

Chapter 4 – Environmental Consequences

4.1 Overview

The National Environmental Policy Act requires that environmental documents discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and adverse environmental effects that cannot be avoided if a proposed action is implemented. In this case, the proposed federal action is the implementation of treatment recommendations contained in the 2004 Cultural Landscape Report for Wilson’s Creek National Battlefield and the identification and disclosure of potential impacts and effects of the alternatives in order to fulfill all compliance requirements. This chapter analyzes and compares the environmental impacts on natural resources, cultural resources, visitor use and experience, and human health and safety. This analysis is the basis for comparing the positive and adverse effects of implementing the alternatives. By examining the environmental consequences of the alternatives on an equivalent basis, decision makers can evaluate which approach would create the most desirable combination of benefits with the fewest adverse effects on the park.

This chapter begins with a brief explanation of general methods followed by a discussion of how cumulative impacts are analyzed for the alternatives. Following this section, the impact analysis is presented. Each of the alternatives, including the no action alternative (continuation of current management), is analyzed for adverse or positive changes that would occur to the existing conditions of each impact topic as presented in the affected environment chapter of this document. After describing the impacts of the alternatives, the cumulative effects on each impact topic are discussed.

4.2 General Methods and Assumptions for Analyzing Impacts

This section describes the environmental impacts and their significance for each alternative. The analysis assumes that the monitoring and mitigation measures identified in Chapter 2 of this document, would be implemented for the action alternative. Overall, the National Park Service based its impact analyses and conclusions on review of existing literature and park studies,

information provided by experts within the park and other NPS personnel, other agencies, professional judgment, park staff insights, and public input.

In accordance with Council of Environmental Quality (CEQ) regulations, direct, indirect, and cumulative impacts are described (40 CFR 1502.16), and the impacts are assessed in terms of context and intensity (40 CFR 1508.27). Where appropriate, mitigating measures for adverse impacts are described and incorporated into the evaluation of impacts. The specific methods used to assess impacts for each resource may vary and, therefore, are described as part of each impact topic.

The following terms are used in the discussion of environmental consequences to assess the impact intensity threshold and the nature of impacts associated with each alternative.

- **Type.** Impacts can be positive or adverse. A positive impact is an impact that would result in a favorable change in the condition or appearance of the resource. An adverse impact is an impact that causes an unfavorable result to the resource as compared with the existing conditions.
- **Context.** The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, the locality and the park. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance usually would depend on the effects in the locale rather than in the world as a whole. In many cases, the term “localized” is used, intending to provide the context that impacts would only occur within a relatively small area (i.e., a few acres) as opposed to throughout the park or into neighboring areas. The term “local” is used to reference the entire park. Both short-and long-term effects are also relevant.
- **Duration.** Duration of impact is analyzed independently for each resource because impact duration is dependent on the resource being analyzed. Impacts may last for the implementation period, a single year or growing season, or longer. Impact duration is described as short term, long term, or permanent for each resource. For the purposes of this analysis, short-term and long-term impacts are defined for each resource.
- **Direct and Indirect Impacts.** Effects can be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or further away but are still reasonably

foreseeable. Direct and indirect impacts are considered in this analysis. Cumulative effects are discussed in the next section.

- **Intensity.** This refers to the severity of impact. The following should be considered in evaluating intensity:

- Impacts that may be both positive and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be positive.
- The degree to which the proposed action affects public health or safety.
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions having significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions that have individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in, or eligible for listing in, the national register or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of federal, state, or local law or requirements imposed for protection of the environment.

For each impact topic analyzed, an assessment of the potential impacts according to context and intensity is provided in the “Conclusion” section that follows the discussion of the impacts under

each alternative. The intensity of the impacts is presented using the relevant factors from the preceding list. Intensity factors that do not apply to a given resource topic and/or alternative are not discussed.

4.3 Climate Change

The impacts of climate change on Wilson's Creek National Battlefield are not expected to vary by alternative, and the lack of certainty about regional climate change adds to the difficulty of predicting how these impacts would be realized. Furthermore, management actions that are inherently part of each alternative would not fundamentally change with the anticipated added impacts of climate change. However, there may need to be flexibility in some of the proposed actions specifically in the need or ability to conduct prescribed burns as frequently and over as extensive an area as proposed in alternative 2. Climate change is one factor among many that cause similar outcomes between the alternatives, so management actions would not likely be taken due to climate change alone. Given this complexity, the potential influences of these changes on the park environment are not analyzed in detail with respect to each alternative in this chapter. Please refer to the discussion of carbon footprint topic in the Chapter 1 section, "Impact Topics Considered but Not Retained for Full Analysis."

4.4 Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act

In this EA, impacts on cultural resources are described in terms of type, context, duration and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 (36CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected National Register eligible or listed cultural resources; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must be made for affected National Register listed or eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g., diminishing the historic integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the national register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision Making* (Director's Order #12) also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor.

Any resultant reduction in intensity of impact due to mitigation; however, is an estimate of the effectiveness of mitigation only under NEPA. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are nonrenewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, actions determined to have an adverse effect under Section 106 may be mitigated but the effect can remain adverse.

A section 106 summary is included, as appropriate, in the impact analysis sections. Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) on National Register eligible or listed cultural resources only, based upon the criterion of adverse effect and no adverse effect found in the Advisory Council's regulations.

4.5 Cumulative Impacts Analysis Method

Definition

The CEQ regulations require assessment of cumulative impacts in the decision-making process for federal projects. A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person

undertakes such other actions” (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative. Cumulative impacts can result from individually minor, but collectively positive or adverse actions taking place over a period of time.

Methods for Assessing Cumulative Impacts

Cumulative impacts were determined by combining the impacts of the action alternative and the no action alternative with other past, present, and reasonable foreseeable future action. Past actions include activities that influenced and affected the current conditions of the environment near the project area. Ongoing or reasonably foreseeable future projects near the park or the surrounding region might contribute to cumulative impacts. The geographic scope of the analysis includes actions in the project area as well as other actions in the park or surrounding lands, where overlapping resource impacts are possible. Once identified, past, present, and reasonably foreseeable actions are then assessed in conjunction with the impacts of the alternatives to determine if they would have any added adverse or positive impacts on a particular resource, human health and safety, or visitor use and experience. The impacts of past, present and reasonably foreseeable actions vary for each resource. Cumulative impacts are considered for each alternative and are presented in the environmental consequences discuss for each impact topic.

4.6 Actions and Projects Inside Wilson’s Creek National Battlefield

In order to determine the potential cumulative impacts, the following existing and anticipated present and future projects at Wilson’s Creek National Battlefield were taken into consideration:

- Past, present, and ongoing vegetation management including: proposed mowing treatment; prescribed fire treatment; proposed herbicide treatment in designated corn fields; and chemical treatment of invasive exotic plants;
- Past, present and future projects associated with expanded interpretation and replacement of tour road waysides;
- Past, present and future projects associated with improvements to accessibility to primary visitor use facilities;
- Future projects associated with the demolition of Double Springs structures and rehabilitation of the farm site;

- Past, present, and ongoing water resource management including: erosion control, sediment load reduction, pollutant reduction, and groundwater table assessment especially related to springs and vegetation requirements.

4.7 Actions and Project Outside Wilson's Creek National Battlefield

The park is planning to remove 25-feet of forest and woodland vegetation within its own borders along two sides of the park where there are major roadways. This can be considered an outside project as it pertains to traffic/deer interactions on roads outside the park.

No additional projects outside Wilson's Creek National Battlefield were identified by park staff. Reasonably foreseeable impacts from projects outside the park might be associated with road expansion along the park boundaries and development of the land that surrounds the park.

4.8 Natural Resources

4.8.1 Soils and Geology

ALTERNATIVE 1: (NO ACTION)

Impacts

Within alternative 1, there are no changes to current conditions. Existing management or maintenance strategies remain in place and include controlling trail erosion and deposition of sediment, limiting visitor access, and avoiding construction of new features or facilities that might cause soil conditions or stability to change or accelerate. No further clearing would be undertaken and current mowing and vegetation management regimes including prescribed burns would continue. Mitigation measures for sensitive natural resources in the current *Fire Management Plan* (2004) will remain in place and include soils and geology. There would be no adverse impacts to soils and geology resources with the implementation of this alternative.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an adverse impact on soils and geology. The incremental impact of this alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

The no action alternative would not modify the existing soils or geology conditions at Wilson's Creek National Battlefield. No adverse impacts to soil and geologic resources would be expected.

ALTERNATIVE 2: (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on soils and geology include: clearing of the newly acquired parcel to the southeast and integration into savanna management practices, establishment of a day-use picnic area in the Double Spring parcel; equestrian parking re-location; expansion of existing pedestrian trails; realignment of pedestrian and equestrian trail segments with ongoing severe erosion; construction of trail fords or bridges crossing various creeks and streams; establishment of a new Tour Road Stop 1 in conjunction with a cleared viewshed; installation of an orchard exhibit at the Guinn house site and limited crop field exhibits; establishment of 10 contemplative/interpretive nodes; clearing vegetation for ten new viewsheds and associated interpretation; installation of buffer plantings; rehabilitation of glade communities; restoration of the watershed and establishment of riparian buffers along stream corridors.

Surface soils in the vicinity of proposed waysides, contemplative nodes, cannon placement and along proposed new trail alignments and stream crossings or modifications would be disturbed during the construction period. There would be some cut and fill required on trails with a switchback alignment. Cut and fill requirements would not be substantial and would result in short-term, localized, and minor adverse impact to soils. Recovery and stabilization time for soils would be minimal and soil fertility or natural physical features would not be reduced or lost. Required mitigation measures plus phasing of projects would ensure the viability of the soils in the vicinity of the trail alignments. The switchback alignment in the long term would have a positive impact on soils due to prevention of erosion on trails with steep slopes. Removal of trail segments on steep slopes would also have long term positive impacts on soils.

