length of time required for animals to pass them, or (if applicable) at the request of the allotment permittees. They would be inspected for weed seed attached to fur and cleaned.
- Domestic livestock used for prescriptive management of invasive species would be excluded from sites (including access routes) where special status plants are known to occur or during seasons

when listed plants are vulnerable to damage or where there is a risk of transmitting diseases to wildlife or during critical times of the year.

- Impacts to water quality from livestock would be minimized by preventing unlimited access by livestock to open water or saturated soils.
- Herbicide use would need to continue to be coordinated with grazing permittees (where applicable) and/or with trailing activities to ensure that these could be conducted at times that did not interfere with the grazing / trailing.
- Herbicide use would be in accordance to label requirements for grazing restrictions.
- Manual/mechanical treatments would occur in ways that would not 'spook' livestock, causing unsafe conditions.

Cumulative Impacts: Increases in nonnative invasive species have affected livestock grazing and trailing where it occurs in the parks by providing generally unpalatable forage for the animals. Grazing has also increased the predominance of weeds in some parks. At Grant-Kohrs where the lack of grazing of nonnative invasive species was also occurring and cows were trained to eat these weeds, there have been some long-term beneficial effects on and from grazing. When the impacts from past, present and future actions in the 10 parks related to grazing are added to the impacts from Alternatives 1 or 2, such as from additional training of cows eating weeds at Grant-Kohrs and a revision to the Grazing Management Plan at City of Rocks, there would be cumulative beneficial impacts on the management of grazing resources. These would continue to be combined with cumulative minor adverse impacts from the ongoing use of grazing where it occurs in the parks.

Conclusion: Alternatives 1 and 2 would continue to have short-term minor adverse impacts on grazing combined with long-term beneficial effects from the removal of nonnative invasive plants.

3. Human Health and Safety / Hazardous Materials Impacts

Alternative 1 Impacts

Employee Safety: The parks would continue to follow existing safety and hazardous materials procedures, associated with implementing treatments and recordkeeping. Ongoing use of small quantities of hazardous materials, including herbicides, gasoline and diesel fuel, oil, and antifreeze would continue. Standard operating procedures and policies derived from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA) and other applicable federal laws would continue to be followed.

Ongoing actions which may pose manageable risks to human health and safety include equipment operation, gas-powered hand tool operation, and manual hand tool operation. Exposure to fuels and lubricants may pose chemical exposure health and safety risks and exposure to herbicides is a health concern. Health and safety risks are managed through administrative controls (e.g., controls formed through park policy and state and federal law) and engineering controls (e.g., back-up alarms on heavy equipment and personal protective equipment).

Small amounts of herbicides (the amount likely to be used in one season) would be purchased and stored at the parks. Currently used herbicides and those that would be proposed have very low toxicity to humans. Nonetheless, personal protective equipment (PPE), such as gloves, coveralls or long sleeves and pants, and masks, is used during application to reduce the potential for both immediate and chronic exposure for employees. Safety procedures include specific guidelines for storing, mixing, transporting, and disposing of herbicides and their containers as well as methods for handling spills (Appendix F: *Pesticide Handling Procedures*). Employees using herbicides have routine training in their use and application and in hazard communications and spill response.

Employees who work on fires also have specific training and equipment. As a result, there are identified procedures associated with prescribed fire use, including ignition, burning and mop-up that would continue to be followed and formally implemented and changed as conditions warrant.

Overall impacts on employees from potential hazards associated with implementing a nonnative invasive plant treatment program would be negligible to minor. If spills or improper handling of herbicides occurred or appropriate procedures were not followed, impacts could be moderate.

Visitor Safety: Use of chemical treatments may require closures to protect visitors during and after treatment, such as while the herbicide dries. Use of some herbicides requires posting an area as no entry for a specified period of time. As a result, visitor access could be restricted from some areas on some days. Prescribed fire treatment would also result in the need for visitor use closures from some areas for a few days to a few weeks. While these actions would have short-term adverse impacts on visitor access and enjoyment, they would be combined with short- and long-term beneficial impacts on visitor safety.

