

Chapter 4: Environmental Consequences

4.1 Introduction

This section analyzes the effects of each alternative and the affected environment issues described in Chapter 3 of this document. The analysis includes effects of each individual alternative and compares the effects to other alternatives, to other reasonably foreseeable future actions in the Park and to actions that occur outside of the Park and in the region. The no action alternative (Alternative 1) is used to compare the effects of current Park actions and management direction with the proposed in the action alternatives. (NPS)

For the purpose of the Environmental Impact Statement (EIS), an issue describes an environmental problem or relationship between a resource and an action or actions. Impact analysis predicts the degree to which the resource will be affected.

Applicable Regulations and Guidelines. The applicable regulations and guidelines for the impact topics are outlined in Chapter 1, Purpose and Need of this document. Additional regulations and guidelines specific to the impact issue topics are provided under each impact section of this Chapter.

Methodology and Assumptions. This describes the methods used to predict the impact. The methods utilized are the best available at the time of this document and based upon literature review, existing information on impact topics, and the best professional judgment of Park staff and partners.

Impact Indicators. As directed by NEPA and NPS Director's Orders 12, considerations must include context, intensity, duration, and timing (1508.27) as described below.

Context. Context is the affected environment within which an impact would occur. This can include site-specific which is defined at trail element scale, local which is defined as the Park boundary, regional which is defined as within 20 miles of the Park boundary, or global affected interests which are beyond the 20 miles of the Park boundary.

Duration. Duration refers to the time period over which the effects of an impact persist. Duration of impacts is defined as follows.

Short-term – impacts last for less than 2 years, often quite less. This would include any temporary impacts such as construction associated with the alternatives.

Long-term – impacts last for more than 2 years, which would include impacts that are permanent. This Trail Management Plan is established to serve the Park for the next 15 years. The analysis period used for assessing impacts is up to 15 years.

Intensity. This refers to the severity of the impact. The intensity of an impact may be negligible, minor, moderate or major. Impact intensities will be described specifically under each impact topic. Impacts may be either beneficial or adverse, but intensity is described only for adverse impacts. Beneficial impacts are those that involve a positive change that moves the resource

toward a desired condition. Adverse impacts involve a change that moves the resource away from a desired condition or detracts from its appearance and condition.

Types of Impacts. As outlined in NPS Director's Orders 12, the following categories of impacts need to be considered and analyzed.

Direct effects (40 CFR 1508.8). Direct effects are caused by the alternatives at the same time and in the same place as the action.

Indirect effects. (40 CFR 1508.8) Indirect effects are impacts caused by the alternatives that occur later in time or farther in distance than the action.

Cumulative effects (40 CFR 1508.7) Cumulative effects are "additive" impacts to a particular resource and include impacts of actions in the past, present and the reasonable foreseeable future. The actions or projects that were identified and analyzed as part of cumulative effects are listed below.

4.1.1 Cumulative Impacts

The National Environmental Policy Act regulations administered by the Council of Environmental Quality require the assessment of cumulative impacts in the process for federal projects. "Cumulative impact" as defined in Section 1508.7 of NEPA, "is 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 non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Cumulative impacts are analyzed for all alternatives under each impact topic. The following plans and projects are considered in the cumulative impact analysis.

Past Actions, Projects and Plans

- *Cuyahoga and Summit County Greenspace Plans.* County Plans that have set in place a vision for the two counties greenspace and trail network.
- *Rural Landscape Management Plan, 2002.* Outlines the goals and preferred strategy to continue the agricultural traditions in the Valley, preserve scenic values of the Park's rural landscape, and using environmentally sound practices for its implementation.
- *CUVA Long-Range Interpretive Plan, 2003.* Provides the strategy for interpretation for the Park.
- *Ohio & Erie Canal Heritage Corridor Management Plan, 2000.* Outlines the concepts and goals for the 110-mile Heritage Corridor that includes the Park. The Plan includes the extension of the Towpath to downtown Cleveland.
- *NOACA and AMATS Regional Transportation Plans.* Provides the vision for alternative transportation including bikeways and trails for the region.

Current Actions, Projects and Plans

- *Urbanization of Region.* While the region continues to trend towards a reduced population size, it remains a highly urban area with communities adjacent to the Park and areas poised for development. Due to the age of these communities, infrastructure upgrades (roads, bridges, and utilities) will continue over the coming years.
- *Brecksville Dam EIS.* The Park and Ohio EPA are conducting an Environmental Impact Statement to evaluate alternatives for the modification or removal of the Dam near Station Road bridge.
- *Krejci Dump Clean-up and Restoration.* The clean-up and restoration of an 46 acre dump site along Hines Hill Road will eventually provide public access to once contaminated lands.
- *Jaite Mill Restoration Project.* The site clean-up and restoration of the Jaite Mill site, south of Highland-Vaughn Road, will eventually provide public access to share the industrial heritage of the Cuyahoga Valley.
- *Visitor Experience Plan for Park Facilities.* A Conceptual Framework for Enhancing Visitors Experiences (2009a) outlined recommendations for specific park facilities and their future functions and roles in providing visitor experiences. Park facilities included in the study included Canal Visitor Center, Wilson's (Alexander) Mill, Stanford House, former Vernon Boodey House, former Nina Stanford Home, Boston Store Visitor Center and surrounding facilities, Hunt Farm Visitor Information Center, Szalay House, Kendall Lake Shelter. Some of the recommendations have been implemented or are currently underway.

Foreseeable Future Actions and Plans:

- *Boston Mills Area Conceptual Development Plan and Environmental Assessment.* An Environmental Assessment is currently being conducted for the Boston Mills area addressing parking, circulation and visitor services for the Park's facilities in Boston Township.
- *Deer Management Plan/ EIS.* An Environmental Impact Statement is being developed to determine the management strategy for deer in the Park.
- *Akron Long-Term CSO Control Plan. 2010.* The City of Akron's Plan to reduce the number of sewer overflows into the Cuyahoga River that contributes to the water quality of the River.
- *Cuyahoga Water Trail Forum.* The group is working on the development of a strategy for designation of the Cuyahoga River as a state water trail and potentially a national recreation water trail, under the National Park Service National Recreational Trails program.

4.1.2 Impairment of National Park Resources

In addition to determining the environmental consequences of implementing the alternatives, NPS Management Policies, 2006 require the analysis of potential effects to determine whether the actions would impair park resources (NPS, 2010f). As defined by NPS Management Policies (1.4.5), an impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park,
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or

- Identified in the park's general management plan or other relevant NPS planning documents as being significant.

4.1.3 Unacceptable Impacts

The NPS Management Policies, 2006 outlines a standard to avoid impacts that it determines to be unacceptable. The Management Policies, (1.4.7.1) defines unacceptable impacts as impacts, individually or cumulatively that would

- Be inconsistent with a park's purpose or values,
- Impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process,
- Create an unsafe or unhealthful environment for visitors or employees,
- Diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- Unreasonably interfere with
 - Park programs or activities,
 - An appropriate use,
 - The atmosphere of peace and tranquility, or the natural soundscape maintain in wilderness and natural, historic, or commemorative locations within the park, or
 - NPS concessioner or contractor operations or services.

4.1.4 Future Compliance

This Environmental Impact Statement describes the impacts associated with a conceptual trail management plan for the Park, it does not provide site-specific evaluations and details for many plan elements. Prior to implementation of any specific trail or facility, the NEPA analysis will be reviewed to determine that 1) all impacts have been adequately analyzed for particular actions, and 2) that there are no changes to the affected environment or impacts on resources. If site-specific detail is insufficient, additional compliance documentation may be required. Specifically, coordination with the State Historic Preservation Office for NHPA Section 106 and/or with the U.S. Army Corps of Engineers and Ohio EPA on stream or wetland permits is expected.

4.2 Impacts on Water Resources

4.2.1 Relationship of Trails to Water Resources

The following water resources may be impacted by the Trail Plan elements.

Watershed imperviousness has been demonstrated to be a reliable indicator of watershed health (Schueler 1994, Arnold and Gibbons 1996). In the Cuyahoga Valley, this has been found to hold true, particularly for ecological values (Skerl and Plona, 2007). Watershed health is affected by factors such as the level of imperviousness (areas that water cannot infiltrate, such as roads and roofs) and biological conditions. The Ohio EPA Index of Biotic Integrity (IBI) measures the structural and functional characteristics of fish communities and is based on trophic composition, diversity, presence of pollution-tolerant species, abundance of biomass, and the presence of abnormal organisms (OEPA 1987). In larger park watersheds, IBI indices decrease from a “Very Good” (at 5% imperviousness) to “Fair” rating as imperviousness exceeds 24%. In smaller subwatersheds, IBI ranges from nearly “Exceptional” (at ~2% imperviousness) to “Very Poor” as imperviousness approaches 35%. The quality of headwater streams, as indicated by their macroinvertebrate communities also appeared to decrease with increasing imperviousness. Increases in turbidity and high bacteria (*E. coli*) levels were observed in park watersheds that exceeded 15% imperviousness. Trail infrastructure can contribute to a watershed’s imperviousness depending on the level of development in the watershed and the extent of the trail infrastructure. Some trails may have impacts due to their materials and width, such as asphalt on a high use, and trails requiring 8-foot tread widths. Other trails may have little or no effect, such as a natural surface low use, primitive trails with a 2-foot tread width.

Water quality can be degraded by trails when trail runoff containing suspended sediments reaches streams, rivers and lakes. Such sedimentation can alter aquatic food chains and fish populations (Forman, 1995). Trails designed to reduce runoff and set back from streams can help preserve water quality (Lanehart, 1998).

Another impact trails and trail facilities may have on water quality is if human and animal waste are not disposed of properly, they can add unwanted nutrients into the stream. Horse manure on trails and their impact to water quality are typically correlated by the number of horses along trails on an annual basis. A study of potential water quality issues associated with horse manure, noted that good trail placement practices assisted in reducing its contribution to water quality degradation and that it was typically a minimal impact compared to other water quality impacts (Westendorf, 2009). Human waste management at campsites can impact water resources through improper disposal, where toilet facilities are not provided. While no specific research on the affects of increased levels of fecal coliform bacteria as a result of unmanaged campsites is available, it is an issue that has been raised in other prominent primitive camping and trail systems (Marion, 2003).

Riparian buffer zones have been shown to remove most sediment runoff based on the type and width of the vegetated buffer area (Wenger, 1999). Trails in close proximity to the immediate vegetative buffers of streams can remove or modify this function by increasing sedimentation into streams. Additionally, stream crossings can modify the function of a stream corridor through use of infrastructure such as bridges and culverts.

Floodplains are unique habitats and typically contain poorly drained and organic soils that can be vulnerable to impacts from infrastructure within them, including trails. Floodplains also have flat landform slopes which challenge the design of trails to provide proper grading in typically wet soil conditions (Lanehart, 1998).

Wetlands are a unique water resource and can be impacted by alteration of hydrology, changes in wetland vegetation, and pollution in runoff (Hopper, 2007). Wetland buffers protect wetlands by moderating the effects of changes surrounding them (NPS, 2002). The Park has established wetland buffer recommendations associated with the wetland characteristics found in the Park, with a minimum requirement of 25' for low quality wetlands. Buffers greater than 125' would maintain water quality of higher quality wetlands (NPS, 2002b). Trails can affect wetlands if trails or their infrastructure are located within wetlands or their buffers.

4.2.2 Applicable Regulations and Guidelines

The NPS is charged with maintaining, rehabilitating and perpetuating the inherent integrity of water resources and aquatic ecosystems consistent under the Clean Water Act and other applicable federal, state, and local laws and regulations.

NPS Management Policies (2006)

Section 4.6 Water Resource Management. NPS will perpetuate surface waters and groundwaters as integral components of park aquatic and terrestrial ecosystems.

NPS Director's Order 77-1; Protection of Wetlands. NPS will minimize degradation, preserve, and avoid direct or indirect impacts of new construction in wetlands where no other practicable alternatives exists.

NPS Director's Order 77-2; Floodplain Management. Directs NPS to preserve floodplain values and minimize potentially hazardous conditions associated with flooding and the issuance of a Statement of Findings where applicable on proposed actions within a regulatory floodplain.

Executive Order 11988, Floodplain Management. Requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of flood plains. Wherever there is a practicable alternative, avoidance of direct and indirect floodplain development should occur.

Executive Order 11990, Protection of Wetlands. to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands."

4.2.3 Methodology

Water resource impacts associated with the Trail Alternatives were evaluated through the use of available information on the Park's water resources, including functional riparian areas, floodplains, wetlands, watershed imperviousness and location of water resources. The information utilized and methodology for analysis for each water resource issues is described below.

Watershed Imperviousness. Current imperviousness of park watersheds was assessed using the 2006 USGS National Land Cover Database imperviousness layer in GIS. Changes in watershed imperviousness from proposed trail development were compared to existing conditions. Trail footprints (in acres) were defined as trail length multiplied by a typical 10' tread width. Trail facilities (in acres) are defined by the approximate area for the facility once fully installed. While the surface conditions of the trails vary, it is assumed that all trails will have some level of compaction occur, causing limited perviousness from existing conditions on all trails. The analysis was intended to determine if the proposed development increases watershed imperviousness levels to thresholds that have historically indicated changes in water quality.

Water Quality. Existing NPS and OEPA headwater stream data was used to evaluate water quality within high quality and cold water stream watersheds. Change in trail miles within designated cold water habitat watersheds, low developed watersheds was characterized and uses that may increase human or animal waste within the watersheds was identified. Figure 12 shows the watersheds in Cuyahoga Valley National Park.

Functional Riparian Zones and Streams. Impacts on functional riparian areas were evaluated based on the placement of trail elements within functional riparian zones. Total trail acres (trail miles x 10-foot width) in functional riparian zones defined by Holmes and Goebel (2008) were characterized. The number of potential stream crossings was quantified by intersecting proposed trails with county stream layers in GIS. The total acres of trail within a functional riparian zone of 125 feet were used to analyze potential impacts to these vegetative buffers.

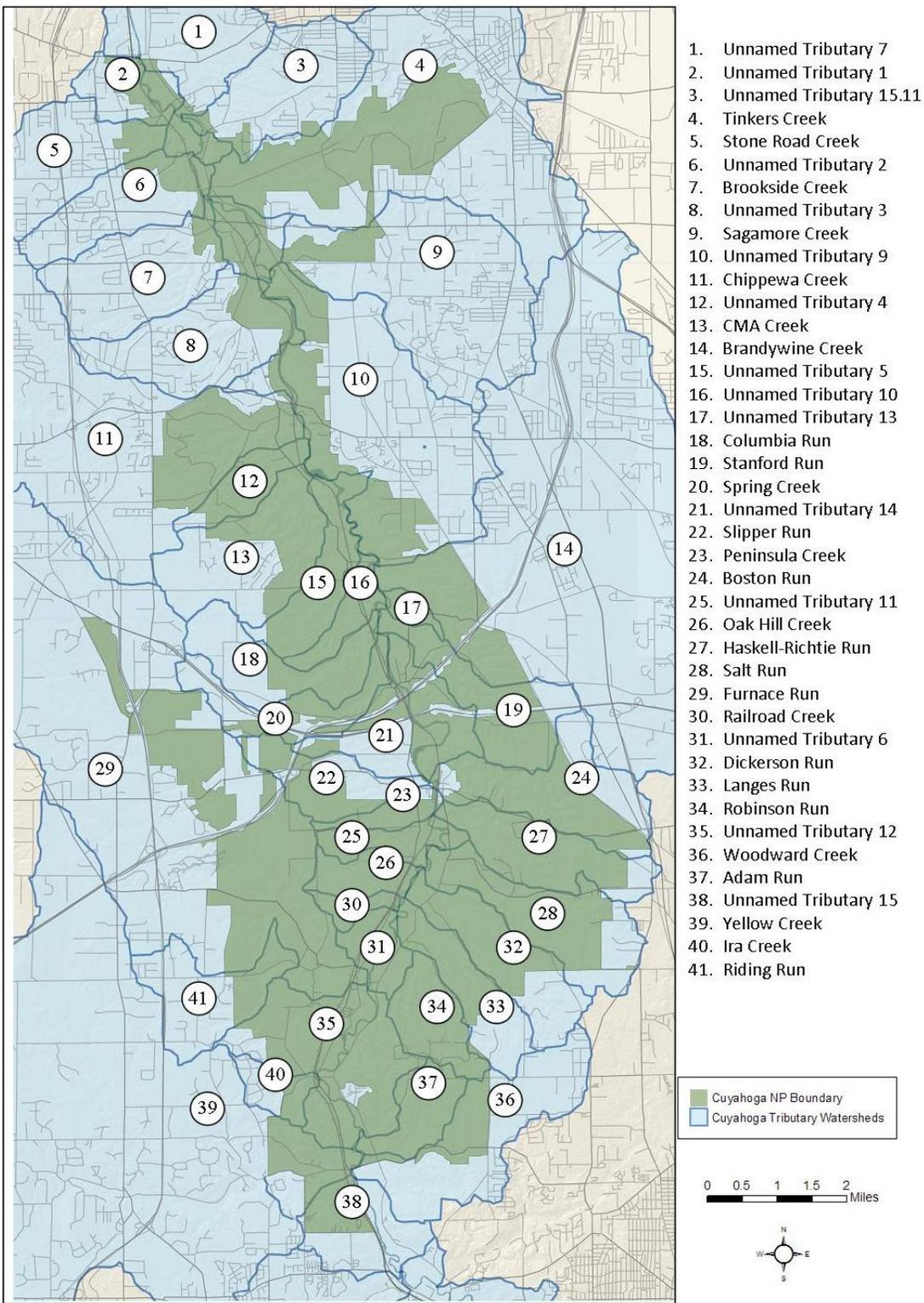
Floodplains. Trail elements within the 100-year floodplain boundary were characterized. Some proposed trail elements may be subject to compliance with NPS floodplain management policies (NPS DO 77-2), including boardwalks, campsites, and water access facilities. Nevertheless, the conceptual level of this Plan does not provide specific trail or facility placement; therefore, this evaluation only highlights where potential conditions for floodplain impacts may occur. Such facilities may require further evaluation in accordance with DO 77-2 during site planning and implementation for each trail or facility.

Wetlands. Wetland impacts were evaluated by characterizing the proximity of trail elements. The Park applied wetland buffers of 25' to 200' based on wetland quality (NPS, 2002b). To evaluate the broad set of wetland conditions in the Park, an evaluation of a trail elements within 25' and 125' buffer widths was used the analysis. A 2010 Park GIS layer was utilized to generate buffers and characterize intersections with trails elements. When available, data on wetlands with moderate to high resource quality (defined by the Ohio EPA as Category 2 or 3 wetlands) is also used in the analysis.

Impacts to wetlands for "excepted actions" are exempt from the requirements of NPS Directors Order 77-1. "Excepted actions" include scenic overlooks, foot and bike trails, boardwalks and small boat launches if the impact is 0.1 acre or less and for minor stream crossings that completely span a channel or wetland habitat with no piling structures (NPS, 2008). For this analysis it is assumed these conditions exist for all trail elements. However, the conceptual level of the Trail Plan does not provide specific trail or facility placement; therefore this evaluation highlights where potential conditions for wetland impacts may occur. Such facilities may require further evaluation in accordance with DO 77-1 during site planning and implementation.

Figure 12: Tributary Watersheds in Cuyahoga Valley NP

Source: CVNP and Ohio EPA



Impact Intensity Levels

Negligible: Impacts on water resources would be barely detectable and would not have an impact to the physical and biological integrity of the water resources locally or regionally. Limited minimal increase or no change associated with number of stream crossings, affected riparian buffer zones, and within the 100-year floodplain would occur. Watershed imperviousness would not increase nor exceed 15% threshold nor affect any designated cold-water habitats. The 15% imperviousness threshold has historically demonstrated where water quality conditions begin to decline.

Minor: The impacts on water resources would be small and measurable within a tributary watershed, but barely detectable. No mitigation measure associated with water quality or hydrology would be necessary. Isolated regional increase or change associated with number of stream crossings, affected riparian buffer zones, the 125' wetland buffer, and within the 100-year floodplain would occur. Watershed imperviousness would increase minimally but not the exceed 15% threshold and may affect minimally cold-water habitats.

Moderate: The impacts on water resources would be detectable and affect multiple tributary watersheds or water resources. Increases occur, parkwide, in the number of stream crossings, affected riparian buffer zones, affected 25' and 125' wetland buffers, and trails within the 100-year floodplain. Watershed imperviousness would increase but not exceed 15% threshold and may affect numerous cold-water habitats.

Major: The impacts on water resources would be substantial and obvious and may extend outside of the Park boundary. Removal or significant alteration of water resources would occur. Mitigation measures would be necessary and would likely result in the loss of water resources within the watershed.

4.2.4 Impacts of the Alternatives

Tables 43 to 48 present data compiled to compare changes in water resource impacts among alternatives.

4.2.4.1 Impacts Common to All Alternatives

Effects of Increased Imperviousness. The watersheds in CVNP have a wide variety of imperviousness that range from near zero in watersheds like Oak Hill Creek to very high in watersheds like Tinkers Creek, where impervious cover accounts for 25% of the watershed. All alternatives contribute to the imperviousness of the tributary watersheds in which they reside at varying degrees of intensity based upon the number of trail miles and trail facilities present in each watershed, since trails and support facilities have varying amounts of impervious cover. However, none of the current or proposed trail elements individually or cumulatively increase imperviousness greater than 1% overall or affect the imperviousness of the park's tributary watersheds to the extent of exceeding a 15% imperviousness threshold. With the application of the Sustainable Trail Guidelines for all Action Alternatives, some trails lengths and tread widths may be reduced, eliminating some level of imperviousness. Best management practices for parking areas for upgrading infrastructure may also reduce imperviousness, providing impacts that are beneficial. Overall, all alternatives may have long-term, negligible to minor adverse impacts to watershed health from increased imperviousness, though these effects may be largely

mitigated by sustainable design and low impact methods of stormwater management for future restoration and development of trails under all alternatives.

Floodplains. There are approximately 22 miles of existing trail within the 100-year floodplain. Using a baseline tread width of 10', the existing trail system occurs on 0.7% or 26 acres of the approximate 3,750 acres of floodplain area that exist in the park. The most notable trail entirely located within the floodplain is the Towpath Trail, which is closed periodically during heavy rain events and damaged due to flooding. The berm built for the Towpath Trail impedes floodplain functions in some areas. Since the Towpath Trail will remain for all alternatives and not be altered from its current conditions, except for repairs and major flooding events, impacts to floodplain functions is long-term, minor to moderate and adverse by the existence of the trail system in the floodplain.

Temporary Construction Activities. All trail elements will require some level of construction that may cause disturbance to water resource conditions during the construction period. These activities may have short-term minor adverse impacts to water resources, however storm water management and water quality protection best management practices will be utilized to minimize these impacts.

Cumulative Impacts

It is likely that continued suburban development outside of the Park will continue to reduce the number and quality of wetlands and increase imperviousness in the Cuyahoga River watershed. Adverse impacts on wetlands inside of the Park may become more significant as total wetland area outside of the Park is reduced. Additionally, continued suburban development will likely adversely impact the water quality and quantity of rivers and streams that flow through the Park. Long-term, negligible to moderate and adverse impacts from suburban development activities outside of the Park are expected as these water resources are either modified or lost.

Other conditions that affect water quality include the continuing operation of combined sewer overflows (CSOs) in the City of Akron and the presence of low head dams, notably the Brecksville Dam and, to a lesser extent, the Peninsula Dam. The CSO's degrade water quality especially after storm events, and the improvements and/or elimination of CSO's will take many years and millions of dollars. The Brecksville Dam has been identified by the Ohio EPA as the primary impact to reaching full attainment of water quality standards within the stretch of river within Park boundaries. Restorative actions such as the removal of dams or CSOs are currently under evaluation and would result in long-term beneficial effects when implemented.

4.2.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

Water Quality. Water quality is indirectly impacted by increased sedimentation from trails located where erosion is occurring and equestrian use in low-land areas, resulting in long term minor adverse impacts.

Functional Riparian Zones and Streams. Approximately 94 miles of existing trail reside within functional riparian zones and involve approximately 400 stream crossings across the Park. The existing trail system covers approximately 219 acres of land within the Park which accounts for 1% of all land within park boundaries, making up less than 0.5 % of landcover within any designated cold water habitat

watersheds. Conditions exist in areas where increased muddiness, erosion, disturbance of aquatic life at stream crossings, and modification of functional riparian areas occur. Impacts to functional riparian and stream crossings to Alternative 1 are likely to be long-term, minor and adverse.

Floodplain. No additional impacts from Alternative 1 will occur than what is described in Common to all alternatives. Impacts to the floodplain will be long-term, minor to moderate and adverse from the Towpath Trail's proximity and conditions within the floodplain.

Wetlands. Approximately 37.63 miles (21%) of all existing trail miles lie within 25' of park wetlands. The existing trail system occurs on 2%, or 45 acres, of the 1,900 acres of wetland (as currently mapped) that exist in the park. These are most notable along the Towpath Trail at Stumpy Basin and the Beaver Marsh areas where elevated boardwalk systems pass through wetland areas. The adverse impacts to wetlands under Alternative 1 are long-term, minor from a limited trail footprint in wetland areas and the use of sustainable design practices, such as boardwalks, to protect the wetland functions.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Alternative 1 would allow continued long-term, negligible to minor adverse impacts to riparian areas, streams, floodplains and wetlands. These impacts are due to the extent of the trails present throughout the Park within sensitive water resource areas and localized conditions that impact water resource issues by their current design, location and use.

4.2.4.3 Impacts Common to All Action Alternatives

Sustainable Trail Guidelines. The proposed actions may affect water resources through direct encroachment, contribution of sedimentation and change in natural drainage patterns. Best practices outlined in the Sustainable Trail Guidelines (Appendix C) and site-specific design to improve water quality, decrease storm water input, and enhance functions and integrity of wetland and water resource features will be adhered to in order to prevent direct and indirect impacts on water resources. The Guidelines set forth procedures and practices that identify the resources, the level of impact caused by the design of the trail facility and design practices to minimize these impacts. The Guidelines set forth a procedure to determine if the trail will proceed or not be implemented based upon the effects it will have on the water resources and the design of the trail.

It is possible that the NPS, after determining that no practicable alternative exists, may decide to expressly permit some level of adverse impact on wetlands or other water resources. Such situations cannot be readily identified at this time as they are related to site-specific plans not yet developed. Should these situations arise, the NPS will implement environmental compliance and documentation procedures as required under the Clean Water Act, NEPA and Director's Orders 77-1 and 77-2 to characterize site specific impacts. The NPS will first seek to avoid impacts to wetlands and water resources. Unavoidable impacts will be minimized and mitigated. Implementing the Sustainable Trail Guidelines will have long-term, beneficial impacts to water resources by the long-term reduction of impacts to water resources in the Park.

Restoration of Trails. There are trails identified for removal or realignment that are common to Action Alternatives. The removal and realignment will reduce trail miles in some wetlands, reduce the trail footprint in some tributary watersheds, and reduce unmanaged stream crossings in some areas. A marginal reduction of 0.2 trail miles within the functional riparian areas occurs in all Action Alternatives, contributing negligible adverse impact to functional riparian areas. Removal of trails will result in a reduction of potentially ten stream crossings, resulting in long-term beneficial impacts to streams. The restoration actions common to all Action Alternatives reduce the number of trail miles marginally (less than 0.5 mile) from existing conditions with the removal of trails that currently existing within 25' of wetlands.

Impacts of Trail Facilities and Amenities. Paddle launch facilities, campsites, parking lots and other trail amenities that are common among alternatives may affect water resources.

Water Quality. All launch facilities will minimize stabilization needs and impacts on streambank erosion through appropriate siting. Only river access routes requiring a ten feet or less elevation change will be selected. Increased human use may affect water quality due to increased littering and disturbance on the river. Increases in education and interpretation of water resource impacts will help minimize this impact.

Minor site disturbance (less than 1 acre cumulatively) would occur if all campsites were implemented, resulting in minor, localized vegetation removal and soil erosion. Impacts from limited restroom facilities associated with the riverside campsites and remote trailside campsites on the Buckeye Trail would require additional visitor education regarding "Leave No Trace" practices associated with human waste management. Access to limited restroom facilities, particularly on riverside campsites, based upon floodplain restrictions may have long-term, minor adverse impacts to water quality. Use of sustainable best practices for construction and operations will minimize these localized impacts.

No parking areas are proposed to be located within designated coldwater habitat watersheds. Proposed parking areas will not require any modification or filling of streams. Best management practices to minimize surface runoff impacts will be implemented as prescribed in the Sustainable Trail Guidelines. Impacts to water quality from parking areas will be long-term, negligible to minor and adverse from the minimal change in runoff from surfaced areas.

Some trail amenities may require temporary soil disturbance during construction and require evaluation of soil conditions prior to construction. The amenities will have isolated disturbance, small in size of disturbance (less than 25 square feet), temporary in soil disturbance.

Adverse impacts of water trail facilities and amenities on water quality will likely be temporary and negligible during construction and then long-term and minor through increased human activity and access to the river, development of riverside campsites, and surface runoff from parking areas.

Functional Riparian Zones and Streams. All launch sites will be within the functional riparian zone but will be isolated and designed to minimize impacts on riparian buffers of the river. Adherence to sustainable siting and design guidelines and the minimal presence of facilities will likely result in long-term, negligible to minor adverse impacts to functional riparian zones.

The placement of all riverside campsites will conform to a minimum 120' buffer distance to the Cuyahoga River and associated recommended buffer distance for streams, reducing impacts to riparian

buffers and streambanks. The trailside campsites along the Buckeye Trail, at Columbia, Dugway and O'Neil, are outside of or along the perimeter of the defined functional riparian zones. No campsites will require any stream crossings associated with their location. Impacts to functional riparian zones from riverside campsites will be long-term, negligible to minor, and adverse from their placement and small footprint within the riparian areas of the Park.

The addition of 20 acres of parking lots will occur in existing developed areas, with the exception of Blue Hen relocation parking area, where new construction would be required in an area where vegetation exist. While all proposed actions for parking areas occur within the functional riparian zone, with the exception of Tree Farm and Coliseum, the size of the areas that will affect the functional riparian zones will be less than 0.5 acre and localized.

Adherence to sustainable siting and design guidelines, small development footprints, and the minimal presence of facilities will likely result in long-term, negligible to minor adverse impacts to functional riparian zones from trail facilities and amenities.