Other construction activities associated with expanded interpretation would have short-term adverse impacts on surface soils until stabilization occurs after clearing of woodlands and minimal grading to shape contemplative nodes and the day-use picnic area in the Double Spring parcel. Required mitigation measures plus phasing of projects would ensure adverse impacts are negligible.

1 Construction of trail crossings over streams and creeks range from a basic low-water unvented
2 improved ford, to a low water bridge. Trail management objectives should be formulated before
3 locating a new crossing or deciding to fix or replace an existing one. Formulating such objectives
4 requires analyzing the entire trail location. Choosing the type of structure for any crossing is
5 highly site-dependent. Depending on the site, the main advantages of low-water crossing over
6 culverts and bridges may include: lower construction and maintenance costs; less channel and
7 floodplain blockage; adaptability; and stormproofing. Low-water crossings are generally less
8 expensive to construct. More often than not, designs are less complicated, construction is
9 quicker, and fewer material are involved. Although the initial cost of more complex low-water
10 crossings may exceed those of simple culvert installations, the lower long-term maintenance and
11 repair costs may still make selecting a low-water crossing more economical. Economic evaluation
12 should take into consideration all lifecycle costs including maintenance, repairs, user costs, and
13 environmental impacts. With proper planning and design of the improved ford as part of the
14 entire trail system and incorporation of mitigation measures, both short-term or long-term
15 adverse impacts to soils would be minor.

16 Low-water bridges are structures supported by piers or spread footings with a natural stream
17 channel bottom. Although low-water bridges are usually the most expensive low-water crossing
18 structures, they can maintain the best channel function and have the least adverse impact on
19 natural resources. With proper planning and design of the low-water bridge as part of the entire
20 trail system and incorporation of mitigation measures, both short-term and long-term direct
21 adverse impacts to soils would be minor.

22 Although difficult to quantify, adverse impacts can be kept minor by applying thorough
23 engineering design and good judgment, using good and suitable materials, and using an
24 interdisciplinary process. Examining existing or current structures that are (or are not)
25 performing well and taking a broad view of the stream and its function can significantly improve
26 project judgement and help reduce the risk of problems. The range of low-water crossings can be
27 very cost-effective structures when the attendant risks are controlled and minimized. Like most
28 hydraulic structures, low-water crossings require attention to both design detail, and
29 compatibility with the hydrologic and natural setting into which the structure will go.¹

¹ *Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations*, U.S. Department of Agriculture, U.S. Forest Service National Technology and Development Program. October 2006. p.4-1.

1 **Mitigation:**

- 2 • In order to minimize the potential for temporary erosion impacts to soils during
3 construction, erosion and sediment control measures would be implemented for each
4 project undertaken for construction.
- 5 • In order to minimize the potential for long-term impacts to soils, develop a strategy for
6 implementation priorities and phasing of the proposed actions to allow sufficient time for
7 re-stabilization of soils after completion of each phase.
- 8 • When soil excavation is an unavoidable part of an approved facility development project,
9 the National Park Service will minimize soil excavation, erosion, and offsite soils
10 migration during and after the activity.
- 11 • For selected trail crossings create an erosion control plan before starting the project.
12 Include the specific practices to be implemented for controlling erosion and preventing
13 management-caused sediment from reaching the drainage. Ensure compliance by frequent
14 inspections.
- 15 • Locate crossing perpendicular to the channel on a straight stretch, whenever possible.
16 Although difficult when retrofitting old crossings or working with certain landforms, this
17 positioning will reduce the effects of streamflow energy on the structure itself as well as
18 impacts resulting from the redirection of flow against channel banks.

19 **Cumulative Effects**

20 There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed
21 within the park, none of which have an adverse impact on soils and geology. The incremental
22 impact of the action alternative when added to other past, present, and reasonably foreseeable
23 future actions would be negligible due to phasing of projects, locations within specific small areas
24 of the park, and use of mitigation measures during and after construction. Within some of the
25 proposed actions, the incremental impact would be long-term and positive due to vegetation
26 management strategies, prescribed burn procedures and mitigation, and trail removals and re-
27 alignments that prevent ongoing and serious soil erosion.

28 **Conclusion**

29 There will be a number of disruptions to surface soils due to construction and grading within the
30 proposed actions of alternative 2. Most impacts are associated with specific small areas of the

park and would last for the most part through the time of project completion. Mitigation measures will ensure negligible impacts to soils and geology.

Thinning and clearing of woodland is extensive in this alternative for establishment of interpretive nodes and historic viewsheds. Tree removal is anticipated to lead to soil disturbance and erosion, particularly for removal of woodland and management of bottomland woods. Once new savanna-like conditions are established, soil erosion and disturbance would be abated.

Construction of trail crossings would have short-term minor impacts to soils due to construction of low structures or the restoration of existing fords. Subsequent stabilization through design and engineering of any crossing alternative and incorporation of mitigation measures would ensure no substantial consequence to soil fertility or natural physical features. Therefore, impacts to soils and geology would be long-term and minor.

Overall, minor adverse impacts to soils and geology would be expected. Long-term positive impacts to soils would be expected due to vegetation management techniques for soil stabilization, design of trail alignments to prevent steep grades and minimization of ongoing soil erosion maintenance associated with the trail system, and use of filter strips and vegetated swales beside the road to slow down water infiltration and pollutant movement into the groundwater or streams.

4.8.2 Prime and Unique Agricultural Land

ALTERNATIVE 1 (NO ACTION)

Impacts

Within alternative 1, there are no changes to current conditions. Existing management or maintenance strategies remain in place and include controlling trail erosion and deposition of sediment, limiting visitor access, and avoiding construction of new features or facilities. No further clearing would be undertaken within this alternative and current mowing and vegetation management regimens would continue. Prime and unique agricultural lands are recognized and included in natural resource mapping for the park and vegetation management strategies are in place for these areas. Strategies include keeping the areas of Peridge silt loam farmed as hayfields or other crop exhibits (Sharp cornfield and Sharp stubblefield); and Secash-Cedargap, Wilderness, and Pembroke categories farmed with corn, oats and orchard (Gibson oatfield, Ray

cornfield and orchard). Implementation of this alternative would result in negligible adverse impacts to prime and unique agricultural land.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park. Those related to the disturbance or the landscape or soils include: demolition of Double Spring structures and rehabilitation of the Farm Site; replacing Tour road waysides, and improvement of accessibility to a primary visitor use facility. None of these projects would have an impact on prime and unique agricultural land. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

The alternative 1 would not modify prime and unique agricultural land at Wilson's Creek National Battlefield. Negligible adverse impacts to this resource would be expected.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Approximately 908 acres fall into the category of prime farmland or soils of state importance. Most of the acreage that falls in the Peridge silt loam category is currently being farmed as hay fields (Sharp Cornfield and Sharp Stubblefield), as is some acreage that falls in the Secash-Cedargap, Wilderness, and Pembroke categories (Gibson Oatfield and Ray Cornfield and Orchard). These existing areas of cropfield will remain within this alternative and proposed actions would have no adverse impact on the prime farmland and soils of state importance.

The remainder of the prime farmland or soils of importance in the park are mapped and discussed within the *Wilson's Creek National Battlefield Natural Resource Condition Assessment Study*. Also the *Vegetation Management Implementation Plan* (2014) prescribes land uses and vegetation management for establishment of warm season grass fields within historic crop field areas. Warm season grass fields preserve the prime farmland and soils of state importance. They can be established using a modicum of soil amendments. Once established, they require few or no additional applications of herbicides or pesticides. Warm season grass field can be cut over for hay production, perpetuating historic agricultural land uses, or burned.

Specific actions within this alternative such as expansion of existing pedestrian trails; realignment and removal of pedestrian and equestrian trail segments with ongoing severe erosion on steep slopes; installation of an orchard exhibit at the Guinn house site; establishment of vegetation management practices and prescribed fire; clearing vegetation for ten new viewsheds and associated interpretation would have a negligible overall impact due to the limited amounts of surface soils with prime and unique qualities that would be disturbed by localized projects. None of the actions would change the agricultural land use that maintains these soils and there would be no threat to soil fertility or its natural physical features. Establishment of ten contemplative/interpretive nodes would result in permanent changes in land use from prime agricultural land to non-agricultural use. The total acreage is minimal so the impact is minor and will not change the character and quality of prime and unique agricultural land within the battlefield. Mitigation measures ensure the stabilization and preservation of these soils.

Establishment of an orchard at the Guinn house site would be a positive impact on prime farmland, by ensuring appropriate land use in an area of prime agricultural lands. These soils are recognized and included in natural resource mapping for the park and vegetation management strategies are in place for these areas. Therefore, adverse impacts to prime and unique agricultural land would be negligible. Implementation of mitigation measures would ensure the viability and quality of the soils.

Mitigation

- In order to minimize the potential for temporary erosion impacts to soils during construction, erosion and sediment control measures would be implemented for each project undertaken for construction.
- Identification of specific areas of prime and unique agricultural land is required and establishment of management strategies for the soils in conjunction with changing land use and associated vegetation.
- The National Park Service actively seeks to understand and preserve soil resources, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy. When soil excavation is an unavoidable part of an approved

facility development project, the National Park Service will minimize soil excavation, erosion, and offsite soils migration during and after the activity.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on prime and unique agricultural land. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be positive as additional appropriate land use is established and vegetation management recommendations are implemented.