The presence of employees, contractors and volunteers treating nonnative invasive plants by a variety of means would also result in the presence of needed equipment and other treatment materials, including chemical herbicides (if used), in potential visitor use areas. Although this equipment would be used per existing safety procedures, its presence could be a potential hazard to visitors if they inadvertently or purposefully entered areas where treatment was occurring. Because there would be safety observers during equipment use and materials and supplies would be in an area of existing use, no or negligible impacts would occur.

Treated areas subject to public visitation are marked during the pesticide no-entry period, as defined by the label, or until dry. Visitors are advised to avoid entering the treated areas to minimize exposure to the chemical(s). There would be no or negligible to minor impacts associated with visitors' exposure to hazardous materials.

Alternative 2 Impacts

Employee Safety: Impacts would be similar to Alternative 1; however there would also be long-term beneficial improvements to employee safety from parks using better information to identify treatment measures with the least possible impact on the environment. There would also likely be improvements related to more effective implementation of a wider variety of mitigation measures to limit impacts on park resources.

Visitor Safety: Impacts would be the same as in Alternative 1.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts on human health and safety:

- Areas treated with herbicides would be closed to visitor use during the formal "no entry" period specified on the label or until dry.
- Weather predictions would be consulted prior to using herbicides to minimize the potential for herbicide drift and to ensure its effectiveness and application according to label temperature, precipitation and wind conditions.
- Herbicides would not be applied to areas with excessive dew to ensure effectiveness.
- Irrigation of treated areas would occur according to the label.
- Small equipment and containers like backpack sprayers and herbicide jugs containing herbicide would not be left unattended in visitor use or housing areas to prevent theft and tampering or accidental exposure.
- Herbicides would continue to be labeled and stored according to manufacturer's recommendations and NPS policies.

- Because herbicide use requires approval from Regional and/or National IPM Coordinators, herbicides used would continue to be of low toxicity with few human and wildlife health hazards.

Cumulative Impacts: There have been no cumulative adverse impacts to human health and safety from past and present actions and none are anticipated from future actions. Long-term beneficial effects in improving human health and safety would result from actions in both Alternative 1 and Alternative 2. There would be no cumulative adverse effects on human health and safety.

Conclusion: There would generally be negligible to minor adverse effects on human health and safety. If appropriate procedures were not followed, these could be moderate. There would be no or negligible impacts on human health and safety from the implementation of Alternative 1 or 2. Alternative 2 would have potential long-term beneficial effects on human health and safety.

4. Wilderness Impacts

a. Natural – As stated by Landres *et al.* 2005, “wilderness ecological systems are substantially free from the effects of modern civilization.” Effects on the natural quality of wilderness would be those that would change the biotic or chemical composition of wilderness plant or wildlife or soils, such as from the application of herbicides.

Alternative 1 Impacts

There would continue to be negligible to moderate localized adverse effects on the natural qualities of wilderness caused by the presence of nonnative invasive species, an impact of modern civilization on wilderness. To the extent that treatment to remove nonnative invasive species was successful, actions under Alternative 1 would have short- and long-term beneficial effects on the natural quality of wilderness. Beneficial effects would be coupled with minor to moderate localized adverse impacts from the application of herbicides, which would affect soils and vegetation, and which could affect wildlife.

Specific impacts to wilderness from ongoing invasive plant management in Craters of the Moon would include treatment of a leafy spurge infestation in the Raven’s Eye Wilderness Study Area and treatment of dyers woad in the Great Rift Wilderness Study Area. These infestations have been treated in the past using herbicides. Future plans may include releasing insect biocontrol agents to contain the infestation. There would also continue to be limited hand-pulling of nonnative invasive species in wilderness and wilderness study areas in the monument and preserve.

Craters of the Moon has also begun controlling nonnative invasive species on a limited basis in wilderness study areas based on wilderness minimum requirement / minimum tool analysis (Appendix N: *Craters of the Moon Minimum Requirement / Minimum Tool Analysis*).