Floodplains. All launch facilities are within the 100-year floodplain. Their sustainable design will not impact floodplain function or streamflow characteristics. Site design recommendations of low impact design, natural surface access with minimal or no surface structures would minimize impacts to the floodplains and the presence of structures in the floodplain. However if launch facilities would require structures, compliance with DO 77-2 would be evaluated during site planning.

The five riverside campsites proposed are located within the 100-year floodplain and would require an evaluation of its applicability to DO 77-2. Due to their primitive and low impact design goals, the campsites will not change or alter the functions of the floodplain and the park will initiate policy for campsite use during rain events and high flood events. Impacts to floodplains will be long-term, negligible to minor adverse.

The expansion of parking at Canal Visitor Center, Lock 29 Overflow, Hunt Farm, and the new Ira Paddle parking would be located within the 100' year floodplain but small in size and associated with daytime use. These parking areas proposed are within the floodplain but meet the exceptions outlined in DO 77-2, therefore, no significant impacts to floodplain function are expected or further assessment required.

Overall impacts to floodplains from trail facilities and amenities may be long-term, minor and adverse due to from the construction of campsites and launch facilities.

Wetlands. Three paddle launch sites are potentially within 125' of existing wetland areas; Fitzwater, Red Lock and Ira. Wetland delineations before construction would help avoid wetland impacts. Paddle launch sites will not require modification or removal of wetlands and will consist of low impact design methods to mitigate their proximity to these resources.

Campsites at Frazee and Ira can be sited outside of the 125' wetland buffer zone.

Of the 31 existing parking lots that provide trail access, three of the lots are within 25' of a known wetland area, and 21 are within 125' of wetland areas in the Park. Proposed expansion at Canal Visitor Center and Lock 29 Overflow would encroach into the 25' buffer of existing wetland areas. Of the new parking areas proposed, the Coliseum and Ira Paddle lots would be within the 125' wetland buffer. The Old Orchard parking areas would be outside of the 125' wetland buffer areas. Design of the parking

areas will not modify the affected wetlands and follow the procedures set forth in the Sustainable Trail Guidelines and NPS policies. The number of new or expanded parking areas within 25' and 125' of wetlands and no modifications to wetlands proposed, adverse impacts to wetlands are likely to be long-term and minor to moderate.

Adverse impacts to wetlands will likely be long-term and minor to moderate from the proximity of three launch sites, three campsites and the construction of parking areas near (but not in) wetlands.

4.2.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Water Quality. Trails proposed in cold water habitat watersheds create a minor increase (0.4%) of trail acre coverage in Slipper Run from the proposed Horseshoe Pond Trail and Coliseum Boardwalk Trail. Effects to water quality will likely be long-term, negligible to minor, adverse from the minimal changes in trail mile coverage in park watersheds.

Functional Riparian Zones and Streams. Alternative 2A will predominantly utilize existing disturbed areas for new trails and remove and restore trails where they currently exist in floodplains and riparian areas. A marginal reduction of 0.2 trail miles within the functional riparian areas is proposed, contributing negligible adverse impacts to functional riparian. Removal of trails will result in a reduction of potentially ten stream crossings, resulting in long-term beneficial impacts to streams.

The campsites at North Stone Road, and Ira-West of River will be within the functional riparian zone, but isolated and designed to minimize impacts on riparian buffers of the river and conform to a minimum 120' buffer distance to the Cuyahoga River for its placement. Impacts to functional riparian zones from these additional sites will be long-term negligible to minor and adverse from their placement.

The expansion of the Red Lock parking area will require new construction where existing vegetation exists. While the expanded area is within the functional riparian zone, the size of the area will be less than 0.5 acres and localized.

Floodplains. New trail miles are increased by less than .70 mile within the floodplain for the entire Park. This largely includes the Ira River Trail south of Beaver Marsh. The trail proposed will likely utilize low impact design and potentially a boardwalk system. Because, the impact is isolated and consists of a minimal area of disturbance and no alteration in floodplain function, impacts to floodplain will likely be negligible to minor and adverse.

The North Stone Road and Ira-West riverside campsites are both proposed within the 100-year floodplain and would require an evaluation of its applicability to DO-77-2. Impacts will be similar to what is described for the riverside campsites, common to all Action Alternatives.

Since, none of the additional parking areas proposed in Alternative 2A are within the 100-year floodplain, impacts will be long-term, negligible, and adverse.

Wetlands. Though some trail will be removed from wetland buffers, Alternative 2A does increase new trail miles within 25' and 125' of existing wetlands by 2.8 miles, including Terra Vista Trail, Coliseum boardwalk (0.27 miles) and the Ira River Trail (0.15 mile). Since the increase is localized in existing

disturbed areas and would apply sustainable best site design practices, the adverse impacts of Alternative 2A on wetlands will likely be long-term, minor to moderate.

Campsites at Stone Road and Ira - West can be sited outside of the 125' wetland buffer zone.

Proposed expansion at Red Lock would encroach into the 25' buffer of existing wetland areas. Of the new parking areas proposed, the Terra Vista lot would be within the 25' wetland buffer. Design of the parking areas will not modify the affected wetlands and follow the procedures set forth in the Sustainable Trail Guidelines and NPS policies. The number of new or expanded parking areas within 25' and 125' of wetlands and no modifications to wetlands proposed, adverse impacts to wetlands are likely to be long-term and minor to moderate.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Since the increase is localized, in existing disturbed areas and use of sustainable best site design practices will be utilized, the adverse impacts of Alternative 2A on wetlands will likely be long-term, minor to moderate. The impacts to floodplain will likely be negligible to minor and adverse from the isolated and minimal trail miles proposed in the floodplain and additional riverside campsites. Contributions to water quality will likely be long-term, negligible to minor from the minimal change in trail mile coverage in all watersheds of the park.

4.2.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts of Alternative 2B to water resources will be similar as described for Alternative 2A except that the inclusion of a mountain bike trail on the existing Buckeye Trail will have additional long-term, minor to moderate adverse impacts to water resources. The tributary watersheds in which the existing trail that would be utilized for mountain bike use travels have high quality headwater streams that contain coldwater species rarely found in other areas of the Park. The proposed segment of the Buckeye Trail will be re-routed to remove the existing trail from an existing high quality wetland reducing current impacts. The proposed mountain bike trail will have no effect on floodplains since it is not located within the 100 year floodplain. While the miles of trail are similar to Alternative 2A, realignment to minimize impacts will occur, and use of sustainable trail design practices will improve conditions of the existing trail for mountain bike use. Increased use in areas where healthy water resources are abundant may have adverse impacts on those resources. Since the mountain bike trail will utilize an existing trail system, the number of trail miles will be similar to Alternative 2A, with a reduction of 0.2 miles, resulting in a negligible adverse impact to functional riparian areas and stream crossings. Trails will have a negligible to minor adverse impact on wetlands, from a marginal reduction of 0.1 in trail miles within 25' of wetlands and a small increase of 1.3 trail miles within 25' and 125' of wetlands parkwide. Impacts to floodplains overall will be long-term, negligible to minor, and adverse with no additional effect from mountain bike trail use. Impacts to water quality from increased use on the Buckeye Trail in multiple high quality tributary watersheds would expect to be long-term, moderate and adverse.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Since the mountain bike trail will utilize an existing trail system, the number of trail miles will be similar to Alternative 2A. A reduction of 0.2 trail miles within the functional riparian zone will result in a negligible adverse impact to functional riparian and stream crossings. Trails will have a negligible to minor adverse impact on wetlands, from a marginal reduction of 0.1 in trail miles within 25' of wetlands and small increase parkwide of 1.3 trail miles within 25' and 125' of wetlands. Impacts to floodplains overall will be long-term, negligible to minor and adverse with no additional effect from mountain bike trail use. Impacts to water quality from increased use on the Buckeye Trail in multiple high quality tributary watersheds would expect to be long-term, moderate and adverse.

4.2.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Water Quality. Impacts to water quality will be long-term minor to moderate and adverse from the increase in trail miles that will occur in two coldwater habitat watersheds; Slipper Run and Boston Run. Trail miles in Slipper Run will increase with the expansion of the Tree Farm trail, Trail miles in Boston Run will increase with the Gateway multi-purpose trail. An increase in trails will occur in watersheds where less development has occurred or less trail miles currently exist where documented high quality headwater streams exist, including Spring Creek and Brandywine Creek

Functional Riparian Zones and Streams. Impacts from the 27% increase of trail miles within functional riparian zones and increased stream crossings on riparian zones and streams will be long-term, minor to moderate and adverse .

The trailside campsites at the Upper CVC and West Rim are outside of or along the perimeter of the defined functional riparian zones.

New disturbance will occur for the construction of the High Meadow parking area. The size of the parking areas will be less than 0.5 acre and localized.

Floodplains. Alternative 3A proposes a 22% increase of trail miles within the floodplain comprising a total of an additional 4.88 trail miles within the floodplain. Proposed trail elements include the West Rim Trail, Jaite Trail loop trail, Rockside trail short loop, a portion of the Rockside-Hemlock Trail, and the Hunt Farm Trail short loop, in addition to Ira River Trail and the Coliseum Trail proposed in Alternative 2A. With the exception of the Hunt Farm Trail loop, all of the trails will consist of a natural surface, thereby not affecting floodplain functions or requiring infrastructure. The Hunt Farm Trail (0.30 mile) may require a boardwalk system because of its development level as an interpretive trail and proximity to a primary system entry point. Impacts to floodplains will likely be long-term, minor and adverse from the increase in trail miles, and small trail areas of less than 0.30 mile overall that may require boardwalk systems. The additional campsites and parking areas in Alternative 3A are not located within the 100-year floodplain and will have no effect.

Wetlands. Alternative 3A would add approximately 2.7 trail miles within the 25' wetland buffer and approximately 12 miles within the 125' wetland buffer. The trail elements within the 25' wetland buffer areas are largely contributed from the West Rim Trail, near Fawn Pond and Pleasant Valley wetlands, the Jaite loop Trail and portions of the Five Falls Trail and South Carriage Trail. Disturbance and increased use near Fawn Pond, a high quality wetland, will result in long-term, minor adverse impacts. All of these trails are proposed as minimally developed natural surfaced trails reducing their footprint and infrastructure requirements. Boardwalks system may need to be utilized where site conditions prohibit natural surface trails, most notably for portions of a ½ mile segment of the West Rim trail and ¼ mile segments of the Five Falls and South Carriage trails. Since impacts are isolated to one large wetland and some isolated areas of smaller wetlands throughout the Park and no removal or modification of wetlands will occur, impacts to wetland is likely to be long-term, minor to moderate.

The additional campsites in Alternative 3A are located outside of the 125' wetland buffer zone and will have no effect. The additional parking area proposed at Snowville would be within the 125' wetland buffer.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Impacts to functional riparian zones and streams will be long-term, minor to moderate and adverse from the increase in trail miles within riparian zones and potential increase in stream crossings. Impacts to floodplains and wetlands will likely be long-term, moderate and adverse from the increase of trail miles in multiple isolated areas. Impacts to water quality will be long-term minor to moderate and adverse from the increase in trail miles that will occur in multiple coldwater habitat watersheds and increase in watersheds with documented high quality headwater streams.

4.2.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

The impacts of Alternative 3B on water resources are similar as described for Alternative 3A except for the addition of two mountain bike trails.

Water Quality. The mountain bike trails will increase trail miles in the Spring Creek, Columbia Run, and unnamed (# 5) tributary watersheds on the West Rim mountain bike trail; and Stanford Run, Brandywine Creek and unnamed (#9) tributary watersheds on the East Rim mountain bike trail as depicted on Figure 12. The tributaries located where these trail systems are proposed, are relatively undisturbed with a network of high quality headwater streams, with each of the areas containing limited development of some residential areas, roads and existing trails contribute to the water quality conditions of the area. None of the mountain bike trails travel through designated coldwater habitat watersheds within the park. Sustainable design practices to reduce runoff and changes in water quality functions will minimize long-term impacts. Combined with the additional impacts of Alternative 3A, impacts to water quality will be long-term, minor to moderate and adverse from the increase of trails in tributary watersheds where minimal disturbance currently exists.

Functional Riparian Zones and Streams. An increase in stream crossings will be necessary in the current network of headwater streams in both areas with the exception of the southern east rim where fewer streams exist. In combination with other impacts described for Alternative 3A, impacts to functional riparian zones and streams will be long-term, moderate and adverse. The additional parking area at Snowville is not within the functional riparian zone and will have no effect.

Floodplains. No floodplains will be affected by either mountain bike trail routes or the additional parking area at Snowville. The impacts are the same as Alternative 3A.

Wetlands. Wetlands will be adjacent to portions of the proposed mountain bike trails in both areas, particularly the Five Falls Trail segment, requiring boardwalk systems or routing the perimeter of the wetlands using low impact design methods. Given the additional trail miles of the mountain bike trails, 2.77 trail miles would occur within the 25' wetland buffer area and 20 trail miles would occur within the 25' to 125' wetland buffer area. The trails will consist of a minimal width less than 4 feet, reducing its footprint and be similar to what is proposed in Alternative 3A with the potential for increased use from the new use. The Snowville Parking area is located outside of the 125' wetland buffer zone and will have no effect. The impacts to wetlands will likely be long-term, minor to moderate, and adverse from the increase of trails within designated wetland buffers in isolated regions of the park.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Impacts to functional riparian zones and streams will be long-term, moderate and adverse. The impacts to wetlands will likely be long-term, minor to moderate, and adverse from the increase of trails within designated wetland buffers in isolated regions of the park. No additional impacts to floodplains will occur. Overall, Alternative 3B will have long-term minor and adverse impacts from other non-mountain bike trails. Impacts to water quality will be long-term, minor to moderate and adverse from the increase of trails in tributary watersheds where minimal disturbance currently exists.

4.2.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

Water Quality. Alternative 4A expands the trail system in multiple tributary watersheds throughout the Park. Impacts to water quality will be long-term minor to moderate and adverse from the increase in trail miles that would occur in three coldwater habitat watersheds: Slipper Run, Boston Run, and Woodward Creek. These are largely a result of the expansion of trails on Tree Farm Trail, the Gateway Trail and the Chart Road neighborhood hike connector. An increase in affected high quality headwater streams, including Spring Creek, Columbia Run and Brandywine Creek will also occur, from addition of the High Meadow Trail, Columbia Run Trail, and Five Falls Trail.

Functional Riparian Zones and Streams. A 31% increase of trail miles within functional riparian zones and a possible 23% increase in stream crossings will cause long-term, minor to moderate adverse impacts to functional riparian zones and streams. The additional campsite at Truxell and parking area at

Mudcatcher-Cancasi will be located outside of the defined functional riparian zone and will have no effect.

Floodplains. An increase of 4.29 miles trails in the floodplain from portions of proposed trails for the West Rim Trail, Jaite Loop Trail, Hunt Farm Short Loop Trail and Ira River Trails as described in Alternatives 2A and 3A is proposed. Additionally, the Canal Visitor River Boardwalk Trail (0.62 miles) and Buttermilk Falls Trail (0.40 miles) may require a boardwalk as a result of site conditions and prescribed high use as an interpretive trail for visitors. Impacts to floodplains will be long-term, minor and adverse. The additional campsite at Truxell and parking area at Mudcatcher-Cancasi are outside of the 100-year-floodplain and will have no effect.

Wetlands. New trail miles within 25' and 125' of wetlands in the park will collectively increase by 26 miles. Proposed additional trails within wetland areas would result in 23% of all trail miles being within the 25' wetland buffer and 26% being within the 125' wetland buffer. The new trail miles are largely contributed by the West Rim trail, which is proposed to travel near Fawn Pond and Pleasant valley wetlands, the Jaite Loop Trail, Tree Farm to Daffodil Trail, and portions of the South Carriage Trail and Five Falls Trail. Many of these trails are low developed natural surface trails, with tread width of 4' and projected for low use. Low impact design and boardwalk systems will be utilized to minimize any impact to wetland functions. The additional trailside campsite at Truxell and parking area at Mudcatcher-Cancasi are outside of the 125' wetland buffer zone and will have no effect. Impacts to wetlands will be long-term, minor to moderate and adverse due to impacts in small specific areas in some of the watersheds.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Impacts to functional riparian zones and streams will be long-term, moderate, and adverse from the increase of trail miles and stream crossings throughout the park in multiple tributary watersheds. Impacts to wetlands will be long-term, minor to moderate and adverse from the increase of trail elements near wetlands and an overall increase in trail miles. Alternative 4A will have long-term, minor adverse impacts to floodplains requiring boardwalk systems on potentially three proposed trails. Impacts to water quality are expected to be long-term, minor to moderate and adverse from increase of trails in high quality headwater stream watersheds.

4.2.4.9 Impacts of Alternative 4B

Direct and Indirect Impacts

Impacts of Alternative 4B on water resources are similar as described for Alternative 4A except for the addition of the mountain bike trail on the east rim of the Park.

Water Quality. Cold water habitat watersheds with high quality headwater streams affected by the mountain bike trail include Salt Run and Boston Run and will likely have long-term, minor to moderate adverse impacts to water quality.

Functional Riparian Zones and Streams. An increase of 48.55 trail miles within functional riparian zones and a potential increase of 143 stream crossings would occur. Impacts to riparian zones and stream crossings and water quality will be long-term, moderate and adverse from the increase of trails in multiple coldwater habitat watersheds and overall increase of trails in functional riparian zones and crossing streams.

Floodplains. The mountain bike trail will not affect any floodplains in the Park. Impacts are the same as Alternative 4A.

Wetlands. An increase of an additional 0.76 trail acres within the 25' wetland buffer area is proposed with the mountain bike trail. Since the increase is minimal and alternative siting during site planning may occur, the impacts to wetlands for Alternative 4B will remain long-term, minor to moderate and adverse, similar to Alternative 4A.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Alternative 4B will have minor to moderate adverse impacts on water quality from additional trails and trail uses in three designated coldwater habitat watersheds and high quality headwater stream areas are expected. Long-term, minor, adverse impacts to floodplains would be expected. Impacts to wetlands would be long-term, minor to moderate, and adverse from the increase of trail elements near wetlands. Impacts to functional riparian zones and streams will be long-term, moderate, and adverse from the increase of trail miles and stream crossings throughout the park in multiple tributary watersheds.

4.2.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

The impacts of Alternative 5 on water resources are similar for associated trail elements as described under all of the Alternatives.

Water Quality. Impacts on cold water habitat watersheds is relatively negligible to minor and common to the trail elements located in the Boston Run and Salt Run watersheds, related to the Old Akron-Peninsula Connector and Armington trail. No proposed mountain bike trails occur in the cold water habitat watersheds. Impacts on water quality will likely be long-term, negligible to minor from the minimal change in trail mile coverage in all watersheds of the park.

Functional Riparian Zones and Streams. Impacts to functional riparian zones and streams will be long-term, minor to moderate and adverse from an increase of 38 miles (a 28% increase from existing conditions) within functional riparian zones and increase in stream crossings.

Floodplains. New trail miles are increased by 3.77 miles within the floodplain for the entire park. This largely includes the Ira River Trail south of Beaver Marsh, the Hunt Farm River Loop trail, the CVC

Boardwalk Trail and portions of the multi-use connector trails. The trail proposed will likely utilize low impact design and potentially a boardwalk system. Because the impact is isolated and consists of a minimal area of disturbance and no alteration in floodplain function, adverse impacts to floodplain will likely be negligible to minor.

Wetlands. New trail miles within 25’ and 125’ of wetlands in the park will collectively increase by 22 miles, including the South Carriage Trail, Five Falls Trail, CVC Boardwalk Trail and smaller portions of other trails. Many of these trails are low developed natural surface trails, with tread width of 4’ and projected for low use. Low impact design and boardwalk systems will be utilized to minimize any impact to wetland functions. Impacts to wetlands will be long-term, minor to moderate and adverse due to impacts in specific wetland areas in some of the tributary watersheds.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Impacts to water resources from trail elements in Alternative 5 will likely be minor to moderate and adverse from the increase of trail miles within close proximity of water resources of the park. This will require sustainable design practices and potential additional evaluation for some proposed trail segments.

Table 47. Trail Miles within Defined Functional riparian Zone

Alternative	Trail Miles within Functional Riparian Zone
Alt 1 (Existing Conditions)	94.34
Alt 2A	-0.21
Alt 2B	+1.59
Alt 3A	+35.94
Alt 3B	+42.14
Alt 4A	+44.6
Alt 4B	+48.55
Alt5 (Preferable Alternative)	+37.94

Note: Alternatives 3A, 3B, 4A, 4B and Preferred Alternative include bike lanes miles of 24.65 on existing roadways within functional riparian zones.

Table 48. Change in Number of Stream Crossings

Alternative	Projected Total Stream Crossings
Alt 1 (Existing Conditions)	400
Alt 2A	-8
Alt 2B	No Change
Alt 3A	+71
Alt 3B	+136
Alt 4A	+94
Alt 4B	+143
Alt 5 (Preferred Alternative)	+84

Table 49. Trail Miles within 25' buffer of existing identified wetlands

Alternative	Change in Trail Miles within 25' of wetland
Alt 1 (Existing Conditions)	37.63
Alt 2A	-0.34
Alt 2B	-0.09
Alt 3A	+2.27
Alt 3B	+2.77
Alt 4A	+3.9
Alt 4B	+5.2
Alt 5 (Preferred Alternative)	+2.67

Table 50. Trail Miles within 25'-125' buffer of existing identified wetlands

Alternative	Change in Trail Miles within 25' to 125' of wetland
Alt 1 (Existing Conditions)	20
Alt 2A	+2.82
Alt 2B	+2.38
Alt 3A	+12.33
Alt 3B	+20.04
Alt 4A	+26
Alt 4B	+30.8
Alt 5 (Preferred Alternative)	+19.66

Table 51. Trail Miles within 100-yr Floodplain

Alternative	Trail Miles within 100-yr Floodplain
Alt 1	22
Alt 2A	+0.69
Alt 2B	+0.69
Alt 3A	+4.88
Alt 3B	+4.88
Alt 4A	+4.29
Alt 4B	+4.29
Alt 5 (Preferred Alternative)	+3.77

Table 52. Percent of Disturbance for 10' wide trail in Designated Cold Water Habitat watersheds

Alternative	Boston Run	Langes	Sagamore	Salt	Slipper	Woodward	Robinson
Alt 1 Existing	0.5	0.4	0.1	0.7	.009	.03	0.0
Alt 2A	0.6	0.4	0.13	0.76	.039	.03	0.0
Alt 2B	0.6	0.4	0.13	0.76	.039	.03	0.0
Alt 3A	0.70	0.47	0.13	0.86	.489	.05	0.02
Alt 3B	0.70	0.47	0.13	0.93	.489	.05	0.02
Alt 4A	0.92	0.47	0.13	0.93	.759	.08	0.12
Alt 4B	0.92	0.47	0.13	1.15	.759	.08	0.12
Alt 5 (Preferable Alternative)	0.75	0.4	0.12	0.78	0.04	.06	0.0

4.3 Impacts on Vegetation

4.3.1 Relation of Vegetation to Trails

Trails and trail facilities considered in the alternatives travel through all of the major habitats of the park including forests, floodplain, shrublands, and to a limited extent, wetlands. Trail impacts to vegetation communities can vary based upon trail location, resource sensitivity, level of trail development, and its designated use.

Changes in vegetation. Changes can occur to habitats through habitat disturbance and fragmentation. Habitat disturbance can occur by trampling from trail use causing recurring ground disturbance. Various studies have been conducted on the impacts of trampling vegetation on trails and in camping areas. One study conducted showed that low levels of trampling can cause substantial reductions in vegetation cover and height (Cole, 2004). The study also documented that plant communities varied greatly in both resistance (their ability to avoid being damaged) and resilience (their ability to recover from damage). For instance, the magnitude of vegetation loss on campsites in meadows was significantly less over time than on forest campsites (Cole, 2004).

The geographic extent of trampling often is fairly limited, extending only about one meter from trail's edge (Dale and Weaver, 1974; Dawson et al., 1974). Trampling causes compaction of leaf litter and soil (Dawson et al., 1974; Whitaker, 1978). Under trampling, some plant species decrease near trails, especially woody and delicate herbaceous plants (Tonneson and Ebersole, 1997). Grasses and sedges are generally most tolerant of trampling (Dale and Weaver, 1974; Dawson et al., 1974).

Fragmentation of habitat can occur when trail corridors pass through a habitat block and result in changes in species diversity or functions of habitat. One study found that microclimatic alterations causing change in plant species may occur within the edges of forests adjacent to clearings (Chen et al., 1999). Edge effects, which are typically changes in vegetation structure where disturbance occurs, can occur along trails within forests, particularly if the trail tread width is wide enough to open up the canopy (Cole, 1978; Dale and Weaver, 1974).

Introduced exotic species. Studies have found significantly less plant cover and more exotic plant species near trail edges (Benninger, 1989). Exotic species tended to be more abundant on more heavily used trails, and total species richness was significantly negatively correlated with distance from trailheads, indicating that trail corridors serve as conduits for movement of species (Benninger-Truax et al., 1992). A correlation analysis of literature from 184 studies from around the world found that the number of exotic species in nature reserves increased with the number of visitors, but no conclusions could be drawn about roles of dispersal and disturbance (Lonsdale, 1999). Edge effects also play a role in creating or widening disturbance corridors that may invite more exotic plant species by the change of vegetative cover (Lonsdale, 1999).

In a study conducted along the Appalachian Trail, 95% of exotic species were typically found near anthropogenic disturbances, and most of the exotic species were within 100 feet of the disturbance. (NPS, 2005a). Trails with higher use will have a greater amount of exotic plant species, especially closer to the trailhead entrance. (Benninger-Truax, 1992) Horse trails also may support increased densities of exotic plants as plant seeds are spread along trails by hoofs and manure (Benninger, 1989).

4.3.2 Applicable Regulations and Guidelines

Executive Order #13112 on Invasive Species. Prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological and human health impacts that invasive species cause.

Endangered Species Act of 1973, as amended. Conservation of ecosystems upon which threatened or endangered species of fish, wildlife and plants depend. Requires federal agencies to insure that any action authorized is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

NPS Management Policies (2006)

4.4.2 Management of Native Plants and Animals. Where possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species.

4.4.4 Management of Exotic Species. Exotic species will not be allowed to displace native species if displacement can be prevented.

4.3.3 Methodology

Analyses of the impacts of alternatives on vegetation are based upon information available on vegetation types at the Park. Impacts were determined by the increase of potential disturbance from proposed trail elements on vegetation in the Park including bottomland forests (forests within the 100-year floodplain), upland forests, and shrublands. The level of disturbance within these major vegetation communities as reflected in changes in trail miles may reflect the degree of expected disturbance and fragmentation from the proposed actions. The impact analysis was based on the knowledge and professional judgment of Park staff, available data and relevant scientific literature, where applicable.

Impacts were quantified by assigning a 10-foot wide disturbance corridor for all trails, which establishes a trail acre measurement of its maximum area of ground disturbance once installed. This corridor represents a “worst-case” footprint of disturbance from a trail. It is expected that most trails actually impact a smaller footprint. The number of trail acres within dominant vegetation types of the Park were quantified using GIS. An NPS 2002 land cover classification and the 100-year floodplain area were used in the analysis. Vegetation types evaluated include bottomland forests within the 100-year floodplain, upland forests, shrub/grassland areas and wetlands.

The potential for invasive plant introduction or expansion was estimated by the mileage of trail development and types of use in currently undisturbed areas. It is assumed that actual disturbance of vegetation will be less with the application of the Sustainable Trail Guidelines that minimize disturbance.

Intensity Thresholds

The following threshold descriptions were used to define the effects of alternative actions on vegetation at the Park:

Negligible. Some changes in native vegetation may occur at this threshold but would be slight, and barely detectable. Changes may affect some individual plants but would not affect entire native populations. New areas of plant disturbance would be small or minimal and the risk of invasive plant proliferation would be low and isolated.

Minor. Changes in native vegetation would affect some native plants and local plant populations, but would not affect population viability. Some minimal disturbance would occur in isolated areas of new development and invasive plant proliferation would be detectable but isolated. Changes to local populations and ecological processes would be minimal but detectable.

Moderate. The change in native vegetation would affect a population's abundance and diversity within a sizeable area of a vegetative type (forest block, wetland complex, etc) but the changes would not affect the viability of affected populations. Changes to local vegetation and ecological processes would be readily detectable but limited to a geographic area of the park. Invasive plant proliferation would be detectable and require management, but new populations would remain isolated.

Major. Change in vegetation would affect a population and its existence locally and compromise its viability regionally. Native vegetation would be affected in a relatively large area both in and out of the Park. Invasive plant proliferation would increase, new populations become established at several sites and require significant new management efforts.

4.3.4 Impacts to Vegetation by Alternatives

4.3.4.1 Impacts Common to All Alternatives

Spread of invasive plants by trail users and off-trail hikers. Trail users and off-trail hikers will continue to promote the spread of invasive plant proliferation in the park as facilitators of seed dispersal through foot, bike or hoof on the trails, continuing to contribute long-term minor adverse impacts to Park vegetation communities. Trail mileage and management among the alternatives and their effect on the spread of invasive plants above or below this common impact threshold are described for each alternative.

Cumulative Impacts. Emerging development projects in and outside of the Park boundary will continue to cause vegetation disturbance that may alter the abundance and resilience of some vegetation communities, causing areas in the Park to be potentially more prone to the introduction or expansion of invasive plant species. Current and future exotic plant management activities and habitat restoration actions focused on disturbed sites will have long-term beneficial impacts on park vegetation. Other current or future plant management activities, including implementing the Heartland Network Regional Exotic Plant Management Plan (in preparation) and potential prescribed burning of designated grassland areas within the park may have long-term, beneficial effects that promote native plants and reduce exotic plants at the Park.

4.3.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

Trails and trail facilities that currently exist are located primarily in the floodplain and forested uplands and wetland areas. Other trails exist in meadow and grassland areas such as the Virginia Kendall Hills. The current trail system covers 212 acres. Table 53 outlines trail impacts within each major vegetation community from each alternative.

Currently, approximately 186 trail acres are within four primary vegetation types in the Park: bottomland forests (6.5 acres), upland forests (131 acres), shrubland (3.5 acres), and wetland buffers (45.6 acres). The current trail system impacts less than 1% of these combined vegetation communities parkwide.