Conclusion

There would be negligible adverse impacts to prime and unique agricultural lands in this alternative. Project phasing and location in specific areas within the park and implementation of mitigation measures are recommended to minimize impacts from project specific construction over a limited time period. Land use management and vegetation management protect these soils and preserve them due to their unique qualities and potential for crop development. Proposed expansions associated with interpretation, circulation, and vegetation management would be carefully surveyed and designed to avoid these unique soils.

4.8.3 Water Resources/Floodplains

ALTERNATIVE 1 (NO ACTION)

Impacts

Protection of floodplains will continue with the current management and maintenance strategies in place. The current landscape patterns of spatial organization composed in part by riparian woodlands along stream corridors and floodplains will also be perpetuated. Within this alternative, there is no comprehensive management strategy that would address the stabilization of the stream banks or the removal of invasive species or other dead or unhealthy vegetation within the floodplains of the streams and springs. Maintenance and management of existing water systems and features would continue as well as protection of creeks and springs. Current and ongoing management does not address restoration of the watershed or establishment of riparian buffers or forests along stream corridors. Location and number of springs need to be verified in the field and integrated into existing management of natural resources. Implementation of this alternative would result in the potential for undesirable changes to water quality, abundance of

aquatic life or floodplain morphology. If the changes occur, the impact to water resources and floodplains would be long-term and adverse. Mitigation measures would be required to ensure short term and minor adverse impacts associated with the continuation of water management strategies within this alternative.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on water resources and floodplains. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be short term and minor due to lack of management strategies for watershed restoration, stream bank stabilization, and riparian buffers or forests along the stream corridors and in the floodplain.

Conclusion

Implementation of alternative 1 over time would have an adverse impacts on water resources/floodplains due to the lack of management strategies associated with watershed restoration, stream bank stabilization, and riparian buffer and or forest vegetation along stream corridors. Mitigation measures would be required.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on water resources and floodplains include: restoration of the Wilson's Creek watershed; establishment of riparian buffers or forests along stream corridors; establishment of filter strips along roads and parking areas; and potential construction of trail fords or bridge crossings across Wilson's Creek and Skegg's Branch. Construction of trail crossings over streams and creeks range from a basic low-water unvented improved ford, to a low water bridge. Trail management objectives should be formulated before locating a new crossing or deciding to fix or replace an existing one. Formulating such objectives requires analyzing the entire trail location. Choosing the type of structure for any crossing is highly site-dependent. Depending on the site, the main advantages of low-water crossing over culverts and bridges may include: lower construction and maintenance costs; less channel and floodplain blockage; adaptability; and storm proofing. Low-water crossings are generally less expensive to construct. More often than

not, designs are less complicated, construction is quicker, and fewer material are involved. Although the initial cost of more complex low-water crossings may exceed those of simple culvert installations, the lower long-term maintenance and repair costs may still make selecting a low-water crossing more economical. Economic evaluation should take into consideration all lifecycle costs including maintenance, repairs, user costs, and environmental impacts. With proper planning and design of the improved ford as part of the entire trail system and incorporation of mitigation measures, both short-term or long-term adverse impacts to water resources and floodplains would be negligible. Changes in floodplain morphology would be negligible.

Low-water bridges are structures supported by piers or spread footings with a natural stream channel bottom. Although low-water bridges are usually the most expensive low-water crossing structures, they can maintain the best channel function and have the least adverse impact on natural resources. With proper planning and design of the low-water bridge as part of the entire trail system and incorporation of mitigation measures, both short-term (construction disturbances through the life of the project) and long-term (daily use by equestrian groups) direct adverse impacts to water resources would be minor.

Use of natural or unimproved fords would result in negligible impacts to water resources. No significant changes to creek or stream surface elevations would be expected. Mitigation measures would be implemented.

According to the National Wetlands Inventory, there are no delineated wetlands in the vicinity of the proposed actions within the park. Riverine wetlands are indicated along a segment of Wilson's Creek. Threats to these wetlands are usually from: reduced waterflow; introduced animals such as horses, cattle and pigs; introduction of fish; weeds; pollution from urban industrial and agricultural products; and livestock grazing around waterways. No of these conditions exist within the proposed actions of this alternative. There would be a negligible impact on riverine wetlands with the implementation of this alternative.

Mitigation

- Wide active flood plains that are frequently inundated often have high ecological value as groundwater reservoirs and as specialized habitats for wildlife. In addition to economical and other objectives, crossing objectives at sites like this should include minimizing the degree to which the trail and crossing obstruct flows on the floodplain.

- Plan and schedule all construction activities to prevent erosion and sedimentation, which could cause possible adverse impacts to water resources and floodplains.
- When feasible, schedule activities in and near the channel during the dry season, or for a time period when precipitation and runoff are unlikely. Stop construction during times when soils are too wet for equipment to operate without increasing the potential for water resource degradation.
- Minimize destruction, loss or degradation of wetlands and floodplains, and preserve their natural and beneficial values.
- Impacts on riverine wetlands would be avoidable. No wetland fill would occur without authorization from the Army corps of Engineers and appropriate permitting under the Clean Water Act.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on water resources and floodplains. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long term and positive due to management strategies for watershed restoration, stream bank stabilization, and riparian buffers or forests along the stream corridors and in the floodplain. Short-term adverse impacts within alternative 2 would not contribute to a cumulative adverse impact.

Conclusion

There would be long-term positive impacts to water resources with the implementation of this alternative. Contributing to the positive impacts are the restoration of the riparian buffers along stream corridors and restoration of the watershed. Other BMP strategies proposed in this alternative would also contribute to positive impacts. The proposed clearing of vegetation for expanded interpretation, trails and trail crossings would be localized and short-term and sediment run-off into streams would be limited once the soils are stabilized and integrated into the larger vegetation management strategies within the park. Proposed viewsheds would have a long-term impact as the vegetation would be permanently changed from riparian forest to more view-opening, short, grassland vegetation. This clearing would be localized and impacts negligible to water resources/floodplains. Action projects within this alternative would not cause changes in

the ability of a floodplain to convey floodwaters and its values and functions would be undetectable. Actions would not contribute to enhancing flood events.

4.8.4 Water Quality

ALTERNATIVE 1 (NO ACTION)

Impacts

Protection of surface water and ground water is a management priority and currently water quality has shown improvement since the 2009 Natural Resources Condition Assessment. Protection will continue with the current management and maintenance strategies in place. Wilson's Creek and other streams on the battlefield landscape are continually monitored for waterflow patterns and physical interaction among a stream, its streambed, and the surrounding land. Levels of salts, nutrients, contaminants, and sediments are also monitored to ensure standards are met for water quality. There is also continuous maintenance for trails to prevent sediment runoff from erosion and strategic mowing near the water's edge to prevent additional sediment loading into the creek. There would be no adverse impacts to water quality with the implementation of this alternative.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on water quality. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

Alternative 1 would not modify water quality at Wilson's Creek National Battlefield, and will continue with current management and maintenance strategies in place. No direct or adverse impacts to water quality would be expected. Protection of water resources would continue, but there would be no restoration of the riparian buffer in the stream corridors or management for restoration of the watershed or any other planned projects that target the improvement of water quality. This limits the opportunity to further enhance water quality and ensure it meets and exceeds the standards required.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on water quality include: restoration of the watershed and establishment of riparian buffers along stream corridors; establishment of filter strips along roads and parking areas, extensive clearing of vegetation for establishment of viewsheds, trail expansion and contemplative nodes for interpretation and visitor use and experience, and construction of trail fords or bridge crossings across Wilson's Creek and Skegg's Branch.

Riparian buffers help to protect water quality by filtering overland run-off and pollutants. "Vegetative buffers that edge watercourses for a minimum of 30 meters on either side help maintain good water quality by controlling erosion, sediment, and the flow of pollutants into watercourses."² Healthy riparian communities can contribute to various important functions: sediment filtering, bank stabilization, water storage and release, and aquifer recharge. The action alternative recommends that the park establish and manage Resource Protection Areas – margins of creeks, rivers, and other bodies of water – and Resource Management Areas – isolated wetlands, floodplains, highly erodible soils, and highly permeable soils – to protect water quality.³

Vegetative filter strips (also called grass filter strips or grass buffer strips) are used to filter and clean sediment, organize material, nutrients, chemicals, and other pollutants from run-of water as it leaves a non-point source. Sources at WICR include crop fields, equestrian staging areas, tour road and tour road pull-offs, and parking areas. Planted with densely growing or clump-forming grasses, filter strips are particularly crucial at locations edging drainages, streams, sinkholes, drainage wells, ponds, or wetlands to protect surface water. Laced between pollution sources and water resources, these planted filter systems can effectively mitigate soil erosion and polluted run-off.⁴

For these reasons, positive impacts to water quality would be expected within the context of the park and region with the implementation of the actions within this alternative.

Actions associated with construction projects including expanded interpretation, trail and trail crossings, clearing of vegetation, and development of a new tour stop and contemplative nodes

² *Wilson's Creek National Battlefield Vegetation Management Implementation Plan*, Wilson's Creek National Battlefield, Department of the Interior, National Park Service, Republic, Missouri, April 2014. p 6.

³Ibid.

⁴ Ibid. p.28.

would have localized minor adverse impacts on water quality. Incorporation of mitigation measures, phasing of projects and limited duration of disturbances, and proper planning and design of the low-water bridge or natural ford ensure that both short-term and long-term impacts to water quality would be minor. Water would remain well within quality standards or criteria and within historical or desired water quality conditions.