Alternative 2 Impacts

Impacts would be similar to Alternative 1. Ongoing manual treatment would be used when possible in wilderness and wilderness study areas because it is generally the most appropriate treatment method. Where manual treatment would result in additional adverse impacts, such as the spread of rhizomatous plants or where manual treatment would be ineffective based on the size of the infestation, other methods would be considered.

Craters of the Moon may propose the release of insect biocontrol agents to control some nonnative invasive species. Releasing biocontrol agents, whether in or near wilderness, would have short-term impacts on the natural quality of wilderness from the introduction of one nonnative species to contain another. The end result, however, would be a return of the natural quality of a wilderness. Because the agents would be host specific overall impacts would be minor.

Through adaptive management, the ability to use newly developed, technologically advanced herbicides in Alternative 2 would reduce risks to non-target plants and therefore also reduce the risk of weed reinvasion occurring before the reestablishment of native vegetation. As in Alternative 1, use of herbicides to treat weeds could potentially affect the “naturalness” of WSAs by killing non-target native vegetation through imprecise application and/or drift. The degree of effect would depend on the application method, with spot applications less likely to cause adverse effects than more widespread applications. Following mitigation measures would reduce overall impacts. Overall impacts from Alternative 2 would therefore remain negligible to moderate.

b. Untrammeled – As defined by Landres *et al.* (2005:11-12), untrammeled means that the “wilderness is essentially unhindered and free from modern human control or manipulation.” Effects on the untrammeled quality of wilderness would include manipulation of biotic and abiotic components of ecosystems – including manipulation of fish and wildlife, manipulation of vegetation, manipulation of abiotic components of aquatic ecosystems and/or manipulation of soils and geologic features (Landres *et al.* 2005:23).

Alternative 1 and 2 Impacts

There would continue to be minor adverse impacts on the untrammeled quality of wilderness from the treatment of nonnative invasive plants, which includes human intervention in wilderness to improve the integrity of wilderness values including vegetation and wildlife habitat. This manipulation would continue to include actions such as hand-pulling, chemical treatment and other aspects of nonnative invasive plant treatment that have been analyzed through the minimum requirement / minimum tool analysis processes. In addition to those treatment methods applied in Alternative 1, Craters of the Moon would potentially also use insect biological control to minimize nonnative invasive species. Based on studies at other parks and anecdotal information from Craters of the Moon staff, insect biocontrol agents are likely already affecting nonnative invasive species at Craters of the Moon from releases that have occurred on adjacent public and private lands. Craters of the Moon staff have observed insects on rush skeletonweed and leafy spurge and known releases of insect biocontrol agents have occurred in Blaine and Butte counties. Overall, Alternatives 1 and 2 would have short- and long-term minor adverse effects on the untrammeled quality of wilderness. If treatments were successful, there would be a return to the apparent untrammeled quality of wilderness, a long-term beneficial effect.

c. Undeveloped – wilderness is essentially without permanent improvements or modern human occupation.

Alternatives 1 and 2 Impacts

There would continue to be no impacts on the undeveloped quality of wilderness from the implementation of Alternatives 1 or 2 in this EA. No permanent improvements or long-term human occupation would occur as a result of the treatment of nonnative invasive plants in wilderness.

d. Outstanding opportunities for solitude or a primitive and unconfined type of recreation – wilderness provides outstanding opportunities for people to experience solitude or primitive and unconfined recreation, including the values of inspiration and physical and mental challenge (Landres *et al.* 2005:iii-iv).

Alternatives 1 and 2 Impacts

Alternative 1 would continue to have negligible to minor adverse impacts on solitude and/or a primitive and unconfined type of recreation. For the most part visitors would remain unaffected by proposed treatment of nonnative invasive plants. Occasionally, visitors could encounter monument staff in wilderness in the midst of treatment; however, it is unlikely that these infrequent encounters would have more than minor adverse or beneficial impacts on other visitors’ enjoyment of their wilderness experience and/or on solitude. A great number of opportunities would continue to exist for a primitive and unconfined recreational experience in the monument and outstanding opportunities to experience

solitude would also be available. Although Alternative 2 would offer a few benefits over Alternative 1 from the incorporation of a series of mitigation measures, it is likely that impacts from both Alternatives would be similar, with negligible to minor adverse effects.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to wilderness:

- Craters of the Moon would use Minimum Requirement / Minimum Tool analysis to determine whether to and how to treat nonnative invasive plants in wilderness.
- Craters of the Moon would minimize the number of trips, noise and activity, and duration of nonnative invasive plant treatment in wilderness.
- A minimum tool analysis would be conducted to determine the least intrusive tool, equipment, device, force, or practice that would achieve both wilderness and invasive weed management objectives.
- Wilderness study areas would continue to be treated as wilderness for ongoing and proposed invasive plant management activities.
- Efforts would be made to minimize the number and duration of trips and reduce the visibility of IPM activities.
- Whenever possible, invasive plant management activities in wilderness would be timed to avoid peak visitor use periods.
- Invasive plant populations must be a potential threat to wilderness character and resources, before program managers would consider herbicide use.
- Herbicide use must meet the conditions of the wilderness Minimum Requirements analysis.

Cumulative Impacts: There is currently limited use of mechanized or motorized equipment in Craters of the Moon wilderness and wilderness study areas. Occasional use of helicopters or low flying aircraft for search and rescue, emergencies and wildland firefighting has occurred. Other impacts from past, present and future planned projects in wilderness and wilderness study areas include placement of inventory and monitoring plot markers. When added to these impacts, use of insect biocontrol agents and/or herbicides in Alternatives 1 or 2 would have minor cumulative adverse effects on the natural and untrammelled qualities of wilderness and invasive plant management activities in wilderness could have negligible adverse cumulative effects on visitor opportunities associated with solitude or a primitive and unconfined wilderness experience.

Conclusion: There would be short- and long-term negligible to moderate impacts on the natural quality of wilderness from the implementation of Alternative 1 or 2. Alternative 2 would have more long-term beneficial effects. Alternatives 1 and 2 would have minor short- and long-term adverse impacts on the untrammelled quality of wilderness and no effect on the undeveloped quality of wilderness. Alternatives 1 and 2 would also have negligible to minor adverse effects on solitude or a primitive and unconfined wilderness experience. There would be no impairment of wilderness or wilderness values from the implementation of Alternative 1 or 2.

5. Park Operations Impacts

Alternative 1 Impacts

There would be a variety of ongoing adverse and beneficial impacts to park operations from invasive plant management programs. There would continue to be minor to moderate adverse impacts from using park budgets to purchase materials and supplies, and from the use of staff time, including park and NRM-EPMT staff, volunteers (where applicable), and/or contractors (where applicable) to implement actions. Among other impacts would include impacts on park staff time from annual pre-season planning and priority setting actions; coordination (where applicable) with park neighbors and partners, adjacent

private and agency landowners, and weed management organizations (cooperative weed management areas); annual recordkeeping and monitoring (where applicable); and orientation / training of staff, including resource management, interpretive, maintenance, and supervisory staff and volunteers, etc. Overall, because most parks are not currently conducting comprehensive invasive plant management programs, effects would generally be negligible to minor compared to overall park operations budgets. Special project funding or emphasis on nonnative invasive plant removal over a short period could temporarily increase impacts from minor to moderate.

Effective invasive plant management awareness and treatment programs would result in long-term beneficial impacts to the parks from a reduction in nonnative plants which would contribute to preservation of park cultural landscapes (where applicable) and ecosystems. Where more comprehensive invasive plant management programs were in place (such as at Craters of the Moon, Grant-Kohrs and Little Bighorn), there would be more beneficial effects from early detection and treatment of plants and from long-term monitoring programs that would help the parks to reduce overall impacts from invasive plants. At other parks, later increases in staffing and/or additional special emphasis focus on invasive plants by the parks or NRM-EPMT would result in other beneficial impacts in these parks. Additional beneficial impacts would occur from nonnative invasive plant treatment near boundary areas in the parks. This kind of treatment would decrease the probability that weeds would spread from within the park to adjacent lands and from adjacent lands to within the park, although weeds would continue to spread via other pathways, including the wind.