Invasive plants are a dominant feature along many sections of trail at the Park, including the Towpath Trail corridor, which is dominated for much of its length by non-native shrubs and grasses. The presence of social trails may promote the spread of invasive plants in some areas of the park. Some existing trails, in the Virginia Kendall Lake area, the Ledges area, and along the Valley Bridle trail, pass in close proximity to known rare or special status plant species, which may increase the risk of deterioration or local extirpation of these populations from trampling or spread of invasive seeds. Impacts to vegetation from continuation of Alternative 1 will be long-term, minor to moderate and adverse.

Cumulative Impacts

No additional cumulative effects are expected.

Conclusion

Impacts to vegetation from continuation of Alternative 1 will be long-term, moderate adverse due to continued promotion of invasive plants throughout the Park.

4.3.4.3 Impacts to Vegetation Common to All Action Alternatives

Endangered, rare and special status species. The general scale of this plan does not provide information on specific impacts to potential special status species. All action alternatives will adhere to the proposed Sustainable Trail Guidelines in the protection of endangered, rare and special status plant species. The Guidance will require the avoidance and setbacks from identified species. Some trail elements will be in proximity to known species causing low-disturbance from human activity. With the implementation of the Sustainable Trail Guidelines, impacts of all alternatives on special status species will be long-term, negligible and adverse. Restoration of trails that travel through known areas of rare or special status species are identified for the Virginia Kendall Lake Trail and Ledges Trail, and will have long-term beneficial impacts.

Restoration of trails. The restoration of trails will include revegetation of disturbed areas and former trailways using native seed and plants. Each Action Alternative proposes approximately 12 acres of trail restoration at varying locations, but largely in upland forest vegetation communities. Revegetation

actions will adhere to the recommendations of the Sustainable Trail Guidelines. All restoration activities will have long-term, beneficial impacts to vegetation by the replanting of disturbed areas and the closure of corridors between similar vegetation types, reducing fragmentation, increasing the size of habitat blocks and restoring some areas where invasive plants may exist. Trail acres restored under each alternative were used in calculations of net trail acre changes.

Multi-use trails. Where multi-use trails are proposed through reuse of roads for the trail, the road corridor will be reduced in width through removal of road surface and reestablishment of native vegetation. This will have long-term beneficial impacts to upland forest habitats in the northern and central eastern portions of the park.

Trail facilities. Water trail facilities for river access launch sites will disturb less than 0.2 acres of riparian vegetation in each area identified, approximately 2 acres overall for the Park if all sites were installed as defined in Chapter 2, 2.4.4.1. The introduction of invasive plants from disturbance activities is possible, but due to its small area of disturbance and control of exotic plants, native revegetation can be successful. Water trail facilities are likely to have short-term and long-term, negligible, adverse impacts on vegetation.

Campsites. Campsites will likely cause trampling and vegetative disturbance in isolated areas proposed for the campsites. Increased foot traffic may pose increased risk for spreading of invasive plants. As proposed dispersed campsites located in the upland forest areas that include O'Neil-Buckeye, Dugway-Buckeye, Columbia-Buckeye campsites, will likely have longer term impacts than the meadow and open area campsites from their disturbance. Campsites would disturb approximately 1.0 to 1.5 acres overall if all proposed campsites were installed in the park as described in Chapter 2, 2.4.4.2 of this document. Campsites are expected to have both short-term and long-term, minor adverse impacts on vegetation.

Parking. Proposed parking areas total approximately 10 acres of proposed disturbance if all of the parking facilities were implemented. The majority of parking areas are proposed in existing open areas. Areas where vegetation exists include Red Lock expansion, Blue Hen relocation, Indigo Lake relocation, Old Orchard and the East Vaughn expanded areas. The footprint of vegetation removal is approximately 3.5 acres cumulative of all these areas. New trailhead parking areas may introduce new avenues for invasive plant movement, particularly at Old Orchard and High Meadow, where no facility currently exists. Impacts on vegetation from proposed parking areas will likely be short-term and long-term, minor and adverse.

Overall trail facilities will have long-term negligible to minor adverse impacts on the primary vegetation communities from minor ground disturbance in isolated regions of the park.

4.3.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Proposed actions in Alternative 2A will largely utilize existing disturbed areas minimizing impacts to vegetation in additional areas of the park. The proposed actions will affect approximately 184 acres (0.7 %) of natural vegetation communities within the Park when considering the proposed trail restoration efforts common to all alternatives, an overall reduction of 2 acres from current levels. Table 53 outlines trail impacts within each major vegetation community from Alternative 2A.

The proposed actions will reduce trails mostly in bottomland forested areas and some upland forest areas through restoration of existing trail corridors, resulting in a net reduction of approximately seven acres of disturbance. This will have long-term beneficial effects on vegetation in those areas.

Upland forest will experience a total of 140 acres of impact under Alternative 2A, a net increase of nine acres from current conditions. New trails in forested areas will occur in the area south of the existing Old Carriage Trail. The Old Carriage Trail extension and South Carriage Trail would result in vegetation disturbance in upland forest areas totaling approximately nine acres (70.4%) where unmanaged social trails currently exist. With the removal of trails in upland forest, trail miles will decrease in this vegetation community by two trail acres.

Floodplain forests will experience 6.7 acres of impact and an increase of approximately 0.2 acres at the proposed Ira River trail using an existing social trail. Additional impacts will be minimal due to the use of existing disturbed corridors, placement of trails in open areas and minimal tread widths for trail use within the upland forest areas.

Shrubland and grassland areas would be affected by approximately four acres, an increase of about 0.5 acres of additional trails, including the Terra Vista Natural Study Area, Horseshoe Pond and the former Coliseum site.

Wetland areas would be affected by approximately 45.2 acres, a decrease of about 0.4 acres of trail within the 25' wetland buffer area by the removal of trail described for the restoration of trails.

Overall, long-term, negligible to minor adverse impacts are expected from new trail miles under this Alternative by the minimal net increase of trail acres within primary vegetation communities.

By the overall minimal reduction of overall trail acres and recommendations for the restoration of trails and management of social trails, impacts on the spread of invasive plants will likely be long-term minor and adverse by the limited expansion of trail acres in some areas.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Impacts on vegetation from Alternative 2A will be long-term, negligible to minor, and adverse from the minimal amounts of new trail miles added and an overall net reduction in trail acres when combined with planned trail restoration.

4.3.5.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts to vegetation from Alternative 2B are similar to impacts described for Alternative 2A with the addition of the proposed designation of a portion of the Buckeye Trail for mountain bike use. Table 53 outlines trail impacts within each major vegetation community from Alternative 2B. Trail acres within the four primary vegetation communities are similar to Alternative 2A.

Some portions of the Buckeye Trail may need to be rerouted within the upland forest between Brecksville Reservation and Boston Mills Road, which will result in minimal additional vegetation disturbance. Restoration of abandoned areas as a result of rerouting, will be required. The narrow tread width (less than 1 meter) and minimal removal of vegetation utilizing sustainable trail practices will reduce alterations and fragmentation of forested habitats in this area. Potential increased use on this portion of the Buckeye Trail may promote invasive plant proliferation along this trail corridor. The proposed mountain bike action will utilize sustainable design, have a minimal level of new disturbance, and be localized in one section in the park, but may increase the intensity of the impact slightly compared to Alternative 2A by increased use in this isolated region. Impacts on vegetation from Alternative 2B will be long-term, minor and adverse by minimal net increase of trail acres in primary vegetation communities and increased use within one upland forest region of the Park.

By the overall minimal reduction of overall trail acres and recommendations for the restoration of trails and management of social trails, impacts on the spread of invasive plants will likely be long-term minor and adverse by the limited expansion of trail acres in some areas.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Impacts on vegetation from Alternative 2B will be long-term, minor and adverse by minimal net increase of trail acres in primary vegetation communities and increased use within one upland forest region of the Park.

4.3.5.6 Impacts of Alternative 3A

Direct and Indirect Impacts

The proposed actions in Alternative 3A will affect approximately 211 acres (0.8%) of natural vegetation communities within the Park when considering the proposed trail restoration efforts, an overall increase of 25 acres from current conditions

Upland forest will experience a total of 162 acres (76%) of impact under Alternative 3A, a net increase of 19 acres from current conditions. Impacts are largely from the Rockside-Hemlock Loop Trail, portions of the West Rim Trail, the Everett–Howe Trail connector, the Dugway Trail, and smaller loop trails at Blue Hen Falls and Canal Visitor Center.

Floodplain forests will experience 8.4 acres (3.9%) of impact, an increase of approximately 2 acres. Additional from the rerouting of the Jaite Loop Trail, Hunt-River Trail, Lower Rockside Loop Trail and portions of the West Rim Trail. Transforming existing roads to multi-use trails may further reduce existing disturbed corridors in the park.

Shrubland and grassland areas would be affected by approximately 4.5 acres (2.1%), an increase of about 2 acres of additional trails at High Meadow, Lower Furnace Run, and Hines Hill-Stanford Loop.

Wetland areas would be affected by approximately 48.8 acres (23%), an increase of about 3.2 acres of trail within the 25' wetland buffer area including the West Rim trail.

Invasive plant proliferation may occur on the interpretive trails near visitor resource centers and trailheads and along the Dugway Trail where horses will be allowed. Overall, impacts on vegetation from Alternative 3A will be long-term, minor to moderate and adverse by the increase in trail miles among all major landscapes in the park, and new entrances for potential invasive plant introduction.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Overall, impacts on vegetation from Alternative 3A will be long-term, minor to moderate and adverse due to disturbance of new forest blocks, increase in trail miles among all major landscapes in the Park, and new access points for potential introduction of invasive plants.

4.3.5.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Proposed actions and their impacts to vegetation from Alternative 3B are similar to the impacts described for Alternative 3A, but include additional impacts from the addition of new mountain bike trails on the central east and west rims of the park. The proposed actions in Alternative 3B will affect approximately 222 acres (0.9%) of natural vegetation communities within the park when considering the proposed trail restoration efforts, an overall increase of 36 acres. Two mountain bike trails (West Rim Trail and the East Rim Trail) account for much of the additional impacts. Table 53 outlines trail impacts within each major vegetation community from Alternative 3B.

Upland forest will experience a total of 174 acres (78%) of impact under Alternative 3B, a net increase of 30 acres from current conditions.

Floodplain forests will experience 7.7 acres (3.2%) of impact, an increase of approximately 1.2 acres.

Shrubland and grassland areas would be affected by approximately 5.3 acres (2.3%), an increase of about 1.8 acres of additional trails.

Wetland areas would be affected by approximately 48.9 acres (22%), an increase of 3.3 acres of trail within the 25' wetland buffer area.

The increase of overall trail miles from the addition of mountain bike trails may also introduce new corridors for invasive plants in areas where current access is limited except for social trails. The addition of mountain bike trails within forests and shrub areas that currently are without trails would have long term, moderate, and adverse impacts in an isolated portion of the Park.

Overall, impacts on vegetation from Alternative 3B will be long-term, moderate, and adverse due to the increase in trail miles among all major vegetation communities in the Park, new trails in currently trail-free areas and new entrances for potential invasive plant introduction.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Overall impacts on vegetation from Alternative 3B will be long-term, moderate, adverse due to increase in trail miles within all vegetation communities.

4.3.5.8 Impacts of Alternative 4A

Direct and Indirect Impacts

The proposed actions in Alternative 4A will affect approximately 224 acres (0.9%) of natural vegetation communities within the park when considering the proposed trail restoration efforts, an overall increase of 38 acres from current conditions. Table 53 outlines trail impacts within each major vegetation community from Alternative 4A.

New trails in forested areas will occur in some of the areas described in Alternative 2A and 3A and additional areas including the Sagamore Loop Trail, Mudcatcher Trail, the Everett to Tree Farm link trails, the Gateway Trail, and connector trails from established picnic areas in the Park, and neighborhood connectors.

Upland forest will experience a total of 172 acres (76.7%) of impact under Alternative 3B, a net increase of approximately 29 acres from current conditions, including which would be the addition of new trail to many forested areas that are currently trail-free.

Floodplain forests will experience 7.9 acres (3.3%) of impact, an increase of approximately 1.4 acres. New boardwalk trails would occur at the Canal Visitor Center, potentially affecting wetland plant communities.

Shrubland and grassland areas would be affected by approximately 5.8 acres (2.5%), an increase of about 2.3 acres of additional trails including the Tree Farm to Daffodil Trail, Horseshoe Pond Trail and the Hines Hill-Stanford Trail.

Wetland areas would be affected by approximately 50.3 trail acres (22.4%), an increase of 4.7 acres of trail within the 25' wetland buffer area in areas including the West Rim trail, and CVC boardwalk trail.

In many areas where current trails do not exist, new pathways will be created that may introduce invasive plants. Impacts on the spread of invasive plants will be long-term, moderate, and adverse.

Overall, impacts on vegetation from Alternative 4A would be long-term, moderate and adverse from the disturbance of trail-free vegetation communities and the potential of introducing new pathways for invasive plant introduction.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Overall, impact on vegetation from Alternative 4A would likely be long-term, moderate and adverse.

4.3.5.9 Impacts of Alternative 4B

Direct and Indirect Impacts

Impacts to vegetation due to proposed actions in Alternative 4B would be similar to the impacts described for Alternative 4A with additional impacts from the East Rim mountain bike trail. The proposed actions in Alternative 4B will affect approximately 238 acres (0.9%) of natural vegetation communities within the Park when considering the proposed trail restoration efforts, an overall increase of 52 acres from current conditions. Table 53 outlines trail impacts within each major vegetation community from Alternative 4B.

The proposed mountain bike trail would utilize some of the proposed hiking trails, including Dugway Trail, Gateway Trail and Armington Trail. An additional 11 acres of trail corridor with a maximum trail width of ten feet in upland forested habitat and approximately one acre in shrubland habitat would occur with the additional trails miles of the mountain bike trail. The wider trails will occur in existing disturbed corridors and the proposed new mountain bike trails will have tread widths that will be less likely to open up the canopy of the upland forest areas.

The mountain bike trail would travel through three additional forest areas where trails currently do not exist and create the potential for pathways for invasive plant introduction by trail users. An increase of trail miles will have impacts to vegetation, but sustainable trail design will be practiced with minimal vegetation removal and the affected area isolated to a portion of the Park.

In many areas where current trails do not exist, new pathways will be created that may introduce invasive plants. Impacts on the spread of invasive plants will likely be long-term, moderate, and adverse.

Alternative 4B would have long-term, moderate adverse impacts from impacts on vegetation communities and the potential of introducing new pathways for invasive plant introduction through new trails in areas throughout the Park.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Overall, impacts on vegetation from Alternative 4B would likely be long-term, moderate and adverse.

4.3.5.10 Impacts of Alternative 5

Direct and Indirect Impacts

The proposed actions in Alternative 5 will affect approximately 217 acres (0.8%) of natural vegetation communities within the park when considering the proposed trail restoration efforts, an overall net increase of 31 acres from current conditions. Table 53 outlines trail impacts within each major vegetation community from Alternative 5.

New trails in currently trail-free areas include the Everett–Howe trail connector, the East Rim mountain bike trail route, Columbia Run Trail and smaller loop trails at Blue Hen Falls and Canal Visitor Center.

Upland forest will experience a total of 167 acres (76.9%) of impact under Alternative 5, a net increase of approximately 23 acres from current conditions, from the addition of new trail to many forested areas that are currently trail-free.

Floodplain forests will experience 7.9 acres (3.6%) of impact, an increase of approximately 1.4 acres. New boardwalk trails would occur at the Canal Visitor Center, potentially affecting wetland plant communities.

Shrubland and grassland areas would be affected by approximately 5.7 acres (2.6%), an increase of about 3.7 acres of additional trails.

Transforming existing roads to multi-use trails may further reduce current impacts on vegetation communities.

Invasive plant proliferation may occur on the interpretive trails near visitor resource centers new trailheads and new corridors for new trails. In many areas where current trails do not exist, new pathways will be created that may introduce invasive plants. This will likely result in long-term, minor to moderate and adverse impacts on the spread of invasive plants.

Overall, impacts on vegetation from Alternative 5 will be long-term, moderate and adverse from new trails in currently trail-free areas, an overall increase in trail miles, and new entrances for potential invasive plant introduction.

Cumulative Impacts

No other cumulative effects other than those described as common to all alternatives are expected.

Conclusion

Overall, impacts on vegetation from Alternative 5 will be long-term, moderate and adverse.

Table 53. Trail Acres within Primary CVNP Vegetation Types

Vegetation Community	Bottomland Forests (within floodplain)	Shrub and Grassland	Upland Forests	Wetlands (forested and non-forested, within 25' wetland buffer)	Trail Acres Restored	Total Primary Vegetation communities in CVNP (Net Acres)
Parkwide Vegetation Acres	1,634 (6.3%)	1,123 (4.3%)	21,821 (85.1%)	1,060 (4.1%)	-	25,638
Alt 1: Trail Acres	6.5	3.5	131	45.6	-	186
Alt 2A: Trail Acres	6.7	3.9	140	45.2	11.6	184
Alt 2B: Trail Acres	6.7	3.9	140	45.5	11.6	184
Alt 3A: Trail Acres	8.4	4.5	162	48.3	12	211
Alt 3B: Trail Acres	7.7	5.3	174	48.9	13	222
Alt 4A: Trail Acres	7.9	5.8	172	50.3	12	224
Alt 4B: Trail Acres	7.9	6.9	183	51.9	13	236
Alt 5: Trail Acres	7.9	5.7	167	48.8	13	217

4.4 Wildlife

4.4.1 Relationship of Trails to Wildlife

Disturbance. Presence of trails can cause direct disturbance of wildlife and wildlife habitat due to the level of noise and motion from trail users.

Disturbance of wildlife from noise and motion by recreational uses can cause changes in wildlife distribution, depending on a species' tolerance to increased human activity. In a summary of recreational impacts on birds, found that rapid movements such as runners were more disturbing than slower hikers. Additionally, children and photographers were especially disturbing possibly due to erratic movements or closer movements, and horses did not seem to disturb birds (Bennett and Zuelke, 1999). Passing or stopping vehicles were less disturbing than people on foot (Bennett and Zuelke, 1999).

Bald eagles (*Haliaeetus leucocephalus*) seem to be particularly sensitive to people on foot in the vicinity of their nests. Human disturbance can result in nest failure by causing eagles to get off of eggs during incubation and eggs die from cold. The U.S. Fish and Wildlife Service (USFWS) recommends a 330-foot buffer from an active eagle nest for non-motorized recreational activities (USFWS 2007). Great Blue

Hérons (*Ardea herodias*) also can be sensitive to disturbance by human presence and USFWS recommends a buffer distance of 200 meters from Great Blue Heron colonies (USFWS, 2011).

Habitat fragmentation and edge effects. Trails can cause fragmentation of habitats when they create openings in tree canopy or cause alteration of vegetation along the trail, creating an “edge effect”. Edge-effect is a term used “to describe the various consequences, on vegetation and wildlife, that occur as a result of one type of vegetation sharing a border with another” (Rowley et al., 1993). Edge effects include changes in species composition, vegetation, increased predation, exposure to invasive plants, and changes in microclimate from changes in sunlight, humidity, soil moisture and wind (Murcia 1995, Chen et. al., 1999, Harper et al., 2005). Such effects can extend more than 100 meters into a forest. Trails placed in forests and other habitats can have the effect of creating edge and fragmenting forests even without significant clearing of vegetation. For example, trails may impede movement and dispersal of some animals that are reluctant to cross openings caused by trails. In addition, the presence of these linear edges breaks up large habitat areas into smaller habitat fragments.

Many small animal species, particularly birds, small mammals, and amphibians, are sensitive to the size of their habitat type. The larger the habitat area, the higher quality it is and the species will have higher breeding success. In contrast, smaller fragments of habitat are of lower quality and breeding success is also lower. Forest-breeding birds are among the most sensitive to fragmentation. For these species, forests blocks smaller than 50 acres generally have little habitat value. Forest blocks exceeding 100 acres have more value and forest blocks greater than 500 acres provide the most benefits (Environment Canada, 2004).

Most studies of impacts on bird populations caused by recreational openings such as trails, campgrounds, and picnic areas, have found that these edges attract generalist (disturbance-tolerant) species, including many potential nest predators (e.g. crows, jays, squirrels), while more sensitive specialist species decline in abundance (Hickman, 1990; Miller et al., 1998; Rosenberg et al., 2004; Palomino and Carrascal, 2007; Walters, 2010). Miller et al. (1998) and Miller (2000) also found that nest predation was higher near trails than away from them, and suggested that trails of 1-3 meters in width exerted a “zone of influence” of approximately 75 meters.

Movement corridors. Trails are often used by wildlife as movement corridors due to their openness and accessibility. These movements can affect species interactions and habits. For example, predators may gain easier access to interior forest habitats via these corridors, changing habitat quality for both predators and prey.

4.4.2 Applicable Regulations and Guidelines

Endangered Species Act of 1973, as amended. Conservation of ecosystems upon which threatened or endangered species of fish, wildlife and plants depend. Any federal action is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

Bald and Golden Eagle Protection Act. Sets protection measures for Bald and Golden eagle species including disturbance that may cause injury to an eagle, decrease in productivity, or nest abandonment, including interference of normal breeding and sheltering behavior.

Migratory Bird Treaty Act. Sets forth regulations for the protection of migratory birds, including nest of egg of any migratory bird.

Executive Order 13186. Outlines responsibilities of Federal Agencies to Protect Migratory Birds.

NPS Management Policies (2006)

4.4 Biological Resource Management. The National Park Service will maintain as parts of the natural ecosystems of parks, all plants and animals native to the park ecosystems.

4.4.3 Methodology

Major vegetation communities were considered wildlife habitats in this chapter. Direct impacts on wildlife habitats were evaluated including habitat loss, degradation, and fragmentation. For forests and shrubland/grassland areas, a 10-foot wide potential disturbance corridor was quantified for all trails (trail acres/habitat type). This corridor represents a worst-case footprint of disturbance from a trail. It is expected that most trails actually impact a smaller footprint. Forests (upland and bottomland) were treated as one wildlife habitat type for the analysis in this section. While most forest trails would be aligned without significant impacts to mature trees or actual forest cover, this footprint represents effects on the understory in forest areas and actual potential habitat loss in shrubland and grasslands. The approach is the same as that outlined for Impact to Vegetation in Section 4.3.3. Table 54 provides a comparison of impacts on wildlife habitats from the trail footprint. Wetland wildlife and habitat impacts were evaluated based on the number of trail miles located within 25' of wetlands as described in Section 4.2.3.

While forests are not expected to experience direct losses, as trails would be designed to minimize any impacts to trees and vegetation, the effects of fragmentation were considered. While fragmentation by trails may affect any habitat, forests are the predominant habitat type in the Park, and are arguably most impacted by fragmentation by trail systems. For this analysis all forest blocks greater than 50 acres were selected in a GIS, totaling 26,170 acres. A 75 meter zone of effect around all trails was applied to existing forest cover in the Park and the sizes of the remaining unaffected, unfragmented forest blocks were documented and compared among the Alternatives. In essence, the results describe the size and distribution of "unaffected" forest habitats that remain after considering trail impacts. Blocks were grouped in the following categories: 0-50 acres, 50-100 acres, 100-500 acres, and >500 acres, representing "Poor", "Fair", "Good," and "Very Good" forest habitat block sizes. Area of forest within the actual "impact zone" was also calculated. Table 55 provides a breakdown of the remaining unfragmented forest habitat blocks after considering the trail corridor effects.

Lastly, disturbance was evaluated by the distance between known nesting areas of sensitive species (eagles, herons) and trail elements. Human disturbance of wildlife is evaluated for all wildlife habitat types. Assembly of information and evaluation was based upon research literature, available information on habitats in the park, and discussions with park and park partner staff in the fields of wildlife biology and management.

Intensity Thresholds

Negligible. Actions would result in impacts on wildlife that would be so slight that they would not be of any measurable consequence at a population level. Abundance and diversity of species would remain with no measurable change. Impacts on special-status species would result in changes that are barely detectable to a population or individuals of such species or its habitat.

Minor. Actions would result in a detectable effect that would be localized, small and of little consequence to species and their habitats. The action may change the abundance or distribution of species, but not affect the viability of local populations. Impacts to special-status species would result in measurable or perceptible changes to individuals of a species, a population or its habitat, but would be localized within a relatively small area and the overall viability of the species would not be affected.

Moderate. Actions would result in clearly detectable effects that would be localized with consequences at the local species level. The action may change the abundance or distribution of species within the park but not affect the viability of regional populations. Changes to population numbers, number of species present, and habitat would occur, but species would remain viable. Impacts on special-status species would result in measurable and or consequential changes to individuals of a species, a population or its habitat within the park.

Major. Actions would result in an obvious detectable effect that would have substantial consequences to wildlife populations and their habitats at a regional scale. The change could result in severely adverse and possible permanent consequence upon the species. Impacts to special-status species would result in measurable and/or consequential changes to a large proportion of individuals of a species or a population or a large area of habitat. The action would change the abundance and distribution of local and regional populations to the extent that may result in loss of species viability and potential extirpation and conditions where species would not likely recover.

4.4.4 Impacts of the Alternatives

4.4.4.1 Actions Common to All Alternatives

Direct and Indirect Impacts

Wetland species and habitat impacts. The current trail system has approximately 37 miles of trail within 25' of wetlands, including boardwalk systems that cross such habitats. Each action alternative proposes either a slight decrease or up to a 5.2 mile increase in the number of trail miles near wetlands. Wildlife associated with wetlands near trails may experience occasional disturbances from visitors using the trails. No alternative proposes any action that would reduce wetland size, though several trails may involve boardwalk construction that will be evaluated under future compliance. As such the impacts on wetland wildlife species and their habitats is expected to remain long-term, minor and adverse under any alternative.

Cumulative impacts. Past, present, and foreseeable future actions that could impact wildlife and wildlife habitat include emerging development surrounding the Park, increased loss of habitat, temporary disturbance from infrastructure projects for roads and other facilities within the park and associated changes in habitat as result of climate change. All of these actions may cause temporary or permanent

disturbance to wildlife and its movement in the park, resulting in both short-term and long-term, negligible to moderate and adverse impacts. Future wildlife management actions in designated areas, including those proposed within the White-tailed Deer Management Plan currently in development may affect local wildlife populations beneficially. Overall, cumulative impacts on wildlife will be short-term and long-term, minor and adverse.

4.4.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

The current trail footprint directly impacts 137.5 acres of forest habitats and 3.5 acres of shrub/grassland habitats in the park (Table 54).

The small amount of impacts on shrub/grassland habitats would have long-term, negligible adverse effects on species associated with those areas.

When considering forest fragmentation, there are many (n=272) “Poor” quality forest habitats <50 acres in size, these total only about 1,900 acres (Table 55). An additional 3,009 acres of “Fair” forest habitats in 44 blocks also exist. Most forest area in the park (13,544 acres) fits into blocks exhibiting “Good” habitat quality (n=58). There are also 7 large blocks greater than 500 acres of “Very Good” forest habitat totaling approximately 4,700 acres. Over 3,000 acres of forest are within the impact zone of the trail system. Overall, long-term, minor adverse effects on forest-associated wildlife are expected from forest fragmentation and degradation, especially for sensitive species (e.g., forest interior birds).

The Towpath currently passes through the nesting area buffer zone for eagles north of the Station Road trailhead in the Pinery Narrows area. Seasonal closures currently occur for the Pinery Narrows bridle trail segment adjacent to the Towpath when eagles are nesting. Towpath Trail users need to observe posted trail restrictions along the segment within the bald eagle closure as well, minimizing the effects of the trail on bald eagles. Other wildlife viewing areas include the Beaver Marsh along the Towpath at Ira Trailhead, and the Ledges Trail system. Impacts on wildlife from such human disturbance are short-term, negligible, and adverse.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Impacts to wildlife under Alternative 1 are likely to be long-term, minor and adverse due primarily to the overall continued fragmentation of forest habitats in the Park.

4.4.4.3 Impacts Common to All Action Alternatives

Direct and Indirect Impacts

Impacts of facilities. The areas proposed for water trail facilities, campsites and parking areas are largely in open disturbed areas of the Park. Campsites may cause disturbance and increase fragmentation to wildlife habitats in the forested areas associated with the Buckeye-O’Neil, Buckeye-Columbia and

Buckeye-Dugway campsites causing some displacement or change in distribution patterns from the increased access for visitors to these currently undisturbed areas. Since the use of the campsites are intended to be low density and low use with the campsite footprint very small relative to the affected forest block, the impacts to wildlife are likely to be long-term, negligible to minor and adverse.

Parking areas that may cause disturbance to wildlife include Old Orchard, Blue Hen, and Red Lock by their removal of vegetation or creation of new disturbance in forested areas. Since all of these proposed parking areas will be located on the edge of the forest block, reducing its impact to the interior of the forest blocks, the impact to wildlife will likely be long-term, negligible and adverse.

Restoration of Trails. The removal of trails in some areas of the Park will limit formal access in largely forest areas that may provide beneficial impacts on wildlife that reduce fragmentation and wildlife disturbance in localized areas of the Park.

4.4.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

The trail footprint under Alternative 2A directly impacts 146 acres of forest habitats and 3.9 acres of shrub/grassland habitats in the Park (Table 54). Alternative 2A proposes trails in two forest blocks that are currently without trails. These blocks are impacted by a portion of the Fitzwater Connector Trail and the Terra Vista Trail.

The small amount of additional impacts on shrub/grassland habitats would have negligible long-term adverse effects on species associated with those areas.

Under Alternative 2A, forest fragmentation levels remain largely unchanged for the “Very Good” and “Good” habitat blocks (Table 55). The primary effect is additional fragmentation of “Fair” habitats into “Poor” habitats as evidenced by changes in the number of blocks and amount of acreage in those categories. Approximately 360 acres of forest habitat would be moved into the “Poor” category from the “Fair” category. An additional 300 acres of forest is added to the trail impact zone under this Alternative. Overall, continuing long-term, minor, and adverse effects on forest-associated wildlife are expected from this small increase in forest fragmentation and degradation, especially for sensitive species.

Disturbance to wildlife is likely to be minimal for trails at Terra Vista and the Coliseum site where nesting birds and butterflies frequent because the proposed trails are located on the perimeter of these sites and on existing disturbed areas. No additional impacts from disturbance of wildlife are expected.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

A minimal change in affected forest blocks will likely maintain the existing long-term, minor, and adverse impacts on wildlife and their habitats.