Mitigation

- NPS will be required to monitor trail use/erosion and make adjustments on carrying capacity based on monitoring findings.
- Best Management Practices (BMPs) are required to support the implementation and management of the actions.
- Vegetative filter strips will be used to filter and clean sediment, organic material, nutrients, chemicals, and other pollutants from run-off water as it leaves a non-point source. Placed between pollution sources and water resources, these planted filter systems can effectively mitigate soil erosion and polluted run-off.
- To best protect water quality, a general erosion-control plan and a project plan should be developed, incorporating specific structure design elements aimed at preventing bed and bank erosion and local scour, and implementing BMPs. BMP's exist for a wide variety of management activities, including those both in and near the channel.
- Plan construction projects during the dry season or periods of low flow if possible.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on water quality. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long term and positive due to management strategies for watershed restoration, stream bank stabilization, and riparian buffers or forests along the stream corridors and in the floodplain. Short-term adverse impacts within alternative 2 would not contribute to a cumulative adverse impact.

Conclusion

There would be long-term positive impacts to water quality due to actions proposed in the alternative. Protection of water resources would continue and there would be a targeted effort at

restoration of the riparian buffer in the stream corridors and management for restoration of the watershed. This alternative provides the opportunity to further enhance water quality and ensure it meets and exceeds the standards required into the foreseeable future. Long-term positive impacts to water quality would be expected due to vegetation management techniques, slope stabilization, and riparian buffer restoration. Localized impacts due to specific construction projects would be minor with the incorporation of mitigation measures and project phasing.

4.8.5 Vegetation

ALTERNATIVE 1 (NO ACTION)

Impacts

Vegetation Management at Wilson's Creek National Battlefield is currently guided by the *Vegetation Management Implementation Plan* (2014) that is consistent with previous planning efforts for the park. These include: *Vegetation Classification and Mapping of Wilson's Creek National Battlefield* (2013); *Fire Management Plan* (2004); *Cultural Landscape Report* (2004); *General Management Plan* (2003); and *General Management Plan Amendment* (2007).

Current mowing and vegetation management and maintenance regimes within this alternative would remain in place. Deciduous forest will continue to move through successional stages to close-canopy, climax forest typical of the region. Riparian forests will remain in small areas and will not be expanded to cover more length and breadth of streams and Wilson's Creek banks. Existing restored prairie will continue to be monitored and maintained with prescribed burns. Ruderal grasslands will continue to be mowed.

These regimes do not include glade restoration, clearing of cedars that overrun glade habitat, extensive management of invasive species or clearing for additional historic viewsheds associated with interpretation within the context of the cultural landscape. Current viewsheds will be maintained and existing landcover character and patterns will be maintained. Projects proposed in the *Vegetation Management Implementation Plan* (2014) would become part of ongoing and future park planning as funding becomes available.

Within the no action alternative, current vegetation management that does not address plant species of conservation concern (glade habitat for the Missouri Bladderpod) or extensive management of invasive species. Continuing with current management would have a direct and long-term adverse impact on the species of concern.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have short-term adverse impacts on select vegetation. Long-term effects on many of the other plant communities will be negligible with this alternative. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would result in long-term and adverse impacts due to lack of implemented management strategies for restoration of the glades, clearing of cedars, and extensive control of invasive species.

Conclusion

Implementation of this alternative would have long-term adverse impacts on vegetation due to the lack of management strategies associated with specific vegetation species of concern and its habitat and with invasive species. There would be incremental positive impacts to vegetation in this alternative, if projects within the *Vegetation Management Implementation Plan* (2014) are developed in the future.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

The *Vegetation Management Implementation Plan* (2014) defines treatments and identifies pathways based on current vegetation to accomplishing objectives to protect and restore native plant communities, restore and enhance critical viewsheds, restore riparian corridors and their function, establish field and historic vegetation exhibits, and interpret missing 1861 farmsteads, all while controlling invasive vegetation which the park identified in previous documents. The proposed actions in this alternative are based on the projects outlined and described in the *Vegetation Management Implementation Plan* (2014). The plan provides a vehicle for implementation of many of the actions within alternative 2.

Specific actions resulting from the implementation of this alternative and associated with potential impacts on vegetation include: clearing of newly acquired parcel to the southeast and integration into savanna management practices, establishment of a day-use picnic area in the Double Spring parcel; equestrian parking re-location; rehabilitation of existing horse trailer parking area; expansion of existing pedestrian trails; realignment of pedestrian and equestrian trail segments with ongoing severe erosion on steep slopes; establishment of a new Tour Road

1 Stop 1 in conjunction with a cleared viewshed; installation of an orchard exhibit at the Guinn
2 house site; establishment of eleven contemplative/interpretive nodes; clearing vegetation for ten
3 new viewsheds and associated interpretation; installation of buffer plantings; rehabilitation of
4 glade communities; establishment of a 25-foot deer management zone between the edge of the
5 woodline and the park boundary fence along Elm Street (Farm Road 182) and State Highway ZZ;
6 rehabilitation of savanna and open mixed forest communities; preservation and protection of the
7 Manley Woods community and cultural vegetation such as the Osage orange hedgerow, the
8 groves of trees associated with the Edgar and Manley cemeteries, and the sugar maple trees near
9 Tour Road stop 5; and restoration of the watershed and establishment of riparian buffers along
10 stream corridors.

11 Actions associated with construction or realignment of trails and trail crossings, a new tour stop, a
12 day use picnic area on the Double Spring parcel, buffer plantings, and a new equestrian parking
13 lot, would be localized within the park and disturbance would occur only during the time of the
14 project implementation. Impacts would not threaten the viability of plant communities or native
15 plant species and the site easily recover from temporary disturbance. Mitigation measures are
16 required to ensure that short-term impacts are minor and do not extend to long-term impacts.
17 Mitigation would include selection of appropriate staging locations for equipment and materials
18 for all projects and erosion and sediment control measures would be incorporated during any
19 level of construction.

20 Some savannas and most of the open mixed forest at Wilson's Creek National Battlefield are
21 overcrowded with pole-sized, evenly-aged trees, which are growing at densities far higher than
22 those recorded historically on the Springfield Plateau. These communities have lost their native
23 groundcover due to extensive shading, overgrazing, and competition from invasive species.
24 Restoration of these areas is critical to the stabilization of the water courses of Skegg's Branch,
25 Terrell Creek, and Wilson's Creek.

26 Savanna and open mixed forests communities are scattered across Wilson's Creek National
27 Battlefield. A relatively high-quality remnant of savanna exists along the west-facing bluffs of
28 Wilson's Creek, above the old railroad bed. Rehabilitating savanna communities should be
29 considered for all areas of the park not specifically identified in other treatments. Rehabilitating
30 Savanna communities are compatible with and should be done in conjunction with rehabilitation
31 of glades, establishment of riparian buffers, establishment of filter strips, and the re-establishment

of critical viewsheds.⁵ The recommended vegetation management and park-wide coordination in this alternative would have long-term and positive impacts on establishing desired vegetation communities.

At Wilson's Creek National Battlefield, invasive species have dramatically reduced species biodiversity and altered the natural systems that once sustained the native landscapes. It is required that a well-developed invasive species control plan specific to the Battlefield be an integral part of the actions implemented within this alternative. This would have a long-term and positive impact on desired native vegetation.

Mitigation

- Temporary barriers extending to tree driplines are required to protect existing trees and shrubs that are not identified for removal, specifically during clearing for battlefield viewsheds.
- Follow BMPs for vegetation removal and thinning. Perform cutting or thinning in the fall and winter. Minimize the use of heavy vehicles; restrict use to times when soil is firm. If felled trees are to be removed, remove without dragging, which gouge the ground surface. Prescribed burns should be used to remove felled trees (fuel loads) when feasible, thus reducing the labor required to mechanically remove felled trees.
- Employ measures to stabilize soil and minimize erosion
- Perform work in phases to ensure that the minimum amount of vegetation possible is removed to meet interpretive needs.
- Utilize thinning and gradual removal of trees over clear-cutting in most areas. One exception will be in eastern redcedar stands where clear-cutting would be appropriate.
- Monitor for growth of invasive materials after clearing, and introduction of new plantings and seed distribution.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have short-term adverse impacts on vegetation. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future

⁵ Vegetation Management Implementation Plan, p.16.

actions would be long term and positive due to implementation of management strategies for restoration of the glades, clearing of cedars, and extensive control of invasive species. Short-term and minor impacts within alternative 2 due to actions associated with construction activity and clearing of vegetation would not contribute to a cumulative adverse impact.

Conclusion

There would be short-term adverse impacts on vegetation within this alternative. Mitigation measures are required to ensure the short-term adverse impacts would not become long-term adverse impacts. Actions in this alternative align with proposed projects in the *Vegetation Management Implementation Plan* (2014) and provide detailed guidance on the implementation of actions within this alternative. These actions would have a long-term and positive impact on desired vegetation assemblages.

4.8.6 Wildlife

ALTERNATIVE 1 (NO ACTION)

Impacts

Existing habitat that supports the current diversity of bird, mammal, and reptile populations that inhabit the park landscape will remain within this alternative. Over time, the existing successional woodland would continue to mature promoting growth in some wildlife habitat and populations. Guidance is afforded for fire management activities through the existing *Fire Management Plan* (2004) with objectives that include: rehabilitation and preservation of oak savanna, prairie and glade habitats; enhancement of native species; protection and enhancement of Missouri bladderpod; reduction of encroachment of species such as eastern red cedar and lespedeza; and encouragement of proliferation of native plants and historic densities of those plants. Within this alternative, this guidance would help to maintain wildlife diversity and create new habitat. Implementation of the no action alternative would result in no adverse terrestrial impacts, however since water quality would not be improved with this alternative the polluted water of Wilsons' Creek will continue to have negative impacts to wildlife and wildlife habitat.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have short-term adverse impacts on wildlife. The incremental

1 impact of the no action alternative when added to other past, present, and reasonably foreseeable
2 future actions would be negligible.