Nonnative invasive plant management programs at the parks would continue to require staff to implement. In addition, the NRM-EPMT would continue to be needed to assist parks in combating these species.

Alternative 2 Impacts

Alternative 2 would result in improved invasive plant management programs in the parks. The systematic 7-Step Decision-making Tool would help parks to identify, prioritize, treat and monitor nonnative invasive plants, resulting in better management of both nonnative invasive and native plants and communities. Improved decision-making ability with regard to priorities for treatment and an emphasis on selecting treatments with the least possible adverse effects on the environment would result in more effective, safe and efficient management of invasive plants. Access to some additional management tools in some parks, such as insect biocontrol, aerial spraying or prescribed fire could improve the effectiveness of park programs.

As a result of these improvements, there would be short-term minor to moderate adverse impacts on park staff from conducting more detailed analyses and from responsibilities associated with implementing a more technically sound program, including additional actions not now emphasized, such as monitoring. Better knowledge would ideally lead to better allocation of resources, including staffing and materials to manage nonnative invasive plants and could result in additional effective justifications for funding and resources to improve or expand treatment.

Once the improved program was underway, there would likely be minor adverse impacts from maintaining it. New administrative responsibilities, such as documenting the effects of treatment through monitoring and improving coordination with partners would likely occur. Long-term beneficial effects would result from improved coordination with the NRM-EPMT since park staff would be better able to direct their annual efforts based on new information about invasive species and invasive species treatments. If new staff became available, these could be used for additional efforts in prevention, early detection, monitoring, and outreach and education. Overall adverse impacts on park operations would be short-term negligible to moderate and long-term negligible to minor and would be combined with both short- and long-term beneficial impacts. High priority invasive plants would likely be eradicated in less time and with fewer resources than in Alternative 1.

Impact Avoidance, Minimization or Mitigation Measures

In addition to measures noted in Chapter III: *Alternatives*, the following measures would also be included (as appropriate to the alternative actions) to minimize impacts to park operations:

- Where possible, projects would be combined to maximize cost-effectiveness.

Cumulative Impacts: There would continue to be ongoing cumulative adverse effects on park operations from the presence of nonnative invasive plants caused by past, present and future projects, primarily related to disturbance from development, but also related to importation of weeds from wind, wildlife, and vehicle use. Although nonnative invasive plants are by definition human-caused, their spread is often attributable to non-human causes. Alternatives 1 and 2 would contribute negligible to minor cumulative adverse effects and long-term beneficial effects from ongoing treatment of nonnative invasive plants. Beneficial effects would be greater in Alternative 2 from a more comprehensive, technically sound program.

Conclusion: Alternatives 1 would have short- and long-term negligible to moderate adverse impacts on park operations combined with long-term beneficial impacts from improving park resources. Alternative 2 would also have short-term negligible to moderate and long-term negligible to minor adverse impacts on park operations combined with both short- and long-term beneficial impacts.