4.4.4.5 Impacts of Alternative 2B

The areas affected by trails in Alternative 2B are the same as described in Alternative 2A (Tables 54 and 55). The only difference that may affect wildlife is the addition of designated mountain bike use on the existing portion of the Buckeye Trail traveling through a large forested habitat block near the Brecksville Reservation.

The addition of mountain bikes on the existing Buckeye Trail will not directly impact forests or cause fragmentation, but may increase disturbance to wildlife by increased intensity of use above its existing use. Since the areas of effect are limited to one trail it is not likely to contribute more than negligible long-term adverse effects on local populations.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

A minimal change in affected forest blocks, similar to Alternative 2A, and the addition of mountain biking on one trail will likely maintain the existing long-term, minor, adverse impacts on wildlife and their habitats under Alternative 2B.

4.4.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Alternative 3A increases impacts on forest habitats from the trail footprint by almost 33 acres and shrub/grassland habitats by 2 acres (Table 54).

The small amount of impacts on shrub/grassland habitats would have long-term, negligible to minor, adverse effects on species associated with those areas.

Alternative 3A includes two trails that will fragment larger forest blocks, including South Carriage Trail, and the Tree Farm Extension Trail.

Under Alternative 3A, forest fragmentation levels increase for the “Very Good” and “Good” habitat blocks, with both experiencing the loss blocks in that category (Table 55). The amount of “Very Good” forests is reduced by over 650 acres (-1 block), and the “Good” forests are reduced by almost 900 acres (-4 blocks). The net effect is additional fragmentation into “Fair” and “Poor” quality habitats as evidenced by changes in the number of blocks and amount of acreage in those categories. Another 625 acres of forest has been moved in the “Poor” category, and over 1000 additional acres of forest is added to the trail impact zone under this alternative.

Overall, these fragmentation effects will have long-term, minor to moderate adverse effects on forest-associated wildlife are expected from this small increase in forest fragmentation and degradation, , especially for sensitive species.

The West Rim Trail is within 300' of the existing bald eagle nesting area and travels adjacent to the Fawn Pond area and may be subject to being closed during nesting season given its proximity to existing sensitive nesting areas. The Coliseum Trail is placed along the perimeter of the grassland/forest edge so as to minimize any impacts to the grassland nesting birds in the site. It is expected these trails will have long-term, negligible to minor, adverse impacts.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Alternative 3A will likely have long-term, minor to moderate, adverse impacts on wildlife primarily from increased habitat fragmentation and loss.

4.4.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Alternative 3B increases direct impacts on forest habitats from the trail footprint by over 44 acres and shrub/grassland habitats by 1.0 acre (Table 54). The areas of impact will be similar to the areas described in Alternative 3A with the addition of the new trails for mountain bike use on the east and west central rim areas of the park.

The small amount of impacts on shrub/grassland habitats would have long-term, negligible to minor, adverse effects on species associated with those areas.

The proposed mountain bike trails, including areas for the West Rim mountain bike Trail and the East Rim mountain bike Trail will fragment four large forest blocks.

Under Alternative 3B, forest fragmentation levels increase for the "Very Good" and "Good" habitat blocks, with both experiencing the loss blocks in that category (Table 55). The amount of "Very Good" forests is reduced by over 650 acres (-1 block), and the "Good" forests are reduced by almost 1500 acres (-4 blocks). The net effect is additional fragmentation into "Fair" and "Poor" quality habitats as evidenced by changes in the number of blocks and amount of acreage in those categories. Another 750 acres of forest has been moved in the "Poor" category, and over 1250 additional acres of forest is added to the trail impact zone under this Alternative.

Overall, these fragmentation effects will have impacts greater than those in Alternative 3A, but would still be long-term, minor to moderate adverse impacts on forest-associated wildlife from an increase in forest fragmentation and degradation, especially for sensitive species.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Alternative 3B will likely have long-term, minor to moderate, adverse impacts on wildlife from increased fragmentation and loss of habitats.

4.4.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

Alternative 4A increases direct impacts on forest habitats from the trail footprint by over 42 acres and shrub/grassland habitats by 2.3 acres (Table 54). The small amount of impacts on shrub/grassland habitats would have negligible long-term adverse effects on species associated with those areas.

Alternative 4A includes several trails that will fragment larger forest blocks, including Tree Farm Extension Trail, the new Riding Run loop, Columbia Run Trail, the Plateau to Howe Connector Trails, Ira-Hampton Trail and the neighborhood connector from Echo Hill. Under Alternative 4A, forest fragmentation levels increase significantly for the “Very Good” habitat blocks (Table 55). The amount of “Very Good” forests is reduced by over 3400 acres (-5 blocks). These larger blocks would be fragmented into smaller pieces as evidence by the “Good” forests increasing by about 440 acres (+1 block), “Fair” habitats increasing by over 460 acres (+5 blocks), and “Poor” habitats increasing by almost 940 acres (+139 blocks). Over 1,500 additional acres of forest is also added to the trail impact zone under this Alternative.

Overall, these fragmentation effects will have long-term, moderate adverse effects on forest-associated wildlife from forest fragmentation and degradation, especially for sensitive species.

The West Rim Trail is within 300’ of the existing bald eagle nesting area and travels adjacent to the Fawn Pond area. The Mudcatcher trail is within 300’ of the large Blue Heron nesting area. The West Rim and Mudcatcher trails may be subject to being closed during nesting season given their proximity to current sensitive nesting areas. The Coliseum trail may cause some disturbance to the bird nesting area, but its placement along the perimeter of the site will reduce disturbance to nesting birds. It is not expected these trails will have anything but long-term, negligible to minor adverse impacts.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Alternative 4A will likely have long-term, moderate adverse impacts on wildlife that from a significant level of fragmentation of large forest habitat blocks.

4.4.4.9 Impacts of Alternative 4B

Direct and Indirect Impacts

Alternative 4B increases direct impacts on forest habitats from the trail footprint by over 53 acres and shrub/grassland habitats by 3.4acres (Table 54). The areas of impact will be similar to the areas

described in Alternative 3A with the addition of the new trails for mountain bike use within the east central rim area of the park.

The small amount of shrub/grassland habitats affected would have long-term, negligible to minor, adverse impacts on species associated with those areas.

Alternative 4B includes several trails that will fragment larger forest blocks as described in Alternative 4A. Additionally, the East Rim mountain bike trail will fragment four larger forest blocks in the east central and southern portions in the Park.

Under Alternative 4B, forest fragmentation levels increase for the “Very Good” habitat blocks, similar to Alternative 4A (Table 55). The amount of “Very Good” forests is reduced by over 3400 acres (-5 blocks). These larger blocks would be fragmented into smaller pieces as evidenced by the “Good” forests increasing by about 259 acres (+3 blocks), “Fair” habitats increasing by over 400 acres (+4 blocks), and “Poor” habitats increasing by over 1000 acres (+ 160 blocks). Over 1,700 additional acres of forest is also added to the trail impact zone under this alternative.

Overall, these fragmentation effects are the largest of any alternative (including Alternative 4A) and will have long-term, moderate adverse effects on forest-associated wildlife from forest fragmentation and degradation, especially for sensitive species.

Similar to Alternative 4A, the West Rim Trail is within 300’ of the existing bald eagle nesting area and travels adjacent to the Fawn Pond area. The Mudcatcher trail is within 300’ of the large Blue Heron nesting area. The Coliseum trail may cause some disturbance to the bird nesting area, but its placement along the perimeter of the site will reduce disturbance to nesting birds. It is not expected these trails will have anything but long-term, negligible to minor, adverse impacts.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Alternative 4B will likely have long-term, moderate, adverse impacts on wildlife from a significant level of fragmentation of large forest habitat blocks and impacts on shrub/grassland habitats.

4.4.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

Alternative 5 increases impacts on forest habitats from the trail footprint by over 37 acres and shrub/grassland habitats by 2.2 acres (Table 54).

The small amount of shrub/grassland habitats affected would have long-term, negligible to minor, adverse impacts on species associated with those areas.

Alternative 5 includes several that will fragment larger forest blocks, including South Carriage Run, Five Falls Trail, Columbia Run Trail, connectors from Plateau to Howe, Ira-Hampton Trail and one forest block for the proposed mountain bike trail.

Under Alternative 5, forest fragmentation levels increase for the “Very Good” habitat blocks (Table 55). The amount of “Very Good” forests would be reduced by almost 1200 acres (-2 blocks) and “Good” forests would decrease slightly by about 80 acres (-1 blocks). “Fair” habitats would remain nearly the same but “Poor” habitats would increase by over 785 acres (+ 131 blocks). Over 1,250 additional acres of forest is also added to the trail impact zone under this Alternative.

Overall, these fragmentation effects will have long-term, minor to moderate, adverse effects on forest-associated wildlife from forest fragmentation and degradation, especially for sensitive species. The Coliseum may experience some disturbance to the bird nesting area, but its proximity along the perimeter of the site will reduce any disturbance impacts. The Mudcatcher Trail is within 300 feet of the large Blue Heron nesting area. Large forest areas of greater than 500 acres, where new trails may increase in larger interior forest areas include the Dugway trail. Since the High Meadow trail is intended to travel along the edge of the forest block, its disturbance and fragmentation will be minimal. It is not expected these trails will have anything but long-term, negligible adverse impacts.

Cumulative Impacts

No cumulative effects beyond those common to all alternatives are expected.

Conclusion

Alternative 5 will likely have long-term, minor to moderate, adverse impacts on wildlife from increased fragmentation in large forest blocks and loss of habitats.

Table 54. Wildlife Habitat Impacts from Trails by Alternatives (Acres)

Alternative	Forests	Change	Shrub/Grassland	Change
Alternative 1	137.5	---	3.5	--
Alternative 2A	146.7	+9.2	3.9	+0.4
Alternative 2B	146.7	+9.2	3.9	+0.4
Alternative 3A	170.4	+32.9	4.5	+2.0
Alternative 3B	181.7	+44.2	5.3	+1.0
Alternative 4A	179.9	+42.4	5.8	+2.3
Alternative 4B	190.9	+53.4	6.9	+3.4
Alternative 5	174.9	+37.4	5.7	+2.2

Table 55. Quality, Size and Number of Unfragmented Forest Habitat Blocks by Alternative

Alternative	Very Good		Good		Fair		Poor		Forests within Impact Zone
	> 500 acres		100-500 acres		50-100 acres		Less than 50 acres		
	#	Total acres	#	Total acres	#	Total acres	#	Total acres	
Alternative 1	7	4,732	58	13,544	44	3,009	272	1,883	3,003
Alternative 2A	7	4,679	58	13,264	29	2,672	323	2,250	3,306
Alternative 2B	7	4,679	58	13,264	29	2,672	323	2,250	3,306
Alternative 3A	6	4,067	54	12,465	45	3,113	360	2,508	4,018
Alternative 3B	6	4,067	55	11,995	46	3,205	384	2,636	4,268
Alternative 4A	2	1,320	59	13,985	49	3,471	411	2,821	4,574
Alternative 4B	2	1,320	61	13,803	48	3,413	432	2,891	4,744
Alternative 5	5	3,525	57	12,623	44	3,101	403	2,668	4,254

4.5 Impacts on Soils

4.5.1 Relationship of Trails to Soils

Soil Erosion Caused by Trail Design. Trails can cause soil compaction, soil loss and its stability and movement increasing erosion rates and altering natural drainage patterns. Trail design can affect soils by its placement on highly erodible soils, steeper slopes or where soils have hydric characteristics (Wilson-Seney, 1994, Leung, Marion, 2001, Lanehart, 1998).

Trail impact assessments have found that heavily used trails had significantly more soil erosion. Trails located on ridgetops and upper slopes exhibited the greatest erosion. Recommended solutions of these soil erosion issues involved trail location to valley walls with side-hill construction methods (Leung and Marion, 2000). Proximity to streams can also increase the susceptibility of trails to erosion due to excessive wetness and periodic flooding of trail treads.

A study evaluating trail conditions, found trail design has a substantial influence on levels of trail degradation (Leung and Marion, 2006). These included flat grades of 0-2%, excessive grades greater than 10%, and trails that directly ascend slopes. When trail grades are low, muddiness often occurs; when trail grades are high, soil erosion cannot be controlled (Leung and Marion, 2006).

Soil Erosion caused by Trail User Types. Studies have shown that trail use by horses produce greater sediment yields than trail use by other users, including off-road bicycling because of the increase load bearing weight on the trail tread (Wilson and Seney, 1994, Marion, 2006).

A trail impact assessment conducted at another eastern National Park, found that heavily used trails had significantly more soil erosion and tree root exposure. Trails receiving a high proportion of horse use were significantly wider, muddier and had more multiple treads (Leung and Marion, 2000).

4.5.2 Applicable Regulations and Guidelines

NPS Management Policies (2006)

4.8.2.4 Soil Resource Management. The Service will actively seek to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources.

4.5.3 Methodology

Soils information utilized for the impact analysis include the Soil Survey Geographic (SSURGO) database for Cuyahoga and Summit Counties by NRCS, observations by park staff on effects on soils from trail activities, and scientific literature on trail impacts to soils. Two trail impact related factors the NRCS evaluates is the k-factor of a soil type and its suitability for recreational trails and recreational uses. As defined by NRCS, the “k” factor is an erosion factor that indicates the susceptibility of a soil to sheet and rill erosion by water (NRCS, 2010). Values of K range from 0.02 to 0.69, where a higher value indicates increased soils susceptibility to sheet and rill erosion by water.

Suitability for trails that involve hiking and horseback riding is prescribed by the “paths and trails” rating of NRCS. Ratings are based on soil properties that affect trafficability and erodibility (NRCS, 2010). For the purpose of the analysis and the conceptual nature of the proposed actions, a 25’ buffer on each side of the centerline of the proposed trail alignment was used in the analysis.

Steepness of trails having greater than 15% slope at a distance of 500 feet or greater were also identified, through a GIS analysis of existing and proposed conceptual trail alignments against available topographic data. The 15% slope and 500 feet distance is based upon various studies of sustainable grade and decreased soil stability.

Tables 56, 57, and 58 provide a summary of the analysis.

Intensity Thresholds

Impacts on soils in the park were assessed based on the two soil suitability factors: proximity to steep grades and the utilization of the Sustainable Trail Guidelines. Impacts compared the existing conditions and the proposed actions and the effects they will have on soils and resource conditions, as a result of location and proposed action. Intensity thresholds of soil impacts are defined as follows:

Negligible. The action would not result in a noticeable change or barely detectable on soils or a geologic feature. No additional measures for trail design beyond general Sustainable Trail guidance would be required.

Minor. The action would result in a slight, localized change specific to a trail location. Soil and geologic resources may be slightly altered, but would not increase the potential for erosion. Trail design and management may require minor additional measures to stabilize soil and prevent increase soil erosion.

Moderate. The action would result in detectable changes in soils or geologic resources. Potential for soil erosion in the trail area would increase and cover greater than 25 acres, parkwide. Trail design and management may require additional measures to stabilize soil and minimize increase of soil erosion.

Major. The action would result in permanent loss of soil or geologic resources to the Park and region. The soil loss would be noticeable and require extensive trail design and management measures to stabilize soil and minimize increased soil erosion.

4.5.4 Impacts of the Alternatives

4.5.4.1 Impacts Common to All Alternatives

Temporary Construction Activities. All trail elements will require some level of construction where soil disturbance would occur. Best site management practices will occur, but the temporary construction activities may have short-term, minor, adverse impacts to soil resources by temporary expanded disturbance. Revegetation and restoration of disturbed sites upon completion will be conducted.

Cumulative Impacts of Urbanization. Present and continuing urbanization adjacent to the Park would continue to impact soils due to increased soil compaction and soil loss, both short and long-term, minor to moderate and adverse. Preventive measures continue to be implemented with storm water management best practices. Practices of ecological design principles of compact and conservation development and soil erosion control during construction are being utilized more often. Construction projects will result in short-term temporary, minor, adverse impacts to soil conditions both within and outside of the Park.

4.5.4.2 Impacts of Alternative 1: No Action

Direct and Indirect Impacts

Alternative 1 would continue to exist and operate at its current level. No new trails would be constructed, with the exception of trails and improvements outlined in section 2.2.3 of the Alternatives Chapter of this document. No guidance would be provided from updated Trail Guidelines, mitigation, signs or standards for the current trail system in addressing areas with soil conditions that are causing erosion and change in natural drainage patterns. Unmanaged social trails will persist with no comprehensive strategy to reduce their contribution to soil compaction and erosion.

Existing trails travel through typical soil conditions that are found parkwide. When measuring the k-factor of erodibility of soils of the existing trail system, approximately 69 miles (40%) of trail have a high k-factor, 70 miles (40.2%) have a medium k-factor, and 13.92 miles (8%) have a low k-factor.

Soils on which trails now exist have a range of suitability limits for recreation, paths and trails: 70 trail miles (40.4%) are “not limited” for this use, 21.5 miles (12.4%) are “somewhat limited”, 60 miles (34.5%) are “very limited”, and 20 miles (11.9 %) are “not rated” or “null”. There are currently 22 trails that have segments greater than 500’ in length with a steepness of greater than 15%. Overall, approximately a third of the trails that exist today are located on “limited” (i.e., “somewhat limited” or “very limited” soil suitability classes) and over 50% have segments with steep slopes, which may increase their

vulnerability for degraded conditions and resource impacts and increase their need for stabilization and additional structures.

Under this alternative, activity on the trail would continue to degrade soils conditions that are wet or muddy, where significant equestrian use occurs, and where trails are located on steep or highly erodible soils. The impacts would continue and increase with rising visitor use, and the lack of comprehensive trail guidelines for design, maintenance and management related to minimizing impacts to soils. Unmanaged social trails would continue to cause potential degraded soil conditions in areas of the Park. Alternative 1 would result in long-term, minor to moderate, adverse impacts to soil resources.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Continued and increased trail use on degraded soil conditions, the existing unmanaged social trail network, and the absence of carrying capacity thresholds for trail closures during muddy conditions will likely have long-term, minor to moderate, adverse impacts to soil resources.

4.5.4.3 Impacts Common to All Action Alternatives.

Sustainable Trail Guidelines. These Guidelines will help the NPS apply best practices in high erosion areas or realigning proposed trails to minimize impacts to soils. Where erosion conditions persist on trails, the Trail Guidelines will prescribe management recommendations that will reduce and eliminate these impacts. The Trail Guidelines will also foster a strategy to address the unmanaged social trails within the Park to further reduce soil impacts. This proposed action will have a long-term beneficial impact to soils within CVNP by reducing trail placement in soil areas that are susceptible to erosion and degradation.

Restoration of Trails. Restoration of trails, through their removal or realignment, will reduce trail impacts in areas most susceptible to wet, muddy conditions that contribute to soil impacts. This action will have a long-term beneficial impact to soils within CVNP by removing areas susceptible to degraded soil conditions.

Impacts of Trail Facilities and Amenities. Each paddle launch site will be confined to an area less than 2,500 square feet adjacent to the river's edge. The sites with proposed access to the river do not have a grade change greater than 5% slope.

The addition of campsites within the Park will utilize existing open areas, limiting any large vegetation removal. The campsites will cause the potential for soil exposure and compaction due to the tent pads. The number of acres of campsites for the entire Park is less than one acre, causing campsites minimal contribution to soil impacts in the park. Studies have shown that dispersed rotational "zone" campsites, tend to be less effective in managing resource impacts over having few sites in central high use areas, essentially, "maximizing spatial concentration of use and impact" (Marion and Cole, 1996). The proposed campsites utilizing a dispersed management approach may result in these resource impact patterns, more so than the more permanent campsites with established tent pads. Additionally, fewer campsites throughout the park than proposed will result fewer impacts to soil exposure. Utilization of

best management practices and monitoring of degraded systems on campsites will be part of the implementation.

The addition of 20 acres of parking areas would occur in areas already disturbed, except for relocation of the Blue Hen parking area, relocation of Indigo Lake parking area, expansion of Red Lock parking area and new parking at High Meadow. Best management practices and use of permeable paving materials where applicable will further reduce storm water impact and soil erosion into the tributaries and river. All proposed parking expansion and new areas are less than one acre per site resulting in very small areas of impact on particular soil conditions within the park.

Some trail amenities may require temporary, small scale soil (less than 25 square feet) disturbances during construction.

Trail facilities and amenities will likely have short-term, negligible, adverse impacts to soil resources during construction due to the minimal size of disturbance. Overall, long-term, minor effects on soil resources are expected from disturbance from access and use of launch sites, campsites, and new and expanded parking areas.

4.5.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Alternative 2A prescribes the use of existing vacant roads, and converting portions of existing roads or existing unmanaged social trails to designated trails. In addition, a small number of short distance trails with limited grade change are proposed. No additional trails are proposed on slopes greater than 15% in grade. Overall, there is not an increase of trails in soils with a high k-factor. Overall, little or no increase in trails on steep slopes or “very limited” soils for recreational trails is expected, limiting vulnerability to degraded conditions within the Park and needs for increased stabilization and structures. Through the utilization of existing disturbed areas, placement on areas with sustainable grades, use of Sustainable Guidelines, and minimal new trail miles in “limited” areas, actions in Alternative 2A will not require significant measures to minimize soil impacts. Utilization of design principles to minimize soil erosion will occur where trail use is expected to be higher, including interpretive trails connected to trailheads, visitor facilities, and the Towpath. The addition of three designated campsites and expanded parking at Red Lock, Terra Vista and East Vaughn Equestrian, will contain minimal soil disturbance and compaction activities in areas currently undisturbed with the exception of the disturbed site for Terra Vista. Soil impacts from Alternative 2A will be long-term, negligible to minor, and adverse.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Impacts to soils from Alternative 2A is expected to be long-term, negligible adverse from no change in trail miles in areas of soils with “very limited” suitability for recreational paths, no change in affected soils areas with high erodibility, no additional trail miles on steep grades, and minimal additional design and stabilization measures necessary for implementation.

4.5.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

The impacts of Alternative 2B on soil resources are similar as described for Alternative 2A except for the addition of mountain bike use on existing portions of the Buckeye Trail. The affected portion of the Buckeye Trail between Boston Mills Road and Station Road currently has erosion issues as a result of steep grades and portions being within wet areas. Realignment of the trail to accommodate this new use will assist in managing soil impacts to the trail. Additional soil impacts as a result of the mountain bike use may occur due to bicycles creating long swaths of wear, which may make the trail surface more prone to channelizing the soil, creating gullies for water to flow (Latrop, 2004). Impacts on soil resources from Alternative 2B will be long-term, negligible to minor and adverse by its minimal increase in trail acres in “very limited” soils and utilization of Sustainable Trail Guidelines.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Alternative 2B will likely have long-term, negligible to minor and adverse impacts on soils from a minimal increase of new trails in undisturbed areas and minimal additional stabilization measures required for implementation. The utilization of existing trails with steep grades and soils with “limited” recreation suitability for mountain bike use will have long, term minor adverse impacts from realignment and practices set forth in the Sustainable Trail Guidelines.

4.5.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Alternative 3A would increase the number of trail acres in undisturbed areas in the Park. The number of trail miles with high k-factor soils would increase six trail miles to 75 trail miles. For recreational trail suitable soils, Alternative 3A would result in an increase of six trail miles to 66 miles in “very limited” soils. Nine new trails would have segments in areas where grades exceed 15%, including Seven Falls Trail, Gateway Trail, Rockside-Hemlock Trail, West Rim trail, CVC Short Loop trail, Blue Hen Loop Trail and Highland Connector Trail. Additional stabilization measures or engineering would be required in these portions or review of realignment to reduce steep segment lengths. Use of Sustainable Trail Guidelines will reduce alignments and soil disturbance activities of trails in poor soil conditions. New uses will largely consist of stabilized multi-use connectors, new low use hiking trails and stabilized boardwalks. Trails where erosion may be susceptible include the Ira River Trail, the new Dugway Equestrian Trail, and the Howe-Everett Connector Trail for equestrians and hikers due to low or high

steepness, and higher weight bearing use. Stabilizing material and additional engineering may be required for these trails to minimize erosion impacts. The additional trail facilities of two trailside designated campsites, one expanded parking area and one new parking area will increase soil disturbance and compaction but will be isolated and less than 0.5 acre at any location. With these conditions, impacts to soils in the park are expected overall to be long-term, minor, and adverse.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Alternative 3A would result in long-term, minor, adverse impacts by short-term construction activities, increased trail miles in soils with “very limited” recreation suitability and new trails proposed in areas where steep grades are present.

4.5.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

The impacts of Alternative 3B on soil resources are similar as described for Alternative 3A except for the addition of two mountain bike trails. Alternative 3B would increase the number of trail acres in undisturbed areas in the Park. The number of trail acres with high k-factor soils increase by 15 trail miles to 84 miles. Trail acres of soils with “very limited” recreation suitability would increase from existing conditions by 10 miles to 70.5 trail miles. New mountain bike trails, are proposed in areas where the soil erosion k-factor are identified as high. Recreational trail suitability varies among the proposed mountain bike areas. The Five Falls Trail area is identified with “moderate” or “not limited” recreation suitability. The Upper Dugway area, areas near the Krejci Dump restoration site, and High Meadow Trail also have areas that are suitable for recreational trails. Construction of mountain trails would be designed and sited in relation to soil conditions to reduce erosion and rutting that may occur, and to avoid steep areas. Stabilization and additional engineering may be required on portions of both the east and west rim trails where steep conditions exist. The addition of the Snowville parking area will disturb soil resources and increase compaction but will be localized, less than 0.5 acre, and utilize sustainable design methods. Impacts to soils will be long-term, minor to moderate, and adverse with increased trail miles in soils with “very limited” recreation suitability and the potential need for additional measures for stabilization.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Impacts to soils will be long-term, minor to moderate and adverse with increased trail miles in soils with “very limited” recreation suitability, increases in trails where steep grades exist, and potential need for additional measures for stabilization.

4.5.4.8 Impacts of Alternative 4A

Alternative 4A will increase the number of trail miles in undisturbed areas. The number of trail miles within high k-factor soils increase by 29 miles for a total of 90 trail miles. Alternative 4A would contain 77 trail miles that have soil conditions identified as “very limited” for recreational trail suitability, a 17 mile increase from existing conditions. Portions of fourteen proposed trails could include steep areas consisting of slopes greater than 15%, including the Buttermilk Falls Trail, Columbia Trail, Maplewood Trail, Ira-Hampton Trail, and Blue Hen Loop Trail. Additional stabilization and engineering would be required for these segments to reduce impacts to soil resources. The additional trail facilities that include one trailside designated campsite and one expanded parking area will increase soil disturbance and compaction but will be minimal of less than 0.5 acre and localized. Impacts to soil resources are expected to be long-term, moderate, and adverse impacts by increase in trail miles in areas with limited recreational trail suitability and in areas where steep grades exist.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Impacts to soil resources is expected to have long-term, moderate and adverse impacts by increase in trail miles in very limited suitable soils, the potential need for additional design measures to limit soil erosion, and increase in trail miles in areas with steep grades.

4.5.4.9 Impacts of Alternative 4B

The impacts of Alternative 4B on soil resources are similar as described for Alternative 3A except for the addition of the proposed mountain bike trail. Alternative 4B would increase the number of trail acres in undisturbed areas. The number of trail acres with high k-factor soils increase by 36 trail miles to 105 trail miles. Alternative 4B would include 83 trail miles within soil conditions that are identified as “very limited” for recreational trail suitability, an increase of 23 trail miles from existing conditions.

New mountain bike trails, are proposed in areas where the soil erosion k-factor are identified as high or medium. Recreational trail suitability varies among the proposed mountain bike areas. The Upper Dugway area and Krecji Dump restoration area have areas that are suitable for recreational trails. Construction of mountain trails would be designed and sited in relation to soil conditions reducing erosion and rutting that may occur. Portions of the mountain bike trail travel where grades exceed 15% near the Old Akron-Peninsula to Route 303 section, portions near Dugway and portions along Boston Mills Road. Hiking and mountain bike trails proposed throughout the park introduce a significant number of new trail miles where none currently exist and that are located in soil conditions that would require site design methods to minimize erosion and prevent long-term soil impacts. Site planning and the use of increased engineered practices to reduce impacts to soil resources from steep grades will be required. Increased use on the mountain bike trails by foot and bike traffic will increase adverse soil conditions such as rutting, compaction and widening.

Alternative 4B will result in long-term, moderate, and adverse impacts by new trail miles being proposed in areas that may be vulnerable to degraded conditions or require additional stabilization, trails where steep grades exist in the area, and increase in user groups on trails.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Alternative 4B will result in long-term, moderate, adverse impacts to soils from increased use, increase in natural surface trails in undisturbed areas of the park and proximity of proposed trails in steep grade areas of the Park that may require additional measures to stabilize soils in these locations.

4.5.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

The impacts of Alternative 5 on soil conditions are similar for associated trail elements as described under all of the alternatives.

Alternative 5 would increase the number of trail acres in undisturbed areas from existing conditions. The number of trail acres within high k-factor soils increase by 13 trail miles to 82 trail miles. Trails located in soil conditions that are identified as very limited for recreational trails would increase by 8 trail miles from existing conditions to 68 trail miles.

New mountain bike trails, are proposed in areas where the soil erosion k-factor are identified as high or medium. Recreational trail suitability varies among the proposed mountain bike areas. The Upper Dugway area and Krecji restoration area have areas of soils that are suitable for recreational trails. Construction of mountain trails would be designed and sited in relation to soil conditions reducing erosion and rutting that may occur. Portions of the mountain bike trail travel where grades exceed 15%. These areas include the section between the Old Akron-Peninsula to Route 303 section, and some areas on the Dugway trail. Site planning and the use of increased engineered practices to reduce impacts to soil resources from steep grades will be required. Hiking and mountain bike trails proposed throughout the Park introduce a significant number of new trail miles where none currently exist and located in soil conditions that would require site design methods to minimize erosion and prevent long-term soil impacts. Increased shared use on the mountain bike trails will increase adverse soil conditions such as rutting, compaction and widening.

Alternative 5 will result in long-term, minor to moderate and adverse impacts by new trail miles being proposed in areas that may be vulnerable to degraded conditions or require additional stabilization, trails where steep grades exist in the area, and increase in user groups on trails.

Cumulative Impacts

No cumulative effects other than those common to all alternatives are expected.

Conclusion

Alternative 5 will result in long-term, minor to moderate, adverse impacts to soils from increased use, increase in natural surface trails in undisturbed areas of the park and proximity of proposed trails in steep grade areas of the Park that may require additional measures to stabilize soils in these locations.