3 **Conclusion**

4 Alternative 1 would not change existing conditions of the water in Wilson's Creek that impacts
5 wildlife due to their need of clean water for drinking and bathing. Minor adverse impacts to
6 wildlife would be expected, with no change in water quality. This impact may cause harm to
7 localized or individual wildlife species, but the viability of the wildlife populations and
8 communities if left alone, would recover.

9 **ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)**

10 **Impacts**

11 Specific actions resulting from the implementation of this alternative and associated with
12 potential impacts on wildlife and wildlife habitat include: expansion of the existing trail system;
13 realignment of trail segments subject to erosion; installation of an orchard exhibit at the Guinn
14 House site; establishment of contemplative/interpretive nodes at 10 locations; clearing of
15 vegetation for viewsheds; rehabilitation of glade communities; rehabilitation of savanna and open
16 mixed forest communities; prescribed fire for vegetation management; preservation and
17 protection of Manley Woods; restoration of the watershed; and establishment of riparian buffers
18 along stream corridors. These actions would be localized in small areas of the park and
19 undertaken in phases in order to minimize impacts. There would be no permanent displacement
20 of wildlife species nor would there be any threat to the viability of the species community. Long-
21 term impacts would be negligible and mitigation measures ensure the stabilization, preservation
22 and expansion of wildlife habitat in the battlefield landscape.

23 Clearing of the parcel acquired to the southeast and integration into savanna management
24 practices will have long-term positive impacts for obligate grassland bird species as it will create
25 new habitat. It will also have long-term negative impacts to obligate interior forest bird species
26 due to habitat disturbance. The impact would not threaten the viability of obligate interior forest
27 bird species communities, but could displace them to other areas of forest in the surrounding
28 landscape. Implementation of the vegetation management recommendations within this
29 alternative which are based on the *Vegetation Management Implementation Plan* (2014), will
30 ensure wildlife habitat diversity and the preservation of wildlife species within the park. Specific
31 recommendations for vegetation management that have a positive impact on wildlife and wildlife

habitat include: rehabilitation of savanna and open mixed forest communities; rehabilitation of glade communities; preservation and protection of the Manley Woods community; establishment of riparian buffers or forest along stream corridors, and improvement of water quality through reduced sediment and pollutant loading.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have short-term adverse impacts on wildlife. Projects such as the demolition of Double Springs structures and rehabilitation of the farm site, replacing tour road waysides, and mowing, fire, and herbicide treatments would have localized and short-term impacts on birds and small mammals due to temporary habitat disturbance. The incremental impact of alternative 2, when added to other past, present, and reasonably foreseeable future actions would be long-term and positive for the desired future conditions of the park.

Conclusion

There would be no long-term adverse impacts on wildlife and wildlife habitat from implementation of this alternative. Most impacts would be localized and associated with specific proposals for trail development, expanded interpretation, and extensive vegetation management. Due to vegetation management recommendations within this alternative that are based on the *Vegetation Management Implementation Plan* (2014), wildlife habitats will be improved and expanded, a positive impact on wildlife and their habitats within the park.

4.8.7 White-tailed Deer

ALTERNATIVE 1 (NO ACTION)

Impacts

Within this alternative, there would be no strategy for the reduction of the deer population at Wilson's Creek National Battlefield. Deer become vulnerable to overpopulation, disease, and starvation in the absence of natural predators and hunting. When deer occur in high densities, diseases are transmitted more readily as well (NPS Heartland I&M Monitoring website). Due to increased development, altered ecosystems, and concerns over visitor safety at Wilson's Creek National Battlefield, Heartland Inventory and Monitoring (I&M Network) has continually monitored deer population at Wilson's Creek National Battlefield since 2005. Using an index of deer density, they are able to identify annual changes in the deer population. There was a sharp

decline recorded in the population between 2005 and 2007. This coincides with an outbreak of hemorrhagic disease. There was a significant increase in population size after the lowest estimation in 2007. The 2016 index of deer density increased sharply from the previous index to a record level of 158 individual deer per square kilometer. The 2016 deer density in the survey areas was 191% above the 12-year average. Long-term trends in deer abundance provide one measure of assessing their potential as a problem for the park. Monitoring data also help managers assess safety risks from deer-vehicle collisions and disease transmission. Long-term monitoring of deer numbers is critical in evaluating any population control measures the park may implement.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have an impact on the white-tailed deer. The additional forest in alternative 1 provides over-winter cover and seasonal sanctuary from hunting pressures outside the park. As forests are converted to savanna this cover will be diminished. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be regional, direct and adverse due to the unchecked population growth of the deer within the context of this alternative.

Conclusion

Within the no action alternative, there would be significant (health and safety issues to the public and direct impacts on the human environment) adverse impacts to the park and the land surrounding the park boundaries if the deer population is not reduced. If current numbers remain or increase, the threat of disease is high. This presents a high survival threat for individual deer hence, negative impacts for them. The issues associated with collisions with deer will increase with the increasing population. At risk would be the safety and well-being of the public and visitors to Wilson's Creek National Battlefield. There are also direct and adverse impacts on the cultural landscape due to destruction of vegetation by the deer population.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Deer Density Goal

The Interdisciplinary team has established a deer density goal that is within a range between the lower ecological carrying capacity (1-4 deer per square kilometer) and the upper biological

carrying capacity (77 deer per square kilometer). This density range would be used as a target to reduce deer numbers as a part of the management action. Deer density goals and subsequent management strategy for population reduction would have a positive impact on the overall health and condition of the remaining herd. As such, it is important the number of deer be reduced to the targets identified in support of CLR treatment plan implementation. Target densities numbers would be designed to protect the survival of the species within the park without threatening the viability of the deer population.

The proposed management strategies for reduction of the deer population within the park include direct lethal reduction using fire arms or archery equipment. Actions necessary to facilitate sharp shooting may include: setting up bait stations, locating deer, sharpshooting, and processing and disposition of deer meat and carcasses. These actions are subject to mitigation measures to ensure human health and safety, the quality of the visitor experience and access to the park, and clear communication to the public of the actions taking place and the effects of these actions on the visitor experience. These actions would have a long-term positive impact on the white-tailed deer population and health. Mitigation measures ensure the impacts are positive for the deer reduction as well as for the visitor use, safety and experience within the park.

Mitigation

- Personnel engaged in direct reduction of deer for this plan would have appropriate skills and proficiencies in the use of firearms or archery equipment for the removal of wildlife and the protection of public safety.
- NPS will use only professional sharpshooter, contractor personnel, volunteer nonprofit groups, public volunteers or NPS staff for the actual shooting in cull operations.
- All volunteers and partners would be supervised and managed in the field by NPS personnel during deer management actions
- Sharpshooting would occur during the day or night as necessary to increase efficiency and effectiveness of culling operations.
- Operations would occur during the late fall and winter months when deer are more visible and less visitors are in the park.
- Management exhibits would be displayed at the visitor center, and information would be posted on the Battlefield's website to inform the public about deer management actions.

- Visitor access would be limited as necessary while reductions were taking place and NPS rangers would patrol public areas to ensure compliance with area closures and public safety measures.
- Bait stations would be placed in an area asway from public use, to maximize the efficiency and safety of the reduction program.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on the deer population. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long-term, direct and positive to deer herd health due to implementation of strategies to reduce population numbers within the context of this alternative.

Conclusion

Within the proposed actions of alternative 2, there would be a positive impact to the white-tailed deer species due to the reduction of the population. Growing deer populations will have adverse impacts on their own species by limiting the quantity and quality of available food resources and increasing susceptibility to disease and starvation during severe winters. Results include a healthier herd of animals with reduced numbers to meet carrying capacity that also meets goals for protection of other park resources. Actions necessary to implement the deer reduction management program would have short-term and negligible impacts on human health and safety, the quality of the visitor experience, and restoration of vegetation.

4.8.8 Threatened and Endangered Species

ALTERNATIVE 1 (NO ACTION)

Impacts

During informal consultation with U.S. Fish and Wildlife Service (USFWS) the following comments were given to the park pursuant to the Fish and Wildlife Coordination Act (16 U.S.C.661 et seq.), National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544). Federally listed species, proposed species, candidate species and designated and proposed critical habitat associated with Wilson's Creek National Battlefield include: Gray bat (*Myotis septentrionalis*); Indiana bat (*Myotis*

sodalis); Northern long-eared bat (*Myotis septentrionalis*); Missouri bladderpod (*Lesquerella filiformis*); Virginia sneezeweed (*Helenium virginicum*); and Ozark cavefish (*Amblyopsis rosae*).

Within this alternative, existing habitat that supports the Missouri bladderpod will continue to diminish in size and quality due to lack of glade restoration and the proliferation of the eastern red cedar within the glade communities. Current fire management regimes as prescribed in the Fire Management Plan (2004) will continue within this alternative and help somewhat in clearing glade areas and protecting the Missouri bladderpod. Based on the current delineation of glades, Missouri bladderpod occurs on six glades at Wilson's Creek National Battlefield: Bloody Hill glade (BHG); Manley Woods glade (MWG); North Bloody Hill glade (NBHG); Northwest Bloody Hill glade (NwBHG); Terrell Creek glade (TCG); Walnut glade (WnG); and Wire Road glade (WRG).