Table 38: Impact Comparison Chart

RESOURCE	ALTERNATIVE 1 (No Action) IMPACTS*	ALTERNATIVE 2 (Preferred) IMPACTS*
Air Quality	Localized, short-term negligible to moderate adverse impacts from some use of prescribed fire and pesticides. No long-term impacts.	Same as Alternative 1
Geology	Negligible to minor adverse impacts to geology from removal of plants.	Same as Alternative 1
Soils	Localized, negligible to moderate adverse and long-term beneficial impacts to soils, including from removal of plants and restoration.	Same as Alternative 1
Paleontological Resources	Localized short- and long-term negligible to minor adverse effects (at the parks with these resources).	Same as Alternative 1
Water Resources (Hydrology and Water Quantity)	Short-term negligible effects on hydrology and localized negligible to minor adverse effects on water quantity from use of water to support some treatment actions.	Same as Alternative 1, with more beneficial impacts from removing nonnative invasive species in wetlands / riparian areas.
Water Resources (Water Quality)	Localized short-term negligible to moderate adverse effects from disturbance of soil to remove plants.	Similar to Alternative 1 with fewer moderate adverse effects from more systematic analysis of potential effects.
Water Resources (Wetlands)	Localized negligible to moderate adverse effects from presence of nonnative species and from their removal. Long-term beneficial effects from removal.	Similar to Alternative 1, with more long-term beneficial impacts from the availability of more tools and methods with fewer impacts.
Vegetation	Short- and long-term adverse and long-term beneficial effects from removal of nonnative plants and replacement with native species.	Similar to Alternative 1, with more long-term beneficial effects from increased effectiveness.
Grazing	Short-term minor adverse impacts combined with long-term beneficial effects from the removal of nonnative invasive plants.	Same as Alternative 1, with some additional long-term beneficial effects from preventing the introduction and spread of invasive plants.
Wildlife	Localized short-term minor to moderate adverse effects on individuals and negligible to minor effects on populations coupled with long-term beneficial effects.	Same as Alternative 1, with more beneficial impacts from additional success in treating nonnative invasive species.
Special Status Species	<i>City of Rocks</i> : No effect on sensitive species. <i>Craters of the Moon</i> : No effect on gray wolf, bald eagle, peregrine falcon, pygmy rabbit. May affect, not likely to adversely affect greater sage-grouse, pika. <i>Fossil Butte</i> : No effect on gray wolf, grizzly bear, bald eagle, whooping crane, black-footed ferret. May affect, not likely to adversely affect pygmy rabbits and greater sage-grouse. <i>Golden Spike</i> : No effect on gray wolf, grizzly bear, greater sage-grouse. May affect, not likely to adversely affect Passey onion. <i>Grant-Kohrs</i> : No effect gray wolf, grizzly bear, bald eagle. May affect, not likely to adversely affect bull trout. <i>Hagerman Fossil Beds</i> : No effect bald eagle, peregrine falcon, white sturgeon, freshwater snails. <i>Little Bighorn</i> : No effect black-footed ferret, bald eagle, whooping crane. <i>Minidoka</i> : No federally-listed special status species (no effect). <i>Nez Perce (Bear Paw)</i> : No federally-listed special status species (no effect). <i>Nez Perce (Big Hole)</i> : No effect gray wolf, grizzly bear, Canada lynx, Ute ladies tresses. May affect, not likely to adversely affect Montana arctic grayling, Lemhi penstemon. There would be no effect on other species listed as sensitive in the parks.	
Prehistoric and Historic Archeological Resources	No adverse effect on archeological resources.	Same as Alternative 1.

RESOURCE	ALTERNATIVE 1 (No Action) IMPACTS*	ALTERNATIVE 2 (Preferred) IMPACTS*
Historic Structures / Cultural Landscapes	No adverse effect (all parks).	Same as Alternative 1.
Visitor Experience	Short-term negligible to moderate adverse impacts on visitor access, enjoyment, soundscapes, and scenic resources and short-term negligible to minor impacts on visitor enjoyment. Long-term beneficial effects.	Same as Alternative 1, with more beneficial effects on visitor enjoyment and scenic resources.
Human Health and Safety	Negligible to minor adverse effects on employee safety (moderate if safety procedures were not followed). No or negligible impacts on visitor safety.	Same as Alternative 1 with additional long-term beneficial impacts on employee safety.
Wilderness	<i>Craters of the Moon only:</i> Short- and long-term negligible to moderate impacts on the natural quality of wilderness; minor short- and long-term adverse impacts on the untrammeled quality of wilderness; no effect on the undeveloped quality of wilderness. Negligible to minor adverse effects on solitude or a primitive and unconfined wilderness experience.	Same as Alternative 1 plus improvements in the natural quality of wilderness.
Park Operations	Short- and long-term negligible to moderate adverse impacts combined with long-term beneficial impacts from improving park resources.	Short-term negligible to moderate and long-term negligible to minor adverse impacts combined with both short- and long-term beneficial impacts.

* There would be no impairment of any resource associated with implementation of Alternatives 1 or 2 (See Appendix P).