Table 56. Trail Miles in Soils with High Erodibility Factors (K)

Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4A	Alt 4B	Alt5
69	69	69	75	84	90	105	82

Table 57. Trail Miles in Soils Very Limited for Recreational Paths

Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4A	Alt 4B	Alt 5
60	60	60	66	70.5	77	83	68

Table 58. Number of trails with segments 500' in length or greater that exceed 15% grade

Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4A	Alt 4B	Alt 5
22	0	0	+9	+11	+14	+15	+7

4.6 Cultural and Scenic Resources

4.6.1 Relation of Cultural and Scenic Resource to Trails

Visitation to cultural resources can compromise the quality of the cultural resource if the movement of visitors is not designed properly or the level of visitor use is large enough to create impacts to the resource. Ground disturbance of new or restored trails would have greatest consideration of impact to cultural resources in the Park.

Scenic views are part of the cultural landscapes of the Park. Trails can compromise or access these views based upon their placement and design. Of the six cultural landscape themes identified for the park, the agricultural landscape theme and its scenic qualities could most likely change from new uses near them. The remaining themes may be affected but only marginally and in very isolated conditions.

4.6.2 Applicable Regulations and Guidelines

Director's Order #28, Cultural Resource Management Guideline. The NPS, as the steward of America's most important cultural resources is charged to preserve them for the enjoyment of present and future generations.

36 CFR National Historic Preservation Act. The Secretary of Interior shall administer the National Register of Historic Places and National Historic Landmarks, and their management.

Director's Order 28A, Archeology. Common management framework pertaining to archeological resources within or that may affect the National Park system.

36 CFR Part 79. The curation of Federally-owned and administered archeological collections.

Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. The standards and guidelines to preserve, rehabilitate and restore cultural landscapes.

NPS Management Policies (2006)

5.0 Cultural Resource Management. The NPS will protect, preserve, and foster appreciation of the cultural resources in its custody and demonstrate its respect for the peoples traditionally associated with those resources through appropriate programs of research, planning and stewardship.

5.3.5.1 Archeological Resources. Archeological resources will be managed, preserved, researched, maintained, and be made available for education as the NPS outlines in this policy section.

5.3.5.2 Cultural Landscapes. The treatment of a cultural landscape will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance.

4.6.3 Methodology

The analysis includes the alternatives and their level of impact to the Park's archeological resources, historic structures, cultural landscapes, and farms and fields within the existing Rural Landscape Management Program, known as the Countryside Initiative. The analysis included a qualitative assessment on the review of existing park policies on the treatment of historic structures and consultation with the park's Cultural Resources Management team (historical architect, historical landscape architect, historian, and Midwest Region archeological advisor). The analysis for cultural resources included the alternatives and the proximity of trail elements to cultural resources in the Park. Proposed Trail elements were evaluated based upon their proximity and trail use type within 100 feet of properties listed in the National Register of Historic Places (NRHP), known archeological areas, and within 10 feet of elements and properties within the Countryside Initiative. Evaluation distances were based upon recommendations from the park historical architect, historical landscape architect and archeologist. For the purpose of analyzing potential impacts to cultural and visual resources, the thresholds of change of the intensity of an impact are defined as follows.

Intensity Thresholds

Negligible. Impact is at the lowest levels of detection-barely measurable with no perceptible consequences to archeological resources, historic structures, cultural landscapes and rural landscape program properties.

Minor. Archeological: Disturbance of a site(s) result in little, if any, loss of its potential to describe and explain human behavior.

National Register of Historic Places: Impact would not increase the rate at which the historic structure is lost and/or influence the loss of historic character of the structure.

Cultural Landscape: Impact(s) would not affect the character of defining patterns and features of a property listed in the National Register of Historic Place, a cultural landscape, or a farm within the Rural Landscape Management Program.

Moderate. Archeological: Disturbance of a site(s) does not diminish the significance or integrity of the site(s) to the extent that it loses its ability to describe and explain human behavior. Such an impact would allow sufficient time for inventory, evaluation, documentation, and duration of collections and associated records.

Historic Structures: Impact would moderately increase the rate at which the historic structure(s) or the historic character of the structure is modified or altered.

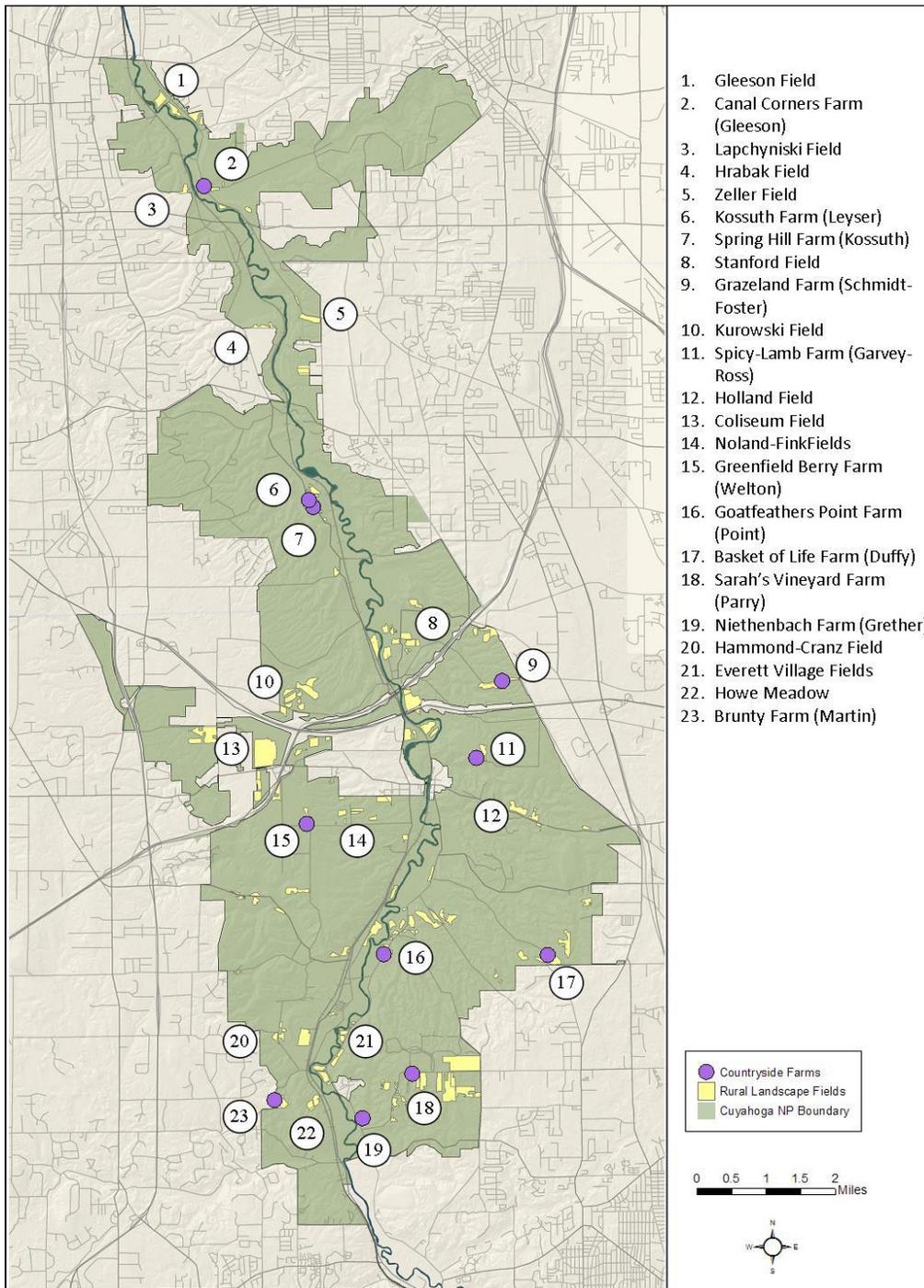
Cultural Landscapes. Impact(s) would alter a character defining pattern(s) or feature(s) of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility is jeopardized.

Major. Archeological Disturbance of a site(s) diminishes the significance and integrity of the site(s) to the extent that it loses its ability to describe and explain human behavior.

Historic Structures: The historic structure would be lost, or the historic character of the structure would be lost.

Cultural Landscapes: Impact(s) would alter a character defining pattern(s) or feature(s) of the cultural landscape, diminishing the integrity of the landscape to the extent that is no longer eligible to be listed in the National Register.

Figure 13: Countryside Initiative Fields and Farms Near Trail Elements



Source: CVNP

4.6.4 Impacts of the Alternatives

4.6.4.1 Impacts Common to All Alternatives

Section 106 Compliance. NHPA Section 106 compliance would be completed, on a project-by-project basis, for all trails proposed in the Preferred Alternative.

Archeological Resources. In general, most archeological survey work at the Park occurs in conjunction with projects that require ground disturbance. The planning process for these projects typically supports the completion of archeological inventory work prior to the actual ground disturbing activity. This inventory work is the initial step taken to provide data about the location of resources and the level of their significance. In turn, potential impacts on archeological resources are reduced through measures such as site avoidance, project redesign, or other site protection measures. Whenever possible, such measures will be implemented rather than archeological excavations, since protecting and preserving these important and nonrenewable cultural resources is the preferred NPS treatment of archeological resources.

The different alternatives considered in this plan propose undertakings that include the development of trails (new, expanded, and/or removals), parking lots, campsites, and paddle launches, some of which would require ground disturbance to accomplish. To avoid or mitigate adverse impacts to significant archeological sites, the following would be required:

- 1) Phase I archeological inventory of any locations where ground disturbance is anticipated and that have the potential to contain archeological resources and have not been previously inventoried;
- 2) Evaluative Phase II archeological testing of newly or previously documented archeological sites that are within the Area of Potential Effect (APE) and potentially would be impacted by components of the trail plan as proposed. The results would be applied in making an appropriate determination on the site's significance and potential eligibility for listing in the National Register of Historic Places (NRHP);
- 3) Finding of effect made for any newly or previously documented archeological sites within the APE for the trail plan that could not be protected through avoidance, redesign, or engineering methods; and/or
- 4) Phase III data recovery investigations of any significant archeological sites that are, or are deemed eligible for, listing in the NRHP. Archeological data recovery projects must include a written Mitigation Plan and Memorandum of Agreement between the park and the State Historic Preservation Office and Tribal Historic Preservation Offices (THPO), where appropriate, that is filed with the Advisory Council on Historic Preservation. The SHPO and NPS develop the plan and agreement in full cooperation. Phase III testing would only be used if all other methods of mitigating the adverse impact were demonstrated to not be feasible.

The scope, if any, of required archeological investigations for the proposed trail plan would be determined on a case-by-case basis for each location where ground disturbance is anticipated to occur or where a trail (or other component) would intersect a significant archeological site. The NPS's Midwest Archeological Center will work directly with Park project planners in determining the appropriate level.

Trail elements where sites are known or where archeological survey would likely need to occur are identified for each Alternative and their individual trail elements.

Cumulative Impacts. Additional parking areas or expansion of existing parking areas may be proposed within 100 feet of the Boston Mills and Stanford NRHPs to support trail plan needs under the Boston Mills Area Development Plan/Environmental Assessment. If these parking areas do occur, they would have long-term, negligible to minor, adverse impacts on these NRHP sites.

Continued use of neighborhood social trails will continue under this alternative, resulting in long-term, negligible to minor and adverse impacts on cultural resources.

4.6.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

National Register of Historic Places. The current system maintains trails within 100 feet of 12 properties listed in the National Register of Historic Places (NRHP) within the Park.

Archeological Resources. Isolated known archeological resources throughout the Park may be affected by near-by trails and visitors utilizing unmanaged social trails.

Countryside Program and Other Agricultural Landscapes. Trails affecting current Countryside Initiative properties are largely limited to the Towpath Trail and Valley Bridle Trail.

Cultural resources within close proximity to trails will continue to be vulnerable to surface disturbance and unavoidable damage due to visitor use patterns and current trail alignments, potentially affecting National Historic Register Districts, known archeological sites or Countryside Initiative properties. Social trails would not be managed or evaluated for cultural resource impacts. Alternative 1 would have negligible to minor adverse impacts on cultural resources from trails in close proximity to known and potentially unknown cultural resources in the Park.

Cumulative Impacts

Social trails from adjacent developments will continue to be used without a management or resource evaluation strategy to address use of these trails and their potential impacts on cultural resources. The no action alternative would have long-term, minor adverse cumulative impacts on cultural resources.

Conclusion

Impacts on cultural resources in Alternative 1 will be long-term, negligible to minor and adverse due to their vulnerability of ground disturbance and level of use in some areas without a comprehensive plan for their management. Existing social trails and unauthorized river access will continue to pose potential risks to unknown archeological resources.

4.6.4.3 Impacts Common to All Action Alternatives

Sustainable Trail Guidelines. The use of the Sustainable Trail Guidelines (Appendix C) during all phases of the trail development process pertaining to the protection and management of cultural resources will be utilized to avoid impacts to the greatest extent possible. If cultural resources cannot be avoided for proposed trail elements, a mitigation strategy would be developed in consultation with the Park's Cultural Resource Management team and the Ohio State Historic Preservation Office.

Impacts from Trail Facilities. The proposed water trail facilities may include facilities in the Boston Mills and Peninsula National Register Districts. Facility design and siting of the facilities may have a long-term, negligible to minor, adverse impact to this District for scenic and visibility resources within the Districts. The other launch facilities and their proximity to cultural resources include the proposed Hunt Farm launch facility utilizing the road right of way adjacent to the privately owned Szalay Farm and near the Hunt Farm NRHP site. The Cuyahoga River was a major corridor for movement of early settlers. Evaluation of each proposed launch facility for archeological resources in the selected alternative would be part of the design process as set forth in the Sustainable Trail Guidelines. Impacts to archeological resources could potentially be long-term, negligible to minor and adverse. The Hunt Farm launch site will have a long-term, negligible to minor, adverse impact to an active agricultural landscape. The remaining water trail facilities will have no effect on the Countryside Initiative Program elements.

Proposed campsites common to all action alternatives will include one campsite within 100 feet of NRHP areas, the Towpath-Old Carriage campsite (within the Ohio & Erie Canal District). The Towpath-Old Carriage Campsite may alter the visual resources of the District and but likely long-term, negligible to minor, and adverse due to the size and proposed siting. Campsites are also proposed within proximity of the private Szalay Fields north of Hunt Farm and NPS farm fields near Ira. All sites will be accessed on the perimeter of these fields having long-term, negligible to minor adverse impacts. The Cuyahoga River was a major corridor for movement of early settlers and some of the upland areas where campsites are proposed have not had archeological surveys conducted. Campsites may have long-term, negligible to minor, adverse impacts to archeological resources due to some of them being in close proximity to the river. Negligible to minor adverse impacts to two NRHP listings will be likely. The remaining campsites will have no effect on NRHP properties. Two campsites, North Hunt Farm and East Ira will have long-term, negligible to minor, adverse impacts to Countryside Initiative lands, but no effect from the other proposed campsite locations. The minimal size, minor facility development and use by a limited number of visitors will cause long-term, negligible to minimal impact to the cultural resources within close proximity to the campsites.

The new parking area for Ira paddle access near the private Szalay fields and the improved parking area near the Coliseum Habitat Management Area would have long-term, negligible to minor, adverse impacts to the Countryside Program and agricultural landscape related to maintaining the views and rural character of the Park. Known archeological resources are within 100 feet of the proposed expanded parking for Canal Visitor Center and Vaughn East. These sites will have a long-term, negligible to minor, adverse impact to archeological resources and will need to be evaluated for mitigation of impacts. New parking facilities at, Ira Paddle and Old Orchard, and relocation at Blue Hen and Indigo Lake will require initial archeological screening and survey. Application of the Sustainable Trail Guidelines will occur to design trail amenities that complement and not impact the characteristics and integrity of cultural resources in the Park. Impacts from trail amenities within defined proximity of cultural resources will be evaluated and mitigation practices will be implemented to avoid or minimize impacts.

Overall, water trail facilities and amenities may have long-term, negligible to minor, adverse impacts on NRHP properties, Countryside Initiative program elements and archeological resources. Impacts to archeological resources will need to be evaluated through site-specific surveys to ensure mitigation of impacts.

Restoration of Trails. The removal and realignment of trails proposed in all action alternatives includes areas within the Virginia Kendall NRHP District. The social trail targeted for removal within the Ledges is not listed in the NRHP nomination as a contributing feature. The proposed action will, therefore, not impact the District's designation and will have long-term, beneficial effects by reducing impacts to the resources within the area. The proposed removal of a portion of the Lake Trail for rare plant protection does alter a contributing feature identified in the National Register designation and will have a long-term, minor to moderate, adverse impact to the NRHP. Restoration of trails will have no effect to Countryside program properties or archeological resources since no proposed actions are within proximity of these resources. Additional survey may be required on future restoration areas as set forth in the Sustainable Trail Guidelines.

4.6.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

National Register of Historic Places. Alternative 2A proposes new trails within three NHRP listings: Michael Duffy Farm, Valley Railway Historic District, and Terra Vista Archeological District, associated with the Armington Trail, Fitzwater Connector and Terra Vista Hike Trail. The Terra Vista improved parking area will be the only parking facility proposed with 100 feet of the Terra Vista Archeological District. Due to its existing disturbance and conditions of the site, it will have no effect to the NRHP site. Since these proposed trails and trail facilities would occur on existing disturbed surfaces, they will have long-term negligible to minor adverse impacts on views within the specified NRHP site.

Archeological Resources. Proposed trails with potential or known archeological resources including the Old Carriage Trail extension and South Carriage Trail may be impacted and require additional evaluation for their alignment and feasibility due to the presence of resources. The Old Carriage Extension as a multi-use trail will have minimal ground disturbance related to its trail surface preparation and construction. If the proposed multi-use connectors would require alignment in undisturbed areas instead of the proposed roadbeds, additional archeological surveys would be required. Archeological resources on these sites may experience negligible to minor adverse impacts though these impacts may be mitigated.

Countryside Program and Other Agricultural Landscapes. The Armington Trail near the Duffy Farm and the Old Akron-Peninsula Connector Trail near the Spicy Lamb Farm (Garvey/Ross Farm) may affect the rural character views of these areas from the introduction or expansion of trail uses. The Coliseum Trail will impact the views and the scenic values of the current habitat management area from State Route 303. The Stone Road campsite, will have long-term, negligible to minor, adverse impacts to Countryside Initiative lands due to its proximity to agricultural landscapes. Impacts to the rural character and views to the associated Countryside Initiative properties will likely be long-term, negligible to minor and adverse.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Alternative 2A contains designated trails within three additional NHRP listings in comparison to Alternative 1. The proposed trails will utilize existing disturbed areas for the trail surface at all three sites, minimizing their impact. Impacts on NRHP's at these three locations are expected to be long-term, negligible to minor and adverse. Three proposed trails will travel near three Countryside Initiative properties located along the perimeter with minimal site disturbance. However, some change in the rural character and views on these sites is expected to have long-term, negligible to minor adverse impacts on the agricultural landscape. Two proposed trails are within areas with archeological resources which may have long-term, negligible to minor, adverse impacts on archeological resources, though these effects may be largely mitigated.

4.6.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts on cultural resources are similar as described for Alternative 2A except for the addition of mountain bike use on a portion of the existing Buckeye Trail. The use of an existing trail surface and alignment will have no effect on NRHP and Countryside Initiative program areas since the trail is not within 100' of any of these areas. The existing route does have two known archeological resources within 100' of the trail. Any realignment that improves conditions for the new use and current trails will adhere to the Sustainability Trail Guidelines and be evaluated for archeological resource impacts and mitigation measures. Alternative 2B will have long-term, negligible to minor adverse impacts to archeological, NRHP and Countryside properties as associated with all trail elements. Mountain bike use on the Buckeye Trail will have long-term, negligible, to minor adverse impacts to known and potentially new archeological resources.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Alternative 2B will have long-term, negligible to minor adverse impacts on archeological resources, NRHP site, and Countryside properties as associated with all trail elements. The addition of mountain bike use on the Buckeye will have long-term, negligible to minor, adverse impacts on known and potentially new archeological resources, but not to a level that would increase its intensity threshold.

4.6.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

National Register of Historic Places. Proposed trails within NRHP listings include the Towpath-Valley Connector trail (Valley Railway Historic District), Jaite Loop Trail and bridle trail (Jaite Mill Historic District), Hines Hill-Stanford Loop Trail (George Stanford Farm), Hunt- River Loop Trail, (Hunt-Wilke Farm), Five Falls Trail (George Wallace Farm), and Armington Trail (Michael Duffy Farm). Of these trails, Armington Trail will utilize existing disturbed areas but may change the rural character of the site with

increased trail use. The additional designated campsite proposed for the West Rim is within 100' of the Hrabak National Register property. Facility design and siting of the campsite will not affect the Hrabak property. Impacts to NRHP's will be long-term, negligible to minor, and adverse from their minimal disturbance for trail surface and minimal design of new trail facilities.

Archeological Resources. Proposed trails with previously undocumented archeological resources include Gateway Connector Trail, South Carriage Trail, Old Carriage Connector Extension, Highland Road Connector Trail, Everett- Hale Trail, off-road Buckeye Trail extension, Lower Furnace Run Trail, West Rim Trail, Upper CVC Trail, Jaite Trail and the Hines Hill–Stanford Loop Trail. With the exception of the Highland Connector Trail, Gateway Connector trail and Old Carriage Connector Extension, all of the proposed trails will consist of natural surface trails with raised bridges or boardwalks in portions of the trails with minimal excavation. Highland Connector Trail, Gateway Connector Trail, and Old Carriage Connector Trail may have long-term, minor to moderate, adverse impacts if mitigation measures cannot be accomplished. The Hunt Farm River Loop Trail may include a boardwalk with a potential increase in ground disturbance. If bike lanes require separated pathways outside of the right-of-way, on Riverview and Wheatley roads, a review of archeological resources would be required. Other proposed trails will need to be evaluated on a case-by-case basis for archeological resources, which may result in long-term, negligible to minor, adverse impacts to archeological resources. New parking facilities at High Meadow will require initial archeological screening and survey.

Countryside Program and other Agricultural Landscapes. Five Countryside Initiative properties are within 10 feet of proposed trails in Alternative 3A. These include the Hunt-River Loop trail adjacent to the privately owned Szalay fields, Tree Farm Expansion Trail adjacent to the Noland-Fink fields, High Meadow trail within the Kurowski Fields, Gateway adjacent to the Holland Fields, and Armington Trail near the Basket of Life (Duffy) Farm already described. All of these trails will exist along the perimeter of the fields, but may alter the rural character of these areas. An additional trailside campsite, Upper CVC, is proposed near the Lapchynski field located west of the Canal Visitor Center. New parking areas at High Meadow, part of the Kurowski fields, would have long-term, negligible to minor, adverse impacts to the Countryside Program and agricultural landscape related to maintaining the views and rural character of the Park. All trails and facilities will be accessed on the perimeter of these fields having long-term, negligible to minor, adverse impacts. Impacts to the Countryside Initiative properties will be long-term, negligible to minor and adverse.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Impacts on NHRP's will be long-term, negligible to minor, and adverse from an increase in trails within or adjacent to six NRHP properties but no significant change in character or alteration that would affect their designations. Impacts on Countryside Initiative properties will be long-term, negligible to minor and adverse with proposed trails along the perimeter of five identified areas. Impacts on archeological resources will be long-term, negligible to moderate and adverse from thirteen proposed trails within 100 feet of known sites, trails with a increased tread width and surface disturbance requirements, and some areas that may require additional archeological survey during site layout.

4.6.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Impacts on cultural resources from Alternative 3B will be similar as described for Alternative 3A except for the addition of proposed new mountain bike trails on the east and west rim.

National Register of Historic Places. The West Rim mountain bike trail will have no effect on NRHP listings. No additional impacts are expected to occur because the east rim trail will utilize existing routes and proposed routes that include the Five Falls trail and the existing Bike and Hike trail and its relation to the George Wallace Farm.

Countryside Program and other Agricultural Landscapes. The Countryside Initiative properties within 10 feet of the proposed mountain bike trails include the Schmidt-Foster and Johnson Fields on the east rim trail and the Kurowski fields on the West Central Mountain Bike trail. The trails will be aligned around the perimeter of these areas, but may impact the rural character of these sites. Impacts on Countryside Initiative properties will increase with the addition of new mountain bike trails, but not to the extent where an increase in the intensity threshold occurs.

Archeological Resources. No previously documented archeological sites are present in the proposed mountain bike trail areas. The presence of archeological resources may be minimal due to the upland locations, however, additional survey may be required where information is not currently available. Since the mountain bike trails do not affect any known archeological resources and is located in upland locations where resources are typically not abundant overall impacts of Alternative 3B to archeological resources will be long-term, negligible to minor. If upon survey of the area, archeological resources are found, impacts on archeological resources will likely have long-term, negligible to moderate adverse impacts.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Impacts on NRHP sites from Alternative 3B will be long-term, negligible to minor, and adverse. Impacts on Countryside Initiative properties will likely be long-term, negligible to minor and adverse from the proximity of some proposed actions to six designated fields and farms. The proximity of thirteen proposed trails within 100 feet of previously undocumented archeological sites, potential increase of disturbance from multi-use trails and potential additional archeological survey for some areas, including mountain bike trails will likely result in long-term, negligible to moderate, and adverse impacts on archeological resources.

4.6.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

National Register of Historic Places. Proposed trails are within 100 feet of eight NRHP listings. With the use of appropriate trail surfaces, aligning trails on the perimeter of sites and use of mitigation measures, impacts on NRHPs will be long-term, negligible to minor and adverse due to their associated visibility within each NRHP.

Archeological Resources. Areas described in previous alternatives with similar trail elements and the addition of the Ira-Hampton, Ira-Howe, Columbia Run, Everett- Plateau, CVC Boardwalk and Station Road- 82 Connector are within 100 feet of previously undocumented archeological resources. An archeological survey may be needed in other areas including: Blue Hen, Buttermilk Falls, Maplewood, Shady Grove, neighborhood connectors, Mudcatcher, Sagamore, Dugway, and Tree Farm-Daffodil trail. Known archeological resources are within 100 feet of the proposed expanded parking at the Cancasi-Mudcatcher site. These sites will have a long-term, negligible to minor, adverse impact to archeological resources and will need to be evaluated for mitigation of impacts. Impacts on archeological resources from Alternative 4A may be long-term, negligible to minor, and adverse.

Countryside Program and Other Agricultural Landscapes. Proposed trails are within 10 feet of ten Countryside Initiative properties. The proposed trails are along the perimeter of these areas, but may impact the rural character of the sites from limited human use. Impacts on the Countryside Initiative properties from Alternative 4A will be long-term, negligible to minor, and adverse.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Impacts from the proposed actions in Alternative 4A on NRHPs will be long-term, negligible to minor, and adverse with their associated visibility within eight NRHP listings. Impacts on the Countryside Initiative properties from Alternative 4A will be long-term, negligible to minor, and adverse from minor changes to the rural character at ten sites. Archeological resources may have long-term, negligible to minor adverse impacts from areas described in previous alternatives with similar trail elements and need for potential additional archeological survey evaluation for eleven proposed trails.

4.6.4.9 Impacts of Alternative 4B

Cultural resource impacts from Alternative 4B are similar as described for Alternative 4A except for the addition of a new mountain bike trail along the central east rim of the park. The proposed mountain bike trail will have a long-term, moderate adverse impact on the Duffy NHRP site from its increased use and type of recreational use. Affected Countryside Initiative properties also include the Duffy Farm and the proposed Countryside Initiative facility at the Black Acre Farm. The rural character of these farms may experience long-term, negligible to minor, adverse impacts. Additional archeological survey may be required for areas proposed along the Central East Rim trail. Impacts on archeological resources will be long-term, negligible to minor and adverse.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Impacts from the proposed actions in Alternative 4B on NRHP sites will be long-term, negligible to moderate and adverse with their associated visibility within eight NRHP sites, the proposed actions and their associated visibility within eight NRHP listings and the mountain bike trail within the Duffy NRHP site. Impacts on Countryside Initiative properties from Alternative 4B are expected to be long-term, negligible to minor, and adverse from minor changes in the rural character to ten sites and the proposed mountain bike trail. Archeological resources may have long-term, negligible to minor, adverse impacts from areas described in previous alternatives with similar trail elements and need for potential additional archeological survey evaluation for eleven proposed trails.

4.6.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

Impacts on Cultural Resources from Alternative 5 are similar for associated trail elements as described under all of the Alternatives.

National Register of Historic Places. Proposed trails are within 100 feet of nine NRHP listings. With the use of appropriate trail surfaces , aligning trails on the perimeter of sites and use of mitigation measures, impacts on NRHP sites will be long-term, negligible to minor, and adverse due to their associated visibility within each NRHP site.

Archeological Resources. Areas described in previous alternatives with similar trail elements thirteen proposed trail elements are within 100' of previously undocumented archeological resources. Archeological survey may be needed in other areas including: Blue Hen Trail, Buttermilk Falls Trail, Neighborhood connectors, Mudcatcher Trail, Dugway Trail, and portions of the mountain bike trails. Impacts on archeological resources from Alternative 5 may be long-term, negligible to minor, and adverse.

Countryside Program and Other Agricultural Landscapes. Proposed trails are within 10 feet of five Countryside Initiative properties. The proposed trails are along the perimeter of these areas, but may impact the rural character of the sites from limited human use. Impacts on Countryside Initiative properties from Alternative 5 will be long-term, negligible to minor, and adverse.

Cumulative Impacts

No additional cumulative effects are expected beyond those identified as common to all action alternatives.

Conclusion

Impacts from the proposed actions in Alternative 5 on NRHP sites, Countryside Initiative properties will be long-term, negligible to minor, adverse with their associated visibility and minor changes to the rural character of the park. Archeological resources will likely have long-term, minor to moderate, adverse impacts from the proximity of two trail elements to known resources and the need for potential additional archeological survey evaluation for eight proposed trails.

4.7 Impacts on Visitor Use and Experience

4.7.1 Relationship of Trails with Visitor Use and Experience

Visitation and carrying capacity. Although visitation in the Park has remained relatively unchanged in the past five years, visitation during peak visitation periods causes some areas in the Park to be perceived as overcrowded by the park visitor. Overcrowding occurs when parking lots reach full capacity and number of encounters of users on the trail and impacts to park resources increase. Crowding in the Park can also be perceived by trail visitors based upon their experience on a trail and their individual desire to encounter other trail, campsite or river paddle users during their visit. For example, encountering other trail users on more developed trails, such as the Towpath Trail, is more acceptable than encountering trail users on less developed primitive trails such as the Buckeye or Valley Bridle trails (Manning 2011).