Current management regimes protect the McElhaney Branch cave, habitat for the endangered gray bat which was last documented there in 1996, the Indiana bat, the Northern long-eared bat, and the Ozark cavefish all of which have not been identified or recorded within the battlefield. Current protection of the cave and its hydrology ensures provision of habitat if these species should migrate to the battlefield landscape. Current management would also include monitoring for the presence of these species within the park. Virginia sneezeweed populations have not been identified within the park. Current cyclical management would continue to provide opportunities for this species to develop and thrive within the park. Major threats to this species include agriculture and residential land development, which does not occur within the park. Current management would also include monitoring for the presence of Virginia sneezeweed within the park.

Current and continuing management practices for protection of endangered species listed above from USFWS will continue within this alternative. Within this alternative, there is direct and long-term adverse impact on Rare, Threatened, and Endangered Species due to the continued reduction of the glade communities and thus the habitat for the Missouri Bladderpod.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on rare, threatened, or endangered species. The incremental impact of the no action alternative when added to other past, present, and reasonably

foreseeable future actions would be long term and adverse due to lack of implemented management strategies for restoration of the glades and re-establishment of the habitat of the Missouri Bladderpod. There would be no incremental adverse impact on the remainder of the species discussed above.

Conclusion

Implementation of the no action alternative would have long term, and direct adverse impacts on rare, threatened and endangered species due to the lack of management strategies associated with glade restoration and removal of eastern red cedar, thus diminishing the habitat and survival rates for the Missouri Bladderpod.

Implementation of the no action alternative would have no adverse impact for the three bat species, the Ozark cavefish, or the Virginia sneezeweed due to existing management practices. There would be some positive impacts to rare, threatened, and endangered species in this alternative, if projects within the Vegetation Management Implementation Plan (2014) are developed in the future. The positive impact from this plan would be for the Missouri bladderpod with restoration of the glade habitat.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on rare, threatened, and endangered species include specific vegetation management recommendations. Based on the *Vegetation Management Implementation Plan* (2014) this alternative recommends the rehabilitation of glade communities; rehabilitation of savanna and open mixed forest communities; prescribed fire vegetation management; preservation and protection of Manley Woods; and establishment of riparian buffers or forests along stream corridors.

Once nearly treeless, the remnant glade communities at Wilsons' Creek National Battlefield are now threatened by a proliferation of Eastern redcedar (*Juniperus virginiana*). Left unmanaged, cedars encroach in glades thereby decreasing space for herbaceous cover and eventually dominate the canopy, decreasing species richness and diversity. The cedars shade out native species, cool the substrate below, deplete available water, and alter soil chemistry. This change in light availability and cooling effect changes the mass-heat relationships of the exposed bedrock

on which native glade plant and lichen species are dependent. The shaded conditions have allowed for a proliferation of invasive Asian annual grasses such as Japanese chess (*Bromus japonicus*), which in addition to the cedars, will require management to control.

Although scarcely resembling their former extent or character, the glades still retain a number of lichens and herbaceous plant species requiring conservation and should be classified as significant natural features to be protected. With proper management, these areas will become healthier; increasing the habitat potential for the park's endangered plant species, in particular the Missouri bladderpod.⁶

For the re-establishment of glade communities, measurable objectives for managing glade communities are indicated in the *Fire Management Plan* (2004) and in the *Vegetation Management Implementation Plan* (2014).

Current management regimes protect the McElhaney Branch cave, a potential habitat for the endangered Gray bat, the Indiana bat, the Northern long-eared bat, and the Ozark cavefish. Current and continuing management practices for protection of these endangered species will continue within this alternative. Actions within alternative 2 will have a positive impact on these species due to the protection and enhancement of the stream riparian buffers, protection of the floodplain, enhancement of water quality including the cave stream, and vegetation management that ensures enhancement of the forest and woodland vegetation.

The actions proposed in alternative 2 have a direct, long-term and positive impact on rare, threatened, and endangered species.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on rare, threatened, or endangered species. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long term and positive due to: implementation of management strategies for restoration of the glades and re-establishment of the habitat of the Missouri Bladderpod; implementation of management regimes for protection of the McElhaney Branch cave, habitat for the endangered bats and Ozark cavefish, and implementation of vegetation management regimes that preserve and enhance Manley Woods and other forest and woodland vegetation.

⁶ National Park Service. *Vegetation Management Implementation Plan* (2014) p.11.

Conclusion

The proposed vegetation management and maintenance and the inclusion of glade restoration and removal and management of eastern red cedar will have a long-term and positive impact on rare, threatened and endangered species, in particular the Missouri bladderpod.

Vegetation management regimes for McElhaney Branch cave and Manley Woods and other forest and woodland vegetation would have a long-term and positive impact on the Gray bat, the Indiana bat, the Northern long-eared bat, the Ozark cavefish, and the Virginia sneezeweed and their potential habitats within the park. Also, actions providing enhancement of riparian buffers, protection of the floodplain, and prevention of sediment runoff all improve water quality and thus the habitat for all of the rare, threatened, and endangered species. There would be a positive impact on these species.

4.8.9 Air Quality

ALTERNATIVE 1 (NO ACTION)

Impacts

Air quality in the area is generally good; the park and surrounding areas are in attainment for all National Ambient Air Quality Standards. Current prescribed fire activities based on the current *Fire Management Plan* (2004) would continue within this alternative and do not result in adverse impacts air quality. Growth of residential areas near park boundaries requires attention to smoke issues. Mitigation measures in the current Fire Management Plan (2004) will remain in place and include measures specific to air quality. There would be no adverse impacts to air quality with the implementation of this alternative.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an adverse impact on air quality. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

The no action alternative would not modify air quality at Wilson's Creek National Battlefield. No direct or adverse impacts to air quality would be expected.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on air quality include management strategies using prescribed burning for establishment and restoration of vegetation communities. The prescribed burning would have a short-term adverse impact on air quality. Due to the established guidelines and mitigation measures prescribed in the *Fire Management Plan* (2004), there would be no long-term adverse impacts.

The area is a Class II air quality location and visibility is generally good. Residential development north, east and west of the unit is increasing and those receptors are critical because of their proximity to prescribed fires. Additionally, the outer limits of the City of Springfield is only 6 miles to the northeast, in line with expected transport wind direction. The ability of the airshed to disperse the volume of smoke produced can be impaired occasionally. Due to the topography of the park, there is a tendency for residual smoke to settle into the creek bottoms, potentially affecting visitors, employees and residents. Prescribed burns are normally of short duration and have little effect on air quality past the initial burning period.⁷

Mitigation measures in the *Fire Management Plan* (2004) were developed to include potential impacts to air quality and would apply to prescribed burns in association with this alternative.

- In order to mitigate potential impacts of fuel treatment projects park staff will: suppress all wildland fires; and maintain a continuous corridor of trees at the very least a few trees deep (based on the canopy of a typical mature, bottomland, hardwood species) on both sides of Wilson's Creek.
- Prescribed fires – Fires to improve resource values will have a smoke dispersion component in the prescription. If smoke creates a prolonged hazard or significant nuisance, appropriate actions will be taken to mitigate the condition causing the problem or the fire will be suppressed.
- Sensitive areas – Planned prescribed fire ignitions in sensitive areas will be conducted either when visitation is low, or the Superintendent will restrict entry to areas potentially impacted by smoke.

⁷ Fire Management Plan for Wilson's Creek National Battlefield, (2004) p.57.

- Residual Smoke – When a fire has burned for an extended period of time and generated a lot of residual smoke, the NPS will consider appropriate actions to minimize additional smoke production.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, most of which have no impact on air quality. There will be continued prescribed burns as part of ongoing vegetation maintenance and management. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be minor, as prescribed burns produce short-term adverse impacts and are required to follow precise mitigation measures to prevent long-term adverse impacts.

Conclusion

There would be no long-term adverse impacts on air quality from implementation of this alternative. Short-term adverse impacts would be mitigated based on recommendations prescribed in the *Fire Management Plan* (2004). With the mitigation measures in place for the park, there would be no long term adverse impact to air quality.

4.9 Cultural Resources

4.9.1 Archeological Resources

ALTERNATIVE 1 (NO ACTION)

Impacts

There would be no new ground-disturbing activities that would potentially affect known archeological resources within this alternative. Current management and monitoring is based on a substantial amount of archeological investigation performed within the park boundaries. Because extensive survey and archeological sampling has been performed on a limited number of targeted, mostly historic sites, little is known about the archeological potential of the greater park landscape. Protection of archeological sites from prescribed burns is currently outlined in the *Fire Management Plan* (2004) and is part of existing management regimes within this alternative. Park management also relies on development of the 100 percent archeological inventory focused on the Civil War period in order to identify and protect currently unknown archeological sites. There would be no adverse impacts to archeological resources.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 “Assessment of Adverse Effects”) has been completed. The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on Archeological Resources.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an adverse impact on archeological resources. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

Overall, known archeological resources are part of the existing policies and processes maintained by the park for protection of cultural resources. The no action alternative would have no adverse impact on any archeological sites that may be potentially eligible for nomination to the National Register. Location of unknown sites needs to be expanded and completed in order to protect archeological resources during routine maintenance, management, and future projects. No direct or adverse impact on archeological resources would be expected.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Alternative 2 includes some ground disturbance associated with implementation of some of the proposed actions. They include: trail expansion and trail realignment; clearing new land parcel to southeast and integration into savanna management practices; establishment of day-use picnic area in the Double Spring parcel; relocation of equestrian parking, restoration of area of existing equestrian parking; establishment of a new Tour Road stop #1; installation of interpretive waysides, cannon, and orientation exhibits; installation of an orchard exhibit at the Guinn house

1 site; establishment of eleven contemplative/interpretive nodes; clearing vegetation for ten
2 viewshed locations; installation of buffer plantings; rehabilitation of glade areas, management by
3 prescribed burning; rehabilitation of savanna and open mixed forest communities; relocation of
4 high-tension electrical lines underground or outside of the park; establishing filter strips along
5 roads and parking areas; and installation of porous concrete where vehicles park. Known
6 archeological sites would not be disturbed within this alternative.