Trail User Experiences and Accessibility. The Park can serve a wide variety of trail users and provide a variety of experiences due to the varied terrain of the Valley, park resources, and its proximity to metropolitan areas. As studies over the years have suggested,

“Diversity in tastes for outdoor recreation can be attributed to a wide variety of factors including types of recreation activities, socioeconomic and cultural characteristics of visitors, attitudes about management, preferences for levels of services and facilities, sensitivity to crowding and conflict, experience level, degree of specialization, place attachment and motivations for recreation participation. The diversity of experiences can be applied equally to campsites and water trail uses (Manning, 2011).”

Trail accessibility can also attribute to a visitor’s trail experience. Accessibility can also include a wide variety of occurrences over the span of a human life. These can include mobility challenges for small children and the elderly, temporary physical capabilities, and permanent physical disabilities.

Trail Use Conflict. In a survey of 83 outdoor recreation managers of multi-use trails, half reported no user conflicts or few if any on their trails (Federal Highway Administration). The most common, when conflicts did exist, occurred between hikers and bikers, followed by equestrians and bikers. Inconsiderate behavior between different trail user groups were reported between hikers, equestrians and mountain bikers in a NPS study of backcountry recreation trails (Federal Highway Administration). In another study, indirect approaches (e.g., education, information) and partnerships can reduce conflict issues among trail user types (Arnberger et al., 2002).

Opportunities for Information and Education. Visitor experience on trails can be affected by how visitors are able to orient themselves to and through a trail system, the information they are provided on features along the trail, and participation in programs that provide in-depth learning about trail and park resource features. As with the variety of trail experiences visitors seek, the same is true on the amount of information and education available on trails, based upon their level of development of a particular trail. Typically, more formal information and education is provided on the developed trails and only basic trail orientation information is provided on less developed primitive trails.

Public Health and Safety. Due to the outdoor nature of trails, resource conditions and urban impacts, trails and trail facilities can cause public health and safety issues pertaining to a trail user's ability, adverse weather conditions and degrading park resources, such as water quality. The conditions of a trail system can have an impact on visitor experience and the use of trails in the Park.

4.7.2 Applicable Regulations and Guidelines

NPS Management Policies (2006)

1.10 Partnerships. The service will seek opportunities for cooperative management agreements with state or local agencies that will allow for more effective and efficient management of the parks, as authorized by section 802(a) of the National Parks Omnibus Management Act of 1998 (16 USC 1a-2(1)).

4.9 Soundscape management. The Service will restore to the natural condition wherever possible to those park soundscapes that have become degraded by unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts.

7.1 Interpretive and Educational Programs. Every park will develop an interpretive and educational program that is grounded in (1) park resources, (2) themes related to the park's legislative history and significance, and 3) park and Service-wide mission goals.

8.2 Visitor Use. Visitor activities will be provided that are appropriate to the purpose for which the park was established, will foster an understanding of park resources and values and can be sustained without causing unacceptable impacts to park resources and values.

8.1 Appropriate Use. Uses of the park will be allowed that are appropriate to the purpose for which the park was established, and can be sustained without causing unacceptable impacts.

8.2.5 Visitor Safety. The Service and its concessioners, contractors and cooperators will seek to provide a safe and healthful environment for visitors and employees.

9.2.2 Trails and Walks. Trails and walks will be planned and developed as integral parts of the each park's transportation system and incorporate principles of universal design.

9.3 Visitor Facilities. Visitor facility development will be limited to that which is necessary and appropriate and designed, built and maintained in accordance with accepted NPS standards for quality and the NPS commitment to visitor satisfaction.

4.7.3 Methodology

Visitor use and experience can be associated to activities that are uniquely suited to the natural and cultural resources that: 1) foster an understanding of and appreciation for park resources and values, 2) promote enjoyment through a direct association or interaction with a park resource, and 3) contribute to the health and personal fitness of park visitors (NPS, 2006a). To analyze visitor use and experience, data was compiled based upon current and proposed trail types, trail use patterns, public scoping input, research on visitor experience issues, and consultation with Park staff and Park partners. The following factors were part of the analysis and evaluation of the alternatives and their impacts to visitor use and experience.

Visitation and carrying capacity. Using trail use data collected in 2010 and 2011 and long-term visitation patterns, the alternatives were evaluated on their potential to address crowding. For the purposes of this analysis crowding is defined as when the capacity of facilities and trails are above current capacity or where increased use may change a perceived trail use experience and the level of contacts with other trail users.

Trail user experiences and accessibility. The alternatives were evaluated by the number of different types of trails offered, their proximity to trail facilities, and number of trail connections first between CVNP trail areas and secondly CVNP trails to regional trail systems outside of Park

Trail User conflict. The alternatives were evaluated on the number of types of trail users and their proximity to other trails, and trail facilities and their level of use.

Opportunities for education and interpretation. The alternatives were evaluated on the level of development and types of park features available along the proposed trail.

Public Health and Safety. The alternatives were evaluated by their level of exposure to adverse conditions, including distance from trail facilities and park resource conditions.

Intensity Thresholds

The following impact intensity levels were established for impacts on the socioeconomic environment:

Negligible. Impacts to trail experiences or opportunities would be barely detectable and/or would affect few visitors. Visitors would likely not be aware of the effects.

Minor. Impacts to trail experiences or opportunities would be detectable but slight. Few visitors would be affected or have a perception of visitor conflict.

Moderate. Impacts to trail experiences or opportunities would be readily apparent. Many visitors would be affected and express opinion about the effects.

Major. Impacts to trail experiences or opportunities would be readily apparent and have consequences. Most visitors would be affected and likely express a strong opinion about the effects.

4.7.4 Impacts of the Alternatives

4.7.4.1 Impacts Common to All Alternatives

Application of Accessibility Guidance. All Action Alternatives will adhere to the accessibility guidance set forth in the Park's Sustainable Trail Guidelines. Accessibility to all of the trails will be available at varying degrees of difficulty. This action will have long-term beneficial impacts to trail user experience and accessibility.

Cumulative Impacts. The expansion of new trail experiences along the Cuyahoga River, north and south of the park, potential new trail uses in Cleveland Metroparks, new trails in local communities, improved on-road bike conditions within the region and within the Park, and other trail connections to the Park, will provide long-term beneficial impacts to visitor use and experience.

Water trail planning beyond park boundaries is currently underway for the entire length of the Cuyahoga River. This will offer new visitor experiences on the river including day-long and multi-day trips, and opportunities for education and interpretation of the river system. The implementation of the City of Akron Combined Sewer Overflow Long-Term Control Plan will affect the river quality conditions for paddling activities and human contact in the river but may take many years before changes in water quality are observed.

Any actions to remove or modify the Brecksville Dam on the Cuyahoga River will have a beneficial effect on paddling use and facilities at Station Road, associated with water trail safety, and portage facilities that may be required. The NPS Boston Mills Area Development Plan (currently underway) may affect the viability and location of any potential facilities and trails in the Boston area.

4.7.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

Current trails and parking areas will continue to be congested during peak seasonal use. No management system will be set in place to evaluate carrying capacity for trail use. Opportunities for new trail uses and expansion of long and short distance or loop trail systems will not exist with zero new trail miles proposed. New trails or improvements of existing trails for accessibility will occur as individual projects are developed. Improved connections from communities will not occur. User conflict among bicycle users and hikers will continue on the Towpath but may be reduced due to ongoing education and outreach on trail etiquette. Trails will continue to have degraded conditions in some locations that risk injury to poor footing. Impacts to visitor use and experience are expected to be long-term, minor to moderate, and adverse.

Cumulative Impacts

There are no additional cumulative impacts from Alternative 1.

Conclusion

Continued congestion in high use trail areas, will affect visitor experience on the trails in the Park. Visitation, trail user experience and user conflict from Alternative 1 is expected to have impacts to

visitor use experiences that are long-term, minor to moderate, and adverse by visitation, limited trail user experiences, and current user conflicts on high use trails. Opportunities for education and interpretation on trails and public health and safety issues will likely not affect visitor use experiences because no additional trail facilities or trails introduced in Alternative 1.

4.7.4.3 Impacts Common to All Action Alternatives

Establishment of Carrying Capacities. The Park will establish indicators and metrics for all action alternatives to gauge trail use and their relative capacity to sustain for future generations of users. Indicators will be established from information of current trail use, projected trail use, types of trail use, and parking lot use during the average peak season. Carrying capacity indicators will assist the Park in managing use levels on particular trail segments where conditions for visitor experience are diminished or altered. Use of carrying capacity indicators will be beneficial to the trail user by providing information to match acceptable levels of trail use and the trail user's desired trail experience appropriately. This action will have long-term beneficial impacts to visitation.

New Opportunities for Information and Education. All action alternatives will utilize the trail development guidance set forth in the Sustainable Trail Guidelines. Programming opportunities are described under each alternative in this analysis section. Utilization of technology to orientate and educate trail users will have beneficial impacts to the visitor experience on the trails by providing real-time information on trail characteristics and conditions, new ways to learn about park resources and to inform the trail user of programs and other visitor experiences associated with the trail system. This action will have long-term beneficial impacts to the visitor experience.

Trail Restoration. The removal and realignment on portions of the primitive portions of the Park may affect some of the circulation patterns on these trails, especially where parallel duplicate trails become a single trail for multiple uses. This may increase visitor contact between trail user types on the Buckeye and Valley Bridle trails. However, since both of these trails experience low use, increased user conflict will be rare and have a long-term, negligible, adverse impact to visitor use experience. Impacts to visitor use and experience will be beneficial by the realignment of trails from improved trails conditions for the trail user.

Impacts of Trail Facilities

Direct and Indirect Impacts

The introduction of designated access points to the Cuyahoga River for kayaking and canoeing will provide a new trail use experience to the Park visitor not currently recognized by Park operations or Park use activities. Accessibility at paddle launch sites will be made available and be assigned a level of difficulty during the planning and design phase of each site. User conflict may occur in high visitor use areas at Boston Store, Hunt Farm, and Lock 29. New programming and interpretation opportunities exist for this new type of trail use, relative to river conditions and ecology. Orientation for access and operations would be required and will need to be coordinated with other trail information. Impacts to visitor use and experience as it pertains to public health and safety of the trail user will be long-term, minor to moderate and adverse due to water trail user exposure to the current water quality conditions following rain events, river conditions park-wide, and at potential hazard areas particularly at locations of Lock 29 and Station Road and the Route 82 dam. Added use for new trail activities of existing parking facilities that currently reach use capacity for some water trail access locations are expected to have

long-term, minor, adverse impacts to visitation from increased overcapacity of parking facilities during peak use. Trail user experience, accessibility, and education and interpretation opportunities will have long-term, beneficial impacts on visitor use and experience from the opportunity to utilize the river with improved facilities for all users, and a new venue for park resource learning and interpretation. Long-term, minor, adverse impacts from increased trail user conflicts are expected at high use trail facilities where use is currently high and congested.

The introduction of an expanded campsite program in the park will provide new opportunities for trail experiences in the Park. Some campsite users may utilize nearby trailhead facilities that reach capacity levels during peak use, including Frazee and Red Lock. Expansion of some parking facilities and campsite use being dispersed from facilities will reduce the parking demand from visitation and have beneficial impacts to visitor use and experience.

The campsites are located to provide experiences to trail users of all abilities, with some located near the Towpath in developed areas of the Park and other campsites located along the primitive Buckeye Trail with fewer amenities nearby. All campsites will meet the guidance for outdoor recreation accessibility facilities. Towpath campsites will have easier access and the Buckeye Trail campsites will have greater difficulty for accessibility, due to terrain and resource conditions.

Trail user conflict may occur in the developed campsites areas where trail use is high. Visitor use and experience may have long-term, minor, adverse impacts from crowded parking conditions in areas where campsite users may utilize high use parking areas and where parking capacity is reached during peak seasonal use occurs. This may occur particularly at Hunt Farm, Red Lock and Lock 29. New programming and interpretation opportunities will be beneficial to the visitor experience by telling the story of park resources to trail users. Health and safety impacts of campsites relate to two conditions; the proximity of campsites to the river and their use during high water levels and the proximity to restroom facilities in the primitive campsites.

Impacts to visitor experience from expanded campsites will have long-term, minor, adverse impacts from visitation related to new use adjacent to the highly use Towpath trail, increased use on the low visitor use Buckeye Trail, and sharing of parking facilities where capacity is limited. Long-term, beneficial impacts on visitor experience are expected from the campsites providing new trail experiences to a wide variety of skill levels through the design of developed and primitive campsites throughout the Park.. Long-term, negligible, adverse impacts on visitor experience are likely due to user conflict in high use areas along the Towpath. Long-term beneficial impacts for visitor experience will likely occur from education and interpretation opportunities through expanded trail facilities. Long-term, moderate, adverse impacts on visitor use and experience from public health and safety are likely with proximity to water resources, current water quality conditions, and limitations to proximity to established restroom facilities and the feasibility to provide new facilities.

Improving, relocating, and expanding parking areas will provide beneficial impacts to the visitor experience to reduce congestion in areas including Hunt Farm and Lock 29. Any increased competition for parking at Pine Lane is not expected to cause impacts on visitors. The proposed relocation of the Blue Hen parking area will provide beneficial impacts to the visitor experience for all user types in this location.

New and expanded parking areas will have long-term beneficial impacts on visitor experience in areas where high seasonal use currently occurs. Parking areas will be provided convenient, dispersed, access points to the trails providing long-term beneficial impacts to trail user experiences. Trail user conflicts would have long-term, minor to moderate, adverse impacts where multiple user groups and high use occur at parking areas. Opportunities for education and interpretation will not be affected. Improved parking areas will improve safety of vehicular traffic and circulation within facilities, but may increase where equestrian trailers exist in high use areas, resulting in long-term, negligible to moderate, adverse impacts.

Trail amenities will have beneficial impacts to the trail experience for visitors that will further enhance the enjoyment and safety on the trails within the Park, especially during poor weather conditions. An adverse impact will be the limited expansion of water for trail users, due to infrastructure restrictions.

Overall, trail facilities and amenities will provide long-term beneficial impacts to visitor use experience by improving facilities for visitation, new and expanded trail user experiences and new opportunities for education and interpretation. Long-term, minor to moderate, adverse impacts on visitor use and experience will likely occur by potential trail user conflict in high use areas by new uses and public safety and health issues associated with river conditions for human contact and human waste management at campsites.

4.7.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Alternative 2A provides limited new trail experiences to the Park that include four new, short distance interpretive hiking trails, one new medium distance cross-country ski trail, improvements and expansion of existing bridle trails, and five new multi-use trails. Alternative 2A also includes improvements and additions to existing trails, minor connections between the Park's trail network and limited multi-use connections to adjacent communities. The range of types of trail experiences will not significantly change from Alternative 1, with the exception of expansion of multi-use trail opportunities. Multi-use connections in five locations will provide alternative transportation options in the north and southern regions of the park. Linkages by the multi-use trails to major visitor activity centers in the Park will occur between Boston and Brandywine areas, Towpath to Plateau Area for hikers only, and Terra Vista to Canal Visitor Center for hikers only. Impacts to visitor use and experience are expected to be beneficial from the limited expansion of new trails and multi-use connections Alternative 2A provides.

Remediation of trail user conflicts by dispersing trail users will be limited to the Terra Vista trail connector and multi-use trails providing beneficial impacts to visitor use and experience. Equestrian trailer parking will have minor impacts on visitor experience by increase in crowding to parking areas where shared parking is proposed at East Vaughn. The new Old Orchard parking area will provide a single use parking facility for equestrian users, which will minimize user conflict and is located in a low use area. Limited opportunities for education and interpretation would be available at the Coliseum Boardwalk Trail and Terra Vista trail where park resource story opportunities exist providing beneficial impacts to visitor use and experience. Terrain conditions on the Stanford Trails and Old Akron-Peninsula Connector Trail will be challenging, limiting their use for all skill levels and may pose safety issues that may have long-term, minor, adverse impacts on the public safety and health of the trail user and their overall visitor experience.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum and Terra Vista sites may affect the use of trails in this Alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible, and adverse.

Conclusion

Impacts on visitor use and experience will be long-term and beneficial through the expansion of parking facilities in high use areas to accommodate carrying capacity of park visitation. Long-term beneficial impacts will also likely occur from the limited increases in new trail areas for a variety of trail users, opportunities for education and interpretation on two new trails and opportunities to reduce trail user conflict on high use trails through dispersment of trail users on new hiking and multi-use trails. Public health and safety issues will be have long-term, minor , adverse impacts from the terrain of two multi-use trails. Overall the impacts of Alternative 2A on visitor use and experience will be long-term negligible, and adverse.

4.7.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts to visitor use and experience are similar as described for Alternative 2A except for the addition of a 10-mile mountain bike trail on the existing Buckeye Trail between Boston Mills Road and Station Road. Trail user conflicts between mountain bikers and hikers may occur but be minor due to the overall low hiker use of the trail. They may be higher near Blue Hen and Station Road where trail use is moderate to high during peak summer use. User conflict will be further reduced with the designation of shared trail use on the existing Valley trail for hikers as an alternative thru-trail route. Because the trail would utilize the existing trail, it would provide a point-to-point trail with no opportunities for loops, hence trail traffic on a single-track would cause conflicts among trail users traveling different directions. Visitor use and experience will have long-term, minor to moderate, and adverse impacts from increased trail user conflicts that may occur with the addition of mountain use on the Buckeye Trail. The use of existing parking areas at Station Road and Blue Hen may increase congestion and capacity at these areas. Expansion at Blue Hen will assist in diminishing this impact. The introduction of mountain bike use in Blue Hen and Brecksville Metroparks regions will have long-term, minor, adverse impacts to visitor use experience from increased visitation at some park facilities. A mountain bike trail through a forested area with varying terrain will provide a new visitor experience within the park. The trail however will be limited, due to its terrain to serve a range of mountain bike experience levels. Additionally, the Buckeye Trail is considered a primary primitive trail experience for trail users in the park. Introducing mountain bike use on this trail will diminish this coveted trail experience unique in the Park. Since there will be long-term, beneficial impacts to visitor use experience from expanding new trail use experiences in the Park and long-term, moderate, and adverse impacts to a highly regarded primitive trail experience, overall impacts to visitor use and experience from trail experiences will be long-term, minor, and adverse. Opportunities for education and interpretation will have beneficial impacts to visitor use and experience by providing a new approach to exploring this area of the Park. The mountain bike trail is limited in access with its sole connection from the Towpath Trail at Station Road. The use of sustainable trail guidelines will have beneficial impacts on visitor use and experience by the improvement of trail conditions for this trail segment.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum and Terra Vista sites may affect the use of trails in this Alternative due to temporary closures during this vegetation management activity.

Expansion of mountain bike trails in the Cleveland Metroparks will provide expanded opportunities for the mountain bike trail user group and disperse use throughout the region. This will be a long-term beneficial impact from expanded opportunities for CVNP trail users, but since it may increase visitor conflict among other trail users in isolated areas, the impacts are somewhat mitigated.

Overall cumulative impacts to visitor use and experience would be long-term, negligible to minor and adverse.

Conclusion

In addition to the impacts described in Alternative 2A, Alternative 2B will likely have long-term, beneficial impacts on visitor use and experience from new mountain bike trail uses and the new opportunities for education and interpretation. Long term, minor, adverse impacts to visitor use experience will occur from new uses on an existing primary primitive trail, increased visitation at existing facilities and potential for increase trail user conflicts among trail users on the proposed mountain bike trail segment. Overall impacts to visitor use and experience from proposed actions in Alternative 2B will likely be long-term, minor and adverse.

4.7.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Alternative 3A expands the visitor experiences for trail users in the Park with the addition of new trails including four new hiking trails, ten new interpretive trails, three new or expanded cross-country ski trails, expansion and one new bridle trail, and six new multi-use trails connecting to the Bike and Hike trail. Short-distance trails for pedestrian use from the Towpath Trail will assist in dispersing use in congested areas of the Towpath. Increase in visitation is likely with the introduction of new trails, but with expanded facilities and dispersal of uses, impacts will be long-term, minor and adverse.

Alternative 3A offers a wide variety of trail experiences including shorter loops near current and proposed activity areas. These areas include Rockside Station, Canal Visitor Center, Brandywine-Stanford-Boston Mills-Jaite, Blue Hen, Lock 29, and Hunt Farm-Everett. Alternative 3A introduces longer distance trails and connections between existing trail systems that include West Rim and the Howe to Everett connector. The variety of trails, trail uses and locations offers a range of difficulties and landscapes for the trail user to experience based upon their skill level, amount of time available and desire for a trail experience near facilities and activities or primitive and solitude. Multi-use connectors and bike lanes will provide beneficial impacts to neighboring communities for new connections for alternative transportation to the Park and for utilizing the Park as a corridor for thru travel to other areas of the region. Multi-use connectors will also assist in dispersing use along the Towpath to expand off-road bicycle opportunities. With the expansion and variety of trails introduced in Alternative 3A, overall impacts on visitor use and experience from trail user experiences will be long-term and beneficial. Trails in new areas of the Park but accessible from primary visitor facilities or proposed

facilities will offer opportunities for education and interpretation resulting in long-term and beneficial impacts. Trail user conflict will be potentially reduced by utilizing low use trails for shared use resulting in beneficial impacts to visitor use and experience. New trails are largely proposed in close proximity to existing or proposed visitor facilities reducing access for safety purposes. The utilization of the Sustainable Trail Guidelines will assist in providing trail surfaces and trail conditions that limit risk of injury. Through the proximity of trails to visitor facilities and improvements of trail conditions, impacts to visitor use and experience with regards to public health and safety will be long-term and beneficial.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum site may affect the use of trails in this Alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible and adverse.

Conclusion

Long-term beneficial impacts on visitor use and experience will likely occur from Alternative 3A from expansion of new trail experiences for a variety of trail users and abilities, expansion of multi-use connections, new opportunities for education and interpretation within new trails, and potential reduced trail user conflict with the expanded trail system aimed to disperse use. Increase in visitation is likely with the introduction of new trails, with likely long-term, minor and adverse impacts to visitor use and experience. Overall, impacts to visitor use and experience from Alternative 3A will be long-term, negligible and adverse.

4.7.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Impacts to visitor use and experience are similar as described in Alternative 3A except for the addition of two new mountain bike trails within the central portion of the Park. The mountain bike trails will be new trails installed in the park with portions shared by hikers and cross-country skiers.

The new mountain bike trails identified in Alternative 3B provide remote and separate locations to enter and exit the designated trails from other trail uses with the exception of some isolated regions of the park. There will be long-term, minor to moderate and adverse impacts to visitor use and experience from increased visitation in the high visitor use area at Brandywine Falls, where the East Rim mountain bike trail is linked between the Bike and Hike trail. With the addition of mountain bike trails in a high use visitor area, visitation may be affected by over capacity of the parking area at Brandywine during peak use periods. New parking facilities at High Meadow, Snow Road, and expansion of the Boston Mills Bike and Hike trailhead, administered by Metroparks, Serving Summit County, will assist in reducing impacts on visitor use and experience at other entry points to the mountain bike trail.

Trail user conflicts will have long-term, minor to moderate, adverse impacts on visitor use and experience by potential user conflicts in small isolated areas of Brandywine trailhead and the Old Carriage Trail Connector extension by the introduction of new uses and increased trail traffic. Because the cross-country ski season and mountain bike trail use is typically during two different seasons, no adverse impacts would occur between these two user groups.

Long-term, minor, and adverse Impacts on visitor use and experience will occur from education and interpretation for increased education on new trail use etiquette and impacts will be long-term and beneficial for new programming and interpretation through a new trail use. Overall impacts on visitor use and experience from education and interpretation will likely be long-term, negligible and adverse. The trail user experience on these trails will be beneficial to the mountain bike trail user, as both loops provide opportunities for a variety of skill levels for mountain bike use that can introduce families to this trail experience and also be used by experienced riders. Because of their locations, a variety of trail and park experiences could occur from a single trailhead or use of the trail. On the east rim, proximity to Brandywine and connection through the Stanford Connector can offer a variety of experiences to connect to the mountain bike trail. On the West rim, a hiking only link to Blue Hen Falls and Buttermilk Falls will allow the mountain bike trail user to utilize bike racks at High Meadow and visit these park features or hike a portion of the Buckeye Trail. The design of the mountain bike trails in Alternative 3B will have beneficial impacts on visitor use and experience of mountain bike trail users, and be beneficial to non-mountain bike trail users by their remoteness and separation from the majority of other trail use types offered in the park. The range of trail expansion for a variety of trail uses, skill levels and their locations provide beneficial impacts on overall visitor use and experiences. Campsites proposed on the Buckeye Trail will not be accessible for mountain bike users which may be long-term, negligible to minor, and adverse to the visitor experience for mountain bikers.

Long-term, negligible to minor, adverse impacts on visitor use and experience on public health and safety will be negligible to minor with the introduction of a new trail use in semi-remote areas of the Park that will require volunteer bike patrol systems in cooperation with the Park.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum site may affect the use of trails in this Alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible and adverse.

Conclusion

Impacts on visitor use and experience will be similar to Alternative 3A with the addition of impacts from mountain bike trails offered in Alternative 3B. Impacts on visitor use and experience are expected to be long-term, minor and adverse from increased visitation and new trail uses in some areas where high visitation currently occurs. Impacts on visitor use and experience from education and interpretation programming opportunities will likely be long-term, negligible and adverse. Impacts will be long-term, beneficial for expanded ways to use trails in new areas of the Park without interruption of other trail use experiences. The marginal remoteness of the mountain bike trails and their challenging terrain may have long-term, negligible to minor, adverse impacts to visitor use and experience for the public health and safety of the trail use. Overall impacts on visitor use and experience will likely be long-term, negligible, and adverse.

4.7.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

Alternative 4A provides the most extensive trail system among the alternatives with the majority of new trails proposed being for hiking and trail running use. Alternative 4A provides twelve new interpretive trails, eight new hiking trails, four multi-use connector trails, five connections of existing hiking trails for longer distance hiking experiences, two new and expanded cross-country trails and improvements and expansion of equestrian trails in areas where they currently exist. Visitation and carrying capacity will increase with new trail opportunities and facilities but may be dispersed with the introduction of new trailheads, such as at the High Meadow Trail and Mudcatcher Trail, and the improvements to parking facilities.

Impacts on visitor uses and experience will be long-term, negligible and adverse from the effects of visitation by the expansion of trail loop and improvements of the trail facilities to accommodate new trail users.

Long-term, beneficial impacts on visitor use and experience will occur from reduced or no effects on trail user conflict from the expansion of designated off-road bicycling opportunities, expansion of loops for a variety of trail users, and dispersal of uses in new locations.

Trail experiences will be geographically limited with the majority of new trails in the central and southern portions of the Park. The expansion of longer distance loops, short distance loops, accessible routes to visitor center facilities, and connections between existing trail systems through a variety of park landscapes will provide the widest variety of trail experiences for the widest variety of skill levels of trail users and park visitors. Connections to neighborhoods, multi-use connectors to communities and other regional trail networks and bike lanes in partnerships with local and regional jurisdictions will be a beneficial impact in providing new trail experiences entering and exiting the Park. Trails in Alternative 4A will provide the greatest new trail access to park resource features including Mudcatcher waterfalls, Buttermilk Falls, the Columbia Run viewshed and Maplewood Overlook. Overall, impacts on visitor use and experience will likely be long-term beneficial impacts from the variety of trail user experiences offered and the opportunities for expanded education and interpretation on new trails and their access to Park features.

Long-term, minor and adverse impacts on visitor use experience will occur regarding the public health and safety of the trail user with extensive new trails proposed in more remote locations of the Park at longer distances between facilities.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum site may affect the use of trails in this alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible and adverse.

Conclusion

Impacts on visitor use and experience from Alternative 4A will be long-term, negligible and adverse by the design and distribution of the proposed trails to accommodate potential new visitation patterns. Long-term, beneficial impacts are likely from the variety and expansion of trail user experiences, the dispersment of trail users to limit trail user conflict and the opportunities to education and interpretation on trails accessible to park features. Long-term minor and adverse impacts on visitor use and experience may result in effects on public health and safety from the expansion of trails in remote areas with challenging terrain. Overall, impacts on visitor use and experience from Alternative 4A are expected to be long-term, negligible and adverse.

4.7.4.9 Impacts of Alternative 4B

Impacts on visitor use and experience are similar as described for Alternative 4A, except for the addition of a new 15-20 mile mountain bike trail on the east rim of the Park.

Visitation may increase from the introduction of a new use, but will be located in existing low use areas resulting in long-term negligible impacts to visitor use and experience.

Alternative 4B also offers opportunities for long and short distance mountain bike trail experiences at varying skill levels. This incorporates the concept of a longer distance trail through the Park connecting to shorter loop systems in the northern, central and southern regions of the Park. Providing this variety of new trail experiences for a new use with limited interaction with other trail uses in the park will have long-term beneficial impacts on visitor use and experience.

Long-term, minor, adverse impacts on visitor use and experience will occur from trail user conflict but will be limited due to the proximity of the mountain bike trail with existing trails, and limited trail intersections with the Buckeye and Valley Bridle trails. The trail intersections on these trails, near Pine Lane, and Cross-Country trail, near Virginia Kendall, currently have low trail use. New and existing parking areas for mountain bike trails will be beneficial by reducing congestion in existing high use areas and utilizing existing parking areas for expansion such as Little Meadow, and the Hike and Bike trailheads at SR 303 and Boston Mills where use is low and moderate.

Long-term, negligible and adverse impacts on visitor use and experience will occur from new opportunities for programming but the need to educate all trail users on the presence of new trail user groups.

The mountain bike trail will have long-term, negligible, adverse impacts on visitor use and experience regarding public safety due to the trail's proximity to public roads along Route 303 and Truxell road.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum site may affect the use of trails in this Alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible and adverse.

Conclusion

Alternative 4B will have impacts on visitor use and experience similar to what is described in Alternative 4A with the additional impacts of mountain bike trails. Long-term beneficial impacts are expected by the introduction of new trail user experiences for a variety of skill levels of mountain bike trails. Long-term, negligible adverse impacts will occur from increased visitation patterns from new trail uses and experiences, increased education and interpretive programming for mountain bike trail use and expanded bike use in proximity to high volume road areas. Long-term, minor adverse impacts are expected from trail user conflicts on limited low use portions of the mountain bike trail and their intersection with other use type trails. Overall, impacts on visitor use and experience from Alternative 4B are expected to be long-term, negligible and adverse.

4.7.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

The impacts of Alternative 5 on visitor use and experience are similar for associated trail elements as described under all of the alternatives.

Alternative 5 provides the widest variety of trail experiences for visitors. Alternative 5 expands short hike trails accessible from the Towpath Trail and primary visitor contact centers and links existing loop trails to provide longer primitive trail experiences. In addition, a new trail unit would be established for the High Meadow, Blue Hen, Columbia and Buttermilk Falls trail system. New multi-use connectors to the Bike and Hike trail will provide regional connection opportunities. Limited expansion of equestrian trails will occur, but improvements to their existing trails and maintenance of current regional connections will improve and sustain trail user experiences. Alternative 5 will provide a multi-loop mountain bike trail system that will introduce a new use to the Park. The variety of trail user experiences and their geographic distribution provided in Alternative 5 will have long-term, beneficial impacts to visitor use and experience.

Visitation will likely increase with the introduction of new trails and new uses, but with expanded facilities and dispersal of uses, impacts on visitor use and experience will be long-term, minor and adverse.

Trail user conflict will be limited from the dispersal of trail use throughout the park and providing use of the mountain bike trail separate from existing high use areas within the park resulting in long-term, minor and adverse impacts on visitor use and experience.

Since new uses and expansion will provide opportunities for education and interpretation but also require outreach on new uses within the Park, impacts on visitor use and experience will likely be long-term, negligible and adverse.

Public safety and health conditions will be similar to other alternatives and their associated trails and uses, related to remoteness and conditions on some trails and their proximity to trail facilities. Long-term, minor and adverse impacts are expected on visitor use and experience from these public safety and health issues.

Cumulative Impacts

Potential prescribed burning for vegetation management at the Coliseum site may affect the use of trails in this alternative due to temporary closures during this vegetation management activity. Overall cumulative impacts on visitor use experience will be long-term, negligible and adverse.

Conclusion

Alternative 5 will have long-term, beneficial impacts on visitor use and experience from expanded trail user experiences throughout the park. The expanded trail system will have long-term, minor and adverse impacts on visitor use and experience from increased and new visitation use patterns, limited trail user conflicts in isolated areas and increased public safety precautions on primitive trails in remote areas. Long-term, negligible, adverse impacts will occur on visitor use and experience from expanded education and interpretation opportunities. Overall impacts on visitor use and experience from Alternative 5 are expected to be long-term, negligible and adverse.

4.8 Impacts on Socioeconomic Conditions

4.8.1 Relationship of Trails with Socioeconomic Conditions

Impacts on local governments, residents and adjacent land owners. Numerous national and regional studies have demonstrated that trails generally increase property values of adjacent residential areas (NPS, 1995; Karaeniz, 2003). No specific studies have been conducted for the residential areas surrounding the Park to date. Trails and trail facilities can also affect governments and residents due to traffic changes and pressures on emergency and safety services from visitation to the Park.

Trails adjacent to private property may experience increased noise from trail users, especially where high use may occur. Siting of trails on private property may require federal land acquisition resulting in reduction in property tax revenue to local municipalities. Siting trails on other public lands will require cooperative agreements for management and maintenance.

Trails and bike lanes can provide benefits to public roads by reducing congestion and carbon emissions and expanding infrastructure with alternative transportation options. Trails and bike lanes can affect the safety of roads by directing non-motorized users to roads, by trails crossing roadways where both high trail use and high road traffic may occur, and when limited sightlines due to road grades or trail location may occur.

Impacts on business. Numerous studies have been conducted demonstrating trails provide business opportunities for trail-based businesses. Trail-related business opportunities include services for food, lodging, clothing and equipment, which result in generating revenue and an increase in employees for local businesses (Rails Trails Conservancy, 2007a). Trail-related business opportunities have been shown across the country to be successful investments for local communities. On the Missouri River State Trail, 28% of businesses along the trail had increased the size of their investment since the trail had opened (American Hiking Society). Increased park visitation can have both adverse and beneficial socioeconomic impacts by creating more opportunities for visitor expenditures for local businesses and services, but

also by increasing congestion and infrastructure damage due to increased traffic. New trails and trail facilities will require contract services for project management, design and construction that will add temporary employment to the region for the next 15 years. In addition, a recent study demonstrated that bicycle and pedestrian improvement projects associated with road improvements such as bike lanes will create 14 jobs per \$1 million in project spending compared to 7 jobs per \$1 million for typical road construction projects (Garrett-Peltier, 2010).

4.8.2 Applicable Regulations and Guidelines

Director's Order #47, Soundscape Preservation and Noise Management. NPS will, to the fullest extent practicable protect, maintain, or restore the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources.

Director's Order #48A, Concession Management. Per NPS Policy 10.1, commercial visitor services will be authorized through concession contracts or commercial use authorizations unless otherwise provided by law.

NPS Management Policies (2006)

1.10 Partnerships. The service will seek opportunities for cooperative management agreements with state or local agencies that will allow for more effective and efficient management of the parks, as authorized by section 802(a) of the National Parks Omnibus Management Act of 1998 (16 USC 1a-2(1)).

4.9 Soundscape management. The Service will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds and will protect natural soundscapes from unacceptable impacts.

8.12 Leases. In accordance with 36 CFR Part 18, the NPS may enter into a lease for the use of any park property if determination of meeting criteria set forth by this policy are made by the appropriate regional director.

8.2 Visitor Use. The NPS will provide appropriate, high quality opportunities for visitors to enjoy the parks and will maintain within the parks, an atmosphere that is open, inviting and accessible to every segment of American society.

8.27 Tourism. The Service will support and promote appropriate visitor use through cooperation and coordination with the tourism industry.

9.2 Transportation Systems and Alternative Transportation. The NPS, will, where appropriate, emphasize and encourage alternative transportation system which may include non-motorized modes of access to and moving within parks.

9.3 Visitor Facilities. The Park Service will encourage the development of private sector visitor services in gateway communities to contribute to local economic development, encourage competition, increase choices for visitors, and minimize the need for in-park facilities.

10 Commercial Visitor Services. Commercial visitor services will be authorized through concession contracts or commercial use authorizations, unless otherwise provided by law.

4.8.3 Methodology

This section analyzes the impacts of the alternatives on the socioeconomic environment within the Park boundary and surrounding areas adjacent to the Park. The analysis considers information from socioeconomic research on trails, input received during public scoping, and existing data available from the Park and local and regional entities.

The following areas of impacts are evaluated:

Impacts on local governments, residents and adjacent land owners. The proximity of trail elements to various types of land ownership is evaluated. Elements within 300 feet of private land were identified based upon perceived noise levels and 1000 feet (approximately ¼ mile) related socioeconomic studies on beneficial and adverse impacts of trails to private property (Cavanaugh, Tocci, 1998, Crompton, 2001). Increased trail miles, location of trails and trail uses by municipality were documented to evaluate impacts of alternatives on municipalities. The analysis evaluated impacts on public roads from increased interactions of trail users to the local roadways system, including number of trail-road crossings and level of use on trails and generally observed on roads.

Impacts on business. The impacts of the alternatives on local and regional commercial business opportunities may occur with increased use, new trail uses, location of use and connections. Alternatives were also evaluated on the beneficial and adverse impacts of trail and trail facility construction projects for local and regional businesses. The analysis also evaluates how potential increased visitation under the alternatives will impact the socioeconomic environment. A general analysis of increased use will occur as increased trail miles are offered, new location of trails and types of trail uses are introduced.

Intensity Thresholds

The following impact intensity levels were established for impacts on the socioeconomic environment:

Negligible. Effects on local and regional socioeconomic environment (including commercial activities) would not be detectable or would be barely detectable with no discernable impact on the character of the social and economic environment.

Minor. Effects on local and regional socioeconomic environment including commercial activities would be small but detectable and geographically localized (neighborhood level).

Moderate. Effects on local and regional socioeconomic environment including commercial activities would be readily apparent or observable across a wide geographic area (parkwide, municipalities), and would affect many people and could have noticeable effects on the social and economic environment.

Major. Effects on local and regional socioeconomic environment including commercial activities would be easily detectable or observable, affect a large segment of the population, extend across much of a

community or region (Cuyahoga and Summit County- wide) and likely have a substantial effect on the social and economic environment.

4.8.4 Impacts of the Alternatives

4.8.4.1 Impacts Common to All Alternatives

Cumulative effects. New planned connections for greenways and trails surrounding the Park may increase visitation into the Park. These corridors may spur the growth of other business opportunities, infrastructure improvements and municipal services near the Park boundary. New business opportunities to service increased number of trail users from other greenways and trails would have long-term beneficial impacts. Additional services on other greenways and trails may be required at the local level and will have long-term, minor adverse impacts on local governments.

4.8.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. Construction, removal or restoration of new trails and facility construction will occur under Alternative 1 on a project by project basis under individual compliance procedures. Formal designated connections to communities will be limited and unmanaged social trails will continue to exist near adjacent neighborhoods. Use of unimproved neighborhood roads to access the trails will continue. Unauthorized trail use will continue with access from community roads and adjacent neighborhoods. Land ownership will not change in the Park from trails and trail facilities. On-road biking will occur without improved infrastructure to accommodate use. Overall, Alternative 1 may have long-term, minor to moderate, adverse impacts on local municipalities and adjacent landowners.

Impacts on business. Visitation will continue to grow, but will be limited to existing uses. Construction projects for trail projects will continue on a project by project basis. There will be negligible effects on business or construction opportunities.

Cumulative Impacts. No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives

Conclusion. The absence of a comprehensive strategy for trail construction, restoration, removal, social trail management and connections to communities, affecting neighborhood and parkwide use of the trail will result in long-term, minor to moderate adverse impacts on local governments, residents and adjacent landowners. No effects on public roads, business opportunities or construction activities will occur. The overall effects of Alternative 1 on the socioeconomic environment are expected to be long-term, negligible and adverse.

4.8.4.3 Impacts Common to All Action Alternatives

Trail Facilities

Impacts on costs to visitors. Costs for permits for new campsites will utilize the current fee system for campsite use. A new permit system for water trail use in the park will be implemented by the NPS. A standard operating permit policy and fee system will be established prior to park operations of river access and its facilities. Long-term, negligible and adverse impacts from marginal costs to visitors for water trail use would be expected.

Impacts on local governments, residents and adjacent land owners. None of the trail facilities will require private or other public lands. One proposed paddle launch facility, near Hunt Farm, is adjacent to private property. Municipal services may increase with expanded and designated use of the river related to safety in cooperation with the NPS. This may be reduced with the incorporation of a water-based Trail Blazer patrol program. The proposed campsite at Towpath-Old Carriage is within 1,000 feet of residences near the Greenwood Village neighborhood. Since the campsites are seasonal and will contain a permitted number of users, the impacts to land ownership will be long-term, negligible and adverse. Impacts from water trails will likely be long-term, negligible to minor and adverse from the potential increase of municipal services assistance associated with the new use. New and expanded parking areas at Coliseum, Hunt Farm, and Lock 29 are within 1,000 feet of commercial and residential areas. Increased visitation will likely occur from new and expanded uses of trail facilities. Impacts on local governments and residents will likely be long-term, minor and adverse from noise and nuisances associated with these facilities.

New and expanded parking facilities and trailheads in the Park may increase traffic entering and exiting existing roadways in particular areas. Two water trail launch sites, the Red Lock and Hunt Farm sites will be within close proximity of public roads where high seasonal trail use occurs at the road crossings. Localized increases in traffic from new parking facilities entering from public roads will occur. New trail facilities will have long-term, negligible adverse effects on local residents and governments from changes in traffic patterns.

Impacts on business. Should river access be implemented under any action alternative, specific business opportunities within the Park related to use of the water trail and paddle launch sites (such as new concession contracts), would require an assessment of economic feasibility, need and appropriate use in relation to the Park's mission before any new services were developed and offered in the Park. Similarly, a canoe livery operation within the Park would be considered for further analysis and consideration through a separate concessioner feasibility plan. Expansion of campsites will also offer commercial business opportunities near the park for camping supplies and other tourism activities. Long-term beneficial impacts to commercial business opportunities would be expected from water trails and campsites and no effect from parking facilities. Short-term beneficial impacts from construction activities will likely occur from the expansion and new facilities.

Overall, trail facilities will have long-term negligible and adverse impacts on costs to visitors for marginal costs for water trail use permits, long-term minor and adverse from noise associated with some facilities and their proximity to non-NPS lands, long-term negligible and adverse from increase uses and additional entry points from public roads for expanded trail facility uses from public roads, and short-term and long-term beneficial impacts on business for new business and construction opportunities associated with expanded trail facilities and uses.

4.8.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. Proposed multi-use connectors and the South Carriage trail will be adjacent to private property or non-NPS public land. The South Carriage trail, Old Carriage Connector extension trail and Perkins trail reroute will occur within 300' of existing residential areas. Noise may occur on new trails adjacent to other landowners, but use is expected to be low, dispersed and seasonal. The addition of three new multi-use connectors to the Bike and Hike Trail will assist in providing connections to the adjacent communities and remove users from existing neighborhood roads entering the Park, such as Holzauer Road. Sounds may be affected by these adjacent users, but use is expected to be low as a result of introducing dispersed use and access to the trail from a variety of entry points. Property ownership of existing park lease properties may be affected for the Stanford Connector Trail and Perkins Trail reroute south of Ira Road.

Portions of Sagamore Road and Stanford Road may be vacated and converted to multipurpose trails. This will require agreement with local municipalities and transfer to NPS and Metroparks for conversion to occur. Municipal services may be reduced with vacated portions of Sagamore, Stanford and Old Akron-Peninsula Roads for multi-use trail use and partnership agreements with NPS and Metropark partners. New multipurpose trails may reduce bicycle traffic on existing roads. New trails that will cross existing roadways, will occur on two new trails, Terra Vista connector Trail on Canal Road and the Towpath to Valley Picnic area connector Trail, on Riverview Road. Signage and marking may be required. New parking areas for Terra Vista, may impact traffic entering and exiting existing roadways and are located within 1,000 feet of a residential area.

Overall, long-term, minor and adverse impacts are expected on local residents, adjacent land owners and local governments.

Impacts on business. The small increase in trail miles, limited new uses, and limited trail connections will offer limited new commercial opportunities and would generally maintain the current conditions. Construction projects for trail projects will be required and be moderately substantial with the multipurpose connector trails. These projects will require contractor services for planning, design and construction. The remaining proposed trails will utilize existing social trails with minor realignments and improvements requiring minimal or no contract services. Impacts will be short-term and beneficial from new construction opportunities and long-term beneficial for local businesses.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Utilization of public roads for multi-use trails in localized portions of the Park will have long-term, minor adverse impacts on local governments, residents and adjacent landowners. Long-term, beneficial impacts are expected on business from commercial business opportunities, increased visitation, and construction opportunities, through the minor expansion of multi-use trails and new trail facilities.

4.8.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. Impacts would be similar to Alternative 2A with the addition of the mountain bike trail on the west-central rim of the Park. The trail will utilize the existing trail or be realigned in the same area and will not impact new adjacent property owners nor create sounds due to its distance from adjacent property owners. Over a third of the trail would utilize land owned by Cleveland Metroparks and a small portion owned by Metro Parks, Serving Summit County. Agreement to utilize their land for this new use would be required. Municipal services related to emergency response will be negligible to minor with this additional use with the establishment of an IMBA certified Bike Patrol Program that assists with first aid and initial emergency response.

The addition of this new use at the Blue Hen improved parking area may impact traffic patterns on Boston Mills Road. The introduction of mountain bike trails in this area will increase trail users crossing at Snowville and Columbia Roads. Long-term, negligible, adverse impacts on local traffic and road safety from the increase of trail user crossings may occur at these locations.

Impacts to local governments, residents and adjacent landowners will be long-term, minor to moderate adverse, due to the multi-use trails expansion and the use of non-NPS land for a portion of the mountain bike trail.

Impacts on business. The addition of mountain bike trails may increase tourism and business opportunities as a new use to the Park. Construction and contract services will be required but minimal due to the use of an existing trails system and the intended design of the trail as a less developed trail class. Impacts to new business opportunities and construction activities will be long-term and beneficial through introduction of new and expanded recreation activities.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Multi-use trail expansion on municipal roadways, small number of road crossings, and use of non-NPS lands for mountain bike trail use will have long-term, minor to moderate adverse impacts on local governments, residents and adjacent land owners. Introduction of new and expanded recreation activities in the Park will have long-term and beneficial impacts on business from new business opportunities and construction activities.

4.8.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. New trails or trail facilities will be expanded including some trails within 300 feet of the Park boundary near low-density residential properties. These include Rockside-Hemlock Trail, West Rim trail, Five Falls trail, Highland Connector Trail, Howe-Everett Connector Trail, Tree Farm trail Expansion trail, High Meadow Trail and Hunt Farm Loop Trail. Noise may occur on new trails adjacent to other landowners, but use is expected to be low, dispersed and seasonal. The addition of three new multi-use connectors to the Hike and Bike Trail will assist in providing connections to the adjacent communities and remove users from existing neighborhood roads entering the Park. Increased noise may occur on new trails adjacent to other land owners, but use is expected to be low, dispersed and seasonal.

The Rockside-Hemlock Trail and West Rim trails are proposed on land owned by the City of Independence and Cleveland Metroparks. These entities would need to agree to the utilization of their lands for these purposes. NPS lease properties may be affected by the Stanford Connector trail, Howe-Everett Connector trail, Tree Farm Expansion Trail, Upper Dugway Trail, Perkins Trail reroute, Lower Furnace Run Trail, CVC Upper Loop Trail and Hines Hill-Stanford Loop Trail. NPS would need to determine the future of these leases if these proposed trails are implemented.

Portions of Sagamore Road and Stanford Road may be vacated and closed and converted to a multipurpose trail. Needs for municipal services may be reduced with vacated portions of Sagamore Road, Stanford Road and Old Akron-Peninsula Road. New multipurpose trails may reduce bicycle traffic on existing roads.

New trails that will cross existing roadways will occur on seven new trails, Rockside-Hemlock Trail, West Rim Trail, Lower Furnace Run Trail, Perkins Trail reroute, Equestrian Jaite Trail, Highland Connector Trail, and the Towpath to Valley Picnic area connector. Signage and marking may be required. New parking areas for the, High Meadow, Ira Paddle and new Equestrian at Vaughn/Highland may impact traffic entering and exiting existing roadways.

Proposed bike lanes would affect transportation facilities by expanding the designation of alternative transportation routes in the Park, increase bicycle traffic on improved roadways, and require the need for signage and infrastructure for these on-road use changes.

Visitation will continue to grow as projected and increase tourism for new uses or activities in the Park. Introduction of bike lanes throughout the Park may reduce vehicular traffic and parking demands during peak seasonal use.

New trails within proximity to adjacent property owners, utilization of NPS lease properties and other public lands for trails, changes to traffic patterns and road crossings and potential municipal services for river use are expected to have long-term, minor to moderate adverse impacts on local governments, local residents and adjacent land owners.

Impacts on business. Commercial business opportunities will continue and have potential to expand with the expanded trail miles and their use. Also connections with bike lanes between the Park and communities may expand existing or incubate new commercial businesses to serve users of these

routes. Construction projects for trail projects may increase and be moderately substantial with the additional trail miles requiring boardwalks and bridges, multipurpose connector trails and bike lanes that will require contractor services for planning, design and construction. Beneficial impacts on businesses are expected to be long-term from expanded recreation activities and non-motorized access points from adjacent communities and short-term from the increase number of trail miles requiring substantial construction activities.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives,

Conclusion

Eight new trails within proximity to adjacent property owners, changes in NPS lease properties, two trails requiring other public lands for construction, and new bike lanes and road crossings are expected to have long-term, minor to moderate adverse impacts to local governments, residents and adjacent land owners. Short-term and long-term beneficial impacts on businesses would be expected from the expanded recreational opportunities and trail construction projects.

4.8.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Impacts on local governments residents and adjacent land owners. The impacts will be similar to Alternative 3A with the addition of mountain bike trails on the east and west central portions of the Park. The East Rim Trail will be within close proximity to low-density residential areas near Highland and Boyden Roads and require a road crossing on Highland Road. The West Rim Trail will consist of one road crossing on Columbia Road (a low use road). New or expanded areas of parking at High Meadow, Snowville (a high use road) and the Boston Mills Road Bike and Hike trailhead for mountain bike users may increase the number of vehicles exiting and entering these roadways. Increased needs for municipal services related to emergency response will be somewhat mitigated with the establishment of an IMBA certified Bike Patrol Program that assists with first aid and initial emergency response.

With new mountain bike trails near residential areas and increased road crossings, including some that are in proximity to low-density residential areas, impacts are expected to be long-term, minor to moderate and adverse.

Impacts on business. Visitation may increase with a new trail user group being introduced for recreation opportunities in the Park. Long-term beneficial impacts for commercial business opportunities will result from the introduction of new recreation activities. Short-term beneficial impacts are expected for minor construction activities associated with new mountain bike trails.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives, except for the introduction of mountain bike trails. The introduction of mountain bike trails by Cleveland Metroparks may increase visitation in localized areas, increasing business opportunities and construction activities with both short-term and long-term beneficial effects.

Conclusion

Alternative 3B would result in long-term minor to moderate adverse impacts on local governments, residents and adjacent landowners. Both long-term and short-term beneficial impacts on businesses from new opportunities from new recreational activities and construction activities are expected.

4.8.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. New trails or trail facilities will be expanded including some trails within 300' feet from the Park boundary. These include, West Rim Trail, Mudcatcher Trail, Upper Dugway Trail, Howe-Everett Connector Trail, Tree Farm to Furnace Run Trail, High Meadow trail, Hunt Farm Loop Trail, Maplewood Trail, Riding Run expansion, Ira-Howe Trail and Ira-Hampton Trails. Noise may occur on new trails adjacent to other landowners, but use is expected to be low, dispersed and seasonal. The addition of three new multi-use connectors to the Bike and Hike Trail will assist in providing connections to the adjacent communities and remove users from existing neighborhood roads entering the Park.

The West Rim Trail is proposed on land owned by the Cleveland Metroparks and the Northeast Ohio Regional Sewer District. Riding Run expanded loop would exist on Metroparks Serving Summit County lands. These entities would need to agree to the utilization of their lands for these purposes. Property ownership of existing park lease properties may be affected for the Stanford Connector Trail, Howe-Everett Connector Trail, Upper Dugway Trail, Perkins Trail reroute, Lower Furnace Run Trail, Hines Hill-Stanford Loop Trail, and Mudcatcher Trail. Designated connections to neighborhoods through off-road and on-road connections will be beneficial to increase connections to neighborhoods and formalize them to alleviate social trails along the boundaries of the Park.

Portions of Sagamore Road, Stanford Road and Old Akron Peninsula Road would be vacated and closed and converted to a multipurpose trail. This will require an agreement with local municipalities and transfer to NPS and Metroparks. New multipurpose trails may reduce bicycle traffic on existing roads. New trails that will cross existing roadways will occur on nine new trails; West Rim Trail, Lower Furnace Run Trail, Perkins Trail reroute, the Towpath to Valley Picnic area connector trail, Ira-Howe trail, Ira-Hampton trail, Buckeye trail reroute near Ira, Sagamore Trail and the Gateway to Armington Trail. Impacts may be greater at Stanford Road due to potential high visitor use and Pine Lane, Coliseum, and Vaughn/Highland due to higher traffic volumes. Signage and marking may be required. Alignment of the Old Akron- Peninsula Connector Trail will require coordination with the Camp Ledgewood facility and its associated overflow parking area. New parking areas for the Mudcatcher expansion may impact traffic entering and exiting existing roadways.

The impacts on local governments, residents and adjacent land owners would be long-term, minor to moderate, adverse from increase of trail miles near some neighborhoods, change in land use for multi-use connector trails, some trails on other public lands, and an increase in trail crossings on public roads.

Impacts on business. Visitation will continue to grow as projected and increase tourism for new uses or activities in the Park. Introduction of bike lanes throughout the Park may reduce vehicular traffic and parking demands during peak seasonal use. Alternative 4A creates new trail heads and multi-use connectors to disperse visitation throughout the park. Improvements to trail facilities and alternative non-motorized options for entering the park will have long-term and beneficial impacts to increased visitation. Increased visitation and connections with bike lanes between the Park and communities may expand existing or incubate new commercial businesses to serve users of these routes. Construction projects for trail projects may increase and be moderately substantial with the additional trail miles, multipurpose connector trails and bike lanes that will require contractor services for planning, design and construction. Alternative 4A will include both short-term and long-term beneficial effects on business.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives, except where trails are proposed on local jurisdictional land. This includes the Columbia Trail on property owned by Metro Parks, Serving Summit County. Impacts on Alternative 4A, should local jurisdiction not choose to allow or implement these trails, will likely be long-term, minor and adverse from reduced trail system opportunities.

Conclusion

Eleven new trails within proximity to adjacent property owners, three trails requiring other public lands or non-NPS roads for construction, and new bike lanes and road crossings are expected to have long-term, minor to moderate adverse impacts on local governments, residents and adjacent land owners. Short-term and long-term beneficial impacts on businesses would be expected due to expanded recreational opportunities and trail construction projects.

4.8.4.9 Impacts on Alternative 4B

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. Impacts would be similar as described for Alternative 4A except for the addition of mountain bike trails on the east rim. Municipal services related to emergency response will be negligible to minor with this additional use with the establishment of an IMBA certified Bike Patrol Program that assists with first aid and initial emergency response. The acquisition of one private land property on Hines Hill Road would assist in an optimal alignment of the trail but not required. Alignment of the East Rim mountain bike trail is near low-density residential areas near Boston Mills road and Old Akron-Peninsula Road. The mountain bike trail will be accessed from the Bike and Hike trail to link to other recreation opportunities. The East Rim Trail will require crossing four public roads along the east region of the Park. Smaller loops of the bike route and use of multi-use connector trails between road crossings will minimize road crossings. Noise may occur on new trails adjacent to other landowners, but use is expected to be low, dispersed and seasonal.

Overall impacts of Alternative 4B on local governments, residents and adjacent owners will be long-term, moderate and adverse.

Impacts on businesses. Short-term and long-term beneficial impacts on business would be similar to Alternative 4A, but with additional benefits from a new user group, increased visitation and additional construction needs.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives, except for the addition of the mountain bike trail. Should Cleveland Metroparks expand their mountain bike trail opportunities in nearby reservations, visitation for this use may increase on the Bike and Hike connector trail as the primary connector between regional mountain bike trail systems. Secondly, if the Hines Hill multi-use connector occurs, increased use in this localized area of the mountain bike trail will also have an impact on the mountain bike access point at the Boston Mills-Bike and Hike trailhead, managed by Metroparks, Serving Summit County. Overall cumulative impacts on Alternative 4B will be long-term, minor to moderate and adverse.

Conclusion

Alternative 4B would result in long-term minor to moderate adverse impacts on local governments, residents and adjacent landowners that are similar to Alternative 4A, except for the additional road crossings for the mountain bike trail and increased localized use on the Bike and Hike Trail as a connector between proposed loops on NPS lands. Both long-term and short-term beneficial impacts on businesses from new opportunities from new recreational activities and construction activities are expected.

4.8.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

Impacts on local governments, residents and adjacent land owners. New trails or trail facilities will be expanded including some trails within 300 feet from the Park boundary with low-density residential use. These include Five Falls trail, Highland Connector Trail, Howe-Everett Connector Trail, Mudcatcher Trail, Ira-Hampton Trail, Ira-Howe Trail, High Meadow Trail and Hunt Farm Loop Trails. The addition of five new multi-use connectors to the Bike and Hike Trail and opportunities for three neighborhood connectors will assist in providing connections to the adjacent communities and remove users from existing neighborhood roads entering the Park. Noise may occur on new trails adjacent to other landowners, but use is expected to be low, dispersed and seasonal.

The Columbia Trail and access points from the Bike and Hike trail for the mountain bike trail are proposed on land owned by the Metro Parks, Serving Summit County. Changes to existing NPS lease properties may occur for the Stanford Connector Trail, Howe-Everett Connector Trail, portion of the mountain bike trail, Perkins Trail reroute, Lower Furnace Run Trail, CVC Upper Loop Trail and Hines Hill-Stanford Loop Trail.

Portions of Sagamore Road, Stanford Road and Old Akron-Peninsula Road would be closed and converted to a multipurpose trail. Municipal services may be reduced with vacated portions of Sagamore and Stanford Roads for multi-use trail use. New multipurpose trails may reduce bicycle traffic on existing roads. New trails that cross existing roadways will occur on seven new trails, Lower Furnace Run Trail, Perkins Trail reroute, Equestrian Jaite Trail, Highland Connector Trail, Old Akron Peninsula Connector Trail, and the Towpath to Valley Picnic area connector. Signage and marking may be required. Proposed bike lanes would provide benefits by expanding the designation of alternative transportation routes in the Park.

Alternative 5 would have long-term, minor to moderate adverse impacts on local governments, residents and adjacent land owners.

Impacts on business. Long-term beneficial impacts on business are likely to occur from potential expansion of commercial business opportunities associated with the existing and expanded trail miles, proposed trail uses and new connector trails to communities. Short-term beneficial impacts are expected from the increase number of trail miles requiring substantial construction activities.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives, except for the local jurisdiction on the proposed Columbia Trail and use of the Bike and Hike trail. Should Metro Parks, Serving Summit County fail to allow construction of the Columbia trail on their property, long-term, minor adverse impacts may occur from limited trails in localized areas. Should Cleveland Metroparks expand their mountain bike trail opportunities in nearby reservations, visitation for this use may increase on the Bike and Hike connector trail as the primary connector between regional mountain bike trail systems. Secondly, if the Hines Hill multi-use connector occurs, increased use in this localized area of the mountain bike trail will also have an impact on the mountain bike access point at the Boston Mills-Bike and Hike trailhead, managed by Metroparks, Serving Summit County. Overall cumulative impacts on Alternative 5 will be long-term, minor to moderate and adverse.