7 Alternative 2 includes ground disturbing activities with the potential to encounter and adversely
8 impact previously unknown archeological resources. Potential adverse impacts would be
9 minimized by pre-construction surveys and monitoring in the areas with high potential for
10 artifacts. There is also potential for adverse impacts from prescribed burning as a tool for
11 vegetation restoration and management. The *Fire Management Plan* (2004) presents mitigation
12 measures for the use of prescribed burning and potential impacts on archeological resources.
13 These mitigation measure include: 1(In all locations every effort will be made to avoid damage to
14 identified resources during suppression and prescribed fire operations; and 2) Archeologists or
15 cultural resource specialists will be involved in all operations to the maximum extent feasible.
16 With mitigation measures and guidelines, this alternative would have no adverse impact to
17 archeological resources.

18 **Section 106 Summary**

19 NHPA section 106 regulations apply only to properties that meet the eligibility requirements of
20 the National Register. Therefore, the assessment of NHPA section 106 effects applies only to
21 those historic structures/cultural landscape features that are listed on the National Register or
22 those that meet National Register criteria for listing. The application of the Advisory Council
23 criteria of adverse effects (36 CFR 800.5 “Assessment of Adverse Effects”) has been completed.
24 The National Park Service has already commissioned a NRHP nomination update that will
25 propose inclusion of the 2011 study area as part of the expanded boundary of the property.
26 For purposes of Section 106 compliance there would be **no adverse effect** on archeological
27 resources.

28 **Cumulative Effects**

29 There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed
30 within the park, none of which have an adverse impact on known archeological resources. The

incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long-term and positive.

Conclusion

Overall, known archeological resources are part of the existing policies and processes maintained by the park for protection of cultural resources. Alternative 2 would have no effect on any archeological sites that may be potentially eligible for nomination to the National Register.

Location of unknown sites needs to be expanded and completed in order to protect archeological resources during routine maintenance, management, and future projects. Alternative 2 would not modify known archeological resources at Wilson's Creek National Battlefield. No direct or adverse impacts archeological resources would be expected.

4.9.2 Historic Buildings and Structures

ALTERNATIVE 1 (NO ACTION)

Impacts

Current management regimes within this alternative will continue and include repair and maintenance to deteriorated historic buildings, structures, and features on the battlefield landscape. This includes the maintenance and management of the Edgar and Manley cemeteries. Current management goals within this alternative are to protect and preserve the historic features that survive from the Civil War period, including the Ray House and spring house and various roads and trails. Within this alternative, preservation, protection, and maintenance of buildings and structures surviving from the 1861-1960 period of significance is ongoing. The alternative would limit the park's ability to rehabilitate the cultural landscape and its associated buildings and or structures to enhance and expand interpretation of the Battle of Wilson's Creek. This alternative would have long term and positive impacts on historic buildings and structures.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 "Assessment of Adverse Effects") has been completed.

The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on historic buildings and structures.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have a beneficial impact to historic buildings and structures. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be long-term and positive.

Conclusion

Current management and maintenance of historic buildings and structures and park goals of preservation of the rural and historical character of the park would result in no modifications to existing historic buildings and structures. Therefore, implementation of the no action alternative would result in no adverse impacts to historic buildings and structures.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Current management regimes within this alternative, will continue and include repair and maintenance to deteriorated historic buildings, structures, and features on the battlefield landscape. Also included is the maintenance and management of the Edgar and Manley cemeteries. Current management goals within this alternative are to protect and preserve the historic features that survive from the Civil War period, including the Ray house and spring house and various roads and trails. Within this alternative, preservation, protection, and maintenance of buildings and structures surviving from the 1861-1960 period of significance is ongoing.

The historic buildings and structures at Wilson's Creek National Battlefield will also be associated with expanded interpretation of the landscape context for the Battle of Wilson's Creek and for an individual building or structure and the entire domestic precincts of the Guinn, C.B. Manley, Sharp, Edwards, Gibson, Short, T.B. Manley, and Edgar house sites. Expanded interpretation that includes historic buildings and structures within the cultural landscape would have a long-term positive impact on historic buildings and structures within alternative 2.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA Section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 “Assessment of Adverse Effects”) has been completed. The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on historic buildings and structures due to proposed actions in alternative 2.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have a positive impact to historic buildings and structures. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long-term and positive.

Conclusion

These cultural resources are currently maintained and managed to retain their historical character. Expanded interpretation proposed within this alternative incorporates additional maintenance to building and structure sites and has a positive impact on the cultural resources. Alternative 2 would not modify historic buildings and structures at Wilson’s Creek National Battlefield. No direct or adverse impacts to these resources would be expected.

4.9.3 Cultural Landscape

ALTERNATIVE 1 (NO ACTION)

Impacts

Current management and maintenance within this alternative focus on preservation of the existing rural and historic character of the Wilson’s Creek National Battlefield cultural landscape and the current associated interpretive programs. Exploration of ways to utilize the cultural landscape as a tool for interpreting the historical context of the battle and the updated understanding of some battle events and troop movements is not part of continuing management within this alternative. Visitors would continue to gain most of their knowledge of the Battle of Wilson’s Creek across the cultural landscape through the exhibits located within the Visitor

Center and along the tour road, tour stops, pedestrian trails and their associated wayside interpretation. This alternative would limit the park in its ability to explain the historical context of the battle through visual association and interpretation of the cultural landscape. There is not a direct physical impact to the cultural landscape within this alternative, but there are limitations to its use in expanded interpretation of the Battlefield site. However, the increasing white-tailed deer population would cause a direct and significant impact to the cultural landscape due to heavy browsing of vegetation and subsequent loss of character-defining features.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 “Assessment of Adverse Effects”) has been completed. The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on the cultural landscape.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have a positive impact to the cultural landscape. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be long-term and positive.

Conclusion

Current management and maintenance of the cultural landscape and park goals of preservation of the rural and historical character of the park would result in no modifications to the existing cultural landscape. Therefore, implementation of the no action alternative would result in no adverse impacts to the cultural landscape.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts to the cultural landscape include: clearing of the parcel to the southeast and integration into savanna management practices; establishment of a new Tour Road stop #1; installation of orientation exhibits at trailheads, trail waysides, cannon, artillery waysides, an apple orchard exhibit at the Guinn House site; interpretation of the domestic precincts; establishment of contemplative/interpretive nodes; establishment of 10 viewsheds; deer population management; and restoration and vegetation management. These actions accomplish objectives to expand interpretation and integrate the cultural landscape into the story of the Battle of Wilson's Creek. Actions also accomplish objectives to protect and restore native plant communities, restore and enhance critical viewsheds, restore riparian corridors and their function, establish field and historic vegetation exhibits, and interpret missing 1861 farmsteads, all while controlling invasive vegetation within the park identified in previous documents. Impacts to the cultural landscape would be long-term and positive, due to vegetation management and expanded interpretation that integrates the cultural landscape into the interpretive story of the site. Visitors would be able to see and understand the role of the landscape in the Battle of Wilson's Creek. Also, due to deer population management within this alternative, the integrity, variety, and character of the cultural landscape would be protected from excessive deer browsing, trampling, and non-native seed dispersal. This would be a long-term and positive impact to the cultural landscape.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 "Assessment of Adverse Effects") has been completed. The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on cultural landscapes.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, some of which have a positive impact to the cultural landscape. The incremental

impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long-term and positive.

Conclusion

With implementation of the proposed actions in alternative 2, there would be a long-term and positive impact on the cultural landscape of Wilson's Creek National Battlefield. Proposed actions are based on the *Cultural Landscape Report* (2004) and updated for this document (See Appendix for the Updated Cultural Landscape Report). Implementation of proposed actions will also follow specific guidelines prescribed in the *Vegetation Management Implementation Plan* (2014).

4.9.4 Historic Viewsheds

ALTERNATIVE 1 (NO ACTION)

Impacts

The historic viewsheds associated with the east and west battlefield overlooks are maintained and managed within this alternative. No additional clearing for identified historic viewsheds will occur. This alternative would limit the park in its ability to explain the historical context of the battle through visual association and interpretation of the cultural landscape. There is no direct adverse impact to the existing historic viewsheds within this alternative. There is no management strategy to clear more historic viewsheds for expanded interpretation and enhancement of the visitor experience of the battlefield site. The no action alternative would not modify the existing historic viewsheds at Wilson's Creek National Battlefield. No direct or adverse impacts to historic viewsheds would be expected.

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures/cultural landscape features that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 "Assessment of Adverse Effects") has been completed. The National Park Service has already commissioned a NRHP nomination update that will propose inclusion of the 2011 study area as part of the expanded boundary of the property. For purposes of Section 106 compliance there would be **no adverse effect** on historic viewsheds.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on historic viewsheds. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be negligible.