Conclusion

Eight new trails within proximity to adjacent property owners, changes in NPS lease properties, one trail requiring other public lands for construction, and new bike lanes and road crossings are expected to have long-term, minor to moderate adverse impacts on local governments, residents and adjacent land owners. Short-term and long-term beneficial impacts on businesses would be expected from expanded recreational opportunities and trail construction projects.

4.9 Impacts on Park Operations

4.9.1 Relationship of Trails to Park Operations

Without the proper park operations in place, trails can have degraded conditions, visitor conflict can increase, park resources can be impacted, visitor safety can be compromised and visitor programs and information may not be provided adequately.

Park operations. All Divisions of the Park are involved in operating and managing trails and trail facilities to ensure safety while protecting park resources. As with any park system, any increase of facilities, their location, use, and relationship to natural, cultural and scenic conditions may require additional staff, new operating procedures or new or enhanced partnerships. In addition, maintenance of existing facilities that have been improperly designed can impact park staff operations and distribution of park budget resources. The operation of other park facilities that are not directly trail related but may be affected by the Trail Alternatives through increased use, new uses or opportunities may require evaluation of how these facilities are operated, including visitor centers and contact facilities, trail equipment and permits.

Partner operations. The management of trails may impact existing and new partnerships by affecting partner program and operations.

Local jurisdiction operations. Coordination of park operations with local jurisdictions such as communities and Metropark systems will be required due to the varied land ownership of some new trail systems.

4.9.2 Applicable Regulations and Guidelines

NPS Management Policies (2006)

1.10 Partnerships. The service will seek opportunities for cooperative management agreements with state or local agencies that will allow for more effective and efficient management of the parks, as authorized by section 802(a) of the National Parks Omnibus Management Act of 1998 (16 USC 1a-2(1)).

9.1.4.1 Maintenance. The Service will conduct a program of preventive and rehabilitative maintenance and preservation to 1) provide a safe, sanitary, environmentally protective and esthetically pleasing environment for park visitors and employees 2) protect the physical integrity of facilities; and 3) preserve or maintain facilities in the optimum sustainable condition to the greatest extent possible.

1.9.1.6 Volunteers in the Parks. The NPS will continue to use its authority under the Volunteers in the Parks Act of 1969 to utilize volunteers and their important contributions to National Parks.

8.2.5 Visitor Safety and Emergency Response. The NPS will provide visitor safety within the constraints of the 1916 Organic Act.

4.9.3 Methodology

Park management and operations refers to the staff available to adequately protect and preserve vital park resources for an effective visitor experience. This impact analysis evaluated the effects of the alternatives on staffing, contract services, partnerships, volunteers, and other park facilities. It was assumed, under all alternatives, that base Park funding would be maintained at current 2011 levels and partnership funding opportunities increase to develop a funding portfolio of a variety of sources to maintain and operate the trails.

The impact analysis is largely qualitative rather than quantitative, because of its conceptual level of planning and uses projected estimates of staffing needs. Park staff knowledge was used to evaluate the impacts of the Trail Alternatives. Current staffing levels associated with the current mileage of trail being managed by NPS, was utilized to characterize the potential projected increase of staff and operational resources for changes proposed in the various Trail Alternatives. Current staffing was estimated at 1 FTE (Full time employee) for every 7.13 trail miles. As the number of trail miles and facilities change, the level of needed staffing using this FTE per mile estimate and the change from current parkwide staffing is projected.

Intensity Thresholds

The following impact intensity levels were established for impacts on park operations:

Negligible: Impacts on park operations would be barely detectable by visitors and park staff. No additional staff would be required to sustain operations.

Minor: Impacts on park operations would be noticeable to park staff, but rarely to visitors. Changes to very isolated conditions would likely affect park operations. Operations for trails and trail facilities will be conducted by existing or minor additional staffing and partner operations of less than a 5% increase of current staffing levels of the park. Coordination with local jurisdictions will increase but be minimal.

Moderate. Impacts on park operations would be apparent to both staff and visitors, but likely affect a small portion of the park. Operations for trails and trail facilities would require increase staff and partner operations of greater than 5%, but less than 10% increase of current staffing levels of the park. Coordination with local jurisdictions will be in focused areas throughout the park.

Major: Impacts on park operations would be readily apparent to both staff and visitors and would likely affect larger areas or parkwide operations. Operations for trails and trail facilities would require substantial increase in staff and partner operations and may require operational changes parkwide. Increase from current staffing levels of greater than 10% would be required. Coordination with local jurisdictions will be parkwide.

4.9.4 Impacts of the Alternatives

4.9.4.1 Impacts Common to All Alternatives

Cumulative impacts. Greenway, trail and bikeway planning by regional Metroparks, local municipalities and regional governments may increase visitation to the Park by non-motorized transportation choices. Increased visitation and potentially new entry points as a result of these plans may require additional park operations. Expansion of mountain bike trails at Mill Stream, Brecksville and Bedford Cleveland Metroparks Reservations, may increase park patrolling and trail conditions with non-authorized use entering the CVNP from these adjacent park systems. Expanding residential and commercial development or redevelopment surrounding the Park may increase visitation and undesignated entry points into the Park, resulting in long-term, minor, adverse impacts to park operations and management.

River use will likely increase outside and inside of Park boundaries regardless of NPS decisions on water trail designation due the expansion of water trail facilities and their use north and south of the Park by other public and non-profit organizations, the possible removal or modification of the Route 82 dam, and implementation of the Akron Long-Term CSO Control Plan. The increase of river use will increase Park operations and the need for cooperation with municipal and state agencies. The expansion of river use on the Cuyahoga River beyond Park boundaries and improvements to river resource conditions will likely have long-term minor adverse impacts to Park, partner and local jurisdiction operations from increased river use by visitors.

4.9.4.2 Impacts of Alternative 1

Direct and Indirect Impacts

Impacts on Park operations. Under Alternative 1, the NPS would maintain staff as it existed in 2011 for the operation, protection, programming and stewardship of Park trails. Beginning in 2012, the Trails Forever program will marginally increase funding for annual maintenance operations on an annual basis. Trail conditions will continue to degrade partly from staffing shortages in maintenance. Maintenance will continue to manage unsustainable trails currently in the Park. Design and construction on trail projects would continue as funding becomes available and when staff is available to develop and coordinate projects. Non-permitted uses and access on social non-designated trails will continue with no coordinated Park operations and protection of Park resources in these areas. Park Partners will continue operations related to trails as they currently exist. Some areas will require capital maintenance due to the extensive needs and conditions of specific trails but due to budgets and staffing, be delayed in their implementation. The lack of Sustainable Trail Guidelines will limit improved efficiencies for Park operations and the management of Park trails. There are no new facilities proposed that require operational needs. The need to increase current staffing levels to manage the trails and their operations successfully will likely have long-term, minor and adverse impacts on Park operations.

Impacts on partner operations. Partnership operations will continue with the need to continue to increase their role in supporting trail operations through Trails Forever and likely have long-term, negligible adverse impacts.

Impacts on local jurisdiction operations. No impacts on local jurisdiction operations are expected.

Cumulative Impacts

No additional cumulative impacts are expected in Alternative 1.

Conclusion

Park operations will experience long-term, minor, adverse impacts from the need to increase staff to fully operate the trails successfully. Partnerships will continue with the need to continue to increase their role in supporting trail operations through Trails Forever and likely experience long-term, negligible adverse impacts. No effect to local jurisdictions would likely occur.

4.9.4.3 Impacts Common to All Action Alternatives

Restoration of Trails. Removing and rerouting trails will reduce maintenance needs on highly susceptible trails of resource damage. Utilization of the Sustainable Trail Guidelines help prioritize and manage the trail system by improving efficiency, improving trail conditions and minimizing impacts to Park operations, thereby having long-term beneficial impacts to Park operations.

Impacts from new trail facilities. The introduction of designated non-motorized use of the river and launch facilities will require a number of park operations to be developed and increase for each division at the Park. A river patrol and rescue component will need to be broadened for the current operations for the Cuyahoga River. This will require at least one additional park ranger dedicated to the river during seasonal use periods.

Additionally, a river use permit system would require administrative operations to be created and managed by the Park or park partner organization. Expansion of river monitoring stations to maintain, monitor and manage reporting river quality conditions during season use periods from the current two to three stations would require one additional seasonal employee or volunteers to manage.

Maintenance of paddle launch sites and river conditions, such as debris will be minimal once installed, but may require annual inspections of the launch facilities and general maintenance of access areas. The introduction of formal river use designation in the Park will provide opportunities for new programs and educational opportunities for one of the primary natural features in the Park. This may require a shift of existing interpretation staff focusing a portion of annual programming to river use activities or requiring one interpretive employee focused on river use programs and interpretation and additional river equipment needs such as canoes and kayaks and associated safety equipment. Education and signage regarding river use will need to be developed and administered to portage sites by park staff or contract services. Volunteer and partnership opportunities for managing and patrolling the river would assist the park and reduce operations impacts. Training and coordination, similar to the existing Trailblazer program, would need to be instituted and managed by division of Visitor Protection or other applicable partner or division in the Park.

Design and construction would be required for each site by Park staff or contract services. Impacts will occur in the short-term to add and train staff and long-term to maintain funding and training for staff, once in place for water trail operations. Introduction of designated river use access points will increase visitation to existing high use parking areas, including, Ira, Hunt Farm, Lock 29, Boston Store, and Red Lock.

The expansion of campsite facilities will require additional staff for operations and management. This will include a part-time ranger for patrol of campsites during seasonal use periods. Maintenance operations where permanent restrooms are provided and general maintenance of all sites will be required. Maintenance access will be limited on the remote sites along the Buckeye Trail and the west Fawn Pond site. Resource management will establish monitoring of sites for resource damage requiring additional work for existing staff or expansion of the resource management monitoring program staff.

The expansion of trailside and riverside campsites will provide new opportunities for programming and interpretation in the Park, requiring additional seasonal staff or modification of existing staff program design and potentially increased camping equipment needs, during the seasonal use period. Signage and education will be required for each campsite installed that will include directional signage and rules and regulations. Extending the existing permit system of the Visitor and Resource Protection Division and the Conservancy for CVNP to campsites would be required.

Design and construction activities would be required for each site by Park staff or contract services. All of the sites are located on NPS lands, but in close proximity to adjacent Metroparks facilities and along the Buckeye Trail, managed by the Buckeye Trail Association. Design, construction and maintenance of other trail amenities will also be required.

Expansion of nine parking areas will have impacts on Park operations. Increased operations for snow plowing due to expanded areas would be required, especially in a primary winter use area, Tree Farm. The introduction of new parking areas and trailheads will require additional or reorganized staffing for patrolling and visitor protection, maintenance, and new areas for snow plowing particularly at proposed cross-country ski areas, which include South Old Carriage Trail, Expanded Tree Farm Trail and High Meadow Trail. A range of four to eight new parking areas identified in the alternatives would require operations for design, construction, management of contract services, annual and seasonal maintenance, signage and visitor information and visitor protection patrolling. All parking areas with the exception of the proposed expansion of the Bike and Hike-Boston Mills parking area are on NPS property. Coordination with Metro Parks, Serving Summit County would be required for facility improvements at this area.

Overall, impacts on Park operation would be short-term and long-term, minor to moderate, adverse from its increase for staffing and operations required for new facilities and long-term, negligible to minor, adverse from increased design and contract service coordination, increased construction and ongoing maintenance for trail facilities, increased coordination with local jurisdictions on new facilities, particularly river use.

Overall, impacts on partner operations would be long-term, negligible to minor, adverse impacts from the need for minor additional operations from new and expanded trail facilities, particularly campsite permitting.

Overall, impacts on local jurisdiction operations would be long-term, negligible adverse impacts from increased visitation to facilities through adjacent lands and multi-jurisdictional coordination for river use.

4.9.4.4 Impacts of Alternative 2A

Direct and Indirect Impacts

Impacts on Park operations. Alternative 2A will result in a 10% net increase in new trails from the existing trail system. This would include the construction of two miles of interpretive hikes on existing disturbed areas that will require relatively minimal construction. The Coliseum Trail, Horseshoe Pond Trail and Ira River Trail may require boardwalk systems requiring substantial design and construction by park staff or contract services. Rerouting of equestrian and hiking trails will require in-house or contract design and maintenance but would reduce overall long-term maintenance for the Park. Extensive design and construction may be required for the multi-use connectors, but long-term maintenance will be less due to their development class.

Improvement and establishment of formal trailhead facilities would be required at Terra Vista and the Coliseum site. The management for the monitoring activities at the Terra Vista Natural Study Area may be affected by increased visitation but may also be beneficial by established operations for this trail unit and minimized by the use of the existing monitoring paths. Design and construction of South Carriage Trail utilizing existing ad-hoc trails or new design would be required. Minor opportunities for programming for new trails would primarily be on new interpretive trails at Terra Vista, Coliseum and Ira River trails. Bike patrol operations may increase due to the additional multi-use connectors and cooperation with Metro Parks, Serving Summit County. Since the increase in trail miles is minimal, Park operations would require less than five additional staff to operate the proposed actions in Alternative 2A.

Access to trails proposed within close proximity to existing trail facilities or near an existing public road with the exception of the South Carriage Trail system which does not have a designated trailhead associated with it. Utilization of existing facilities with the exception of improved or new uses at Terra Vista, Coliseum and Old Orchard will minimize any additional facility operations. Minor increase in visitation where multi-use trails enter the park (Frazee, Brandywine/Boston, Peninsula, and Fitzwater) may increase operational needs at these facilities.

The limited expansion of trail miles and the associated facilities would require an increase of staffing of 4% or less from current Park operation staff levels. Park operations would experience short-term and long-term, minor adverse effects from design, construction and management of proposed trails, and an increase of less than five staff to operate the limited expanded trail system.

Impacts on partner operations. An increase in opportunities for the Bike Aboard service related to proximity to multi-use trails at Stanford and Peninsula may occur. The Towpath-Valley Picnic Trail connector does propose to cross CVSR tracks and will require coordination with railroad operations for this trail connection. Partner operations will likely experience long-term, negligible to minor, adverse impacts from the proposed actions due to a minimal increase in trail miles in proximity to existing partner facilities and programs.

Impacts on local jurisdiction operations. Park operations related to maintenance and visitor protection involving Metro Parks, Serving Summit County will increase with the new multi-use connections to the Bike and Hike trail including Sagamore Trail, Stanford Trail and the Old Akron-Peninsula Connector Trail that would re-utilize existing roadways. Cooperation with municipalities on new trailheads and trails at

Terra Vista and Coliseum would be required. Impacts on local jurisdiction operations will be long-term, minor and adverse.

Cumulative Impacts

No additional cumulative impacts are expected under this alternative beyond those identified as common to all alternatives.

Conclusion

Alternative 2A will likely have impacts on Park operations staffing that are short-term, negligible to minor and adverse during initial construction projects and then long-term, minor and adverse for ongoing operations. Partner operations will experience long-term negligible to minor adverse impacts from the expansion of bike trail networks to their facilities and additional need for support of new trails. The operation of local jurisdictions will likely experience long-term minor adverse impacts from the multi-use connectors and their proximity to their facilities. Overall impacts on park operations will be long-term minor and adverse.

4.9.4.5 Impacts of Alternative 2B

Direct and Indirect Impacts

Impacts on Park operations. Impacts to Park Staff Operations from Alternative 2B would be the same as described for Alternative 2A with the addition of mountain bike use on the current Buckeye Trail between Boston Mills Road and Station Road. This new use will require new patrolling by park staff or through partnership with volunteer bike safety patrols for this segment. Realignment and redesign will improve trail conditions to reduce maintenance needs to the trail. NPS currently does not maintain this trail. New partnerships can be established with new user groups for maintenance and stewardship of new use. Because of its use on an existing trail and utilization of existing trailheads at Blue Hen and Station Road, visitor protection and maintenance would not require additional resources for new facilities. User education would be required to provide awareness, rules and regulations regarding new use, but could be conducted by existing staff with minor impacts. Impacts to staff and facility operations with the addition of mountain bike use will be long-term and negligible from the minimal additional law enforcement and interpretation and use of existing facilities.

Impacts on partner operations. Partnership cooperation with the Buckeye Trail Association will continue. Redesignating the Buckeye Trail in the Park will create multiple stewardship partners for the trail, which can be beneficial to improve the stewardship of the trail for all users. Impacts on partner operations will be long-term and beneficial from the increase of new groups for stewardship and management.

Impact on local jurisdiction operations. Coordination of operations with Cleveland Metroparks and Metroparks Serving Summit County would be required due to the multiple land ownership on the Trail by these entities. Local Metropark system operations will experience long-term moderate and adverse impacts from new trails constructed on their lands.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives except those related to the introduction of mountain bike use. Expansion of mountain bike trails in close proximity and connecting potential mountain bike trails in Cleveland Metroparks will increase coordination and partnerships for patrolling and controlled management of the mountain bike trail use within a specific area of the Park, resulting in a long-term beneficial impact to Park operations.

Conclusion

Impacts on Park operations with the addition of mountain bike use will be long-term, negligible to minor and adverse due to minimal staffing increases (less than 5%), utilization of existing facilities, and minimal additional needs for the mountain bike trail designation. The addition of new stewardship groups to support the management Impacts on partner operations will be long-term negligible and adverse. Impacts on local jurisdiction operations will be long-term moderate and adverse from new trails built on their lands. Overall impacts on Park operations will be long-term, minor to moderate and adverse.

4.9.4.6 Impacts of Alternative 3A

Direct and Indirect Impacts

Impacts on Park Operations. Alternative 3A will result in a 29% net increase in new trails from the existing trail system. The design, construction and maintenance of the new trails will vary with significant resources needed for proposed boardwalk systems or substantial infrastructure for Blue Hen improvements, boardwalks for Hunt Farm Trail, Ira Trail and Coliseum Trail, new cross-country trails at High Meadow Trail and Tree Farm Trail, the multi-use Gateway Trail and Highland Trail and the new equestrian trail at Upper Dugway Trail. New operations will be required for new trail systems and trailheads at Dugway Trail, High Meadow Trail, Coliseum and Old Orchard. Access to trails will be limited on West Rim trail, South Carriage Trail for all operations. Expanded operations will require the need for additional staffing of between 5-10 employees, a 5-10% increase of current staffing levels. New trails and trail connections to visitor facilities may increase visitation and use. These locations include the Howe- Everett connector trail, Stanford-Hines Hill Loop, Upper CVC and West Rim trails, Rockside trails, Hunt Farm trail and Gateway Connector trail. Additional coordination with local jurisdictions will be required for the multi-use connectors involving three local jurisdictions and Metroparks Serving Summit County. With the proposed trail additions and small increase in facilities, increase in staff as described for staffing will be required for Park operations. Impacts on Park operations under Alternative 3A will be long-term, moderate and adverse from its expansion of trails and facilities to a level that current staffing would not be able to sustain successfully.

Impacts on Partner Operations. Impacts on partner operations include the increase of trail miles for volunteer stewardship, coordination where shared use trails are proposed or crossing CVSR at Rockside, Towpath at Valley Picnic and the West Rim and Upper CVC trail. Partnerships will continue and require an increase to support the increase in trails and trail facilities throughout the park and their proximity to primary visitor areas. Impacts on partner operations under Alternative 3A will be long-term, minor to moderate and adverse for the increase of support required.

Impacts on Local Jurisdiction Operations. Impacts on local jurisdiction operations will be long-term, minor and adverse from increased coordination with three local jurisdictions and Metroparks, Serving Summit County for the proposed multi-use connector trails.

Cumulative Impacts

Cumulative impacts expected under this alternative beyond those identified as common to all include Increased coordination and partnerships with local jurisdictions and Metroparks for defined bike lanes Overall, cumulative impacts in combination with proposed actions in Alternative 3A will be long-term, negligible and adverse.

Conclusion

Impacts on park operations under Alternative 3A will be long-term, minor to moderate and adverse from the requirement of five but less than ten additional staff, a 5-8% increase of park staff from existing operations. Impacts on partnership operations will be long-term minor to moderate and adverse from the increase of support required for the expanded trail system. Effects on local jurisdictions will be long-term, minor and adverse from the multi-use connectors and limited jurisdictions involved. Overall impacts on park operations will be long-term, minor to moderate and adverse.

4.9.4.7 Impacts of Alternative 3B

Direct and Indirect Impacts

Impacts on Park Operations. The addition of mountain bike trails to the system combined with other trail elements described in Alternative 3A will result in 47 additional miles of trail, a net increase of 39% from the existing trail system. These trails will require additional patrol by Park staff, the introduction of an expanded Trailblazer program or new volunteer patrol group. Maintenance and stewardship of the mountain bike trail will be minor or negligible with utilization of the Sustainable Trail Guidelines and the assistance of a stewardship partnership with the local mountain bike organizations and volunteers. Increase in programs will require a change in park interpretation programming or additional staff for new programs focused on mountain bike trails. In addition to the new trails, increased use at new trailheads and parking proposed at High Meadow, Snowville and expanded Boston Mills Bike and Hike will require Park operations for visitor protection and maintenance. These trails have easy access for park operations due to their proximity to existing roads at regular intervals along the routes and the Bike and Hike for the East Rim. The South Carriage Trail will be accessible only from Holzhauer Road or the Red Lock trailhead. Increase in Park staffing and facility management for mountain bike trails in combination with proposed actions of Alternative 3A will likely be long-term, moderate and adverse impacts on Park operations.

Impacts on Partner Operations. Since the utilization of new user group volunteers and partnerships will assist in providing support to the mountain bike trails, impacts on partner operations will not increase or change from Alternative 3B.

Impacts on Local Jurisdiction Operations. Since the proposed mountain bike trails are within close proximity to Metro Parks, Serving Summit County and within multiple jurisdictions, these jurisdictions

will likely experience long-term, minor to moderate adverse impacts, particularly from the East Rim mountain bike trail by increased coordination with NPS and potential increased use from their adjacent facilities.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all except for those related to the additional mountain bike trails. Limited access to potential mountain bike trails in Cleveland Metroparks may increase park operations for unauthorized use in CVNP to access proposed CVNP mountain bike trails on west rim, but will increase coordination of Park operations with both Metroparks for access from Bike and Hike Trail on East Rim mountain bike trail resulting in long-term, minor adverse impacts. Overall, cumulative impacts in combination with Alternative 3B will be long-term, moderate and adverse.

Conclusion

Impacts on Park operations will be long-term, moderate and adverse from new trails for mountain bike use requiring minimal additional or similar staffing and trails and associated facility management from Alternative 3A. Impacts on partner operations will likely be long-term, minor to moderate and adverse due to the additional resources needed to sustain the expanded trail system. Local jurisdiction operations will likely have long-term, minor to moderate adverse impacts from the multi-use connectors and proximity of the east rim mountain bike trail to park facilities managed by Metro Parks, Serving Summit County. Overall impacts on Park operations will be long-term, moderate and adverse.

4.9.4.8 Impacts of Alternative 4A

Direct and Indirect Impacts

Impacts on Park Operations. Alternative 4A will result in a 48% increase of new trails from the existing trail system. Trails and trail facilities will require additional staff by the Park, Park partners or contract services to build, maintain and operate the proposed expanded trail system. The use of the Sustainable Trails Guidelines and removal of unsustainable trails will reduce maintenance needs on trails, particularly on low use trails. Some trails will meet challenges for access including Maplewood Overlook Trail, West Rim Trail, the East Rim Trail south of Station Road and the Plateau to Tree Farm Connector Trail. Substantial construction and engineering would be required for trails at Mudcatcher Trail, Blue Hen Trail, Buttermilk Falls Trail, Gateway Trail, Maplewood Overlook Trail, Coliseum Trail and Echo Hill Connector Trail. New trailheads will require additional operations for visitor protection, visitor information and facility maintenance at High Meadow Trail, Old Orchard Trail, Mudcatcher Trail and Coliseum Trail. Expanded use at Maplewood and Shady Grove picnic areas will require additional park operations at these existing facilities. Due to the significant increase in trail miles, new locations and limited access in some new locations, Park operations may require additional staff of more than 10, a 10% increase from current park staff, to operate the trails successfully.

Other visitor facilities will be impacted by increased visitation where trails are proposed for access. These include the CVC Boardwalk Trail, West Rim Trail, multi-use connectors, Stanford-Hines Hill Trail, Gateway Hike Trail, Howe-Everett-Plateau connector Trail, Hunt Farm Trail, Ira-Howe trail and Ira-Hampton Trail. New trailheads at the Mudcatcher Trail in addition to High Meadow Trail, Old Orchard

Trail and Coliseum Trail will increase operations to facilities. Park operations will likely experience impacts that are long-term, moderate to major, adverse from the additional staff required to manage the parkwide expansion of the trail system and its facilities.

Impacts on Partner Operations. Trail stewardship needs by volunteers will increase due to an increase in trail miles. Trails requiring operations coordination with CVSR include the Towpath-Valley Picnic Trail and West Rim trail. Impacts on Partner operations will likely be long-term, moderate to major and adverse from the expansion of the trail system that will require volunteers and partnerships for their successful operation.

Impacts on Local Jurisdiction Operations. Impacts on local jurisdictions will be long-term, moderate and adverse from the multiple jurisdictions that will require coordination for bike lanes, multi-use connector trails, neighborhood connector trails and trails on NPS-lands.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives and described in Alternative 3A. Cumulative impacts for Alternative 4A will be long-term, minor and adverse.

Conclusion

The significant increase in trail miles, new locations and limited access in some new locations, requiring a 10% increase in Park staff and increase facility management, will likely have impacts that are long-term moderate to major adverse on Park operations. Impacts on local jurisdiction operations will be long-term, moderate and adverse from the multiple jurisdictions that will require coordination with NPS for bike lanes, multi-use connector trails, neighborhood connector trails and trails on NPS-lands. Impacts on partnership operations will be long-term, moderate to major and adverse from the expansion of the trail system that will require volunteers and partnerships for their successful operation. Overall impacts on park operations will be long-term, moderate to major and adverse.

4.9.4.9 Impacts of Alternative 4B

Direct and Indirect Impacts

Impacts on Park Operations. Alternative 4B will result in a net increase of 59% of trails from the existing trail system. Operations for the mountain bike trail will require Park patrol or volunteer patrol, design and construction through Park staff or contract services, maintenance by Park staff or volunteer partnerships, resource and visitor monitoring, and programming and visitor information on the new trail use in the Park. The East Rim trail utilizes existing trailheads for parking with some expansion, so no new trail facilities will be required for operations, except, a potential for increase of operations due to increased use in current low use areas of the Park. Two of the trailheads are part of the Bike and Hike trail system, which are managed by Metro Parks, Serving Summit County. The addition of mountain bike trails and the expanded trail system, Park staffing would need to increase by 10% or greater from current staffing levels to operate successfully. Impacts on Park operations for the new mountain bike trail and proposed actions of the expanded trail system described under Alternative 4A will likely be long-term, major and adverse.

Impacts on Partner Operations. Impacts on partner operations will be similar as described for Alternative 4A with the addition of new stewardship groups to assist with the mountain bike trails. If additional support from new user groups occurs, the increase of support for the significant trail expansion will result in similar impacts, overall, to partner operations as described under Alternative 4A as long-term moderate, and adverse.

Impacts on Local Jurisdiction Operations. Local jurisdiction operations will experience long-term, moderate to major, adverse impacts from a variety of new trails and new uses, including Metro Parks, Serving Summit County for the mountain bike trail, with the utilization of the Bike and Hike Trail as a connector to the mountain bike loops.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives and Alternative 3A for bike lanes and multi-use connector trails, except for those associated with the addition of a mountain bike trail. Potential future increase of mountain bike trails within Cleveland Metropark's Brecksville and Bedford Reservations will be connected through the Bike and Hike and Towpath Trails. These potential trails will reduce unauthorized use and increase efficiencies in Park operations for mountain bike use among NPS and the regional Metroparks and their facilities, resulting in increased but managed operations that will have long-term, minor adverse impacts. Overall, cumulative impacts will be long-term, moderate and adverse.

Conclusion

Impacts on Park operations will be long-term, major and adverse by an increase of staffing levels by 10% or greater from the current operation level to manage new uses and the expanded trail system and its associated facilities. Impacts on partner operations will likely be long-term, moderate and adverse by the increased operational support required for the expanded trail system and new uses. Impacts on local jurisdiction operations will be long-term, moderate to major and adverse by the increased coordination for bike lanes, multi-use connector trails and new use trails.

4.9.4.10 Impacts of Alternative 5

Direct and Indirect Impacts

Impacts on Park Operations. Alternative 5 will increase the number of trails in all regions of the Park adding 38 miles to the trail system resulting in a net increase of 21% in trail miles from the existing trail system. The staff and facility operations described in the other alternatives will be similar for Alternative 5, including the operational needs for the new uses and trail and will likely require staffing to increase by 5-10%. In addition to the new trails, new trailheads and parking proposed at High Meadow and expanded Boston Mills Bike and Hike will require Park operations for visitor protection and maintenance. The South Carriage Trail will be accessible only from Holzhauer Road or the Red Lock trailhead. Impacts on Park operations from Alternative 5 will likely be long-term, moderate and adverse from increase of staffing by 5-10% required to successfully operate and manage the expanded trail system and its associated facilities.

Impacts on Partner Operations. The utilization of new user group volunteers and partnerships will assist in providing support to the mountain bike trails. However, the overall expansion of the trail system and its associated facilities will require additional partner operations for volunteer coordination, programming and stewardship activities. Overall, impacts on partnership operations will be long-term, moderate and adverse by the increased partner operations to assist in the operation and management of the expanded trail system and its associated facilities.

Impacts on Local Jurisdiction Operations. The impacts on local jurisdictions will be similar to those described for the common trail elements in the other alternatives, including bike lanes, multi-use connector trails, and the proximity of the mountain bike trail. With these associated areas, impacts on local jurisdictions will be long-term, moderate and adverse.

Cumulative Impacts

No cumulative impacts are expected under this alternative beyond those identified as common to all alternatives and as described for the other alternatives. Cumulative impacts will likely be long-term, moderate and adverse for Alternative 5.

Conclusion

Impacts on Park operations from Alternative 5 will likely be long-term, moderate and adverse from increase of staffing by 5-10% required to successfully operate and manage the expanded trail system and its associated facilities. Impacts on partnership operation will be long-term, moderate and adverse by the increased partner operations to assist in the operation and management of the expanded trail system and its associated facilities. Impacts on local jurisdictions will be long-term, moderate and adverse from increased coordination with associated trails including bike lanes, multi-use connector trails and mountain bike trails. Overall impacts on Park operations will be long-term moderate and adverse.