Conclusion

Historic viewsheds at the east and west overlooks associated with interpretive waysides will be managed and maintained within this alternative. Current management and maintenance of the viewsheds and park goals of preservation of the rural and historical character of the park would result in no modifications to the existing historic viewsheds. Therefore, implementation of the no action alternative would result in no adverse impacts to historic viewsheds.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Re-establishment of 10 critical viewsheds associated with Civil War landscape is proposed within alternative 2 to support the interpretation of the Battle of Wilson's Creek. While this may be accomplished through woodland thinning in the short term, it is recommended that the park re-evaluate the quality of key views as other actions within this alternative such as rehabilitation of glades and savanna are initiated, and crop field exhibits are in place. This will result in the reduction of woody thickets that are currently obscuring views. Where views are particularly critical to interpreting the events of the 1861 battle, the action would proceed with clearing and thinning operations prior to vegetation community rehabilitation to establish these view corridors as soon as possible. As other treatment actions are implemented, a strong sense of what troops saw on the landscape during the battle will become apparent.⁸ Vegetation management in selected areas on the battlefield offers the best opportunity to improve critical views from multiple observer points within the park. Restoration of historic viewsheds will have a long-term positive impact to the cultural landscape as a result of expanded interpretation of the historical context of the battle, battle events, and troop movements across the landscape. Impacts to existing historic viewsheds are positive as they are maintained and managed as part of the proposed action of re-establishment of 10 additional historic viewsheds.

⁸ *Vegetation Management and Implementation Plan* (2014) p.31.

Mitigation:

- When clearing or disturbing an area's vegetation there is always the chance for introducing invasive, exotic plant species. Mitigation requires monitoring and implementation of the Updated Invasive Species Control Plan as outlined in the *Vegetation Management Implementation Plan* (2014)

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the National Register. Therefore, the assessment of NHPA section 106 effects applies only to those cultural landscape features including historic viewsheds that are listed on the National Register or those that meet National Register criteria for listing. The application of the Advisory Council criteria of adverse effects (36 CFR 800.5 "Assessment of Adverse Effects") has been completed. Under Alternative 2, the action alternative, viewsheds associated with the Civil War landscape conditions would be re-established and offer park visitors an understanding of the battle as it unfolded. For purposes of Section 106 compliance there would be **no adverse effect** on historic viewsheds.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, none of which have an impact on historic viewsheds. The incremental impact of the action alternative when added to other past, present, and reasonably foreseeable future actions would be long-term and positive due to the re-establishment of critical viewsheds in conjunction with guidelines and recommendations in the *Vegetation Management Implementation Plan* (2014).

Conclusion

Restoration of historic viewsheds in association with other interpretive additions within this alternative would have a long-term positive impact on the overall interpretive experience through visual associations with the cultural landscape that expand the understanding and knowledge of the Battle of Wilson's Creek. Overall, alternative 2 carefully considers and sensitively addresses the issue of clearing of historic viewsheds to expand interpretation and provide visitors with more complete understanding of the cultural landscape and how it looked during the battle period. The impact of the action alternative on historic viewsheds would be long-term and positive.

4.10 Visitor Use and Experience

ALTERNATIVE 1 (NO ACTION)

Impacts

Within this alternative, there are no additions to visitor facilities and the visitor experience begins at the visitor center. Within the visitor center, there is the Civil War research library that is open to visitors and researchers. Programs and interpretation guided by the Long Range Interpretive Plan will continue. Visitors will continue to access the park at the main entrance, park at the visitor center and drive along the tour road, stopping at the nodes of interpretation. The park would continue to manage and maintain the tour road and interpretive nodes and pedestrian and equestrian trails. Within this alternative there are no new visitor amenities and no expansion of interpretation using the cultural landscape as a tool for interpreting the events of the battle. The park will continue to offer the current array of opportunities and experiences that enhance visitor understanding of the significance of the battlefield landscape and its role in the Civil War west of the Mississippi River. The no action alternative would continue to have minor impacts on the visitor experience due to limited interpretation, limited visual access to the battlefield landscape as it existed during the war, and no trail expansion for physical site access.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, which have short-term positive impacts, associated with maintenance and management, to the visitor experience at Wilson's Creek National Battlefield. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be long-term and adverse as the overall visitor experience would remain the same, without expanded interpretation and use of the cultural landscape to help understand the full story of the Battle at Wilson's Creek.

Conclusion

Within this alternative, there are no additions of waysides and cannon, no creation of viewsheds identified as important in the interpretation of the battle, and no expanded knowledge of the entire extent of the Battle of Wilson's Creek across the landscape. Visitors would experience some occurrences of eroded trails that require constant maintenance. The park would be limited in its ability to explain the historical context within which the battle occurred and the updated

understanding of some battle events and troop movements that followed installation of current wayside exhibits. This alternative would have minor adverse impacts on the visitor experience due to the limitations of existing interpretation and use of the cultural landscape to tell the story of Wilson's Creek National Battlefield.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on visitor use and experience include: expansion of the pedestrian and equestrian trail system and re-alignment of trail segments; establishment of a new Tour Road stop #1; installation of upright orientation exhibits, trail waysides, cannon, artillery waysides, an orchard; expanded interpretation of domestic precincts; establishment of contemplative/interpretive nodes; establishment of 10 new historic viewsheds; vegetation restoration and management; establishment of a 25-foot deer management zone between the park boundary and adjacent roads; and institution of a program that diminishes deer populations within the park. Most actions proposed in this alternative strengthen and expand interpretation within the park and integrate the cultural landscape in telling the story of the Battle of Wilson's Creek. Proposed contemplative/nodes provide visitor comforts such as seating and shade. The deer management zone and the program for diminishing the deer population also enhances the visitor experience and directly addresses the ongoing issue of concern for visitors to the park. The proposed actions have a long-term positive impact to visitor use and experience at Wilson's Creek National Battlefield.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, which have short-term positive impacts, associated with maintenance and management, to the visitor experience at Wilson's Creek National Battlefield. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be long-term and positive for visitor use and experience at the Battlefield.

Conclusion

Overall, this alternative would have long-term positive impacts on visitor use and experience. Due to increased interpretive opportunities and features, improved and expanded education and communication, construction of new trails and realignment of others, development of

contemplative nodes with associated site furnishing and shade, and establishment of programs and strategies to manage and control the deer population, visitor use will expand and the visitor experience will be improved.

4.11 Human Health and Safety

ALTERNATIVE 1 (NO ACTION)

Impacts

Park personnel remain vigilant within this alternative about visitor safety issues dealing with severe summer weather, heat and humidity, hail storms, and tornadoes. Current and ongoing management and maintenance of trails, roads, exhibits, site furnishings, buildings, and vegetation would continue. There is also continued monitoring and maintenance of the park's signage that clarifies to visitors the separation of equestrian and pedestrian use. In 2016, the park completed the *Sign Inventory and Assessment* to help guide current and ongoing management. Deer population monitoring by Heartland I&M continues as the numbers grow and the incidents of collisions of deer with vehicles and bicycles continues to be a safety issue for the public. Agencies and park officials associated with the current Fire Management Plan (2004) for the park, continue to work to ensure the safety of the public during prescribed burns for vegetation management.

The no action alternative would not include an overall strategy for deer management and control of the growing deer population within the park. Even with ongoing monitoring, there would be long-term and significant impacts to human health and safety associated with the deer population within the park.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, which have short-term positive impacts associated with maintenance and management to human health and safety at Wilson's Creek National Battlefield. The incremental impact of the no action alternative when added to other past, present, and reasonably foreseeable future actions would be long-term and adverse due to the continued issue of visitor safety associated with the deer population within the park.

Conclusion

Within this alternative, there would be significant (immediate and unaddressed threats to human safety) adverse impacts on human health and safety. Continuing erosion challenges on trails would remain a safety hazard for both pedestrians and equestrians. The over-abundant population of deer within the park would not be reduced, and potential for collisions with vehicles and bicycles would remain high.

ALTERNATIVE 2 (PROPOSED ACTION AND NPS PREFERRED)

Impacts

Specific actions resulting from the implementation of this alternative and associated with potential impacts on human health and safety include: re-alignment of steep or eroded trail segments, and removal of steep and eroding trail segments; establishment of a 25-foot deer management zone between the park boundary and adjacent roads; and institution of a program that diminishes the white-tailed deer population within the park. Trail improvements within this alternative would have a positive impact on human health and safety. Elimination of dangerously steep trail segments and re-alignments of other segments prevents serious soils erosion and destabilization of trail surfaces. This is a positive impact for both equestrian riders and walkers along the interpretive trails.

The 25-foot deer management zone between the park boundary and adjacent roads as well as the initiation of a management program for reductions in the deer population has a direct and long-term positive impact on the health and safety of visitors to the park. The over-abundant population of deer would be reduced as would the potential for collisions with vehicles and bicycles.

Cumulative Effects

There are a number of past, ongoing, and reasonably foreseeable projects occurring or proposed within the park, which have positive impacts to human health and safety at Wilson's Creek National Battlefield. The incremental impact of alternative 2 when added to other past, present, and reasonably foreseeable future actions would be direct, long-term, and positive. The reduction of the deer population and subsequent downturn in collisions with vehicles and bicycles would have a long-term positive impact on human health and safety as would trail re-alignments and stabilization of trail surfaces for equestrians and pedestrians.

Conclusion

- 1 Overall, long-term positive impacts to human health and safety would occur due to proposed
- 2 actions in this alternative. Management of the deer population and the 25-foot maintained deer
- 3 management zone would result in a decline of vehicle and bicycle collisions with the deer along
- 4 the tour road and along roads that surround the park boundaries to the north, south, and west.
- 5 Additional positive impacts include realignment of trails currently experiencing ongoing and
- 6 severe erosion and establishment of contemplative/interpretive nodes for overall comfort, health,
- 7 and safety of visitors to the park.

